

THOR LAKE RARE EARTH METALS BASELINE PROJECT

Environmental Baseline Report:
Volume 3 – Aquatics and Fisheries

FINAL INTERIM REPORT



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EXECUTIVE SUMMARY

Avalon Rare Metals Inc. (Avalon) is currently undertaking a prefeasibility study for the development of the Nechalacho Deposit, located on mineral leases it holds at its Thor Lake site in the Northwest Territories. The deposit is located approximately 100 km southeast of Yellowknife and 4 km north of the Hearne Channel of Great Slave Lake.

Stantec (formerly Jacques Whitford AXYS Ltd.) initiated environmental baseline studies at the Thor Lake project site in fall 2008. This interim Technical Data Report presents results of the baseline aquatics and fisheries study as of fall 2009. The study investigated water quality, aquatic ecology and fisheries values in nine watercourses and fifteen lakes that will be directly or indirectly affected by Project development. Ten other lakes were also studied: six in the local area to better establish local aquatic conditions and four for use as reference sites. One site in Great Slave Lake was established in an area being proposed for a wharf.

Of the nine watercourses studied, three are passable to fish during high flows, two are not passable except during exceptional circumstances (i.e. very high flows), one had visible surface flows but is not passable to fish and three had no visible channels. The quality of the available habitat for fish in these nine watercourses was generally low due to very low water levels. Fish presence was observed in two streams only: a nine-spine stickleback in the outlet of Long Lake and three northern pike in the outlet of Murky Lake. The known fish species in the area primarily use lake habitats; however, northern pike, slimy sculpin and nine-spine stickleback are known to use watercourse habitat as well. These three species spawn in still or slow-moving water and it is unlikely that any of them would fully complete their life cycle in the watercourse habitats of the study area.

Littoral and riparian areas of each study lake were examined for predominant aquatic and terrestrial vegetation and fish habitat features (e.g. large woody debris). Substrate in the littoral areas varied from bedrock to organic muck and several species of submerged and emergent aquatic plants were present. Large woody debris and large boulders were often absent. The riparian area of most lakes was dominated by black spruce; other species observed included paper birch, tamarack, dwarf birch and Labrador tea. Wetlands and bedrock bluffs were present or predominant at several lakes.

Water and sediment data were collected at 23 study lakes. Water was neutral to basic (mean pH from 7.07 to 8.62), with a large range of conductivity and hardness and low nutrient levels. Large ranges in many general parameters and metals were noted, as levels tended to be elevated during winter in shallow lakes (less than 3 m deep). In shallow lakes during winter, total iron levels were 3 to 61 times higher than the CCME guideline. Sediment characteristics varied across the study area, though generally had relatively high phosphorus, organic carbon and nitrogen content. Arsenic concentrations in sediment exceeded the CCME guideline in many lakes (60% of sample stations), followed by silver (32%), nickel (28%) and copper (16%) exceedances. Data on levels of radionuclides and rare earth elements in lake sediment are not available at this time.

Aquatic community data were collected at most sample stations; at the time of this report, phytoplankton and zooplankton data were available for June 2009 but not September 2009, while benthic invertebrate data from September 2009 were not available. Based on chlorophyll *a* values,

nineteen lakes are considered oligotrophic, four are mesotrophic, and one lake may be eutrophic. Phytoplankton taxon richness (number of taxa per site) varied from 38 to 81 species; richness was greatest at Thor Lake and lowest at Great Slave Lake. Both phytoplankton and zooplankton species diversity was greatest at Porkchop Lake and lowest at Great Slave Lake. Zooplankton taxon richness varied from 13 to 21 species; richness was greatest at A, North Tardiff, South Tardiff and Thor lakes, and lowest at Elbow North and Great Slave lakes.

Fisheries studies were conducted in 19 lakes. Of these, 11 are considered fish-bearing. The most common species found were three large bodied species (northern pike, lake whitefish and lake cisco) and two small bodied species (slimy sculpin and ninespine stickleback); all five species were present in Thor, Long, Elbow, A and Redemption lakes. Lake trout was captured only in Carrot and Great Slave (the deepest lakes), while lake chub was captured only in Kinnikinnick Lake. The lakes that are considered non-fish bearing are isolated from other waterbodies and, therefore, do not directly contribute food or nutrients to fish bearing waters; these non-fish bearing lakes are not considered fish habitat under the *Fisheries Act*.

Catch per unit effort (CPUE) was calculated for the large bodied fish species captured in six-panel gang gill nets for 2008 and 2009. CPUE for northern pike and lake whitefish was similar between years, varying by 0.2 fish/hour or less. A decrease in CPUE for lake whitefish was noted for Fred Lake; however, this change is difficult to interpret as this lake suspected to be a sink habitat (fish can enter the lake but do not survive the winter). A change in CPUE for lake whitefish (decrease) and lake cisco (increase) was also noted in A Lake between 2008 and 2009; this change is consistent with known fish habitat use and a change in gear type from sinking to floating gill net. Between 2008 and 2009, there was greater variation in lake cisco CPUE compared to northern pike and lake whitefish; lake cisco appear to form schools, so the catch rate for this species is expected to be more variable than for non-schooling species such as northern pike and lake whitefish.

Fish health was assessed. Fish were measured for length and weight, examined for parasites, and sampled for muscle, liver and age structures. Muscle was analyzed for mercury, while livers were analyzed for metals and rare earth elements. The average lengths of northern pike, lake whitefish and lake cisco caught were 378, 431 and 162 mm, and no overall size-related trends among lakes were observed. Mean relative weights were lowest for Great Slave Lake cisco and highest for Fred Lake whitefish; northern pike tended to have lower relative weights than lake whitefish, possibly due to differences in spawning times. Fish age ranged from one year (one lake whitefish and one northern pike) to 18 years (one northern pike). Frequency of internal and external parasites was relatively low; among large-bodied species, frequency was highest for lake whitefish, and among lakes, frequency was highest for Elbow Lake. Tissue metals data are not available at this time.

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ABBREVIATIONS AND ACRONYMS

%	percent
<	less than
>	greater than
µ	micro
µg/L	micrograms per litre
mg/kg	milligrams per kilogram
mL	millilitre
ALS	ALS Laboratories
BC-MOE	British Columbia Ministry of Environment
CCME	Canadian Council of Ministers of the Environment
CPUE	Catch Per Unit Effort
CRM	Certified Reference Materials
CV	Coefficient of Variation
D.O.	Dissolved Oxygen
DOC	Dissolved Organic Carbon
GCDWQ	Guidelines for Canadian Drinking Water Quality
GIS	Geographic Information System
GPS	Global Positioning System
GSI	Gonadosomatic Index
HSI	Hepatosomatic Index
ICP-MS	Inductively Coupled Plasma Mass Spectrophotometry
ISQG	Interim Sediment Quality Guidelines
NORM	Naturally Occurring Radioactive Materials
PAH	Polycyclic Aromatic Hydrocarbons
PEL	Probable Effects Level
QA/QC	Quality Assurance/Quality Control
REE	Rare Earth Elements
RPD	Relative Percent Difference
SRC	Saskatchewan Research Council

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Abbreviations and acronyms

TDR.....	Technical Data Report
TDS.....	Total Dissolved Solids
TKN.....	Total Kjeldahl Nitrogen
TOC.....	Total Organic Carbon
TSS.....	Total Suspended Solids
UTM.....	Universal Transverse Mercator

1 INTRODUCTION

Avalon Rare Metals Inc (Avalon) is currently undertaking a prefeasibility study (PFS) for the development of the Nechalacho Deposit, located on mineral leases it holds at its Thor Lake site in the Northwest Territories. The deposit is located approximately 100 km southeast of Yellowknife and 4 km north of the Hearne Channel of Great Slave Lake. The Thor Lake site has been subject to mineral exploration by others since the 1970s. Previous exploration focused on beryllium resources in the T-zone (approximately 1 km north of Thor Lake) and included drilling and bulk sampling. Since acquiring the property in 2006, Avalon has focused on delineating the rare earth resource within the Nechalacho Deposit, which is not part of the T-zone. Preliminary development concepts being considered during the PFS include development of an underground mine, mineral concentration, tailings disposal, waste rock disposal, fuel and concentrate storage, power generation and transportation infrastructure (airstrip, upgraded site roads, wharf on Great Slave Lake). Concentrate would be shipped off-site seasonally for refinement into a marketable rare earth product.

The Thor Lake site is within the Taiga Shield ecozone, characterized by Precambrian bedrock outcrops with many lakes and wetlands in glacially carved depressions.

The Thor Lake site is located within the Akaitcho Territory, an area currently under negotiation of a comprehensive land claim between the federal government and the Akaitcho First Nations, representing First Nations in LutselK'e, Fort Resolution, Ndilo and Dettah. Thor Lake lies within the Mackenzie Valley region of the NWT and is, therefore, subject to the provisions of the *Mackenzie Valley Resource Management Act* (MVRMA) in addition to other federal and territorial legislation. Regulations pertinent to aquatics and fisheries at Thor Lake include the *Fisheries Act*, Metal Mining Effluent Regulations (MMER) and, potentially, the *Canadian Environmental Assessment Act*, due to the nature of the required federal approvals.

Stantec (formerly Jacques Whitford AXYS Ltd.) initiated environmental baseline studies at the Thor Lake project site in fall 2008. Aquatic monitoring of drilling was also undertaken during fall 2007 and winter 2008, though winter 2008 data has been incorporated into the aquatic baseline data. This interim Technical Data Report (TDR) presents and analyzes data collected for the aquatics and fisheries studies as of fall 2009. These studies were conducted in 25 lakes in the Thor Lake area and included physical environment, water and sediment chemistry, aquatic organisms, and fisheries components. The studies included lakes that may be directly or indirectly affected by the Thor Lake project, as well as four reference lakes. Fisheries values in nine watercourses in the Thor Lake area were also investigated. Information in the hydrology (Volume 1), hydrogeology (Volume 2) and permafrost (Volume 4) assessments for the Thor Lake Project also provide information relevant to an understanding of conditions in lakes of the project area.

2 AQUATICS AND FISHERIES OVERVIEW

This interim technical data report presents results of the aquatics and fisheries components of the Thor Lake Baseline Study as of fall 2009. The study investigated water quality, aquatic ecology and fisheries values in nine watercourses and fifteen lakes that may be directly or indirectly affected by Project development. Ten other lakes were also studied: six in the local area to better establish local aquatic conditions and four for use as reference sites. Additional results from analytical and taxonomy laboratories, not available at the time of report preparation, will be provided at a later date.

2.1 Baseline Study Objectives

The objectives of the aquatics baseline study are to:

- Characterize baseline water and sediment quality in the Thor Lake area
- Describe the aquatic community through collection of phytoplankton, zooplankton and benthic invertebrates
- Assess spatial and temporal variation in water quality and aquatic biota.

Data for benthic invertebrate and late summer phytoplankton and zooplankton samples were not available at the time of this report and will be integrated into the final technical data report.

The objectives of the fisheries baseline study are to:

- Map and assess the physical fish habitat value of study area watercourses and lakes, including:
 - bathymetric mapping
 - assessment of the fish passage potential of watercourses
 - identification of available habitat in watercourses and lakes.
- Determine fish species presence in study area watercourses and lakes
- Assess the health of fish by examining:
 - population characteristics
 - metals concentrations in tissue
 - external condition and parasitization
 - internal parasitisation.

Bathymetric map preparation has not been completed for all lakes, and 2009 tissue metals data were not available at the time of this report. These data will be included in the final technical data report.

2.2 Baseline Study Area

The study investigated 25 lakes in the Thor Lake area (Figure 2-1 in Appendix A), including 15 lakes within or downstream of the preliminary project footprint, six other lakes in the local study area and four potential reference lakes (Table 2-1).

Aquatic sampling stations were initially selected in 2008 with Avalon's input on preliminary Project design, potential future expansion, and the lakes' proximity to and location within major geologic zones and watersheds in the Thor Lake area. As the Thor Lake project progressed and additional project information became available, the aquatic sampling program was expanded to reflect revised potential mine infrastructure locations and to include a far-field reference lake, on advice from Environment Canada and Fisheries and Oceans Canada.

Fisheries study lakes were selected based on the direct project footprint and known information about the surface water drainage in the Thor Lake area. All lakes that would potentially directly interact with the mine footprint (i.e., lakes above the underground excavations), tailings storage areas and ore transport routes were selected, as was the first lake downstream of the mine area. Known and suspected watercourses that are within the project area or that could potentially serve as migration routes between lakes were also selected for the fisheries study.

Reference lakes outside the potential influence from both air emissions and water discharges will be needed for long term monitoring programs. Reference lakes are an important component of the baseline study as they allow more informative analysis of monitoring data collected during or after mine operations and to assess the influence of factors beyond the influence of the project, such as climate change, on aquatic conditions. Two near- and two far-field reference lakes were investigated for this study. Selection of a suitable reference lake for aquatics and fisheries began in 2008 with Kinnikinnick (aquatics) and U (fisheries). Sampling at Kinnikinnick (located 5 km southeast [cross-wind] of the Thor Lake camp) began in March 2008 and has been carried through the baseline program; Kinnikinnick is still being considered as a potential near-field reference lake for aquatics. U Lake (located 5 km west northwest of Thor Lake) was rejected as a potential fisheries reference lake due to its shallow depth and dissimilar fish assemblage following bathymetry and fisheries data collection in September 2008.

Discussions with Environment Canada and Fisheries and Oceans Canada in 2009 identified the need for a far-field reference lake. Selection of a far-field reference lake began in September 2009. Two lakes were initially chosen based on location (upwind of project), apparent size and distance from site. However, these two lakes were rejected following a reconnaissance survey and a third lake, Carrot, was chosen for investigation. Carrot is located approximately 16 km northeast of the Thor Lake camp. Bathymetry and fisheries data collected at Carrot revealed it to be an unsuitable reference due to deep maximum depth (36 m) and a fish community dissimilar to that in the potential impact lakes (e.g, Thor Lake). A fourth lake, Redemption, was selected following a second reconnaissance survey. Bathymetry, fisheries and aquatics data were collected at Redemption Lake and initial analyses indicate it is a potentially suitable far-field reference lake. Redemption Lake is located approximately 18 km northeast of the Thor Lake camp.

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 Section 2: Aquatics and Fisheries Overview

Table 2-1: Overview of Aquatics and Fisheries Baseline Studies Sites (lake names, locations, rationale for selection, study components and number of sampling dates)

Name	Activity ^a	Aquatic Sample Station	Coordinates		Rationale	Aquatics (Number of Sample Events) ^b					Fisheries Components ^c			
			Easting	Northing		Wat	Sed	Phy	Zoo	Ben	BM	HA	FP	FH
Lakes														
A	A/F	FL-03	413762	6886729	Affected by project	5	1	2	2	1	✓	✓	✓	✓
Blachford	A	BL-01	415403	6891246	Local conditions	5	1	2	2	1	✓	–	–	–
Buck	A/F	UN-12	417861	6889261	Affected by project	1	1	–	–	1	✓	✓	✓	n/a
Carrot	F	-	430686	6894730	Reference	–	–	–	–	–	✓	✓	✓	n/a
Cressy	A/F	FL-02	416471	6887742	Affected by project	4	1	2	1	1	✓	✓	✓	n/a
Dinosaur	A	UN-09	418403	6889795	Local conditions	5	1	2	2	1	✓	–	–	–
Drizzle	A/F	UN-13	418851	6888823	Affected by project	1	1	–	–	1	✓	✓	✓	n/a
Egg	A	UN-11	420050	6888277	Local conditions	5	1	2	2	1	✓	–	–	–
Elbow	A/F	EL-01 EL-02	416388 415576	6885140 6883908	Affected by project	5	1	2	2	1	✓	✓	✓	✓
Fred	A/F	FL-01	415751	6887108	Affected by project	5	1	2	1	1	✓	✓	✓	✓
Great Slave	A/F	GL-01	413845	6882398	Affected by project	4	1	2	2	1	✓	✓	✓	✓
Kinnikinnick	A/F	UN-08	420757	6885658	Reference	5	1	2	2	1	✓	✓	✓	✓
Long	A/F	LL-02	417273	6885871	Affected by project	5	1	2	1	1	✓	✓	✓	✓
Megan	A/F	TL-05	418356	6886890	Affected by project	5	1	2	1	1	✓	✓	✓	n/a
Murky	A/F	UN-10	417893	6887973	Affected by project	5	1	2	2	1	✓	✓	✓	✓
North Tardiff	A/F	NT-01	417128	6886360	Affected by project	5	1	2	2	1	✓	✓	✓	n/a
Pistol	A	UN-05	419676	6886500	Local conditions	5	1	2	2	1	✓	–	–	–
Porkchop	A	UN-07	418462	6885389	Local conditions	5	1	2	2	1	✓	–	–	–
South Tardiff	A/F	ST-01	417360	6886126	Affected by project	5	1	2	2	1	✓	✓	✓	n/a

Name	Activity ^a	Aquatic Sample Station	Coordinates		Rationale	Aquatics (Number of Sample Events) ^b					Fisheries Components ^c			
			Easting	Northing		Wat	Sed	Phy	Zoo	Ben	BM	HA	FP	FH
Thor	A/F	TL-06 TL-07	415842 416636	6886885 6887520	Affected by project	5	1	2	2	1	✓	✓	✓	✓
Thorn	A/F	TL-03	417700	6886655	Affected by project	5	1	2	2	1	✓	✓	✓	n/a
Redemption	A/F	UN-14	429566	6899312	Reference	1	1	-	-	1	✓	✓	✓	✓
Ring	A/F	TL-04	417267	6888738	Affected by project	5	1	2	1	1	✓	✓	✓	n/a
U	F	-	411115	6889193	Reference	-	-	-	-	-	-	-	✓	✓
Wasp	A	UN-04	418521	6886407	Local conditions	5	1	2	2	1	✓	-	-	-
Watercourses														
Cressy Out	F	-	415870	6887352	Affected by project	-	-	-	-	-	n/a	✓	n/a	n/a
Elbow Out	F	-	414615	6883369	Affected by project	-	-	-	-	-	n/a	✓	n/a	n/a
Fred Out	F	-	415542	6887115	Affected by project	-	-	-	-	-	n/a	✓	□	n/a
Long Out	F	-	415851	6886222	Affected by project	-	-	-	-	-	n/a	✓	□	n/a
Megan Out	F	-	417976	6887031	Affected by project	-	-	-	-	-	n/a	✓	n/a	n/a
Murky Out	F	-	417946	6887824	Affected by project	-	-	-	-	-	n/a	✓	✓	-
South Tardiff Out	F	-	417333	6885995	Affected by project	-	-	-	-	-	n/a	✓	✓	n/a
Thor Out	F	-	415868	6887009	Affected by project	-	-	-	-	-	n/a	✓	✓	n/a
Thorn Out	F	-	417658	6886921	Affected by project	-	-	-	-	-	n/a	✓	n/a	n/a

NOTES:

^a Activity = Aquatics (A) and/or Fisheries (F)

^b Aquatics Samples = Water Quality (Wat), Sediment Quality (Sed), Phytoplankton Taxonomy & Chlorophyll (Phy), Zooplankton Taxonomy (Zoo) and Benthic Invertebrate Taxonomy (Ben)

^c Fisheries Study = Bathymetry (BM), Habitat Assessment (HA), Fish Presence (FP), Fish Health (FH); yes [✓], no [-], or not applicable [n/a] (e.g., fish health not assessed in lakes where no fish were caught)

Table 2-1 presents the names, aquatic sampling station identification codes, locations and rationale for selection of the lake and watercourse study sites, as well as the number of aquatic samples collected and types of fisheries data collected at each site.

2.3 Historical Data

Mineral exploration activities have occurred in the Thor Lake area since the 1970s, including two previous baseline environmental programs (Saskatchewan Research Council 1989, Golder Associates 1998). The 1988 and 1998 aquatics and fisheries baseline programs sampled eight lakes associated with the project footprint proposed at that time, three of which were sampled in both programs. Historic data from the 1988 and/or 1998 baseline programs for seven of the current study lakes are referenced where applicable in the following sections.

Historical water quality and aquatic program details are summarized in Appendix B and include:

- In 1988, collection of water quality, chlorophyll a and zooplankton taxonomy data for Thor, Elbow, Cressy, A and Ring lakes.
- In 1998, collection of water and sediment data at Thor, Elbow, Blachford and Great Slave lakes.

Habitat assessments were completed in 1988 at five of the current study lakes and one of the study watercourses (Thor, Cressy, Ring, A and Elbow lakes; Fred Out), and three of the current study lakes in 1998 (Thor and Elbow lakes, Great Slave Lake docksite). Bathymetric maps were prepared for Thor and Elbow lakes in 1989. Fish sampling was conducted in Thor, Cressy, Ring and Elbow lakes in 1988 and Blachford Lake and the Great Slave Lake docksite in 1998.

The species that are most likely to inhabit the lakes in the Thor Lake area were identified from the two previous studies in the area (SRC 1989, Golder 1998) and discussions with regulatory agencies. These species include:

- Northern pike (*Esox lucius*)
- Lake whitefish (*Coregonus clupeaformis*)
- Lake cisco (*Coregonus artedii*)
- Lake trout (*Salvelinus namaycush*)
- Slimy sculpin (*Cottus cognatus*)
- Ninespine stickleback (*Pungitius pungitius*)
- Troutperch (*Percopsis omyscomaycus*)
- Burbot (*Lota lota*)
- Lake chub (*Couesius plumbeus*).

Historical data were used for guidance in the development of the baseline study. However, differences in sample station locations, sampling depths, detection limits and methodology prevent useful comparison of historic aquatics and fisheries data with the current data set. Although limited

comparison of historic data may be possible to support certain general lake characteristics (e.g., sediment radionuclides, fish presence), much of the historic aquatics and fisheries data would be considered incomplete or inadequate when compared to current regulatory requirements. The historic aquatics and fisheries data are not included as part of the baseline data set.

3 WATERCOURSE SURVEY METHODOLOGY

Nine watercourses shown on NTS maps for the Thor Lake area (Figure 3-1 in Appendix A) were assessed in September 2008 and May 2009 (Table 3-1). All nine watercourses assessed flow either into or out of lakes that were included in the fisheries study were surveyed.

Table 3-1: Watercourse Survey Dates

Stream Name	Sept 2008	May 2009	Watercourse Name	Sept 2008	May 2009
Cressy Out		✓	Murky Out	✓	✓
Elbow Out		✓	South Tardiff Out	✓	✓
Fred Out		✓	Thor Out	✓	✓
Long Out		✓	Thorn Out		✓
Megan Out		✓			

As the surveyed watercourses are unnamed, the watercourse names presented in this report indicate which lake the watercourse flows out from. Habitat connectivity in the area (i.e., fish passage/migration potential) was investigated in May 2009. Fish habitat characteristics and fish presence were investigated in September 2008 for South Tardiff Out, Murky Out and Thor Out; and in May 2009 for all watercourses except for South Tardiff Out (which was frozen).

Volume 1 – Hydrology of this Technical Data Report series contains flow data for Long Out, Thor Out, Fred Out, and Murky Out.

3.1 Watercourse Occurrence and Connectivity

Habitat connectivity refers to whether a species can move between habitats. Lakes, the primary fish habitat type in the Thor Lake area, tend to be isolated from each other. Connectivity was assessed by walking the watercourses in May 2009, during spring freshet, to investigate the potential for fish to use the watercourses to migrate between lakes during the time of highest annual flows. Potential barriers to fish passage, such as cascades or watercourse sections lacking a channel, were identified. If no channel was found, the land surrounding the suspected lake outlet was traversed several times perpendicular to the suspected channel alignment (i.e., based on topography) until a channel was identified or it was determined that no channel was present. Suspected lake outlets were identified using 1:50,000 scale National Topographical System (NTS) maps.

3.2 Biophysical Characteristics

Fish habitat in each watercourse was assessed over the entire length of the visible channel; except for Fred Out, in which measurements were taken over a 150 m distance. Watercourse habitat was assessed in accordance with the British Columbia Reconnaissance (1:20,000) Fish and Fish Habitat Inventory Standards and Procedures (RIC 2001), which included physical habitat and *in situ* water quality measurements, and characterization of riparian vegetation. Physical habitat measurements included channel width, wetted width, channel depth, residual pool depth (the depth of remaining pools at the lowest possible flow) and channel gradient. Each parameter was measured four to six times along the length of the surveyed channel. Channel characteristics, such as pattern and presence of pools, riffles and cascades, were qualitatively identified.

3.3 Fish Presence

Fish presence was assessed at each watercourse identified by electrofishing the entire length of the channel, except at Fred Out and Murky Out, in which at least 150 m of channel was electrofished. All habitat types were sampled. Most watercourse sites were not deep enough to accommodate minnow traps, so these were not used.

3.4 Habitat Quality

The value of the available habitat for feeding and rearing of juvenile and adult northern pike, slimy sculpin and ninespine stickleback was also qualitatively assessed.

4 WATERCOURSE SURVEY RESULTS

4.1.1 Watercourse Occurrence and Connectivity

Five of the watercourses marked on the NTS map for the Thor Lake area had continuous or intermittent channels, and one was a surface water swamp. Cressy Out, Megan Out, and Thorn Out did not have visible channels (Table 4-1). Cressy Lake appears to have an outlet, but this channel does not continue very far and does not connect to other channels, whereas Megan Out and Thorn Out did not have identifiable outlets.

Table 4-1: Drainage Route and Fish Passage Potential of the Nine Study Watercourses

Mapped Lake Outlet	Drains to	Watercourse Presence Confirmed	Fish Passage
Cressy Out	Fred	No	No
Elbow Out	Great Slave	No (Swamp)	No
Fred Out	A	Yes (Intermittent)	Unlikely
Long Out ¹	Thor	Yes	Yes

Mapped Lake Outlet	Drains to	Watercourse Presence Confirmed	Fish Passage
Megan Out	Thor	No	No
Murky Out	Thor	Yes	Yes
South Tardiff Out	Long	Yes (Intermittent)	Unlikely
Thor Out	Fred	Yes	Yes, downstream only
Thorn Out	Thor	No	No

NOTES:

¹ See Volume 1 – Hydrology for a discussion of flows in Long Out, which sometimes flows from Thor Lake to Long Lake.

Of the six outlet watercourses and swamps identified, three (Thor Out, Long Out, and Murky Out) are passable to fish during normal seasonal peak flows (Thor Out is only passable in one direction); two (Fred Out and South Tardiff Out) are not passable except during exceptional circumstances (i.e. very high flows); and Elbow Out had visible surface flows but is not passable to fish (Table 4-1).

Each of the three fish passable watercourses had some impediment to fish passage during normal seasonal flows. In Thor Out, downstream fish passage is possible but fish cannot migrate upstream, from Fred Lake back to Thor Lake, due to a 1.2 m high bedrock cascade with no downstream pool,. Long Out was blocked by a beaver dam in 2009, but beaver dams are not considered permanent barriers to fish passage. Murky Out passes through some willow swamp sections and develops multiple channels, but these undefined channels would be deep enough to allow fish passage, particularly for small fish or northern pike.

Fred Out and South Tardiff Out had intermittent channels that would only become connected during extreme high flow events. The intermittent channel of Fred Out passes through extensive willow swamp areas and does not retain deep enough wetted areas to allow fish passage. South Tardiff Out is blocked in multiple locations by gaps in the channel, up to 1 m long, where the water flows through the ground.

Elbow Out is primarily a willow swamp and is further blocked by the existing road crossing, which lacks a passable culvert (water currently runs across the road in a thin layer during freshet). The swamp area is densely vegetated with grasses and willows that would severely impede fish passage at all times of year; in some areas the water becomes shallow enough, even during freshet, fish passage is most likely impossible.

4.2 Biophysical Characteristics

Biophysical characteristics were assessed at the five watercourses with visible channels. It is impractical to make biophysical measurements of Elbow Out, the swamp watercourse, as it did not have a channel to measure.

Channel and sediment dimensions are presented in Table 4-2. Thor Out has the widest channel (3.4 m) and South Tardiff Out has the narrowest channel (0.8 m) of any of the watercourses with defined channels. Wetted width measurements were equal to or greater than channel measurements

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for most of the watercourses due to freshet conditions during sampling (mostly in May). The low watercourse gradients (less than 2% for all watercourses except South Tardiff Out, with a gradient of 4.3%) reflect the generally flat nature of the local topography. Sediment measurements also indicated generally low flow rates, as the largest particles that could be moved by water (D95) were all less than 20 cm, except for Thor Out (the largest watercourse measured, with a D95 of 35 cm). The average particle size (D) in the watercourses was generally small gravel (0-3 cm).

Table 4-2: Physical Habitat Measurements and Channel Characteristics for Surveyed Watercourses

Parameter	Thor Out	Fred Out	Murky Out	Long Out	South Tardiff Out
Channel Characteristics	Riffle-pool, sinuous, decoupled, unconfined	Riffle-pool, sinuous, decoupled, occasionally confined	Riffle-pool, irregular, decoupled, occasionally confined	Riffle-pool, irregular, decoupled, unconfined	Riffle-pool, straight, decoupled, unconfined
Channel Width (m)	3.4	2.0	1.0	3.1	0.8
Wetted Width (m)	3.4	1.8	2.2	2.7	0.7
Channel Depth (m)	0.3	0.4	0.4	0.6	0.6
Residual Pool Depth (m)	0.02	0.03	0	0.1	0.3
Gradient (%)	1.5	0.8	0.7	0.3	4.3
D95 (cm)	35	16	15	1	7
D (cm)	3	3	8	0	1
Left Bank	sloping, fine texture	undercut, fine texture	sloping, fine texture	sloping, fine texture	vertical, fine texture
Right Bank	sloping, fine texture	sloping, fine texture	sloping, fine texture	sloping, fine texture	vertical, fine texture

Canopy cover was less than 20% for all the watercourses. The main riparian vegetation species were black spruce (*Picea mariana*), tamarack (*Larix laricina*), dwarf birch (*Betula nana*), Labrador tea (*Ledum sp.*) and other shrubs and grasses.

4.3 Fish Presence

All five watercourses with defined channels were electrofished; Elbow Out was not electrofished as there were too few areas near Elbow Lake with wetted areas large and deep enough to accommodate the electrofisher anode. A nine-spine stickleback was observed in Long Out near Thor Lake and two 25 cm northern pike were captured in Murky Out near Thor Lake. A northern pike was also observed in Murky Out near Murky Lake. No other fish were observed or captured in any of the watercourses.

4.4 Habitat Quality

Quality of available habitat for fish was generally low due to shallow water depths. The best habitat was found in Long Out (3.1 m wide and 0.6 m deep) and Thor Out (3.4 m wide and 0.3 m deep), as their wider and deeper channels were better suited for fish use. Parts of Murky Out would also be useful habitat. Known fish species in the area primarily use lake habitats, but northern pike, slimy sculpin and ninespine stickleback are also known to use streams (Scott and Crossman, 1998).

5 LAKE SURVEY METHODOLOGY

The aquatics and fisheries field programs for lakes were conducted in March and September-October 2008, and March, June and September 2009. The studies investigated the physical environment, water and sediment chemistry, aquatic organisms and fisheries. Data were collected in up to 25 lakes; however, not all parameters were investigated at all lakes. See Tables 5-1, 5-2 and 5-3 for sampling locations and dates for each parameter.

Physical parameters were studied at up to 23 lakes. The depth of each lake was mapped through a bathymetric survey on one survey date, and water column profiles were conducted at the deepest location in each lake on several dates. Vegetation, sediment types and habitat features were identified at 18 of these lakes on one date.

Water chemistry was studied at 23 lakes on several dates (winter, spring, late summer/early fall) to capture seasonal variability. Sediment was sampled in late summer, as temporal variability is typically low. Some sample station locations changed to deeper basins in October 2008 following collection of additional bathymetry data. Locations changed in Blachford, Egg, Dinosaur, Long, Murky and Thor lakes.

Aquatic organisms (phytoplankton (including chlorophyll *a*) and zooplankton) were collected on two sampling dates to assess temporal variability. Benthic invertebrate samples were collected on a single sampling date, as temporal variability of the benthic community composition is typically low.

Fish species presence and health were assessed during two field programs in late summer/early fall 2008 and 2009. Temporal variability in fish presence is expected to be low, but multiple sampling dates are required to establish presence. For this reason, one additional fish presence study was done in March 2009 in Fred Lake, to examine winter survival in this suspected habitat sink (a lake into which fish migrate but cannot survive winter conditions).

The September 1988 and June 1998 programs (SRC 1989, Golder 1998) also studied some of the parameters included in the current baseline study; however, the water quality data are of limited use, given that they provide information about one date per program, separated by ten years, and were collected at different sampling locations and depths, with different detection limits. Sample collection types and dates for the 1988 and 1998 programs are also included in Tables 5-1, 5-2 and 5-3.

The following sections describe the rationale for study, sampling methodology, laboratory methodology, and data analysis for the parameters included in this baseline study.

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Table 5-1: Study Dates and Locations for the Physical Environment Parameters of the Thor Lake Baseline Study

Lake	Profile Station	September 1988			June 1998a	March 2008	October 2008		March 2009	June 2009	September 2009		
		Bath	Prof	Hab	Hab	Prof	Bath	Prof	Prof	Prof	Bath	Prof	Hab
A	FL-03		✓	✓		✓	✓	✓	✓	✓		✓	✓
Blachford	BL-01				✓	✓	✓	✓	✓	✓	✓	✓	
Buck	UN-12										✓	✓	✓
Carrot	–										✓		✓
Cressy	FL-02		✓	✓		✓	✓		✓	✓		✓	✓
Dinosaur	UN-09					✓		✓	✓	✓	✓	✓	
Drizzle	UN-13										✓	✓	
Egg	UN-11					✓		✓	✓	✓	✓	✓	
Elbow	EL-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	EL-02					✓		✓	✓	✓	✓	✓	✓
Fred	FL-01					✓	✓	✓	✓	✓		✓	✓
Great Slave	GL-01				□	✓	✓	✓	✓	✓		✓	✓
Kinnikinnick	UN-08					✓		✓	✓	✓	✓	✓	✓
Long	LL-02					✓	✓	✓	✓	✓		✓	✓
Megan	TL-05					✓	✓	✓	✓	✓		✓	✓
Murky	UN-10					✓		✓	✓	✓	✓	✓	✓
North Tardiff	NT-01					✓	✓	✓	✓	✓		✓	✓
Pistol	UN-05					✓		✓	✓	✓	✓	✓	
Porkchop	UN-07					✓		✓	✓	✓	✓	✓	
Redemption	UN-14										✓	✓	✓
Ring	TL-04			✓		✓		✓	✓	✓	✓	✓	✓
South Tardiff	ST-01					✓	✓	✓	✓	✓		✓	✓
Thor	TL-06	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
	TL-07					✓		✓	✓	✓		✓	✓
Thorn	TL-03					✓	✓	✓	✓	✓		✓	✓
U	–						✓		✓				
Wasp	UN-04					✓		✓	✓	✓	✓	✓	

NOTE: ^a Profile data not collected in 1998 aquatic survey

Table 5-2 Sample Collection Dates and Locations for the Water and Sediment Chemistry and Aquatic Organism Components of the Thor Lake Baseline Study

Lake	Station	Dates Sampled & Sample Type															
		September 1988			June 1998		March 2008	Oct. 2008	March 2009	June 2009			September 2009				
		Water	Chla ¹	Zoopl	Water	Sed	Water	Water	Water	Water	Phyto ²	Zoopl	Water	Phyto	Zoopl	Sed	Benth
A	FL-03	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Blachford	BL-01						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Buck	UN-12												✓			✓	✓
Carrot																	
Cressy	FL-02	✓	✓	✓			✓		✓	✓	✓		✓	✓	✓	✓	✓
Dinosaur	UN-09						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Drizzle	UN-13												✓			✓	✓
Egg	UN-11						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Elbow	EL-01 EL-02	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fred	FL-01						✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Great Slave	GL-01				✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Kinnikinnick	UN-08						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Long	LL-02						✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Megan	TL-05						✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Murky	UN-10						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
North Tardiff	NT-01						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pistol	UN-05						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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Lake	Station	Dates Sampled & Sample Type															
		September 1988			June 1998		March 2008	Oct. 2008	March 2009	June 2009			September 2009				
		Water	Chla ¹	Zoopl	Water	Sed	Water	Water	Water	Water	Phyto ²	Zoopl	Water	Phyto	Zoopl	Sed	Benth
Porkchop	UN-07						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Redemption	UN-14												✓			✓	
Ring	TL-04	✓	✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✓	
South Tardiff	ST-01						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Thor	TL-06 TL-07	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	☐✓	✓	✓	✓	
Thorn	TL-03						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
U																	
Wasp	UN-04						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

NOTE:

¹ Chla = chlorophyll a; sampled as an indicator of phytoplankton biomass

² Phyto = phytoplankton taxonomy and chlorophyll a

Table 5-3: Study Dates and Locations for the Fisheries Parameters of the Thor Lake Baseline Study

Lake	September 1988		June 1998		September-October 2008		March 2009	September 2009	
	FP ¹	FH ²	FP ¹	FH ²	FP ¹	FH ²	FP ¹	FP ¹	FH ²
A					✓	✓		✓	✓
Blachford			✓	✓					
Buck								✓	
Carrot								✓	✓
Cressy	✓				✓			✓	
Dinosaur									
Drizzle									
Egg									
Elbow	✓				✓	✓		✓	✓
Fred					✓	✓	✓	✓	✓
Great Slave					✓	✓		✓	✓
Kinnikinnick								✓	✓
Long					✓	✓		✓	✓
Megan					✓			✓	
Murky								✓	✓
North Tardiff					✓			✓	
Pistol									
Porkchop									
Redemption								✓	✓
Ring	✓							✓	
South Tardiff					✓			✓	
Thor	✓	✓			✓	✓		✓	✓
Thorn					✓			✓	
U					✓	✓			
Wasp									

NOTE:

¹ FP = Fish Presence

² FH = Fish Health

5.1 Physical Environment

5.1.1 Bathymetry

Bathymetric surveys were conducted at 24 of the 25 study lakes (23 complete lakes and a bay on Great Slave Lake) during September to October of 2008 or 2009 (see Table 5-1). A bathymetric survey was not completed at U Lake, which had been included as a potential reference lake but was found to be unsuitable for this use. Depths were measured using a depth sounder (Humminbird PiranhaMAX 215) and location waypoints were recorded on a hand held GPS unit (Garmin GPSMap76 or GPSMap72). Only one GPS was used at each lake. GPS waypoints and associated depth sounder readings were recorded as the boat was driven across the lake. The boat was driven as slowly as possible to minimize the effect of any GPS lag time. Transects were spaced as evenly as possible in each lake. Transects were 20 – 150 m apart, depending on lake size (transects were spaced further apart in larger lakes). The waypoints were more tightly spaced in areas where depth changed rapidly (5 m or less – as close together as the GPS allowed), such as near shorelines, islands and shallows, and further apart in areas with more uniform depth (up to 30 m).

The waypoints, depth readings, and lake boundaries were loaded into ArcGIS 9.2, and the lake surface elevations were determined from the waypoints elevations. Depth reading outliers (depths that were much lower than surrounding readings) were not included in the analysis. Using the waypoints, depth readings and lake shoreline, a Triangulated Irregular Network (TIN) was created to generate a three dimensional surface for the lake bottom. A Tin_Contour function in ArcGIS 9.2 was used to create the contours of the bathymetry data at 1 m to 0.5 m intervals, depending on the total lake depth (0.5 m contours were generated for very shallow lakes). The contour lines were smoothed and overlapping lines were corrected to create the final bathymetric maps for each lake.

The 3D Analyst ArcMAP extension was used to calculate total surface area, littoral zone area (area less than 2 m deep), deep water area (greater than 8 m), and total lake volume.

5.1.2 Lake Water Quality Profiles

Lake water quality profiles were measured during all aquatics sampling events at each lake, at consistent sample stations. Station locations were recorded as Universal Transverse Mercator (UTM) points using a handheld Garmin Map76 GPS unit. *In situ* water quality data were collected using a YSI 600QS multi-meter; measured parameters were temperature, conductivity, pH, dissolved oxygen, salinity and oxidation-reduction potential. Measurements were recorded on pre-printed datasheets and documented every 0.5 m from the lake surface to the lake bottom. More frequent measurements (i.e., every 0.25 m) were taken in shallow lakes, typically those lakes less than 2 m deep. *In situ* water quality data for aquatic sample stations are included in Appendix E.

5.1.3 Littoral and Riparian Area Survey

The littoral area – the shallow area where light penetrates to the lake bottom – is critical habitat for many fish species. The known fish species in the Thor Lake area (northern pike, lake whitefish, lake cisco, slimy sculpin and ninespine stickleback) all make use of shallow habitats for spawning, and

juveniles of some of these species also rear in the littoral area. Northern pike and ninespine stickleback prefer or are dependent on littoral habitat with aquatic vegetation, while other species make use of bedrock or other habitats (Scott and Crossman 1998). The riparian area can affect the water quality and littoral habitat characteristics of a lake, and provides habitat for wildlife as well.

The habitat in the littoral and riparian areas of the fisheries study lakes was surveyed during the September 2009 field program. The survey collected georeferenced data on littoral and riparian habitats, with the goal of mapping the different habitat types in each lake. The boat was driven near the shoreline of each lake and habitat characteristics recorded. A GPS waypoint was recorded at locations where there were changes in littoral or riparian habitat, and all habitat types were photographed.

The littoral survey identified:

- Dominant sediment class (bedrock, boulder, cobble, gravel, fines or organic)
- Locations of submerged, floating and emergent aquatic vegetation
- Locations of habitat features such as large woody debris or beaver dams.

The riparian survey identified the dominant habitat types, including:

- Black spruce forest
- Bedrock with lichen and sparse trees
- Lowland wetland habitat.

Since a fringe of shrubs, such as dwarf birch, or grasses frequently grew along the shoreline, the shoreline vegetation was characterized separately if it differed from the dominant riparian vegetation.

5.2 Water and Sediment Chemistry

5.2.1 Water

Physical and chemical water quality parameters determine the physiological performance of individual aquatic organisms and influence characteristics at the population and community levels in terms of distribution, diversity and density. Because freshwater systems are complex, adaptive and dynamic systems, the completion of an extensive water quality monitoring program is essential to distinguish natural variations over time and space from human-induced environmental changes.

The water quality assessment was designed to provide data on general water chemistry, nutrient, organic carbon content and metal levels. These parameters are relevant to toxicity and habitat requirements for plants, algae, benthos and fish. These parameters are relevant to toxicity and physical habitat requirements for benthos, fish eggs and juvenile fish. Radionuclides potentially associated with the thorium present in the area were measured in water and sediment, and rare earth elements were measured in sediment.

The specific objectives of the water quality studies are:

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- To obtain baseline water quality data that can be used to assess changes related to construction, operation, closure and post-closure stages of the Project
- To identify parameters that may be present at elevated levels, and to use this information to propose site-specific water quality objectives, if needed
- To provide baseline data that can be used to support future biological monitoring programs.

5.2.1.1 Sample Collection

Water samples were collected at each sample station during field sampling events (Table 4-1). Water was collected at depth using a Van Dorn sampler or by hand at 0.5 m if water depth was not sufficient for Van Dorn use. During winter sampling events, an ice auger was used to access the underlying water. Sample collection depth varied and depended upon the temperature profile of the lake at the time of sampling. Water samples were collected at mid-depth if water temperature was relatively stable throughout the water column and there was no evidence of thermal stratification (e.g., at most stations in spring and fall, and all stations in winter). If the lake was thermally stratified, water samples were collected at mid-depth of the epilimnion, above the thermocline.

Samples requiring preservation were preserved as soon as possible after sample collection, usually immediately. Samples requiring filtration were typically dealt with as soon as possible after returning to camp for the day. However due to field constraints and/or the physical characteristics of the specific sample (e.g. high total and/or dissolved solids), not all samples could be field filtered following collection. Some samples for dissolved organic carbon and dissolved metals were submitted to the analytical laboratory for filtration and analysis.

All samples and blanks were kept in coolers with ice packs until arrival at the analytical laboratory. Chain of custody forms describing sampling times and analytical requirements were submitted to the analytical laboratory.

5.2.1.2 Laboratory Methods

Water samples were analyzed at ALS Environmental, Vancouver, BC, for general parameters. These included major anions, alkalinity, total suspended solids (TSS), total dissolved solids (TDS), pH, conductivity, total metals, dissolved metals, total Kjeldahl nitrogen (TKN), nitrate and nitrite nitrogen, total phosphate, orthophosphate, and dissolved organic carbon (DOC). Detection limits were suitable for comparison with water quality guidelines.

Water samples for radionuclide determination were analyzed at the Saskatchewan Research Council (SRC) Analytical Laboratory in Saskatoon, SK. Radionuclides analyzed included radium-226 (^{226}Ra), radium-228 (^{228}Ra), lead-210 (^{210}Pb), thorium-230 (^{230}Th) and thorium-232 (^{232}Th).

5.2.1.3 Data Analysis

Summary statistics were generated for all parameters at each site over the entire baseline program to date. These statistics included sample size, minimum and maximum values, median, mean, standard deviation, standard error, coefficient of variation, number of samples exceeding guidelines, and number of samples with values equal to or lower than the corresponding detection level. In

addition, for each metal, the ratio (in percent) between dissolved and total concentrations was calculated as an indication of metal bioavailability.

For results below detection limits, a value of half the detection limit was used for statistical calculations. Detection limits used in 1988 and 1998 were consistent with laboratory practice at that time but, for several parameters, were higher than used in the current program. In most cases, detection limits were well below Canadian Council of Ministers of Environment (CCME) Protection of Aquatic Life (PAL) guidelines and had no bearing on the water quality assessment. Parameters with detection limits close to or exceeding CCME guidelines are summarized in Table 5-4. These include cadmium, mercury and selenium.

Table 5-4: Summary of CCME PAL Guidelines and Detection Limits for Water Quality Parameters with Detection Limits Approaching Guidelines

Parameter	CCME PAL (µg/L)	Detection Limit (µg/L)	
		2008 – 2009	September 2009
Cadmium	Site-specific based on water hardness; ranges from 0.028 to 0.082	0.05	0.017
Mercury	0.026	0.05	0.01
Selenium	1.0	1.0	1.0

All general chemistry results were compared to available CCME guidelines (maximum levels) for protection of aquatic life (CCME 2007). The British Columbia Approved and Working Water Quality Guidelines (BC-MOE 2006, 2008, Nagpal, *et. al.* 2006, Nordin and Pommen. 2009) were used where CCME guidelines did not exist. These general water quality guidelines (WQG) are listed in Table 5-5.

Table 5-5: Routine Parameters Analyzed and Canadian (CCME) and British Columbia (Approved and Working) Water Quality Guidelines for Protection of Aquatic Life

Parameter	Water Quality Guideline Maximum (µg/L unless stated)	
	CCME	BC
Temperature, °C	–	1°C change from optimum for fish species
Dissolved oxygen	minimum 5.5–9.5	minimum 5 to 9, depends on life stage
pH, units	6.5–9	6.5–9
Total Alkalinity	–	site-specific
Turbidity, NTU	–	8 NTU (when background ≤ 8)
Dissolved organic carbon (DOC)	–	30-day median ± 20%
Total suspended solids (TSS)	–	25 mg/L (when background TSS ≤ 250)
Fluoride	–	0.2–0.3 mg/L
Chloride	–	600 mg/L
Sulphate	–	100 mg/L
Ammonia-N	varies with temp., pH	varies with temp., pH

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Parameter	Water Quality Guideline Maximum (µg/L unless stated)	
	CCME	BC
Nitrate-N	2.9 mg/L	31.3 mg/L
Nitrite-N	0.06 mg/L	0.06 to 0.60 mg/L (when Cl ⁻ ranges <2 and >10 mg/L)
Aluminum, total	100 (when pH ≥ 6.5)	-
Aluminum, dissolved	-	100 (when pH ≥ 6.5)
Antimony, total	-	20
Arsenic, total	5	5
Barium, total	-	5000
Beryllium, total	-	5.3 ^a
Boron, total	-	1200
Cadmium, total	0.02 to 0.13 ^b	0.02 to 0.13 ^b
Calcium, dissolved	-	Up to 0.004 mg/L – highly sensitive to acid inputs 0.004 to 0.008 mg/L – moderately sensitive > 0.008 mg/L – low sensitivity
Chromium, total	8.9 (Cr III)	8.9 (Cr III)
Cobalt, total	-	110
Copper, total	2 to 4 ^b	6.7 to 47.1 ^b
Iron, total	300	1000
Iron, dissolved	-	350
Lead, total	1 to 7 ^b	34 to 601 ^b
Manganese, total	-	1100 to 5800 ^b
Mercury	0.026	0.1
Molybdenum, total	73	2000
Nickel, total	25 to 150 ^b	25 to 150 ^b
Selenium, total	1	2 (considered maximum)
Silver, total	0.1	0.1 (for hardness ≤ 100 mg/L) 3 (for hardness >100 mg/L)
Titanium, total	-	2000
Uranium, total	-	300 ^c
Vanadium, total	-	6
Zinc, total	30	33 to 371 ^b

NOTES;

^a Chronic maximum guideline

^b Varies with hardness; the range of metal values is presented for hardness of 50–480 mg/L

^c Health Canada Canadian Drinking Water Guideline for uranium is 20 µg/L (Health Canada 2008)

Additional parameters analyzed include: conductivity (field and lab), total hardness, total dissolved solids (TDS), bromide, phosphate (total and ortho), total Kjeldahl Nitrogen, bismuth, lithium, thallium, tin, magnesium, potassium, sodium, silicon and the dissolved fraction for all listed metals.

Radionuclides potentially associated with the thorium present in the area were measured in water. All radionuclide results were compared to maximum acceptable concentrations (MAC) available for the protection of drinking water, specified in the Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ; Health Canada 1995). No radionuclide criteria are available for the protection of aquatic life, and the GCDWQ are the most stringent. Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM; Health Canada 2000) were also used for comparison of acceptable exposures for workers and the public to NORM. The radionuclide WQGs are listed in Table 5-6.

Table 5-6: Radionuclide Parameters Analyzed and Canadian Water Quality Guidelines

Parameter	Water Quality Guideline Maximum (Bq/L)	
	GCDWQ	NORM
Lead-210	0.1	1.0
Radium-226	0.6	5.0
Radium-228	0.5	5.0
Thorium-230	0.4	5.0
Thorium-232	0.1	1.0

Temporal trends were assessed for each station individually then differences among stations or lakes were evaluated. Temporal differences were assessed for current data (2008 – 2009) for sites sampled in all years. For lakes where historic data (1988 and/or 1998) were available, temporal trends were partially examined, due to the limited use of the data, as described in Section 2.3.

Summary statistics were calculated with Microsoft Excel 2007, while graphical data were prepared with Sigmaplot 10.

5.2.1.4 QA/QC

The Quality Assurance/Quality Control (QA/QC) program was designed to provide reliable monitoring data by minimizing sampling error, contamination and erroneous results, and by quantifying any bias in the results. Values that exceeded the mean \pm 2 standard deviations for a given parameter in a given site were considered as outliers when they were associated with a manipulation or analytical problem (e.g., blank contamination, high hold time). Outliers were identified for a sample from Porkchop (dissolved copper), Elbow South (total zinc), a Ring replicate (total organic carbon) and an original Thor Lake station (TL-01; total copper). These values were reported in the raw data appendix but highlighted and excluded from summary statistic calculations.

Another important component of the QA/QC program was to assure data quality regarding precision, bias, adequate sample hold times and detection limits. The examination of environmental data for potential artifacts due to contamination or reporting errors was thorough. Laboratory results and field notes were verified in relation to replicate and blank results, hold times and occurrence of unusual events. Levels of total and dissolved metals were compared to evaluate potential contamination during sample filtration in the field.

Field and Travel Blanks

Field blanks (bottles filled in the field with lab-supplied de-ionized water) and travel blanks (sealed de-ionized water supplied by the lab) were analyzed for each sampling event. The blanks were examined to determine whether there were detectable levels of any parameters. Most field and travel blank results were at or below detection limit, and values just above the detection limit were not considered to reflect contamination. Blank results are presented in Appendix F1. Results suggesting contamination are highlighted in these appendices.

None of the travel blanks had parameters that exceeded detection limits by more than five times over the 2008 to 2009 sample period. One of the field blanks had a parameter that exceeded detection limits by more than five times. Dissolved organic carbon (36.8 mg/L) from October 2008 exceeded detection limits by 73 times, and was indicative of contamination of the blank during field filtering. The high DOC reading was not related to outliers among the sample results from that date. None of the other field blanks had detectable levels above five times the detection limits.

Replicates

Field replicates (10% of samples) were collected for each sampling event. Laboratory results for field replicates were examined to determine if precision thresholds were exceeded. Field duplicates should have a difference of no more than 25% of their mean for parameters equal to or greater than five times the detection limit. Results for duplicate samples are presented in Appendix F1. Results for which the precision thresholds were exceeded are highlighted in these appendices.

Among the approximately 580 analyses performed in duplicate, 1% (6 analyses) showed results differing by more than 25% of the mean, when the replicate values were more than five times the detection limit. These variations included total suspended solids, turbidity, total organic carbon and total aluminum at Ring Lake (March 2008), total phosphate at Cressy Lake (September 2009), and dissolved manganese at Redemption Lake (September 2009).

Dissolved versus Total Concentrations

Levels of total and dissolved metals were compared to evaluate potential contamination during sample filtration. Dissolved concentrations that exceeded the total concentrations by more than 25%, when both concentrations were at least five times the detection limit, were flagged as an indication of contamination. Where the metal concentration in the dissolved phase exceeded the total concentration by less than 10%, the higher values of the dissolved phase were attributed to random variations.

Dissolved metal concentrations exceeded total concentrations five times at specific sample stations: arsenic (up to 1.4 times greater than total in Dinosaur, Megan and Thor (west) lakes in June 2009), copper (1.4 times greater than total in Egg Lake in October 2008) and manganese (1.3 times greater than total in Great Slave Lake in March 2009).

Hold Time

All efforts were made to submit samples within applicable hold times, although with the remote location of the property and periodically limited flights, the 72 hour hold time for alkalinity, nitrate, nitrite, total phosphate and ortho-phosphate was typically exceeded by four to five days. The seven

day hold time for total suspended and total dissolved solids was occasionally exceeded by one to two days. Additional wait time may also have occurred at the analytical laboratory after sample receipt and prior to sample analysis.

To assess the effect of hold time exceedances on analytical results, three individual samples were collected from Thor West immediately prior to leaving the Site on March 20, 2009. Samples were shipped to ALS Laboratories and received three days later (March 23, 2009). General chemistry parameters were analyzed in each sample at pre-determined time intervals after collection to assess changes in water chemistry:

- The first sample was analyzed as soon as possible after arrival at the laboratory (one to three days), equivalent to 4 to 6 days after sample collection.
- The second sample was analyzed 12 to 14 days after sample collection.
- The third sample was analyzed 25 – 27 days after sample collection.

The three samples were received at the laboratory at the end of the 72 hour hold time and within the seven day hold time for TSS/TDS. However the hold time was exceeded for the first TSS/TDS sample as analyses were conducted 8 and 9 days after arrival at the laboratory (corresponding to 11 and 12 days after sample collection). TSS/TDS analysis in the second and third samples also took place much later than other general chemistry parameters.

Though the 72 hour hold time was exceeded for all samples when analyzed, most general chemistry results among the three individual samples did not dramatically change as time between sampling and analysis increased (standard deviation ranged from 0 to 0.58). Increased time (exceeded hold times) appeared to affect TDS and alkalinity, as these two parameters varied the most between the three samples (standard deviation was 7.09 and 9.29, respectively). Alkalinity levels decreased with time, but there was no clear trend for total dissolved solids (levels decreased then increased); results and summary statistics for these three samples are located in Appendix F1.

5.2.2 Sediment

Sediment metal analysis is widely used as an indicator of environmental quality in baseline monitoring and environmental assessments. Lake sediments serve as a repository for metals in both the particulate and dissolved fractions, often containing higher metal concentrations than are found in water. When disturbed, metals in sediments can be resuspended into the water column. Metals that enter aquatic systems may cause acute or chronic toxicity in benthic and planktonic organisms (e.g., biochemical and physiological changes; Hook and Fisher 2001; Grosell, *et al.* 2006; Wilding and Maltby 2006; Shaw *et al.* 2006), which can lead to altered community structure, and to effects on other organisms in the aquatic food web.

Metals accumulate in sediments when metal particles are washed into water and settle onto the substrate or when soluble metals become sorbed by sediment particles. The fate of these metals depends on local physical and chemical conditions in the sediment. Sediments act as either a source or a sink for metals, depending on redox potential, cation exchange capacity, particle size of sediments and organic carbon content (Salomons, *et al.* 1987).

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Particle size influences sediment quality and binding behaviours for metals and other contaminants. Fine (<63 µm) and coarse particles (>63 µm) differ in their mineralogical, morphological, physicochemical and mechanical properties (Salomons and Forstner 1984). Metals tend to be associated with the fine particle size (clays) as a result of the following characteristics:

- Their diverse shapes and sizes
- Their tendency to aggregate and precipitate into the sediment as floc networks, which provides an open structure that binds metal ions in water
- Their electrical charge, so metals are attracted and bound more easily than to coarse, non-charged particles
- Clay particles form aggregates from colloidal suspension so settle more quickly than particles in colloids.

In general, metals adsorb more readily to fines (Brook and Moore 1988), with the highest metal concentrations in the clay-sized particles. The exceptions are manganese and iron, which preferentially bind to coarse particles >300 µm. Characteristics such as water depth, pH, hardness, nutrient concentration, temperature, dissolved oxygen and water circulation also affect the behaviour of metals (Mudroch and MacKnight 1991).

Metal-sediment interactions strongly influence the toxicity of metals in freshwater systems. Although there is some debate surrounding the sources and mechanisms of metal toxicity for benthic organisms (i.e., water vs. sediment) or absorption of dissolved metals vs. ingestion of particulate metals, the bioavailability and toxicity of metals can largely be determined by metal ion activity in sediment pore water (Carbonaro, *et al.* 2005; Campbell, *et al.* 2006). Thus, chemical interactions that produce insoluble metal species reduce the potential for metal toxicity. For example, the natural presence of iron monosulphide (FeS) in lakes and streams lowers dissolved concentrations of Cu^{2+} , Cd^{2+} , Ni^{2+} , Pb^{2+} , Zn^{2+} , and Ag^+ through formation of insoluble metal sulphides (Carbonaro, *et al.* 2005). The potential for metal toxicity also depends on oxygen levels, which oxidize metal sulphides, releasing metal ions back to the sediment pore water (Carbonaro, *et al.* 2005). Binding of metal ions to organic carbon also affects metal concentrations in pore water (Ankley, *et al.* 1996).

In the present assessment, samples from each lake were analyzed for total metals, particle size, total carbon, organic and inorganic carbon, total Kjeldahl nitrogen, total phosphorus, radionuclides and rare earth elements in the fine fraction. In addition, polycyclic aromatic hydrocarbons (PAH) were analyzed in samples from four lakes (potential exposure and reference area lakes), to provide baseline data for future mine activities that could result in air emissions containing PAHs.

Metal and PAH concentrations were compared to CCME Interim Sediment Quality Guidelines (ISQG) (CCME 2002) and BC working sediment quality guidelines (SQGs) (Nagpal, *et al.* 2006), which are the same for most parameters. CCME SQGs are provided as two values: ISQG, representing concentrations below which adverse biological effects are not expected, and probable effects levels (PELs), above which adverse biological effects are usually or always observed. Both levels are derived from available literature; however, at present metal and PAH SQG are considered interim due to a lack of data.

5.2.2.1 Sample Collection

Sediment samples were collected during September 2009 using a 2.4 L (152 mm x 152 mm) petite ponar sediment grab. Three individual sites at least 20 m apart were established in the deepest basin of each lake and sediment grabs were collected at each site. The top 3 cm of sediment from each grab was removed with a stainless steel spoon and placed in clean sample jars for analyses of general sediment chemistry and total metals. Due to field issues, only one set of sediment samples was collected at several lakes; sediment samples were collected in triplicate from all other lakes.

One composite sample containing well-mixed sediment from each of the three sites was also collected from each sample lake. A portion of the top 3 cm of sediment from each of the three sites was removed and composited in a clean, stainless steel bowl. Composited sediment was well-mixed and transferred to clean sample jars for analysis. Composited sediment samples were analyzed for radionuclides and rare earth elements (REEs). An additional composited sediment sample was collected from four lakes for polycyclic aromatic hydrocarbon (PAH) analysis.

Once sediment samples were collected, they were kept in coolers with ice packs until arrival at the analytical laboratory. Chain of custody forms describing sampling times and analytical requirements were submitted to the analytical laboratory.

5.2.2.2 Laboratory Methods

Sediment samples were analyzed at ALS Laboratories in Edmonton, AB, for general chemistry and PAHs. General chemistry parameters included total carbon, organic and inorganic carbon, total Kjeldahl nitrogen, total phosphorus, total metals and particle size. Detection limits were generally suitable for comparison with sediment quality guidelines.

Radionuclides and REEs were analyzed at the Saskatchewan Research Council Analytical Laboratory in Saskatoon, SK. Radionuclides analyzed included radium-226, radium-228, lead-210, thorium-230 and thorium-232. REEs analyzed include the Lanthanide series (lanthanum to lutetium, except promethium), niobium, tantalum, yttrium, zirconium and hafnium.

5.2.2.3 Data Analysis

Summary statistics were generated for all parameters at each site where samples were collected in triplicate. These statistics included minimum and maximum values, median, mean, standard deviation, standard error, coefficient of variation, number of samples exceeding guidelines, and number of samples with values equal to or lower than the detection level.

For results below detection limit, a value of half of the detection limit was used in the calculations. Detection limits used in 1998 appear to be generally comparable to current detection limits, though not all detection limits were reported in 1998. In most cases, current detection limits were well below CCME ISQG and PEL for protection of aquatic life and did not influence the interpretation of results. Table 5-7 lists parameters with detection limits approaching or exceeding ISQG or PELs. Mercury and PAH measurements within the detection limits were considered to be within guidelines.

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Table 5-7: Summary of CCME ISQ Guidelines and Detection Limits for Sediment Parameters with Detection Limits Approaching Guidelines

Parameter	CCME (mg/kg)		Detection Limit (mg/kg)
	ISQG	PEL	
Mercury	0.17	0.486	0.05
Silver	0.5 ^a	–	1.0
Cadmium	0.6	3.5	0.5
PAHs ^b	0.00587 – 0.111	0.0889 – 2.355	0.3 – 1.0

NOTE:

^a Silver sediment guideline from BC Working Sediment Quality Guidelines

^b PAHs includes 17 parent PAHs; individual guideline values are described in Table 5-8

Metal and PAH data were compared to available CCME sediment criteria for protection of aquatic life (CCME 2002) and, where there are no CCME guidelines, to the British Columbia Working Sediment Quality Guidelines (Nagpal, *et al.* 2006), as shown in Table 5-8. To Stantec’s knowledge, there are no guidelines for radionuclides or REE in sediment. At the time of this report, sediment radionuclide and REE results had not been received. Sediment radionuclide and REE results are expected early in 2010 and will be reported in the final TDR.

Table 5-8: Parameters Analyzed and Canadian (CCME) and British Columbia Working Sediment Quality Guidelines for Protection of Aquatic Life

Parameters	Sediment Quality Guidelines (mg/kg)			
	CCME ISQG ^a	CCME PEL ^a	BC LEL ^{b,c}	BC SEL ^{b,c}
Arsenic, total	5.9	17.0	–	–
Cadmium, total	0.6	3.5	–	–
Chromium, total	37.3	90.0	–	–
Copper, total,	35.7	197.0	–	–
Lead, total	35.0	91.3	–	–
Mercury, total	0.17	0.486	–	–
Nickel, total	–	–	16	75
Selenium, total	–	–	5	–
Silver, total	–	–	0.5	–
Zinc, total	123	315	–	–
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	0.00671	0.0889	–	–
Acenaphthylene	0.00587	0.128	–	–
Anthracene	0.0469	0.245	–	–
Benz(a)anthracene	0.0317	0.385	–	–
Benzo(a)pyrene	0.0319	0.782	–	–

Parameters	Sediment Quality Guidelines (mg/kg)			
	CCME ISQG ^a	CCME PEL ^a	BC LEL ^{b,c}	BC SEL ^{b,c}
Benzo(g,h,i)perylene	–	–	0.17	3.2
Benzo(k)fluoranthene	–	–	0.24	13.4
Chrysene	0.0571	0.862	–	–
Dibenz(a,h)anthracene	0.00622	0.135	–	–
Fluoranthene	0.111	2.355	–	–
Fluorene	0.0212	0.144	–	–
Indeno(1,2,3-c,d)pyrene	–	–	0.2	3.2
2-Methylnaphthalene	0.0202	0.201	–	–
Naphthalene	0.0346	0.391	–	–
Phenanthrene	0.0419	0.515	–	–
Pyrene	0.053	0.875	–	–

NOTE:

^a ISQG = Interim Sediment Quality Guideline; PEL = Probable Effects Level

^b BC LEL and SEL guideline equal to CCME ISQG and PEL guideline, respectively, unless otherwise shown

^c LEL = Lowest Effects Level; SEL = Severe Effects Level

Additional parameters analyzed include: inorganic carbon, total organic carbon, total carbon, CaCO₃ equivalent, total Kjeldahl nitrogen, total phosphorus, benzo(b&j)fluoranthene, and total, barium, beryllium, cobalt, molybdenum, antimony, tin, thallium, uranium and vanadium.

5.2.2.4 QA/QC

QA/QC protocols consisted of standard procedures in the field to avoid sample contamination, examination of certified reference materials (CRM) and laboratory duplicates, and assessment of the precision of field replicates.

Field Procedures

Quality assurance in the field included cleaning the equipment (stainless steel bowl, stainless steel spoons), rinsing thoroughly with ambient water between replicates and stations, and wearing nitrile gloves (clean gloves at each site). The glass sampling jars were acid-washed and supplied uncontaminated from the laboratory. Upon collection, samples were immediately placed in a clean cooler, with ice packs. Care was taken to not contaminate the inside of the jar or the cap. Samples were kept in coolers until they were sent to the laboratory for analysis.

Laboratory Procedures

Certified Reference Materials

ALS Laboratories provided results for analysis of CRM reported the analysis and certified values and calculated percent of target value. The laboratory analyses generally met the criteria of less than 20% difference in the value of metals found in the CRM samples compared to the target value as determined by the National Research Council (NRC).

Analytical Duplicates

Laboratory replicates were within 20% difference when parameter levels exceeded five times the detection limits.

Field Replicates

Replicate samples provide information about heterogeneity of the sediment within a station. Field replicates were collected for composited samples (10% of samples); however, due to field difficulties, the collection of three replicate samples for general chemistry took place at some, but not all, lakes. The three replicate samples were assessed for precision and variability by calculating the coefficient of variation (CV) of each parameter at a site, using the formula $CV = [\text{standard deviation} / \text{mean}] * 100$. Standard deviation and CV should be no more than 20% of the mean when the replicate values are all at least five times the detection limit. Results for which the precision thresholds were exceeded are highlighted in Appendix G1.

Of the 203 analyses completed in triplicate (29 parameters times 7 stations), 15 results (7%) had CV greater than 20% (one to five parameters per station); arsenic exceeded 20% CV at four stations, while organic carbon, Kjeldahl nitrogen, total phosphorus, barium, copper and molybdenum exceeded once at separate stations. These precision analyses indicate some heterogeneity of lake sediments in some lakes in the study area. Additional sampling would provide a better characterization of lake benthic habitat to improve detection of differences in sediment quality among sites or over time.

5.3 Aquatic Organisms

5.3.1 Phytoplankton

Phytoplankton are algae that grow suspended in the water column, and provide the primary source of energy in lakes (Wetzel 2001). They convert inorganic carbon, nitrogen and phosphorus into organic matter, making it available for secondary consumers such as zooplankton and benthic invertebrates. Phytoplankton are sensitive to changes in water chemistry, and have been used as indicators of water quality since the early 1900s because of known sensitivity to changes in nutrient, sediment (TSS) and metal levels, which makes them useful sentinels of changes related to mine operations. They also provide valuable links between water chemistry and the fish community. Nutrient additions (eutrophication), through direct discharge of effluent or through diversion of water from one system to another, can lead to increased and excessive phytoplankton growth, which deplete oxygen as they decompose and can alter composition of the zooplankton community.

5.3.1.1 Sample Collection

Phytoplankton were collected at each lake sampling station during the ice-free season in 2009 (June and September). The Van Dorn sampler was deployed to 1 m depth to collect phytoplankton. Collected water was divided into samples for chlorophyll a (chl a) analyses, a measure of phytoplankton biomass, and taxonomic determination.

The chl *a* sample was collected in a 1 L amber glass jar and kept in a dark cooler with ice packs until filtering at the end of the day. The samples were filtered through a 0.45 µm filter and magnesium carbonate (MgCO₃) was added to the last portion of filtering sample water to stabilize the phytoplankton cells and chlorophyll pigments. The filter was then folded and wrapped with aluminum foil, labeled with the location, date and time of sample collection and volume filtered, and frozen until arrival at the analytical laboratory.

Taxonomic samples were collected in 250 mL labeled plastic bottles and preserved with Lugol's solution (1 mL per 100 mL). Samples were kept in coolers until arrival at the laboratory. Chain of custody forms describing sampling times and analytical requirements were submitted with each phytoplankton sample shipment.

5.3.1.2 Laboratory Methods

Chlorophyll

Chlorophyll *a* samples were analyzed at ALS Laboratories in Vancouver, BC for chlorophyll *a* and pheopigment (an indicator of natural degradation of chlorophyll). ALS analyzed samples using fluorometry based on procedures adapted from the USEPA Method 445.0. Chlorophyll *a* and pheopigment results were reported as µg/L.

Taxonomy

Taxonomy samples were examined at Fraser Environmental Services in Surrey, B.C., following procedures outlined in the Fraser Environmental Methods Manual and described in Appendix D. Samples were settled in 25 mL Utermohl-type settling chambers for approximately 24 hours and examined in an inverted microscope. The entire chamber was scanned at increasing powers of magnification to determine the species or genera present. At least ten random fields were counted, to a total count of at least 100 for the predominant species, and data were converted to cells/mL.

5.3.1.3 Data Analysis

Chlorophyll *a* data are included in Section 6.1.3.1. Summary statistics have not been generated, as samples have only been collected on two dates.

Raw taxonomic data from the June 2009 sampling event are presented in Appendix H as cells/mL; data from the September 2009 sampling event were not received at the time of this report. Data are reported by taxonomic group and for the most abundant taxa at each site. The six groups are diatoms (Bacillariophyceae), green algae (Chlorophyta), yellow-brown algae (Chrysophyta), cryptophyte algae (Cryptophyta), blue-green algae (Cyanophyta) and dinoflagellates (Pyrrophyta).

Phytoplankton diversity at each station was calculated using Simpson's Diversity Index (Environment Canada 2002):

$$D = 1 - \sum_{i=1}^S p_i^2$$

Where:

p_i is the proportion of the total cell density (cells/mL) for each taxon i , and S is the total number of taxa.

Abundance data for many taxa were reported as a less than value, indicating the taxa were observed during the initial visual scan, but not found during the regular counting protocol. The Simpson's Diversity Index was calculated for three scenarios: treating less than values as zero, treating less than values as half the reported value, and treating less than values as their reported non-less than value (e.g. <1.4 becomes 1.4). Due to the high number of phytoplankton taxa reported, the diversity index did not vary greatly between the three scenarios. As a result, the convention followed was that for chemistry data (using one-half the reported less than value for all stations) for calculation of Simpson's Diversity Index. This ensured that taxa reported as less than values were not excluded from diversity calculations and did not inflate diversity calculations, making rare taxa seem more common.

Percent abundance of diatoms, green, blue-green, yellow-brown and cryptophyte algae species was estimated and abundance was characterized as predominant (>25% abundance), common (5 to 25% abundance) or present, providing a semi-quantitative summary.

5.3.1.4 QA/QC

Quality control procedures involved precautions for ensuring samples were protected from contamination and deterioration (consistency of sampling, correct use of equipment, detailed field notes, use of clean bottles, adequate preservation). Bottles for taxonomy samples were labeled with indelible ink (sample station, collection date and preservative). Care was taken to ensure bottles were kept in a cool, clean environment, either cooler or refrigerator, with minimal exposure to light.

Replicate samples were collected for chlorophyll *a* and taxonomy (10% of samples). A maximum of 20% relative percent difference (RPD) between replicates, when results were at least five times the detection limit, was the data quality criterion for replicate samples. Field blanks were also collected for chlorophyll *a* to assess the potential for cross-contamination from one sample filtration to the next. For blank samples, results were required to be below detection for all parameters.

Standard protocols for chlorophyll *a* samples were followed to maintain sample quality prior to analysis. Fraser Environmental Services followed internal procedures for taxonomy: microscope calibration, counting procedures, Batch Quality Control procedures for precision and accuracy in taxonomic identifications, verification with an in-house reference collection and external review.

5.3.2 Zooplankton

Zooplankton are an important lake component because of their role as secondary producers and relationship with phytoplankton and fish production (Mazumder 1994; Vadstein, *et al.* 1995). The smallest zooplankton can be characterized as recyclers of water-column nutrients and often are closely tied to measures of nutrient enrichment. Larger zooplankton are important food for forage fish and the larval stages of all fish. The zooplankton community is composed of primary consumers, which eat phytoplankton, and secondary consumers, which feed on other zooplankton. There are

three main taxonomic groups: rotifers and two subclasses of the Crustacea (Cladocera and Copepoda). Protozoans, a few coelenterates, larval trematode flatworms, gastrotrichs, mites and the larval stages of some insects are also considered zooplankton, even if some of them only live in the water column occasionally or for a portion of their life cycles (Wetzel 2001).

5.3.2.1 Sample Collection

Zooplankton samples were collected at each sampling station in June and September 2009, using a 12 cm diameter zooplankton net (64 µm mesh size). Where lake depth was sufficient, two 3 m vertical net tows were deployed to collect zooplankton. In shallow lakes (e.g. less than 3 m deep), two 3 m horizontal net tows were used. The zooplankton net was rinsed with filtered ambient water at each sampling station to ensure all captured organisms were collected in the sample bottle.

Zooplankton samples were collected in 500 mL labeled plastic bottles and preserved with 10% buffered formalin (25 mL per 250 mL sample). Zooplankton samples were kept in clean coolers until arrival at the analytical laboratory. Chain of custody forms describing sampling times and analytical requirements were submitted with the zooplankton samples.

5.3.2.2 Laboratory Methods

Taxonomic zooplankton samples were examined at Fraser Environmental Services in Surrey, B.C., following procedures outlined in the Fraser Environmental Methods Manual and described in Appendix D. The volume of each sample was measured and a 50 mL subsample removed and examined in a petri dish. The entire dish was examined at increasing magnification and taxa identified. A series of 1 mL aliquots of sample were then settled in a Sedgewick-Rafter chamber for 15 minutes, then counted using a strip counting method. At least three aliquots were counted, to yield a minimum of 200 organisms. Results were averaged and counts converted to organisms per litre (i.e., per sample).

5.3.2.3 Data Analysis

Raw taxonomic data from the June 2009 sampling event are presented in Appendix I as organisms per litre (i.e., per sample); taxonomical data from the September 2009 sampling event had not been received at the time of this report. Data were reported by taxonomic group and abundance of taxa at each site.

Diversity of zooplankton at each station was calculated using Simpson's Diversity Index (Environment Canada 2002):

$$D = 1 - \sum_{i=1}^s p_i^2$$

Where:

p_i is the proportion of the total average cell density (cells/mL) for each taxon i , and S is the total number of taxa.

Percent abundance of zooplankton at each sample station was estimated and abundance was characterized as predominant (>25% abundance), common (5 to 25% abundance) or present, providing a semi-quantitative summary.

5.3.2.4 QA/QC

Quality control procedures involved precautions for ensuring samples were protected from contamination and deterioration (consistency of sampling, correct use of equipment, detailed field notes, use of clean bottles). Bottles for taxonomy samples were labeled with indelible ink (sample station, collection date, and preservative). Care was taken to ensure sample bottles were kept in a cool, clean environment, either cooler or refrigerator, with minimal exposure to light.

Replicate samples were collected for taxonomy (10% of samples). A maximum of 20% relative percent difference (RPD) between replicates, when results were at least five times the detection limit, was set as the data quality criterion for replicate samples.

Standard protocols for zooplankton samples were followed to maintain sample quality prior to analysis. Fraser Environmental Services followed internal procedures for taxonomy: microscope calibration, counting procedures, Batch Quality Control procedures for precision and accuracy in taxonomic identifications, verification with an in-house reference collection and external review.

5.3.3 Benthic Invertebrates

Benthos (benthic invertebrates) are commonly used for biomonitoring purposes. Their ubiquity and basically sedentary nature allow effective spatial analysis of the effects of contaminants and disturbance on a long-term basis through measurement of changes in density, community composition or ecosystem functioning. Benthic invertebrates are an important component of both flowing and standing water habitats, as they consume smaller animals and plants, aid in decomposition of organic material and are an important source of food for fish and other animals.

The main advantages of using benthic invertebrates for biomonitoring are: 1) they are ubiquitous, so can be affected by perturbations in many aquatic habitats; 2) the many species involved offer a wide range of responses to environmental stresses; 3) they are relatively sedentary, which allows for the determination of the spatial changes caused by perturbations; and 4) they have long life cycles, so effects of perturbations over time can be observed (Rosenberg and Resh 1993, Barbour, *et al.* 1999).

5.3.3.1 Sample Collection

Benthos samples were collected during September 2009 using a 2.4 L (152 mm x 152 mm) petite ponar sediment grab. Three individual sites at least 20 m apart were established in the deepest basin of each lake and sediment grabs were collected at each site. Due to field difficulties, two different methods were used for collection of benthos samples. In some lakes, nine grabs were

composited to make one sample while in other lakes the nine grabs were composited into three samples (three grabs per sample).

Benthos grabs were composited in buckets and transported to shore where the samples were sieved through a box with 500 µm mesh. Sediment and invertebrates that did not pass through the sieve were collected in labeled 500 mL plastic jars. Benthos sample were preserved with 10% buffered formalin to a final concentration of 50% preservative. Samples were placed in clean coolers or totes until arrival at the analytical laboratory. Chain of custody forms describing sampling times and analytical requirements were submitted with the benthos samples.

At the time of this report, taxonomic results from the benthos study had not been received. Benthos results are expected early in 2010 and will be reported in the final TDR.

5.4 Fisheries

5.4.1 Species Presence

5.4.1.1 Fish Sampling

Fish species presence was investigated in 12 lakes in September-October 2008 and 18 lakes in September 2009, 11 of which were common to the two years (see Table 5-3). Multiple methods were used to target as many of the different species that potentially inhabit the lakes as possible. Two fishing methods, gill netting and minnow trapping, were used in 2008. These two methods, combined with beach seining and dip netting, were used in 2009. The fishing effort at each lake is summarized in Table 5-9.

Fred Lake is suspected to be a „sink“ habitat, in which many fish die overwinter, because of its shallow depth and low winter oxygen concentrations. Therefore, Fred Lake was also sampled in March 2009, using gill nets and minnow traps, to investigate winter fish presence.

Two years of fishing effort are recommended by DFO for baseline investigations of fish presence, so all lakes were visited twice, except for lakes that were added to the sampling program in 2009.

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Table 5-9: Fishing Effort During the 2008 and 2009 Fisheries Field Programs Using Overnight Gill Net Sets (GN), Overnight Minnow Trap Sets (MT), Beach Seines (BS) and Dip Netting (DN)

Lake	September – October 2008		March 2009		September 2009			
	GNa	MT	GN	MT	GN	MT	BS	DNb
A	S	5	-	-	F, N	8	1	65
Buck	-	-	-	-	F, N	8	-	-
Carrot	-	-	-	-	S, F, N	8	2	10, 60
Cressy	S, F	8	-	-	S, N	8	1	-
Drizzle	-	-	-	-	F, N	8	-	-
Elbow	S, F	10	-	-	S, F, N	8	1	-
Fred	S	8	Sc	7	F, N	8	1	-
Great Slave	S, F	8	-	-	S, F, N	8	1	-
Kinnikinnick	-	-	-	-	S, F, N	8	1	30
Long	S(2), F(2)	11	-	-	S, F, N	8	2	150, 150
Megan	F	6	-	-	F, N	8	-	30
Murky	-	-	-	-	F, N	8	-	45, 20
North Tardiff	-	6	-	-	N	8	-	80
Redemption	-	-	-	-	S, F, N	8	1	-
Ring	-	-	-	-	F, N	8	-	-
South Tardiff	F	8	-	-	F	8	-	35
Thor	S, F	12	-	-	S, F, N	8	3	-
Thorn	S	6	-	-	F, N	8	-	20
U	S, F	8	-	-	-	-	-	-

NOTES

^a Gill net types: sinking (S), floating (F), and fine (N).

^b Dip net effort is recorded as meters of shoreline dip netted; if more than one area was dip netted then the lengths are separated by commas

^c Fred Lake March 2009 gill net sets: 25 mm and 76 mm mesh panels, 30 m total net length.

Gill Nets

Gang gill nets were employed to target as many of the fish species present in each lake as possible. One or two gang gill nets with six panels of varying mesh sizes were set overnight in each study lake. The gill nets were set overnight to ensure that they were fishing during the dawn and dusk periods, which are the most active times of day for many fish species.

The nets were manufactured according to the British Columbia Fish Collection Methods and Standards (RIC 1997) specifications. Each of the six panels in the gang net was 15.2 m long and 2.4 m deep, resulting in a combined total net length of 91.2 m. The mesh size of the panels varied in the following order (from one end to the other): 25 mm mesh, 76 mm mesh, 51 mm mesh, 89 mm mesh, 38 mm mesh and 64 mm mesh. Although these mesh sizes will most effectively sample fish with fork lengths ranging from 114 mm to 380 mm, larger fish can also be captured.

The number of gang gill nets set per lake was two in larger lakes, one floating and one sinking, and one in smaller lakes, either floating or sinking. Floating nets were generally set perpendicular to shore, with one end near the shore, to capture fish traveling through the littoral area or parallel to the shoreline. Sinking nets were generally set parallel to shore, between the littoral area and deeper waters, to capture fish traveling between shallow and deep waters (RIC 1997). In the smaller shallow lakes, the nets often spanned the entire water column; therefore a single gang net, either floating or sinking, was placed perpendicular to shore in these lakes.

A single panel gill net, measuring 15 m long by ~2.5 m deep with 25 mm mesh, was set in addition to the one or two gang gill nets in each lake in 2009. The purpose of this net was to target small bodied fish. This net was set in shallow littoral habitat, near aquatic vegetation or other features that would provide cover for small fish.

Fred Lake was also sampled using gill nets in March 2009. Two panels of a gang gill net (one large mesh [76 mm] panel and one small mesh [25 mm] panel), were set under the ice for two 8-hour periods. An ice auger was used to drill holes in the ice, and an ice jigger was used to set the nets under the ice (see Murphy and Willis, 1996). The nets spanned the water column under the ice. One set was perpendicular to shore, the other parallel. The nets had to be set in the middle of the lake rather than near the shore because the space between the ice and the lake bottom was too small near the shore to get the ice jigger through.

Minnow Traps

Between 5 and 12 minnow traps (usually 8) baited with cat food, fish muscle tissue or no bait were set overnight in littoral areas of each lake. The traps were usually set in pairs, in a variety of representative habitat types in each lake. Depending on habitat availability in the lake, trapping locations included areas with boulders, emergent or submerged aquatic vegetation, large woody debris, bare cobbles, or bedrock areas.

Minnow traps were set overnight to ensure that the dawn and dusk periods were sampled. Minnow trapping is a non-lethal fishing method, so there was no concern that long set times could be detrimental to fish populations.

Beach Seine

One or two beach seine passes were conducted in each lake in which suitable habitat was present. The beach seine net was approximately 20 m long and 1.5 m deep, with 5 mm mesh. Lakes with organic sediments in the littoral area could not be beach seined effectively, as the seine filled with muck and was very difficult to pull to shore. Any fish caught in these sets would have been very difficult to locate as well. Some lakes were not beach seined due to logistical difficulties in the field, such as soft treacherous footing along the shoreline or long (>200 m) portages when the lakes were accessed overland.

Habitats with bedrock, small cobble and fine sediments were beach seined on foot or by boat, depending on the slope and strength of the substrate. If field staff could walk through the water without falling or sinking into the substrate then the beach seine was set by walking. If field staff could not safely walk through the water then the net was deployed by boat.

The net was dragged perpendicularly away from shore until it was approximately two thirds deployed, then parallel to shore until fully deployed, then straight toward shore. Both ends of the net were then pulled together and out of the lake until any fish within the seined area were caught in the net mesh.

Dip Net

In several lakes, littoral habitats providing cover were dip netted using two handheld nets. Each net had a 1 m long handle, 0.5 m opening, and approximately 25 mm mesh. Field staff moved the net quickly through cover habitat, such as areas with aquatic vegetation, by walking along the lake edge, or by driving the boat through the littoral area. Each dip-netted area was visually scanned before sampling to search for fish; if a fish was seen then the fish was targeted with the dip net. If no fish were seen then the net was used to sweep the habitat to capture any fish present. One or two patches of suitable habitat were sampled in each lake; patches of emergent vegetation were sampled most frequently.

5.4.1.2 Catch Rate Calculations

The catch per unit effort (CPUE) for the gill net sampling was calculated for each species in each lake. The CPUE was calculated as the number of fish caught per hour that the net was set. Each sampling date was considered separately; data from both nets were combined when more than one net was set. The CPUE data cannot be used to estimate absolute fish density. However, they can be used qualitatively to describe relative fish density in the different years. They can also be used for comparison with future capture rates following mine activation.

5.4.1.3 Species Identification

Captured fish were removed from the fishing gear carefully to minimize injury, and placed in a large container of water. All fish were identified to species in the field. Any unfamiliar species were brought to the laboratory for identification using Scott and Crossman (1998). Voucher specimens were collected for species with uncertain identification, if possible; otherwise, photographs of the fish were taken for later confirmation of identification using McPhail and Lindsey (1970).

5.4.2 Fish Habitat

Each lake was classified as fish bearing or non-fish bearing based on the results of the physical habitat (including watercourse investigations), water quality, and fish presence assessments discussed above. Lakes were identified as non-fish bearing if three criteria were met:

- No fish were captured in two years of study
- The lake is isolated from known fish bearing habitat
- The winter water quality data indicate that dissolved oxygen concentration is below the acute minimum value for the protection of aquatic life (5 mg/L; CCME 1999).

Dissolved oxygen, which is required by aquatic organisms for survival, varies in concentration throughout the year. The primary sources of dissolved oxygen are the atmosphere and photosynthesis of aquatic plants and algae. Oxygen is consumed by respiring aquatic organisms and oxidative decomposition of organic material. The sources of dissolved oxygen in northern lakes are cut off by ice in the winter, but respiration and decomposition continue, resulting in decreasing dissolved oxygen concentrations as the winter progresses. The dissolved oxygen levels can become so low that aquatic organisms die. Low dissolved oxygen concentrations can also lead to developmental deformities in developing fish eggs.

The CCME guideline for the minimum concentration of dissolved oxygen to prevent acute effects on aquatic life is 5 mg/L. The guideline for the minimum concentration sustained for seven days is 6.5 mg/L. Fish are known to survive below these concentrations, but concentrations below these guidelines can lead to mortality.

Sensitivity to low dissolved oxygen concentrations varies between species. Northern pike are very tolerant and have been found alive at 0.04 mg/L (Casselman 1978). However, a threshold of 5 mg/L for lethal and sub-lethal effects is representative for a broad range of species.

The plankton community was also considered in the determination of fish bearing status as there is generally an inverse relationship between maximum zooplankton body size and the degree of fish predation (Vanni 1988). If the plankton community was indicative of a fishless lake (i.e., if large zooplankton species were present, particularly the predators *Chaoborus* and *Heterocope*), it was considered supporting evidence for identifying the lake as non-fish bearing.

If no fish were captured but other parameters would not definitively exclude fish presence then the lake was suspected to be non-fish bearing.

5.4.3 Fish Biometrics and Health

5.4.3.1 Field Methodology

Fish Processing

Length and weight were measured in the field while fish were as fresh as possible to avoid changes that can occur due to rigor mortis. Fish that were still alive were measured and released alive, if possible. Fish that were alive but injured, such that they were unlikely to survive if released, were

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euthanized with a blow to the head and a blade through their gills to minimize suffering. Fork length of all captured fish were measured in the field using a fish measuring board with millimeter markings. Wet weight of each fish was also measured; in 2008 fish were weighed with a spring scale with 10 g precision (Accu-weigh tubular spring scale, 2 kg, 20 g) due to difficulties with the electronic scale; in 2009 fish were weighed with an electronic scale with 0.1 g precision (Ohaus Scout Pro SP4001).

Each fish was examined for external parasites when its length and weight were measured. See Section 5.4.2.2 for further discussion of fish parasites.

Tissue Sampling and Fish Dissection

The captured large-bodied species (northern pike, lake whitefish and lake cisco) from each lake, were brought back to the camp laboratory for dissection and collection of aging structures and tissue samples. A maximum of twelve fish of each species were sampled from each lake; if more than twelve fish were caught then fish were selected to sample as wide a range of lengths as possible.

The camp laboratory was located in one of the geologists' core processing tents. The fish processing laboratory was set up anew each day, and all tools were stored in a closed container between uses to minimize contamination. The core tent tables were covered in plastic, and fish were kept in plastic trays during dissection. The plastic trays were wiped with clean paper towel and deionized water regularly to prevent contamination between fish. All tools used to collect tissues were wiped with deionized water between fish, and new scalpel blades were used for each species. Staff wore nitrile gloves when handling fish and samples, and changed gloves between species. Care was taken not to pierce sampled organs with any tools.

Age structures were removed from each dissected fish. In 2008, scales were removed from lake whitefish and northern pike. In 2009 otoliths were removed from lake whitefish and lake cisco, and cleithra were removed from northern pike. All age structures were cleaned and stored in paper coin envelopes until they were sent to the ageing lab. Scales and otoliths were sent to Hamaguchi Fish Aging Services for aging, and cleithra were sent to North/South Consultants Inc. Age structure data can be used to estimate the growth rates of fish in different lakes; this analysis was not conducted for this interim TDR.

A block of muscle tissue, without skin or bones, was removed from each northern pike and lake whitefish. The block was removed from the left dorsal surface (above the lateral line), from the posterior margin of the dorsal fin to the posterior end of the fish. In small fish, the block was removed from the anterior margin of the dorsal fin to the posterior end of the fish. The samples were weighed to 0.01 g (Ohaus Pro Scale PS202). At least 10 g of tissue is required for laboratory analysis; if the tissue block was too small then a second block of tissue was collected from the same location on the right side of the fish. Care was taken not to cut into the tissue blocks. The muscle blocks were frozen promptly and sent to ALS Laboratory Group for mercury analysis. See Section 5.4.2.3 for further discussion of tissue metals analyses.

The body cavity of each fish was opened and the internal organs examined for visible parasites. See Section 5.4.2.2 for further discussion of fish parasites.

The gender of each fish was determined by examining the gonads. If the fish was too small for its gender to be reliably identified, it was considered immature. In 2009 the gonads were removed whole and weighed to 0.01 g. A gonad sample of approximately 1 g was removed from each female, weighed, and stored in 10% formalin. These samples will be used to determine the proportion of eggs that were mature and immature.

The liver was removed, without the gall bladder or bile duct, and weighed to 0.01 g. The livers were frozen promptly and sent to a laboratory for metals analysis. In 2008 samples were sent to Saskatchewan Research Council (SRC) and in 2009 samples were sent to ALS Laboratory Group. In both years, composites of the liver samples were prepared and analyzed by SRC for the rare earth elements lanthanum (La), gadolinium (Gd) and yttrium (Y). See section 5.4.2.3 for further discussion of tissue metals analyses.

5.4.3.2 Length-Weight, Age and Condition Parameters

Length and Weight Measurements

The length-weight relationship indicates whether the fish grow isometrically (maintain the same shape as they grow) or allometrically (change shape as they grow), and is used in the calculation of fish condition. Length-weight relationships are best described using a power function

$$W = aL^b$$

Where:

W is wet weight, L is fork length, and a and b are model parameters. Growth is isometric when b equals 3, and is allometric for other values of b .

Length-weight relationships are calculated based on \log_{10} transformed data, which results in a linear rather than a power relationship.

$$\log_{10} W = \log_{10} a + b \log_{10} L$$

The length-weight relationships for fish caught in this study have not yet been calculated.

Condition – Relative Weight

Relative weight describes the condition, or „plumpness“, of the fish. It can be used to compare fish of different lengths and different populations when growth is allometric (i.e., when b in the length-weight relationship above is not equal to 3). The relative weight is calculated using a species-specific standard-weight equation prepared for that species using data from a minimum of 50 populations.

The relative weight is calculated using the formula

$$W_r = (W/W_s) \times 100$$

Where:

W_r is the relative weight, W is the weight of the individual fish, W_s is the standard weight calculated for that fish based on its length using the standard weight equation, and 100 is a constant.

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Standard weight equations are available for three of the species in this study: northern pike, lake whitefish and lake cisco. These standard weight equations are based on total lengths, not fork lengths. Measured fork lengths of fish in this study were converted to total lengths using published formulae. Standard weight and conversion equations are presented in Table 5-10.

Table 5-10: Fork Length to Total Length Conversions and Standard Weight Equations for Northern Pike, Lake Whitefish and Lake Cisco

Species	Fork Length to Total Length Conversion ^a	Standard Weight ^b
Northern pike	$TL = 0.442 + 1.048(FL)$	$\log_{10} W_s = -5.437 + 3.096(\log_{10} TL)$
Lake whitefish	$TL = 6.885 + 1.095(FL)$	$\log_{10} W_s = -5.560 + 3.218(\log_{10} TL)$
Lake cisco	$TL = 1.102(FL)$	$\log_{10} W_s = -5.517 + 3.224(\log_{10} TL)$

NOTES

^a Fork length to total length conversions from: Casselman (1996) for northern pike; Fisher and Fielder (1998) for lake whitefish; and Carlander (1969) for lake cisco

^b Standard weight equations from: D.W. Willis, South Dakota State University (unpublished) for northern pike; Rennie and Verdon (2008) for lake whitefish; Fisher and Fielder (1998) for lake cisco.

Age

Scales and otoliths were aged by Hamaguchi Fish Aging Services. Scales are aged by viewing through a microscope and counting the light and dark rings, which indicate periods of faster (summer) and slower (winter) growth. Clean otoliths are aged by cutting them in half, as close to the annulus (oldest part of the otolith) as possible. The cut surface is then burned slowly in an alcohol flame until it became an orange colour. The cut surface is brushed with canola oil and examined under a microscope. The light and dark rings are counted, as in scales. Photographs of the cut surfaces are taken when the whole surface can be brought into focus at once. A photograph of an aged otolith is presented in Appendix D.

Northern pike cleithra were aged by North/South Consultants Inc. Cleithra do not require preparation prior to aging except for cleaning. The cleithra were read a minimum of two times and, if consistency was not met between the first two readings, a third was taken. All readings were conducted „blind“ (i.e., independent from each other). Second and third ageing technicians review a sub-sample (i.e., 10%) of the ages provided by the first ageing technician. These readings are conducted to look for consistency and accuracy. These quality control readings are also conducted as „blind“. A laboratory methodology document is presented in Appendix D.

Age was measured to record the age ranges of fish in the Thor Lake area. Growth analyses may be possible in the future, but more age data would be necessary.

Organosomatic Indices

The average gonadosomatic index (GSI) and hepatosomatic index (HSI) were calculated for each species (northern pike, lake whitefish and lake cisco) collected in 2009 in each lake. The gonadosomatic index (GSI) is the ratio of ovary weight to body weight. It is an indication of stage of ovary development. The GSI indicates whether different populations are at approximately the same

maturity stage. The hepatosomatic index (HSI) is the ratio of liver weight to body weight. The HSI may decrease in starved fish, or increase in fish exposed to toxins.

5.4.3.3 External and Internal Parasite Assessment

Visible external parasites and other signs of injury or poor health were recorded for each captured fish as it was being measured for length and weight. The body surface, lips and jaws, mouth, eyes and gills of each fish were examined. The type of parasite was also recorded if the field staff could readily identify it.

Visible internal parasites and cysts were recorded for each sampled fish when it was dissected. The body cavity, liver surface and surface of the gastro-intestinal tract were examined. Parasites were occasionally identified in other tissues or in the gut, but no specific examination of other tissues was conducted.

Field staff were not specifically trained in fish parasitology and did not use magnifying devices to search for parasites; these data are an indication of the presence of large, visible parasites only. Photographs were taken of the more common types of parasites, but specimens were not collected for identification.

5.4.3.4 Tissue Metals Analysis

Muscle and liver tissue samples from large bodied species (northern pike and lake whitefish) were analyzed for total mercury and a metals scan. If northern pike or lake whitefish were not present then another large bodied species was sampled, if possible. In 2009 lake cisco were also sampled, as they are a candidate species for long term monitoring. Lake cisco were only sampled in lakes that were expected at the time of the survey to be directly affected by mining activities (A and Great Slave), and in two candidate control lakes (Redemption and Carrot).

Arctic grayling were sampled for tissue metals analyses in the Great Slave dock site in 2008 because only three northern pike were caught.

Mercury

Muscle samples from northern pike and lake whitefish were sent to ALS Laboratory Group to be analyzed for total mercury content using cold vapour atomic spectrophotometry. The detection limit for mercury was 0.001 mg/kg wet weight, which is suitable for comparison with BC guidelines for total Hg concentration in edible tissue when the human diet is based primarily on fish (BC-MOE 2006). Human consumption of fish tissue should be limited to a maximum weekly amount of 1050 g when total mercury concentration in fish tissue reaches 0.1 mg/kg wet weight; recommended quantities for safe weekly consumption decrease as mercury concentrations increase and no tissue with mercury concentration higher than 0.5 mg/kg wet weight should be consumed.

Metals Scan

Livers from northern pike, lake whitefish and lake cisco were sent to SRC in 2008 and ALS Laboratory Group in 2009. The samples were analyzed for metal concentrations using inductively coupled plasma mass spectrometry (ICP-MS). The two labs analyze slightly different metals and

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have slightly different detection limits (Table 5-11). However, all detection limits are below the available guidelines for tissue metals concentrations (Table 5-12). Guidelines for tissue metals concentrations are only available for methyl and total mercury (discussed above), lead and selenium.

Table 5-11: Metals Included in the ICP-MS Metals Scans at SRC and ALS Laboratories, and the Detection Limits at Each Facility

Metal	SRC Detection Limit (mg/kg wet weight)	ALS Detection Limit (mg/kg wet weight)
Aluminum (Al)	0.02	2
Antimony (Sb)	0.05	0.01
Arsenic (As)	0.02	0.01
Barium (Ba)	0.02	0.01
Beryllium (Be)	0.005	0.1
Bismuth (Bi)	–	0.03
Boron (B)	0.5	–
Cadmium (Cd)	0.005	0.005
Calcium (Ca)	–	2.0
Chromium (Cr)	0.2	0.1
Cobalt (Co)	0.005	0.02
Copper (Cu)	0.02	0.01
Iron (Fe)	0.05	–
Lead (Pb)	0.005	0.02
Lithium (Li)	–	0.1
Magnesium (Mg)	–	1.0
Manganese (Mn)	0.05	0.01
Molybdenum (Mo)	0.05	0.01
Nickel (Ni)	0.02	0.1
Rubidium (Rb)	0.02	–
Selenium (Se)	0.02	0.2
Silver (Ag)	0.005	–
Strontium (Sr)	0.05	0.01
Thallium (Tl)	0.02	0.01
Tin (Sn)	0.02	0.05
Titanium (Ti)	0.02	–
Uranium (U)	0.002	0.002
Vanadium (V)	0.05	0.1
Zinc (Zn)	0.2	0.1

Table 5-12: British Columbia Ministry of Environment Guidelines for Tissue Metals Levels

Metal	Criterion	Guideline Maximum (mg/kg)
Lead (Pb)	Human consumption	0.8
Selenium (Se)	Aquatic life	1.0

Rare Earth Elements

The concentrations of three rare earth elements – lanthanum, gadolinium and yttrium – were analyzed in composite liver samples for each species in each lake. Very little information is available on the potential toxic effects of any rare earth elements, although available literature suggests that the acute toxicity of these elements is low to moderate (e.g., Tu, *et al.* 1994). Rare earth elements are the target minerals of the Thor Lake Project and were, therefore, selected for analysis.

Composite liver samples were analyzed by SRC using ICP-MS for La, Gd and Y at a detection limit of 0.02 mg/kg wet weight. No guidelines exist for tissue concentrations of any rare earth elements.

6 LAKE SURVEY RESULTS OVERVIEW

The following section outlines findings to date from the aquatics and fisheries baseline programs. An overview of the results is presented first, followed by details on key findings at individual lakes, organized into lake groupings. Study lakes were grouped geographically based on known or anticipated drainages, as shown in Table 6-1, not on results of the aquatics or fisheries surveys.

Table 6-1: Groupings of Lakes by Known or Presumed Drainage System

Drainage System	Lakes	Aquatic Station Name
Thor	Thor West and Thor East	Thor West (TL-06) and Thor East (TL-07), plus original stations (TL-01 and TL-02)
	Long	LL-02, plus original station (LL-01)
Cressy	Cressy	FL-02
	Fred	FL-01
	A	FL-03
Ring	Ring	TL-04
	Buck	UN-12
	Drizzle	UN-13
	Murky	UN-10
	Egg	UN-11
Reference ¹	Kinnikinnick	UN-08
	Redemption	UN-14
	U	no station
	Carrot	no station

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Drainage System	Lakes	Aquatic Station Name
Tardiff	North Tardiff	NT-01
	South Tardiff	ST-01
Tributary ²	Thorn	TL-03
	Megan	TL-05
	Wasp	UN-04
	Pistol	UN-05
	Porkchop	UN-07
Blachford ³	Blachford (bay)	BL-01
	Dinosaur	UN-09
Elbow	Elbow North	EL-01
	Elbow South	EL-02
Great Slave	Great Slave (proposed port location)	GL-01

NOTES:

¹ These lakes are not in the same drainage but are grouped because of their distance from the Project and potential suitability as reference lakes

² The Tributary lakes drain into Thor Lake (Thorn and Megan) or Long Lake (Wasp, Pistol, Porkchop)

³ Dinosaur appears to drain indirectly into Blachford through a series of lakes

The 2008-2009 water quality dataset is presented in Appendix F3 while summary statistics are presented in Appendix F2. Data for sediment, phytoplankton, zooplankton and fish are included in Appendices G, H, I, J and K, respectively.

6.1 Physical Environment

6.1.1 Bathymetry

Bathymetric maps were prepared and lake morphometric measurements were made for 11 lakes (see Figures 6-1 through 6-11 in Appendix A). Lake morphometric measurements are presented in Table 6-2. Maximum depths of lakes surveyed in 2009 are also presented in Table 6-2.

The deepest lake surveyed in both year was Carrot in 2009 (36 m). Seven of the lakes were 2 m deep or less, and nine of the lakes were more than 8 m deep. Total depths, surface areas and volumes ranged from 1.7 m (North Tardiff) to 36 m (Carrot), 14,109 m² (North Tardiff) to 1,452,875 m² (Thor), and 14,260 m³ (North Tardiff) to 5,054,270 m³ (Thor), respectively.

Great Slave Lake and Blachford Lake are not presented in Table 6-2, as these sites are open bays with no defined edge. At the Great Slave Lake site the deepest location surveyed was 24 m. The west side of the bay is steeper than the east side. The bay slopes steadily from its northern point, where a small watercourse flows into the lake, toward the southwest at a 12% grade. At the Blachford Lake site the deepest location surveyed was 5.3 m.

Table 6-2: Lake Morphometric Measurements

Lake	Surface Area (m ²)	Littoral Area (m ²)	Deep Area (m ²)	Maximum Depth (m)	Total Volume (m ³)
A	132,751	25,477	71,083	18	1,099,806
Blachford				5.3	
Buck				2.0	
Carrot				36	
Cressy	64,366	25,672	0	7.5	211,756
Dinosaur				5.1	
Drizzle				2.5	
Egg				10	
Elbow				17	
Fred	49,499	49,499	0	1.9	39,940
Kinnikinnick				20	
Long	304,352	60,821	75,611	16	1,745,591
Megan	96,912	56,302	0	6.6	241,419
Murky				2.3	
North Tardiff	14,109	14,106	0	1.7	14,260
Pistol				1.8	
Porkchop				17	
Redemption				15	
Ring				1.8	
South Tardiff	37,018	37,018	0	1.9	39,260
Thor ¹	1,452,875	436,939	99,361	16	5,054,270
Thorn	59,249	20,046	0	5.9	184,822
Wasp				2.5	

NOTES

¹ Additional bathymetric data collected in 2010 may change the total volume calculation slightly

6.1.2 Lake Water Quality Profiles

Water quality profiles show that mean water temperature across the study area was 9.3°C in the open water season (June to October) and 2.0°C during winter (March). Mean pH generally was lower in winter (7.55) than during the open water season (8.09). Dissolved oxygen fluctuated seasonally and the shallow lakes generally had anoxic conditions in the winter (< 5% dissolved oxygen). Winter ice thickness was similar in 2008 and 2009, ranging from 0.54 to 1.0 m (mean of 0.69 m) in 2008 and 0.56 to 1.14 m (mean of 0.70 m) in 2009. Water quality profiles for each sample station are included in Appendix E and are organized by season. Lake stratification and limnological patterns will be discussed in the Final TDR following graphical analyses of the profile data.

6.1.3 Littoral Area

Substrate in the littoral areas varied from bedrock to organic muck (Table 6-3). All rocky substrates were coated in algae and a film of organic matter, and a layer of algae was often visible on shallow fine and organic sediments.

Several species of submerged and emergent aquatic plants were present in the lakes. The plants are discussed here based whether their stems and leaves are submerged, floating, or emergent (Table 6-3). Floating and emergent species were most abundant in the littoral areas. Floating plants included one or more pondweed species in the genus *Potamogeton* (possibly *P. natans*) and a lily species in the genus *Nuphar* (possibly *N. variegatum*). Emergent plants included various grasses, sedges and rushes, and a horsetail species (*Equisetum fluviatile*). Submerged species were not identified. Volume 5 – Vegetation presents the results of the 2009 vegetation studies, which included some shoreline vegetation.

Large woody debris and large boulders, both of which provide habitat structure and cover for small fish, were often absent, and when present were not abundant.

The locations of different types of littoral substrates and aquatic vegetation were recorded in the field using a GPS. These locations have not yet been mapped, but will be displayed in the final version of this baseline study report.

Table 6-3: Littoral Substrates and Aquatic Vegetation Types Present in Study Lakes

Lake	Littoral Substrate	Littoral Aquatic Vegetation
A	Cobbles, some boulder/bedrock patches	Patches of emergent plants Small area of floating plants
Buck	Organic muck	Abundant floating plants
Carrot	Bays: fines and organic muck Most of lake: steep bedrock, boulders	Floating plants present in bays only
Cressy	Bays: organic muck Most of lake: steep bedrock and cobbles	Floating plants along south shoreline and east and west bays
Drizzle	Organic muck with some large boulders	Low density of emergent and floating plants over most of lake
Elbow	South bay and west arm: organic muck Most of lake: gravel and cobble	Emergent plants common throughout
Fred	Organic muck	Floating plants common throughout
Great Slave	Boulders and cobbles	None
Kinnikinnick	Boulders, cobbles, steep bedrock	Emergent plants in shallow bays only
Long	Cobbles, boulders, steep bedrock	Emergent plants common throughout Floating plants abundant at west end
Megan	Cobbles, small bedrock patches	Emergent and floating plants present, not abundant
Murky	Organic muck	Floating plants abundant
North Tardiff	Organic muck	Floating plants very abundant

Lake	Littoral Substrate	Littoral Aquatic Vegetation
Redemption	Bedrock, boulders	Floating and submerged plants in bays only
Ring	Organic muck with some boulders Small bedrock areas	Floating and emergent plants abundant throughout
South Tardiff	Organic muck	Floating plants abundant
Thor	Cobbles, gravels, boulders, bedrock, fines,	Emergent plants present throughout Floating and submerged plants in sheltered areas
Thorn	Boulders and cobbles	Emergent plants present throughout Floating plants present in small patches

6.1.4 Riparian Area

The riparian area of over 80% of the lakes was dominated or co-dominated by black spruce (*Picea mariana*) (Table 6-4). Other species associated with black spruce include paper birch (*Betula* sp), tamarack (*Larix laricina*), dwarf birch (*Betula* sp) and Labrador tea (*Ledum* sp.). Where black spruce forests grew to the lake boundaries, either grasses or shrubs, such as willow (*Salix* sp.), grew along the shoreline. This black spruce vegetation group is a potential source of large woody debris to the lakes.

Two additional types of ecosystems were present or predominant at several lakes: wetland and bedrock bluff (Table 6-4). Wetland areas included mats of floating vegetation around the edges of several of the lakes, as well as wetlands dominated by grasses and willows. Wetlands dominated the riparian area at three of the lakes (Buck, and North and South Tardiff), and were present at over 50% of the lakes in total. At least one small area of bedrock bluff was present at almost every lake, and bedrock bluffs formed a substantial amount (approximately half) of the riparian area at four lakes (Carrot, Cressy, Kinnikinnick and Long).

The types of riparian communities present at the fisheries study lakes are listed in Table 6-4. The locations of different types of riparian groups were recorded in the field using a GPS. These locations have not yet been mapped, but will be displayed in the final version of this baseline study report.

Table 6-4: Riparian Plant Groups Dominant (D), present (✓) and Absent (-) at Study Lakes

Lake	Black Spruce Forest	Wetland	Bedrock Bluff
A	D	✓	✓
Buck	✓	D	✓
Carrot	D	-	D
Cressy	D	✓	D
Drizzle	D	✓	✓
Elbow	D	✓	✓
Fred	D	✓	-

Lake	Black Spruce Forest	Wetland	Bedrock Bluff
Great Slave	D	–	✓
Kinnikinnick	D	–	D
Long	D	–	D
Megan	D	–	✓
Murky	D	✓	✓
North Tardiff	✓	D	–
Redemption	D	–	✓
Ring	D	✓	✓
South Tardiff	✓	D	–
Thor	D	–	✓
Thorn	D	–	✓

6.2 Water and Sediment Chemistry

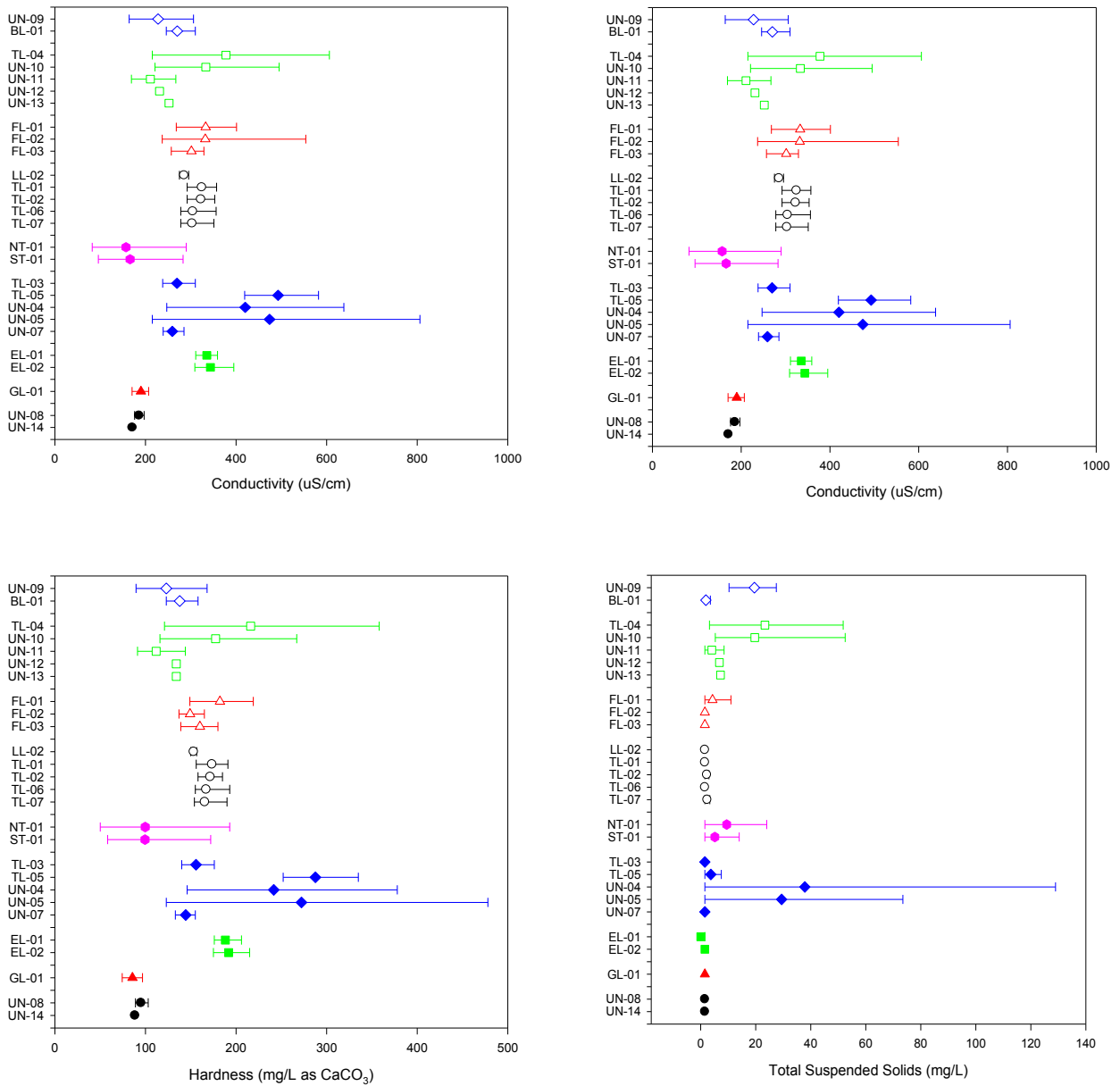
6.2.1 Water Chemistry

Neutral to basic conditions were observed at all sample stations, with mean pH ranging from 7.07 to 8.62. Mean conductivity ranged from 157 to 493 $\mu\text{S}/\text{cm}$ and hardness ranged from 86 to 288 mg/L. Nutrient levels tended to be very low. Mean nitrate, ammonia and total phosphate values were low or below detection at many samples stations, though levels were higher and more variable in Fred, Cressy, North Tardiff, South Tardiff, Megan, Wasp and Pistol lakes (shown in Figure 6-12).

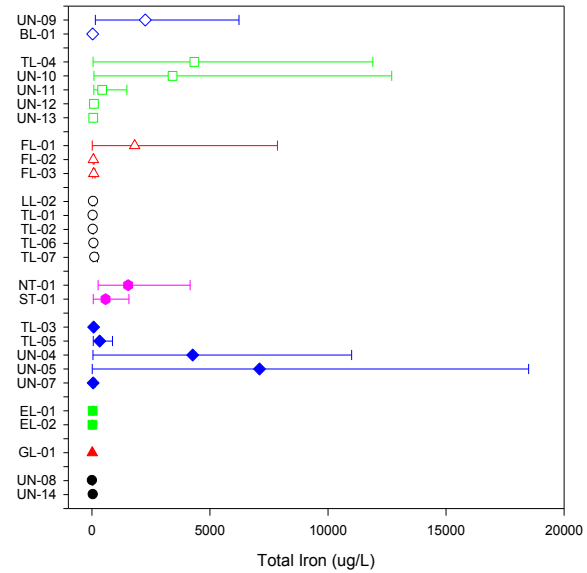
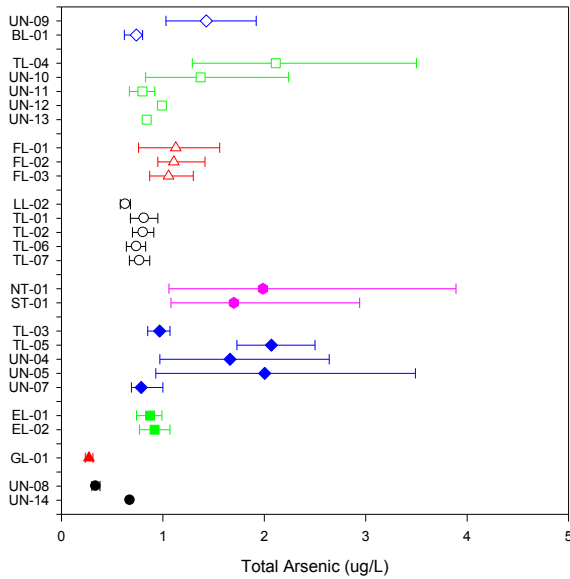
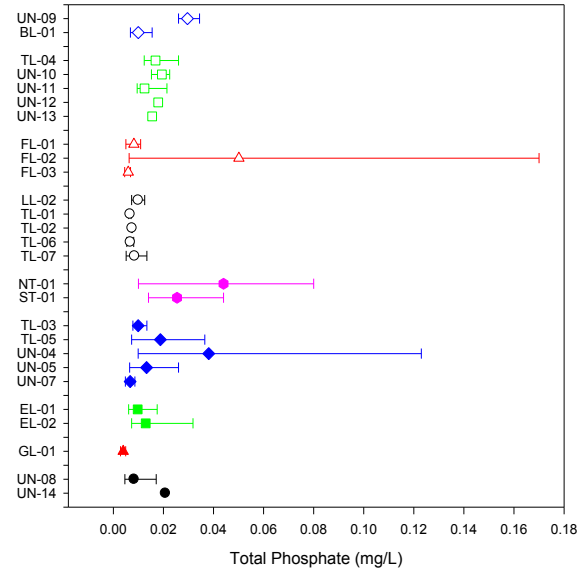
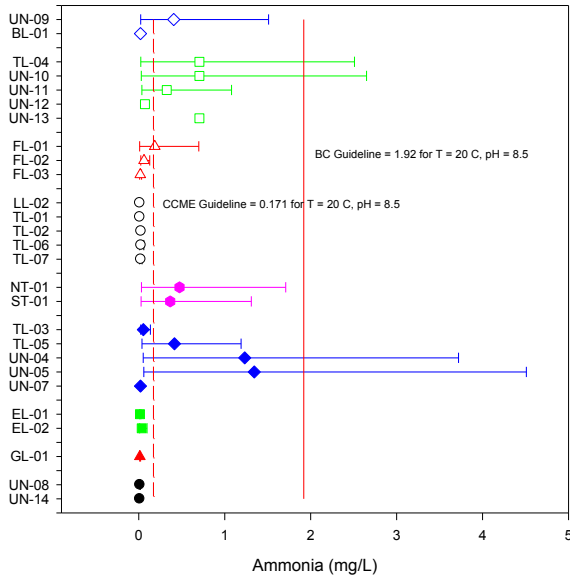
Large fluctuations were observed in many general chemistry and metal parameters through the 2008-2009 data, as indicated by minimum and maximum values for each sampling station (see Figure 6-12). Large fluctuations at some sample stations were related to conditions during winter sampling. Many shallow lakes (less than 3 m deep, including Dinosaur, Wasp, Murky, Fred, Pistol, North Tardiff and South Tardiff) exhibited highly reducing, anoxic conditions under ice in winter, which decreased pH and increased solubility of many metals and other compounds. Larger and/or deeper lakes (e.g. A, Thor, Elbow, Kinnikinnick, Porkchop, Thorn and Great Slave) showed slight increases in metals, conductivity, hardness and total phosphate in winter, though the range of variation was much less than for the shallow lakes.

Figure 6-12: Minimum, Average and Maximum Levels of Several Water Quality Parameters in 2008 and 2009

Blue open diamonds: Blachford Group; green open squares: Ring Group; red open triangles: Cressy Group; black open circles: Thor Group; pink circles: Tardiff Group; blue diamonds: Tributary Group; green squares: Elbow; red triangle: Great Slave; black circles: Reference Group; red lines: CCME and/or BC Guidelines



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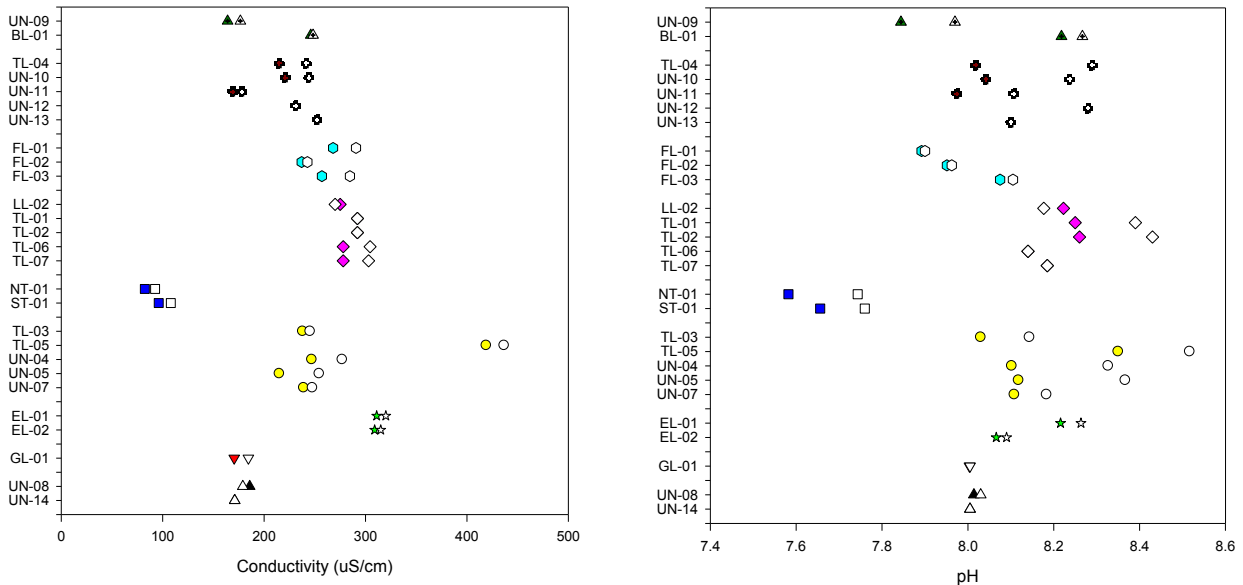
Winter water quality had a large effect on summary statistics for the shallow lakes, as the high values inflated the mean. This is depicted in Figure 6-13 where mean values, including and excluding winter data, have been plotted for specific parameters. Mean values for larger, deeper lakes are less affected by omission of winter data, showing less seasonal variation in general chemistry. Megan

Lake is one exception to this, though it would not be considered a shallow lake (maximum depth of approximately 6.6 m), and tends to have greater mean values for conductivity, pH, hardness, ammonia and total arsenic, with and without winter data, compared to other non-shallow lakes.

Conductivity, hardness, ammonia, total phosphate and total aluminum, arsenic, iron, manganese, strontium, and uranium values generally were greatest during winter in shallow lakes; the CCME guideline for total iron was exceeded in winter by 3.4 to 61 times. A combination of increased solubility and higher total suspended solids in winter likely caused the large increases in iron. Increased total suspended solids in shallow lakes in winter may also reflect difficulties encountered when sampling shallow lakes under ice (e.g., by suspension of bottom sediments).

Figure 6-13: Average Levels of Several Water Quality Parameters in 2008 and 2009, Including and Excluding Winter Water Quality Data (solid fill includes all data, no fill excludes winter data)

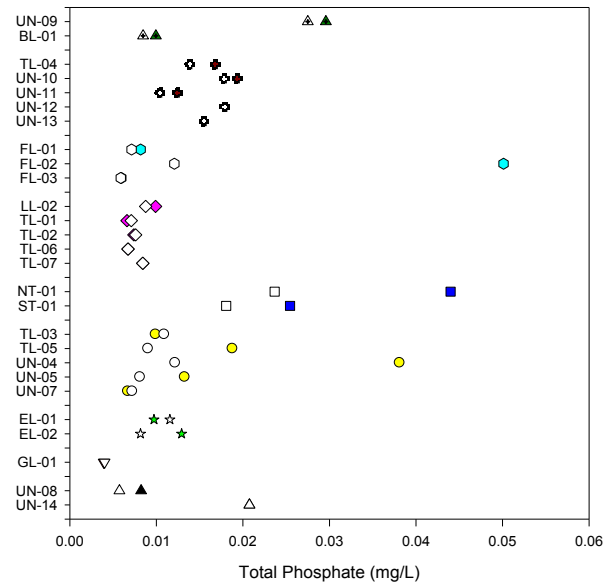
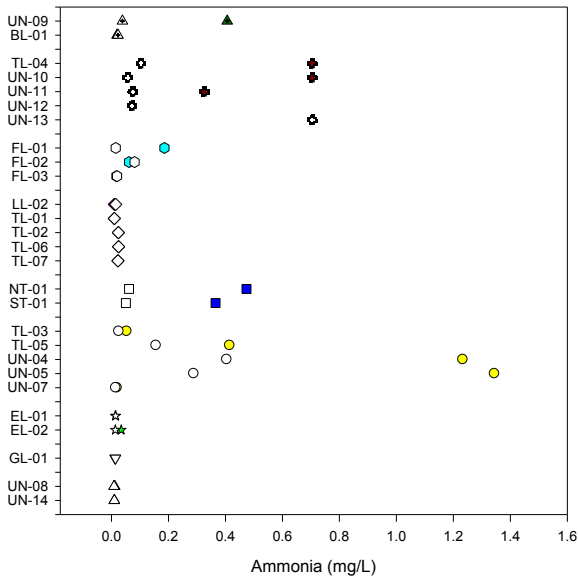
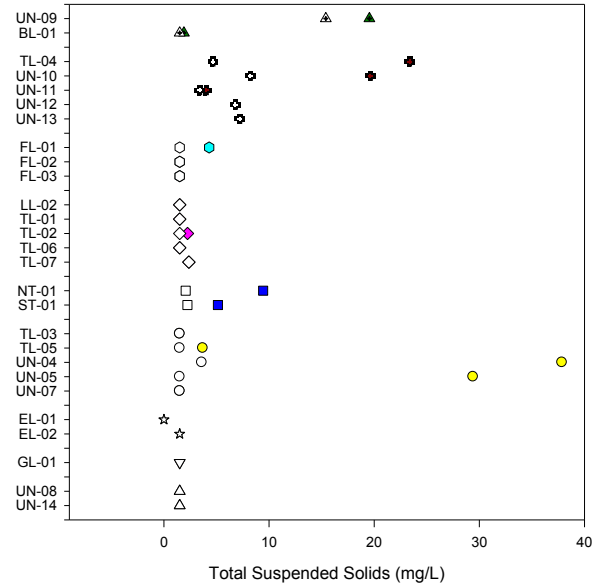
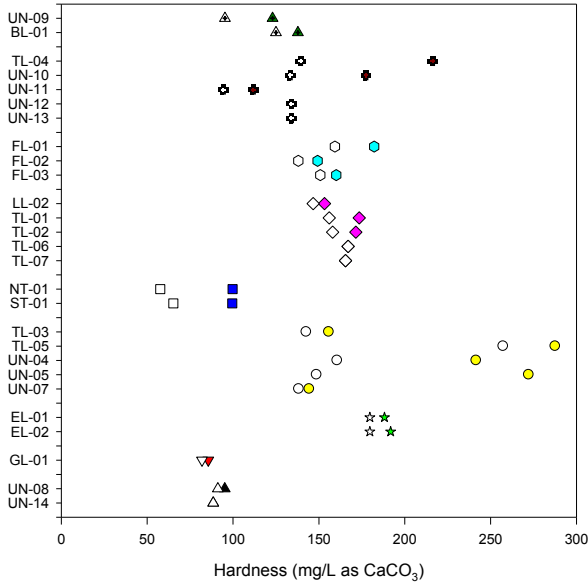
Triangles with plus sign: Blachford Group; plus signs: Ring Group; hexagons: Cressy Group; diamonds: Thor Group; squares: Tardiff Group; circles: Tributary Group; stars: Elbow; upside-down triangle: Great Slave; and, triangles: Reference Group.

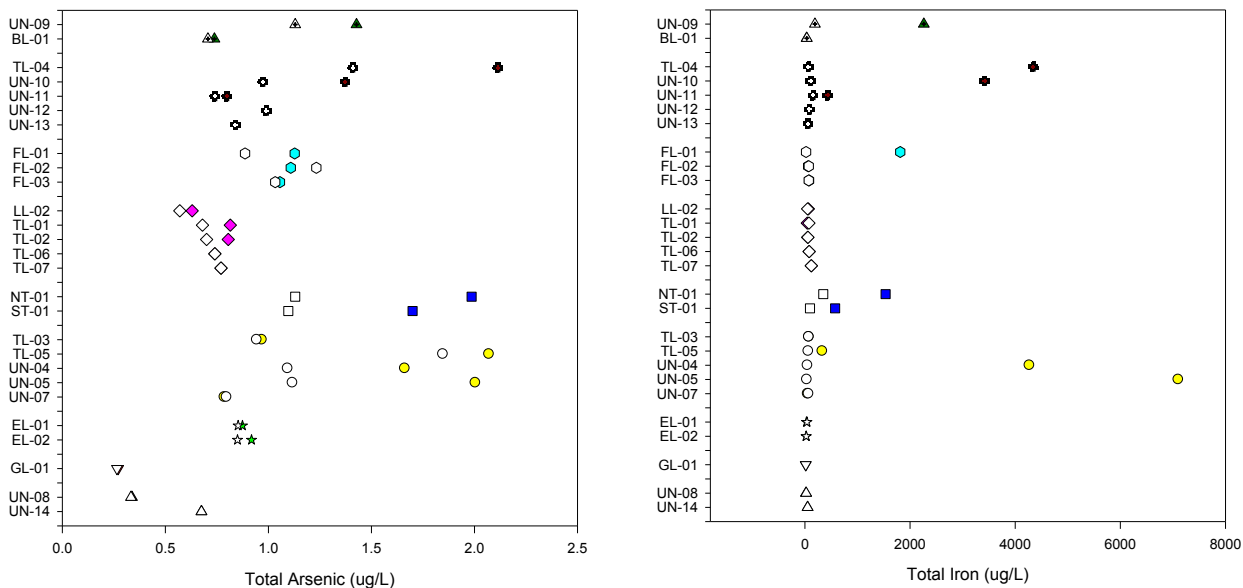


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Radionuclides results at all sample stations were typically below detection or less than five times the detection limit. No guideline exceedances were observed for any of the measured radionuclide parameters (lead-210, radium-226, radium-228, thorium-230 and thorium-232).

Differences in general chemistry between the lake groups were noted for the Tardiffs, Reference and Great Slave lakes, which had lower mean conductivity and hardness than the other lakes; mean pH was also lower in the Tardiffs. The Tardiff, Tributary and Ring lake groups tended to have higher mean ammonia, phosphate, iron and arsenic levels than the other groups, likely related to the shallow depth in the majority of these lakes.

6.2.2 Sediment Chemistry

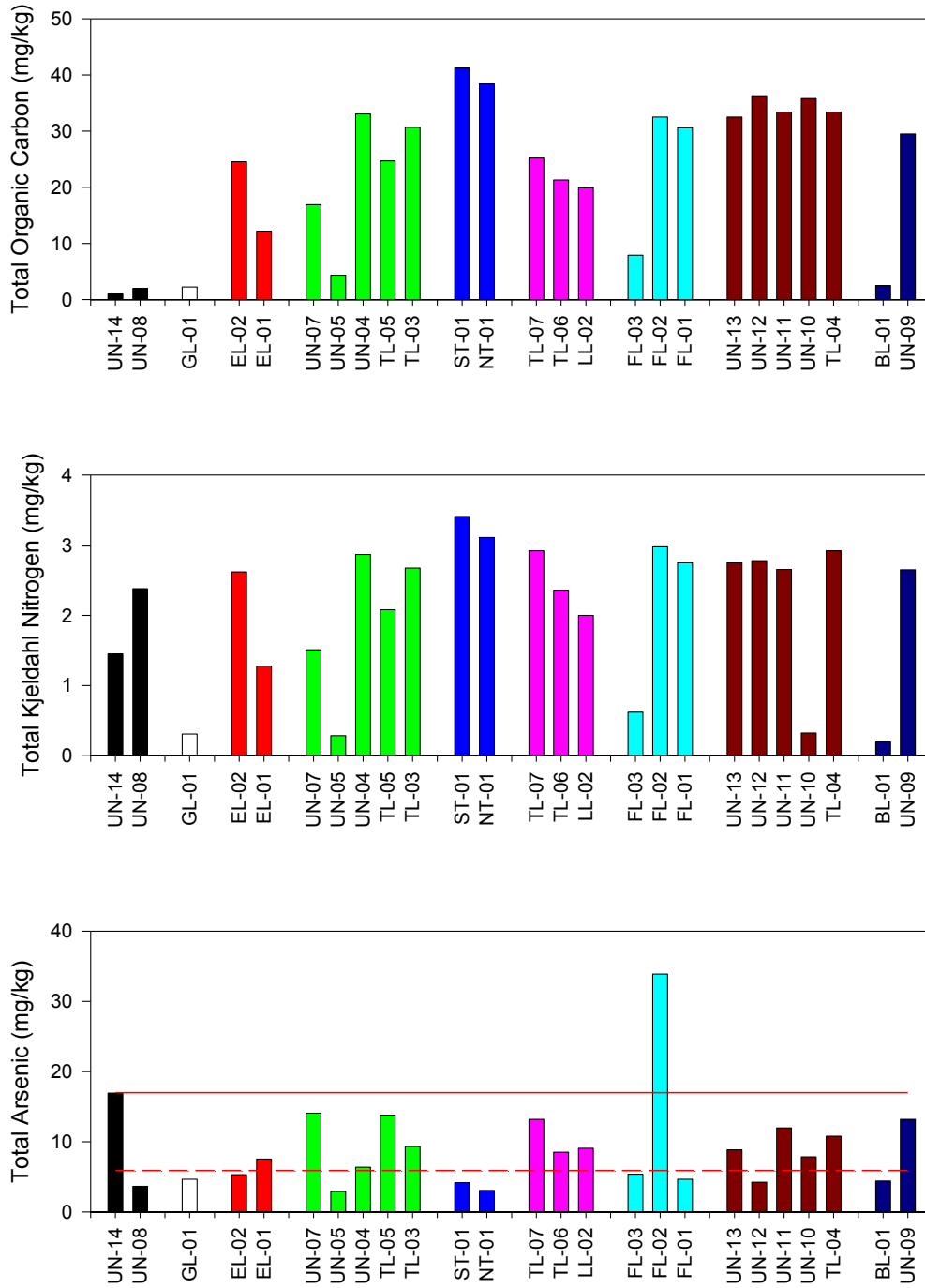
Sediment characteristics varied across the study area, though the lakes can be generally described as having high phosphorus content (306 to 1890 mg/kg) and with organic carbon comprising the greatest portion of total carbon; total organic carbon ranged from 2.24 to 41.2 mg/kg whereas inorganic carbon ranged from less than detection to 4.03 mg/kg. Total organic carbon (TOC) and Kjeldahl nitrogen were relatively high across the study area, though values were highest in the Tardiff group (see Figure 6-14). TOC concentration was lowest in the Reference group, while Blachford Lake showed the lowest Kjeldahl nitrogen.

Metal concentrations varied across the study area, ranging from less than detection to higher than guidelines. Arsenic exceeded its CCME ISQG at 60% of sample stations, followed by silver (32%), nickel (28%) and copper (16%). Arsenic and zinc also exceeded their CCME PELs at one sample station (Cressy Lake). No trends were identified in metal concentrations among lake groups.

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Figure 6-14: Average Levels of Several Sediment Quality Parameters in September 2009 (red dashed line indicates the CCME ISQG, solid red line indicates CCME PEL)



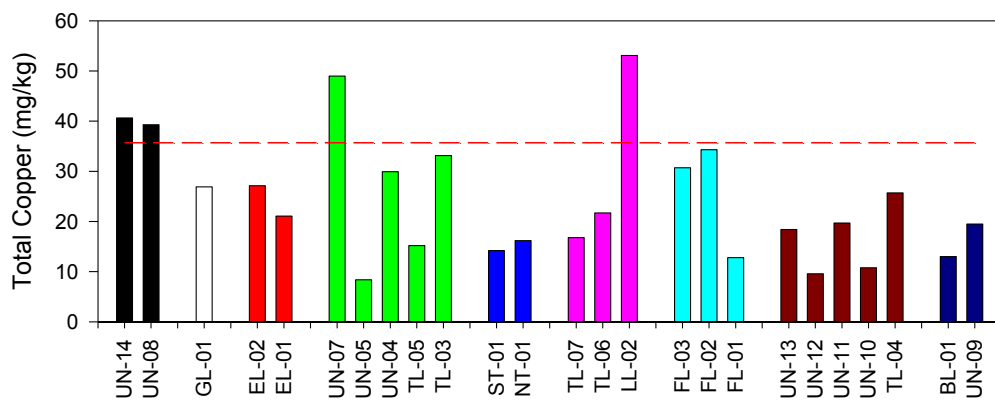
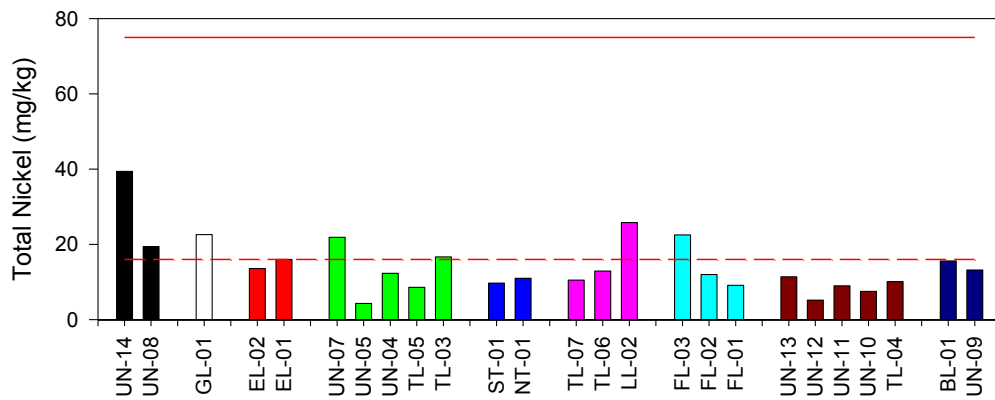
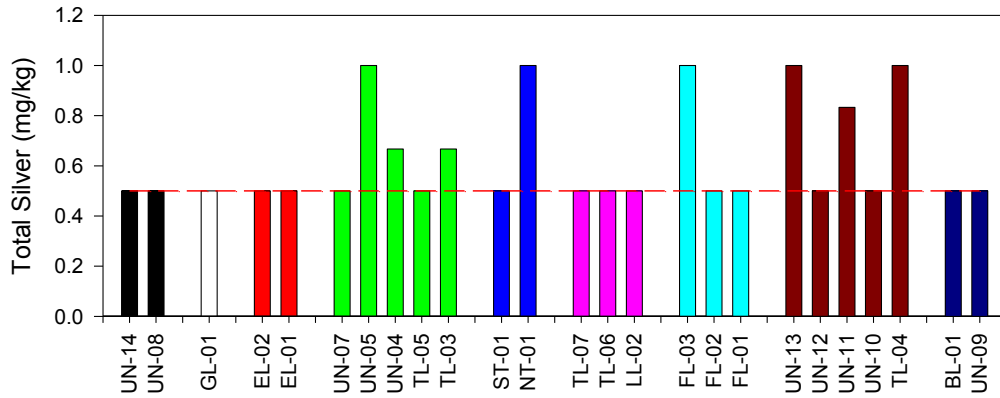
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6.3 Aquatic Organisms

6.3.1 Phytoplankton

6.3.1.1 Chlorophyll *a*

Chlorophyll *a* values ranged from 0.294 to 5.73 µg/L in June 2009, with a mean value of 1.84 µg/L (Table 6-5). Levels ranged from 1.08 to 14.6 µg/L in September 2009, averaging 3.18 µg/L. Based on these and mean station values, most of the lakes in the study area are considered oligotrophic (OECD 1982). Chlorophyll *a* concentrations in four lakes (Murky, Thorn, South Tardiff and Wasp) indicate more mesotrophic conditions, while results for Dinosaur Lake suggest a eutrophic state (OECD 1982).

Table 6-5: Chlorophyll Concentrations in Study Area Lakes in June and September 2009

Station	Chlorophyll <i>a</i> Results (µg/L)		
	June	September	
	Chl <i>a</i> ¹	Chl <i>a</i>	Phaeopigment
A	0.908	1.91	0.498
Blachford	0.626	1.42	0.379
Cressy	0.637	3.39 ^b	1.20 ^b
Dinosaur	4.90	14.60	7.74
Elbow North	0.675	2.24	0.662
Elbow South	1.28	4.05	0.480
Egg	–	2.69	0.400
Fred	0.294	1.77	1.39
Great Slave	1.03 ^b	1.08	0.230
Kinnikinnick	1.40	1.14	0.191
Long	0.816	2.07	1.07
Megan	0.930	3.21	0.450
Murky	2.14	8.22	4.11
North Tardiff	2.00	1.33	2.72
Pistol	1.26	3.36	0.721
Porkchop	1.31	1.26	0.381
Ring	2.52	2.68	0.650
South Tardiff	5.73	3.33	1.71
Thor West	1.76	2.23	1.43
Thor East	2.01	2.04	0.712
Thorn	2.46	3.88	1.67
Wasp	3.05	2.29	0.851

NOTE:

¹ Phaeopigment was not measured in June 2009

Phaeopigment concentrations (an indicator of phytoplankton senescence) were analyzed in September, but not in June. Comparing results for the individual stations, North Tardiff exhibited the highest senescence of phytoplankton (2.72 µg/L phaeopigment vs. 1.33 µg/L chlorophyll *a*) across the study area, followed by Fred (1.77 µg/L phaeopigment vs. 1.39 µg/L chlorophyll *a*) and Thor West (2.23 µg/L phaeopigment vs. 1.43 µg/L chlorophyll *a*). Elbow South showed the highest level of phytoplankton productivity and low senescence (0.48 µg/L phaeopigment vs. 4.05 µg/L chlorophyll *a*). Megan and Egg followed Elbow South, showing lower phytoplankton senescence (0.45 µg/L phaeopigment vs. 3.21 µg/L chlorophyll *a*, and 0.40 µg/L phaeopigment vs. 2.69 µg/L chlorophyll *a*, respectively).

6.3.1.2 Phytoplankton Taxonomy

Phytoplankton abundance in June 2009 ranged from 264 to 14,578 cells/mL, with the highest abundance reported at Dinosaur Lake (as for chlorophyll *a*) and the lowest at Great Slave Lake. Within lake groups, June phytoplankton abundance ranged from:

- 1,680 to 2,300 cells/mL in the Thor Group
- 379 to 1,619 cells/mL in the Cressy Group
- 2,010 to 2,968 cells/mL in the Ring Group (excludes Buck and Drizzle)
- 1,059 cells/mL in Kinnikinnick of the Reference Group (excludes Redemption)
- 890 to 923 cells/mL in the Tardiff Group
- 467 to 7,672 cells/mL in the Tributary Group
- 511 to 14,578 cells/mL in the Blachford Group
- 3,729 to 4,417 cells/mL in Elbow
- 265 cells/mL (average) in Great Slave.

In total 171 phytoplankton taxa were identified across the study area. Seven phytoplankton species were present at all stations including five diatom species, one yellow-brown (*Dinobryon* sp.) and one green alga (*Ankistrodesmus falcatus*). Additionally, 61 taxa were common to at least half of the stations. Taxon richness (number of taxa per site) varied from 38 to 81 species, with the highest number reported at Thor Lake and the lowest number reported at Great Slave Lake in June.

Phytoplankton species diversity ranged from 0.48 to 0.89 in June 2009 with the highest value reported at Porkchop Lake and the lowest value at Great Slave Lake.

6.3.2 Zooplankton Taxonomy

Zooplankton abundance in June 2009 ranged from 4,877 to 89,226 organisms per litre (per sample) with the highest abundance reported at Thor East (TL-07) and the lowest at Great Slave Lake. Within lake groups, June zooplankton abundance ranged from:

- 84,764 to 89,226 organisms/L in Thor (excludes Long)
- 23,166 organisms/L in A of the Cressy Group (excludes Cressy and Fred)

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- 33,484 to 40,140 organisms/L in the Ring Group (excludes Ring, Buck and Drizzle)
- 20,762 organisms/L in Kinnikinnick of the Reference Group (excludes Redemption)
- 5,872 to 39,944 organisms/L in the Tardiff Group
- 14,088 to 59,330 organisms/L in the Tributary Group (excludes Megan)
- 28,520 to 30,516 organisms/L in the Blachford Group
- 39,914 to 51,958 organisms/L in Elbow
- 4877 organisms/L (average) in Great Slave.

In total 43 zooplankton taxa were identified across the study area. Fourteen taxa were present at half the sample stations and five taxa were present at all stations, including three copepod taxa, one rotifer (*Kellicottia longispina*) and one daphnid (*Daphnia*). Taxon richness varied from 13 to 21 species, with the highest number reported at A, the Tardiffs and Thor Lake, and the lowest number reported at Elbow (EL-01) and Great Slave Lake.

Zooplankton species diversity ranged from 0.38 to 0.84 in June 2009 with the highest value reported at Porkchop Lake and the lowest value at North Tardiff Lake.

6.3.3 Benthic Invertebrates

Data will be provided in the final TDR.

6.4 Fisheries

6.4.1 Species Presence and Catch Rate

Fish were captured or observed in 11 of the 19 fished lakes (Table 6-6; Figure 6-15 in Appendix A). Three large bodied species (northern pike, lake whitefish, lake cisco) and two small bodied species (slimy sculpin and ninespine stickleback) were most common, and were all present in Thor, Long, Elbow, A, and Redemption Lakes. Lake trout was captured in Carrot and Great Slave (the deepest lakes), and lake chub was captured in Kinnikinnick. Only northern pike were caught in Murky and U. No fish were caught in Buck, Cressy, Drizzle, Megan, North Tardiff, Ring or Thorn Lakes. Blachford, Dinosaur, Egg, Pistol, Porkchop and Wasp lakes were not fished, as they are not expected to be directly affected by the project and are not being considered as fisheries reference lakes.

A previous study (SRC, 1989) reported trout-perch in Thor Lake. No trout-perch were captured or observed in this study. Trout-perch typically inhabit deeper waters during the day and move into shallow areas at night; they are most commonly caught by seining at night (Scott and Crossman, 1998). No night seines were completed for this study, but a fine mesh gill net set in the littoral zone overnight did not capture any trout-perch.

Eight species were captured in the proposed dock site bay on Great Slave Lake (Table 6-6). For Great Slave Lake, the goals were to identify species that use habitat within the dock site bay and to

characterize the fish habitat. The list of species in Table 6-6 is probably not a complete list of species that use the bay, as fish can travel freely in and out of the bay.

No fish were captured during winter sampling of Fred Lake in two daytime sets (9 hours and 7.25 hours) of two panels of a gang gill net in March 2009. The minnow traps set under the ice also did not catch any fish.

Table 6-6: Fish Species¹ Observed or Captured during the 2008 and 2009 Field Programs

Lake	NP	LWF	LC	SSC	STB	LT	CH
A	✓	✓	✓	✓	✓		
Buck							
Carrot		✓	✓	✓	✓	✓	
Cressy							
Drizzle							
Elbow	✓	✓	✓	✓	✓		
Fred	✓	✓	✓				
Great Slave ²	✓	✓	✓			✓	
Kinnikinnick	✓		✓	✓			✓
Long	✓	✓	✓	✓	✓		
Megan							
Murky	✓						
North Tardiff							
Redemption	✓	✓	✓	✓	✓		
Ring							
South Tardiff							
Thor	✓	✓	✓	✓	✓		
Thorn							
U	✓						

NOTES

¹ Northern pike (NP), lake whitefish (LWF), lake cisco (LC), slimy sculpin (SSC), ninespine stickleback (STB), lake trout (LT), lake chub (CH)

² The following species were also captured at Great Slave Lake: arctic grayling (*Thymallus arcticus*), burbot (*Lota lota*), longnose sucker (*Catostomus catostomus*), round whitefish (*Prosopium cylindraceum*)

Ring, Buck, Drizzle, Murky, Kinnikinnick, and Redemption were added to the sampling program in 2009 and have only been sampled once.

The four gear types used for this study captured different species and sizes of fish. Only large bodied species (northern pike, lake whitefish, lake cisco and lake trout) were captured in the gill nets, except for one adult lake chub captured in Kinnikinnick lake. Slimy sculpin, ninespine stickleback, and

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juvenile northern pike were captured in the beach seines and by dip netting. Juvenile lake chub were also captured in a beach seine. One fish, a ninespine stickleback in Carrot Lake, was captured in a minnow trap.

Catch rates varied from 0.1 (northern pike and lake cisco in several lakes – Table 6-7) to 8.4 for lake cisco in Great Slave Lake. Average CPUE values for each species, combined for all lakes and both years, were 0.3 for northern pike, 1.0 for lake whitefish, and 1.1 for lake cisco. Northern pike was consistently the least abundant species caught, except in Kinnikinnick Lake, and in Murky and U lakes where no other species were caught.

Table 6-7: Catch rate (CPUE) of Large Bodied Species Captured in Gill Nets. Effort is measured in hours and the number of nets set is shown in parentheses. CPUE is measured in fish per hour and total number of fish is shown in parentheses. A (-) indicates no nets were set

Lake	2008				2009			
	Effort (hours)	NP ¹ (fish/h)	LWF ¹ (fish/h)	LC ¹ (fish/h)	Effort (hours)	NP ¹ (fish/h)	LWF ¹ (fish/h)	LC ¹ (fish/h)
A	23.8 (1)	0.3 (8)	1.2 (28)	0.3 (6)	16.2 (1)	0.1 (2)	0.4 (6)	1.6 (26)
Buck	–	–	–	–	17.6 (1)	0	0	0
Carrot	–	–	–	–	34.4 (2)	0	0.2 (8)	0.4 (14)
Cressy	31.3 (2)	0	0	0	17.1 (1)	0	0	0
Drizzle	–	–	–	–	15.8 (1)	0	0	0
Elbow	36.0 (2)	0.4 (16)	2.0 (71)	0.6 (21)	33.7 (2)	0.5 (16)	2.1 (72)	0.2 (6)
Fred	15.4 (1)	0.5 (7)	2.0 (31)	0.1 (1)	15.2 (1)	0.5 (8)	1.2 (18)	0
Great Slave	37.0 (2)	0.1 (3)	0.5 (17)	4.1 (150)	36.3 (2)	0	0.7 (27)	8.4 (304)
Kinnikinnick	–	–	–	–	33.1 (2)	0.5 (18)	0	0.1 (4)
Long	71.9 (4)	0.3 (24)	1.0 (72)	0.1 (10)	32.1 (2)	0.1 (4)	1.1 (36)	1.0 (31)
Megan	20.9 (1)	0	0	0	16.8 (1)	0	0	0
Murky	–	–	–	–	16.4 (1)	0.1 (1)	0	0
Redemption	–	–	–	–	33.3 (2)	0.3 (9)	0.5 (18)	0.8 (25)
Ring	–	–	–	–	18.7 (1)	0	0	0
South Tardiff	15.0 (1)	0	0	0	17.1 (1)	0	0	0
Thor	38.7 (2)	0.5 (18)	2.2 (84)	0.1 (3)	30.7 (2)	0.4 (11)	2.1 (64)	0.9 (29)
Thorn	21.3 (1)	0	0	0	15.9 (1)	0	0	0
U	37.0 (2)	0.2 (7)	0	0	–	–	–	–

NOTES:

NP=Northern Pike, LWF=Lake Whitefish, LC=Lake Cisco

Catch per unit effort for northern pike varied substantially in relation to the mean CPUE for northern pike (up to 0.2 fish per hour, mean is 0.3 fish per hour). The CPUE for lake whitefish also varied by up to 0.2 fish/hour between years, but this is a smaller variation in relation to the mean CPUE for the species (1.0 fish/hour). However, the CPUE for lake whitefish in Fred and A lakes was higher. In Fred Lake there was a decrease in CPUE for lake whitefish of 0.8 fish per hour in 2009. This change is difficult to interpret because Fred Lake is unique among the fish bearing lakes studied, as it is suspected to be a sink habitat; for further discussion of Fred Lake please see the Cressy Group section below (Section 6.3). In A Lake, the CPUE for lake whitefish decreased from 1.2 to 0.4 fish/hour, and the CPUE for lake cisco increased from 0.3 to 1.6 fish/hour. As mentioned above, A Lake is deep but small, and was sampled with different gear types in the two years. For A Lake, the decrease in lake whitefish CPUE and increase in lake cisco CPUE is consistent with the switch from a sinking gill net to a floating gill net (the gear type was switched to sample different habitat), as lake whitefish frequently forage in benthic habitats and lake cisco typically forage in limnetic (upper water column) habitats.

There was more variation in CPUE for lake cisco compared to CPUE values for the other two species, up to 4.3 fish/hour in Great Slave Lake (see Table 6-7). Lake cisco are more likely to form schools than the other large bodied species, so the variation in catch rate for this species is expected to be higher than for other, non-schooling species.

6.4.2 Fish Habitat

Eleven of the nineteen lakes included in the fisheries study are considered fish bearing (Table 6-8). All lakes that are considered non-fish bearing are isolated from other waterbodies and, therefore, do not directly contribute food or nutrients to fish bearing waters. These non-fish bearing lakes are not considered fish habitat under the *Fisheries Act*, which defines “fish habitat” as *spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes*.

Table 6-8: Fish Bearing Status and Criteria for Designation; (–) Indicates No Data Collected

Lake	Fish Caught	Isolated ¹	Winter DO ² (mg/L)	Years of Fishing ³	Large Plankton ⁴	Fish Bearing	Confidence ⁵
A	Y	Y	2.84 – 10.66	2	Y	Y	High
Buck	N	–	–	1	–	N	Low
Carrot	Y	–	–	1	–	Y	High
Cressy	N	Y	0.07 – 4.15	2	N	N	High
Drizzle	N	–	–	1	–	N	Low
Elbow	Y	Y	3.63 – 11.34	2	N	Y	High
Fred	Y	N	0.24 – 4.98	2	N	Y ⁶	High
Great Slave	Y	N	13.13 – 15.41	2	N	Y	High
Kinnikinnick	Y	–	6.68 – 11.42	1	N	Y	High
Long	Y	N	0.25 – 10.09	2	N	Y	High

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Lake	Fish Caught	Isolated ¹	Winter DO ² (mg/L)	Years of Fishing ³	Large Plankton ⁴	Fish Bearing	Confidence ⁵
Megan	N	Y	0.14 – 2.31	2	N	N	High
Murky	Y	N	0.33 – 0.89	1	Y	Y ⁷	High
North Tardiff	N	Y	0.38 – 0.47	2	Y	N	High
Redemption	Y	–	–	1	–	Y	High
Ring	N	–	0.44 – 1.50	1	N	N	Low
South Tardiff	N	Y	0.38 – 0.62	2	Y	N	High
Thor	Y	N	2.25 – 7.96	2	N	Y	High
Thorn	N	Y	0.25 – 5.93	2	Y	N	Moderate
U	Y	–	0.15 – 1.62	1	–	Y	High

NOTES

¹ Indicates whether the lake is isolated from other lakes that are fish bearing. See Section 4.1.

² The range of dissolved oxygen concentrations measured in March 2008 and 2009 is shown (see Appendix E). Values less than 5 mg/L are below the minimum guideline for the Protection of Aquatic Life (CCME, 1999).

³ Years of fishing includes only fishing conducted as part of this baseline study.

⁴ Large plankton include *Daphnia galeata* and species in the genera *Chaoborus* and *Heterocope* (see Appendix I).

⁵ Confidence is low for the non-fish bearing designation if data have not yet been collected on winter water quality, zooplankton species, or if only one year of fishing effort has been completed (a second year of data collection should be conducted to confirm findings), and moderate if one of the criteria for the designation of non-fish bearing waters was not met.

⁶ Fred Lake is very shallow and has low winter dissolved oxygen concentrations. It is suspected to be a sink habitat for lake whitefish and lake cisco, into which fish migrate during the freshet and die during the winter.

⁷ Murky Lake is very shallow (<2 m) with low winter dissolved oxygen concentrations. It may be a sink habitat, but northern pike are known to tolerate very low dissolved oxygen concentrations so the population may be self sustaining.

Northern pike were caught in Murky and U lakes, despite their low winter dissolved oxygen concentrations. Northern pike are tolerant of low dissolved oxygen concentrations, so the fish may survive the winter in these lakes. However, fish passage is possible from Thor to Murky during the spring freshet so the fish presence in Murky may be a result of immigration. Fish passage in Murky Out is possible, but would be challenging for some fish due to dense vegetation in some locations, which may explain the absence of lake whitefish and lake cisco from Murky. Fish passage into U has not been investigated, and will not be investigated further as U is not considered a suitable reference lake for the project.

Northern pike, lake whitefish and lake cisco were caught in Fred Lake despite its low winter dissolved oxygen levels. As discussed above, northern pike may survive the winter in Fred Lake. However, no fish were caught in Fred Lake in March 2009 and fish passage from Thor to Fred is possible for all fish species. It is likely that any lake whitefish and lake cisco that enter Fred Lake during the spring do not survive the winter.

6.4.3 Fish Health

6.4.3.1 Length and Weight Measurements

The average lengths of northern pike, lake whitefish and lake cisco caught in the study lakes were 378 mm, 431 mm and 162 mm (Table 6-9). Very few small northern pike and lake whitefish were

caught; lake whitefish smaller than 200 mm were only caught in three lakes (Carrot, Redemption and Thor), while northern pike smaller than 200 mm were only caught in two lakes (Long and Murky). The largest fish of each species were a 825 mm northern pike in Redemption Lake, a 542 mm lake whitefish in Great Slave Lake, and a 312 mm lake cisco in A Lake. No overall size related trends were observed among lakes. Average weights are not presented because weight and length are not linearly related and weight is not expected to follow a normal distribution, so the mean value is less informative. Fish length and weight measurements are presented in Appendix J.

Table 6-9: Average Lengths and Ranges of the Lengths and Weights of Northern Pike, Lake Whitefish and Lake Cisco Caught in the Study Lakes. A (-) indicates that no fish were caught.

Lake	NP		LWF		LC	
	Length (mm)	Weight (g) ^a	Length (mm)	Weight (g)	Length (mm)	Weight (g)
A	273 (25 – 509)	305 – 998	443 (409 – 525)	1,068 – 2,210	185 (112 – 312)	15 – 469
Carrot	–	–	311 (148 – 520)	38 – 1,976	164 (130 – 196)	29 – 76
Elbow	514 (383 – 773)	439 – 4,410	422 (219 – 474)	113 – 1,641	142 (117 – 203)	15 – 104
Fred	328 (220 – 442)	118 – 615	307 (229 – 446)	154 – 1,541	152 (114 – 205)	16 – 107
Great Slave	756 (729 – 793)	3000 – 4,500	408 (338 – 542)	449 – 2,461	161 (123 – 405)	15 – 806
Kinnikinnick	443 (152 – 694)	–	–	–	187 (133 – 241)	26 – 184
Long	323 (110 – 626)	120 – 1,580	373 (206 – 441)	96 – 1,140	147 (105 – 215)	11 – 124
Murky	177	38	–	–	–	–
Redemption	480 (280 – 825)	164 - >4,000	357 (110 – 528)	11 – 2,346	187 (106 – 292)	17 – 365
Thor	467 (272 – 631)	131 – 1,589	352 (71 – 439)	29 – 1,160	149 (116 – 219)	17 – 142
U	259 (250 – 284)	100 – 250	–	–	–	–

NOTES

^a Weight measurements in were to the nearest 10 g in 2008 and 0.1 g in 2009

^b Weight measurements at Kinnikinnick not reported due to field difficulties with the scale

The size of fish that can be caught is related to the fishing gear used. The smallest fish were caught in the beach seine, which had a very small mesh (5 mm). The gang gill nets tend to catch larger fish in their larger mesh panels and smaller fish in the smaller mesh panels; the majority of the lake cisco were caught in the two smallest panels of the gang gill nets.

Length-weight relationships were not calculated for this interim report.

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6.4.3.2 Condition – Relative Weight

Relative weight of individual fish was calculated for the three large bodied species that were present in most of the fish bearing study lakes: northern pike, lake whitefish and least cisco (Table 6-10). The relative weight compares the weight of each fish with its expected weight based on its length and a standard length-weight relationship developed using data from at least 50 populations. The standard weight equations provide a benchmark for comparison between populations; a fish whose measured weight exactly matches its expected weight has a relative weight of 100.

Table 6-10: Relative Weights of Northern Pike (NP), Lake Whitefish (LWF), and Lake Cisco (LC) in the Fisheries Lakes in 2008 and 2009. A (–) indicates that no fish of that species were caught. Mean values are presented ± standard deviations; sample sizes are reported in parentheses.

Lake	2008			2009		
	NP	LWF	LC	NP	LWF	LC
A	88.4 ± 7.0 (8)	97.5 ± 19.1 (26)	100.1 ± 6.8 (6)	93.6 ± 6.4 (2)	108.3 ± 14.5 (6)	93.0 ± 8.5 (26)
Carrot	–	–	–	–	88.3 ± 5.9 (9)	91.2 ± 10.8 (14)
Elbow	85.2 ± 12.4 (16)	94.8 ± 11.4 (66)	78.0 ± 8.2 (21)	78.7 ± 9.1 (16)	98.9 ± 9.1 (72)	82.9 ± 7.6 (6)
Fred	97.1 ± 5.1 (6)	114.3 ± 21.6 (31)	101.6 (1)	97.1 ± 9.7 (8)	108.1 ± 9.3 (18)	102.0 ± 19.6 (2)
Great Slave	104.0 ± 7.8 (3)	89.7 ± 6.0 (17)	70.9 ± 6.7 (146)	–	91.3 ± 9.6 (27)	74.7 ± 11.8 (292)
Long	87.3 ± 11.2 (24)	91.2 ± 13.6 (71)	78.3 ± 7.9 (10)	89.3 ± 5.2 (4)	88.2 ± 15.1 (37)	88.5 ± 9.2 (30)
Murky	–	–	–	98.2 (1)	–	–
Redemption	–	–	–	99.0 ± 5.1 (8)	107.5 ± 12.0 (18)	104.8 ± 18.0 (24) ^a
Thor	89.5 ± 8.6 (18)	98.3 ± 29.4 (84)	91.5 ± 11.9 (3)	90.9 ± 8.8 (12)	88.9 ± 14.7 (65)	85.4 ± 27.4 (29)
U	112.3 ± 23.6 (7)	–	–	–	–	–

NOTES

^a One very fat lake cisco was excluded when calculating the mean relative weight for lake cisco in Redemption. This fish was measured twice; the fresh length and weight were 196 mm and 325.6 g.

Mean relative weights of the fish populations in the Thor Lake area varied from 70.9 for Great Slave lake cisco to 114.3 for Fred Lake lake whitefish (Table 6-9). Fish in Fred and Redemption tended to have high relative weights, while fish in Elbow, Long and Thor tended to have low relative weights.

The sample timing for this study (September and early October) may explain why northern pike tended to have lower relative weights in this study than lake whitefish. Relative weights vary throughout the year due to seasonal patterns of sexual maturation, particularly for female fish. Lake

whitefish and lake cisco spawn in late fall, and many were ripe when collected. Northern pike spawn in the spring, and had developing gonads when collected.

Lake cisco are known to be morphologically plastic, with more highly variable body form than is usual for other fish species (Scott and Crossman, 1998), which confounds comparisons of health among lakes based on condition factor by masking differences related to health with differences related to natural selection or random genetic drift. Lake cisco relative weights calculated for this study are most useful for comparison with future data, and have limited use for comparison between lakes.

Relative weights were not calculated for fish from Kinnikinnick Lake, as the weight measurements were affected by wind on the sampling day and are expected to be less accurate than measurements from other lakes.

6.4.3.3 Age

Scales were used to age a subsample of the northern pike and lake whitefish collected in 2008, and cleithra were used to age a subsample of the northern pike collected in 2009. The aging results are presented in Table 6-11. The aging results for otoliths collected from lake whitefish and lake cisco in 2009 are not yet available. The ages of subsampled fish are presented in Appendix J.

Table 6-11: Age Ranges of Northern Pike Sampled in 2008 and 2009 and Lake Whitefish Sampled in 2008. Age structures collected in 2009 from lake whitefish and lake cisco have not yet been aged. A (-) indicates that no age structures were collected, or that the data are not yet available.

Lake	NP	LWF
A	2 – 5	6 – 10
Elbow	4 – 10	4 – 9
Fred	1 – 4	1 – 5
Great Slave	–	6 – 13
Kinnikinnick	2 – 10	–
Long	2 – 7	3 – 8
Murky	2	–
Redemption	3 – 18	–
Thor	2 – 7	3 – 9
U	2 – 3	–

The youngest fish subsampled were 1 year old (one lake whitefish and one northern pike from Fred Lake), and the oldest was an 18 year old northern pike from Redemption Lake. No young of the year (age 0) fish were subsampled.

No statistical analyses of age data were completed for this interim report.

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6.4.3.4 Organosomatic Indices

A subsample of fish caught in each lake was returned to the camp laboratory for further sample collection and measurements. The organosomatic indices are the ratios of organ weight to total body weight. The hepatosomatic index compares the liver weight to body weight, while the gonadosomatic (GSI) index compares the gonad (ovary) weight to body weight. The GSI differs between males and females and throughout the year; the GSI was only calculated for females (Table 6-12).

Table 6-12: Hepatosomatic Index Values (%) Calculated for Northern Pike and Lake Whitefish Collected in 2008 and 2009, and Lake Cisco Collected in 2009. A (–) indicates that no fish of that species were dissected. Mean values are presented ± standard deviations; sample sizes are reported in parentheses.

Lake	2008		2009		
	NP	LWF	NP	LWF	LC
A	1.7 ± 0.3 (8)	1.3 ± 0.3 (12)	–	1.2 ± 0.4 (6)	0.9 ± 0.4 (22)
Carrot	–	–	–	0.9 ± 0.1 (7)	1.4 ± 0.5 (11)
Elbow	1.9 ± 0.5 (11)	1.6 ± 0.5 (12)	1.4 ± 0.4 (12)	1.1 ± 0.2 (12)	–
Fred	2.0 ± 0.3 (6)	1.7 ± 0.5 (12)	2.1 ± 0.4 (8)	1.2 ± 0.5 (12)	–
Great Slave	–	1.7 ± 0.5 (12)	–	1.4 ± 0.6 (12)	0.9 ± 0.4 (20)
Long	1.7 ± 0.5 (12)	1.5 ± 0.4 (12)	2.2 ± 2.1 (4)	1.3 ± 1.5 (12)	–
Murky	–	–	1.8 (1)	–	–
Redemption	–	–	1.2 ± 0.2 (9)	1.0 ± 0.4 (12)	0.7 ± 0.2 (24)
Thor	1.6 ± 0.5 (12)	1.6 ± 0.4 (12)	1.5 ± 0.3 (11)	1.3 ± 0.4 (12)	–
U	1.3 ± 0.2 (7)	–	–	–	–

In 2008 the livers of all subsampled fish were weighed, and in 2009 the livers and gonads were weighed. Lake cisco were added to the subsampling component of the baseline study in 2009 because they are a candidate species for long term monitoring for the Thor Lake project; they were subsampled at four lakes only.

The differences in total weight measurement between years (discussed above) also affect the organosomatic indices, and should be considered if these data are used for comparison with future measurements.

The hepatosomatic index tended to be highly variable (Table 6-13), and also appears to vary with length, although no statistical analysis was conducted (see Appendix J for data). Increases in relative liver weight can be an indication of poor health.

Table 6-13: Gonadosomatic Index Values (%) Calculated for Northern Pike, Lake Whitefish and Lake Cisco Collected in 2009, with Sampling Date. A (–) indicates that no female fish of that species were dissected. Mean values are presented ± standard deviations; sample sizes are reported in parentheses.

Lake	Sample Date	NP	LWF	LC
A	Sept 21	–	7.1 ± 3.6 (4)	7.6 ± 0.6 (4)
Carrot	Sept 26	–	0.1 (1)	4.5 ± 1.2 (7)
Elbow	Sept 29	2.4 ± 0.5 (7)	18.6 ± 3.8 (2)	–
Fred	Sept 6	1.5 (1)	13.3 ± 1.6 (2)	–
Great Slave	Oct 1	–	2.2 ± 3.4 (8)	4.1 ± 4.2 (14)
Long	Sept 12	2.1 ± 0.7 (3)	8.5 ± 2.9 (6)	–
Redemption	Sept 27	1.8 ± 0.1 (2)	12.7 ± 1.3 (3)	3.9 ± 1.1 (6)
Thor	Sept 7	2.1 ± 0.8 (6)	9.1 ± 4.9 (6)	–

Sample sizes for the calculation of the GSI were very small, and as a result the standard deviation of the calculations was high. The mean values do not appear to show a temporal trend; spawning dates are affected by lake temperature, which varied between lakes and could mask the expected increase in GSI over time.

6.4.3.5 External and Internal Parasites

Large, easily visible external parasites, primarily leeches, were observed in four of the lakes: Elbow, Long, Redemption and Thor (Table 6-14). The proportion of parasitized fish was generally low. Elbow had the highest parasite frequency, and was the only lake in which external parasites were observed on northern pike. Lake whitefish had the highest parasite frequency of the three species; more than one third (37.5%) of lake whitefish in Elbow were parasitized.

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Table 6-14: Incidence of External and Internal Parasites. Values indicate the number of fish that had parasites, values in parentheses indicate the total number of fish examined.

Lake	External			Internal		
	NP	LWF	LC	NP	LWF	LC
A	0 (4)	0 (5)	1 (26)	–	2 (5)	2 (22)
Carrot	–	0 (9)	0 (14)	–	1 (7)	0 (11)
Elbow	3 (16)	27 (72)	1 (6)	0 (12)	12 (12)	–
Fred	0 (8)	0 (18)	0 (2)	0 (8)	0 (12)	–
Great Slave	–	0 (27)	0 (304)	–	0 (12)	1 (20)
Kinnikinnick	0 (18)	–	0 (4)	0 (12)	–	–
Long	0 (6)	8 (37)	1 (31)	0 (4)	3 (12)	–
Murky	0 (1)	–	–	0 (1)	–	–
Redemption	0 (8)	2 (18)	1 (25)	0 (8)	4 (12)	2 (24)
Thor	0 (12)	1 (64)	1 (29)	0 (11)	10 (12)	–

The most common type of internal abnormality observed was cysts in the outer tissues of the gastrointestinal tract, sometimes extending to other organs associated with the gastrointestinal tract such as the liver (see photo 39 in Appendix C). The cysts were 1-2 mm across and were light coloured and shiny (they had a metallic appearance). It is assumed at this time that these cysts were caused by a parasite. Fish with large numbers of the cysts tended to have soft, discoloured livers. In some fish with large numbers of cysts the gonads were severely underdeveloped. Nematode worms were also observed inside some lake whitefish, usually in the swim bladder or the gut.

As with external parasites, Elbow had the highest frequency of internal parasites – 100% of dissected lake whitefish had the cysts. Lake whitefish also had the highest frequency of internal parasites of the three species examined. A high frequency of internal parasites was also observed in Thor lake whitefish (10 of 12).

6.4.3.6 Tissue Metals

Tissue samples collected in 2009 are being processed at the time of writing. Tissue data from 2008 and 2009 will be analyzed together and presented in a later report.

7 LAKE SURVEY RESULTS BY LAKE GROUP

This section presents the key findings of the aquatics and fisheries baseline studies for each lake, organized by lake group. Physical environment data such as littoral and riparian habitat are not presented because detailed habitat maps are not yet available.

7.1 Thor Group

The Thor Group is comprised of Thor and Long lakes and entirely overlies the Nechalacho ore body. Thor Lake has one defined inlet from Murky Lake and one defined outlet to Fred Lake (see Section 4.1). Long Lake has one defined inlet from South Tardiff and a potential second inlet from Porkchop; the inlet from Porkchop is depicted on topographical maps but was not investigated as it was outside the project footprint. Long Out, the stream between Thor and Long Lakes, appears to primarily flow from Long Lake to Thor Lake, but flows in the opposite direction at specific times of the year, (see Volume 1 – Hydrology for more details).

7.1.1 Water and Sediment Chemistry

Water quality has been assessed in both lakes since March 2008. The original stations were relocated to the deepest basins of each lake in October 2008 (two on Thor and one on Long). Both original and new stations were sampled in October 2008 on Thor and Long and only the new stations have been carried forward with the aquatics program.

The two stations sampled in Thor Lake (TL-06 and TL-07) had only slight differences in maximum and mean values for specific parameters (nitrate, total aluminum and iron, and total and dissolved manganese and zinc). Observed differences may be related to proximity to shore (Thor East (TL-07) is located approximately 5 m from vertical bedrock cliff) and use of different sample depths.

Overall, both Thor and Long lakes are characterized by clear, hard water with low conductivity, dissolved solids and a high acid-buffering capacity (high alkalinity, hardness and calcium). Nutrients, such as nitrate-nitrite, total Kjeldahl nitrogen, and phosphates (total and ortho) were typically low or below detection, with slight increases observed during winter. No guideline exceedances were observed for any metals during 2008 – 2009; one original Thor Lake station (TL-01) exhibited high total copper in March 2008 though this value is considered an outlier.

Sediment chemistry at Thor and Long lakes indicated relatively high organic carbon and phosphorus levels. Arsenic exceeded CCME ISQG but not PEL in both lakes. Copper and nickel also exceeded CCME ISQG in Long Lake. Particle size analysis indicated high fractions of silt and clay in Thor (silty clay) and Long (silty clay loam) lakes.

7.1.2 Aquatic Organisms

Chlorophyll *a* values fluctuated at the two Thor Lake stations, though differences were relatively small. Chlorophyll *a* was higher in Thor than in Long Lake in June, however values were similar in the two lakes in September.

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Phytoplankton and zooplankton data for June 2009 samples are summarized in Table 7-1. Thor Lake had higher phytoplankton taxon richness and diversity than Long Lake. Blue-green algae were predominant in Long Lake, and a variety of algal groups (blue-green, yellow-brown, diatoms, cryptophytes) were predominant in Thor Lake. The common and predominant species differed in the two lakes. Phytoplankton taxon richness and diversity were the same at the two Thor stations in June, but with some differences in percent composition.

At the two Thor stations, zooplankton richness and diversity were different with Thor West having slightly greater richness and diversity. Rotifers were the predominant taxa at both stations though were more abundant at Thor East. Copepods were also common at both stations, being more abundant at Thor West. Zooplankton were not sampled at Long in June.

Table 7-1: Thor Group Lakes – Phytoplankton and Zooplankton Richness, Diversity and Predominant Taxa in June 2009

Station	Phytoplankton			Zooplankton		
	Richness	Diversity	Taxa	Richness	Diversity	Taxa
Thor West	81	0.84	Blue-green (35%) Yellow-brown (33%) Diatoms (6%)	21	0.81	Rotifers (60%) Copepods (25%)
Thor East	81	0.84	Yellow-brown (36%) Blue-green (19%) Cryptophytes (12%) Diatoms (7%)	17	0.73	Rotifers (77%) Copepods (17%)
Long	63	0.73	Blue-green (86%)	–	–	–

7.1.3 Fisheries

Both Thor and Long Lakes are considered fish habitat, as fish were caught in both lakes. The same five fish species (northern pike, lake whitefish, lake cisco, slimy sculpin and ninespine stickleback) were caught in both Thor and Long. Catch per unit effort was approximately twice as high in Thor compared to Long for northern pike (0.5 and 0.4 versus 0.3 and 0.1) and lake whitefish (2.2 and 2.1 versus 1.0 and 1.1; see Table 6-7). CPUE for lake cisco was similar in the two lakes (0.9 in Thor and 1.0 in Long). Long Lake CPUE values were similar to the average CPUE values for the three species (0.3 for northern pike, 1.0 for lake whitefish, and 1.1 for lake cisco).

The fish captured in the two lakes had the similar size ranges and were comparable with other lakes in the study (Tables 6-9). The length ranges at all lakes encompassed the study average lengths. Average lengths in Long and Thor were 323 mm and 467 mm for northern pike (study average is 378 mm), 373 mm and 352 mm for lake whitefish (study average is 431 mm) and 147 mm and 149 mm for lake cisco (study average 162 mm). Lake whitefish in Long Lake had a high external parasite rate (8 of 37 fish had parasites) compared to other populations, many of which had no external parasites (Table 6-14). Lake whitefish in Thor Lake had a high internal parasite rate (10 of 12 fish had cysts); three other populations had one or zero fish with observed internal parasites.

7.2 Cressy Group

The Cressy group of lakes consists of Cressy, Fred and A lakes. Cressy and Fred are contained within the Thor Lake syenite, outside of the ore body, while A is located within the Blachford Intrusive Complex, outside of the syenite.

Cressy is the headwater lake for this drainage system and has no defined inlet channel. Cressy Out is located at the west end of Cressy Lake and drains overland and through the ground to Fred Lake (there is no defined surface channel connecting Cressy and Fred Lakes). Fred Lake has one defined inlets (Thor Out) and one defined outlet (Fred Out) leading to A Lake. A Lake has one defined inlet (Fred Out) and one defined outlet. This drainage continues through several more lakes to Great Slave Lake at a point approximately 18 km from Thor Lake.

7.2.1 Water and Sediment Chemistry

Water quality has been assessed in the Cressy group lakes since March 2008. General chemistry parameters tend to be similar among these three lakes; however, Fred and Cressy typically have greater variability in levels. All three lakes appear to have a high acid-buffering capacity, indicated by high alkalinity, hardness and calcium. Total and dissolved iron typically exceeded CCME guidelines by up to 26 times in Fred Lake during winter. Fred Lake is one of the small, shallow lakes that shows strong seasonal fluctuations; large increases in iron during winter were accompanied by increases in conductivity, hardness, dissolved solids, ammonia, Kjeldahl nitrogen, barium, manganese and strontium. Guideline exceedances for metals did not occur in Cressy or A Lakes.

Guideline exceedances for metals in sediment included arsenic and zinc in Cressy Lake, where both parameters exceeded the CCME ISQG and PEL, and nickel in A Lake. Mercury was also relatively high in Cressy (0.111 mg/kg), though it did not exceed its guideline (0.17 mg/kg).

7.2.2 Aquatic Organisms

Chlorophyll *a* values were low (less than 1.0 µg/L) at all three lakes in June, and Fred Lake had the lowest chlorophyll *a* of all sampled lakes in June (0.294 µg/L). Chlorophyll *a* increased in September with Cressy exhibiting the highest value of the three lakes (3.39 µg/L).

Though Fred Lake had low phytoplankton biomass in June, it showed the greatest richness and diversity of the three lakes (see Table 7-2). A single cryptophyte alga (*Chroomonas acuta*) was the predominant phytoplankton taxa in Fred, while a yellow-brown alga (*Dinobryon* sp.) was predominant in both Cressy and A Lakes.

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Table 7-2: Cressy Group Lakes – Phytoplankton and Zooplankton Richness, Diversity and Predominant Taxa in June 2009

Station	Phytoplankton			Zooplankton		
	Richness	Diversity	Taxa	Richness	Diversity	Taxa
Cressy	64	0.65	Yellow-brown (57%) Green (8%) Cryptophytes (8%) Blue-green (8%)	–	–	–
Fred	74	0.85	Cryptophytes (31%) Yellow-brown (24%) Blue-green (6%) Green (6%)	–	–	–
A	53	0.81	Yellow-brown (60%) Cryptophytes (13%) Diatoms (6%) Green (5%)	21	0.53	Rotifers (61%) Copepods (19%)

Due to equipment issues, zooplankton samples were not collected from Fred and Cressy lakes in June. Taxon richness in A Lake was among the highest across the entire study area (21 species) with a median level of diversity, dominated by rotifer species.

7.2.3 Fisheries

Northern pike, lake whitefish and lake cisco were caught in A and Fred Lakes. Slimy sculpin and ninespine stickleback were also caught in A Lake. No fish were caught in Cressy Lake. Catch per unit effort was higher in Fred than A for northern pike (0.5 in both years for Fred and 0.1 and 0.3 in A; study average 0.3) and lake whitefish (2.0 and 1.2 in 2008; 1.2 and 0.4 in A; study average 1.0) but lower for lake cisco (0 to 0.1 in Fred and 0.3 to 1.6 in A; study average 1.1 - Table 6-7).

A and Fred Lakes are considered fish bearing, and are fish habitat (Table 6-8). However, Fred Lake may be a net habitat sink (i.e., the population in Fred Lake is sustained by immigration, not by reproduction within the lake). Fred is shallow (less than 2 m) and has low winter dissolved oxygen levels (0.24 to 4.98 mg/L), which could result in fish mortality, particularly for lake whitefish and lake cisco (pike are more tolerant of low oxygen levels). Fish passage is unimpeded during the spring freshet from Thor Lake to Fred Lake, so fish could be travelling to Fred from Thor. Winter fishing effort in March 2009 did not catch any fish in Fred Lake which supports the hypothesis that fish do not survive winter conditions in Fred Lake.

Cressy Lake is considered non-fish bearing due to its isolation from other lakes, low winter dissolved oxygen and multiple years of fishing effort with no catch (Table 6-8). Because it does not contribute food or nutrients directly to downstream fish bearing waters, Cressy Lake is not considered fish habitat.

In A Lake, lake whitefish and lake cisco were generally larger than average (Table 6-9). The lake whitefish caught in A Lake were almost all larger than the study average (range of 409-525 mm compared to an average of 431 mm). The largest lake cisco caught in A Lake (312 mm) was the

largest lake cisco caught in any study lake except for Great Slave Lake. The fish in these lakes had some of the higher relative weights in the study lakes (Table 6-7). All of the species caught in Fred Lake had relative weights greater than 195, and the lake whitefish and lake cisco in A Lake were over or near 100.

Fish in both A and Fred had low parasite frequencies (no parasites were observed on Fred Lake fish), except for internal parasites in lake whitefish in A Lake (2 of 5 fish had cysts – Table 6-14).

7.3 Ring Group

The Ring Group consists of Ring, Buck, Drizzle, Murky and Egg lakes and is entirely contained within the Thor Lake syenite, outside the ore body. Ring is the headwater lake of this drainage system and is presumed to drain into Buck, Drizzle, Murky and Thor, while Egg appears to drain into Drizzle. Surface drainage is inferred from topographic maps but has not been investigated yet, as it is outside the initial project footprint.

7.3.1 Water and Sediment Chemistry

Water quality in Ring, Murky and Egg lakes have been investigated since March 2008. Buck and Drizzle were added to the aquatic baseline program in September 2009 after review of preliminary information from the prefeasibility study).

In Ring and Murky lakes during 2008 and 2009, mean values of conductivity, hardness, total suspended solids, nitrate, ammonia and total phosphate were similar, with a slightly greater range of values for Ring Lake; both lakes appear to have high acid-buffering capacity. Mean values for most parameters tend to be lower and less variable in Egg Lake than in Ring and Murky. Both Ring and Murky are small, shallow lakes with strong seasonal fluctuations in water chemistry. Egg Lake is larger and deeper (maximum depth approximately 10 m).

Total and dissolved iron levels in Ring and Murky lakes were 40 and 43 times higher than CCME guidelines, respectively, in winter. Total iron exceeded the CCME guideline in Egg Lake in March 2009, associated with high total suspended solids and turbidity and low dissolved iron levels. Based on general chemistry results in September 2009, water quality in Ring, Buck, Drizzle and Murky lakes appears to be comparable, and similar winter water chemistry is expected in these lakes.

Arsenic in sediment exceeded CCME ISQG in Ring, Drizzle, Murky and Egg lakes. The mean mercury level was also relatively high in Egg Lake (0.103 mg/kg) but did not exceed its guideline.

7.3.2 Aquatic Organisms

Chlorophyll a levels in Ring and Murky were relatively high in June 2009 (2.52 and 2.14 µg/L, respectively); the chlorophyll a sample from Egg Lake broke in transit. Phytoplankton biomass increased in Ring and Murky between June and September (chlorophyll a of 2.68 and 8.22 µg/L, respectively), with the greatest increase noted for Murky Lake.

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Phytoplankton taxon richness and diversity varied slightly through the Ring Group, with Egg Lake having the highest richness and Ring Lake having greatest diversity (see Table 7-3). Blue-green algae (two or three species) were predominant in Ring, Murky and Egg lakes in June, with *Anacystis* cf. *elachista* the predominant species in each lake. *Dinobryon* (a yellow-brown alga) was common in Ring, Murky and Egg lakes, though it was the least abundant in Murky Lake.

Table 7-3: Ring Group Lakes – Phytoplankton and Zooplankton Richness, Diversity and Predominant Taxa in June 2009

Station	Phytoplankton			Zooplankton		
	Richness	Diversity	Taxa	Richness	Diversity	Taxa
Ring	63	0.87	Blue-green (51%) Yellow-brown (22%) Diatoms (5%)	–	–	–
Murky	76	0.84	Blue-green (57%) Yellow-brown (9%)	18	0.58	Rotifers (57%) Copepods (39%)
Egg	78	0.70	Blue-green (46%) Yellow-brown (29%) Diatoms (7%)	17	0.61	Rotifers (87%) Copepods (6%)

Zooplankton taxon richness and diversity in June 2009 were similar in Murky and Egg lakes. Rotifers were the predominant taxa in both lakes, with copepods also comprising a large proportion in Murky. Equipment issues prevented collected of a zooplankton sample at Ring Lake.

As Buck and Drizzle were only added to the aquatics baseline program in September 2009, phytoplankton and zooplankton were not sampled in these lakes in June.

7.3.3 Fisheries

Egg Lake was not fished because it is outside of and upstream from the project area. Ring, Buck, Drizzle and Murky were fished in 2009; with the resulting capture of only one northern pike from Murky Lake only (CPUE: 0.1). Northern pike was also observed in Murky Lake near its outlet in May 2009. The captured northern pike was 177 mm long, weighed 38.1 g and was 2 years old. The condition of this one fish was good (98.2). It was immature and had no parasites.

At this time Murky is considered fish bearing, while Ring, Buck and Drizzle are suspected non-fish bearing. The non-fish bearing designations are suspected at this time because they are based on only one year of data, the inlets and outlets have not yet been examined for fish passage potential, and no winter data have been collected for Buck and Drizzle. However, the shallow maximum depths of these lakes (1.8 m, 2 m, and 2.5 m for Ring, Buck and Drizzle) and the minimal surface flows observed in October 2009 (see Volume 1 – Hydrology) suggest these lakes will have poor winter conditions and be isolated.

7.4 Reference Group

The Reference Group includes Kinnikinnick, Redemption, Carrot, and U Lakes. These lakes are not connected by drainage, but were grouped together as they were examined as potential reference lakes. Kinnikinnick Lake is contained within the Thor Lake syenite, while Redemption, Carrot and U are located outside the Blachford Intrusive Complex.

Surface drainage has not been investigated, but is inferred from topographic maps. Kinnikinnick Lake appears to have two inlets and one outlet, draining south through a series of small lakes into Great Slave Lake. Redemption Lake appears to have two inlets at its northeast and northwest basins, and one outlet draining south and west through a similar sized lake into Blachford Lake. Carrot Lake appears to drain to Great Slave Lake through two smaller lakes. U Lake appears to drain to Great Slave Lake by eventually joining the same watercourse that drains from Thor Lake.

7.4.1 Water and Sediment Chemistry

Water quality data has been collected at Kinnikinnick Lake since March 2008. General chemistry is typical of large, deep lakes in the study area (maximum depth of 20 m) and is characterized by clear, moderately hard water (89 to 103 mg/L) with low conductance, nutrients and organic carbon, and a low buffering capacity. No exceedances of WQG for metals occurred in the 2008-2009 dataset; most metal concentrations are low and relatively stable throughout the seasons sampled. Redemption Lake (maximum depth of 15 m) was added to the aquatics baseline program in September 2009 and has only been sampled once. Preliminary water quality appears to be similar to that of Kinnikinnick.

Sediment chemistry at Kinnikinnick Lake indicates high total phosphorus (1,740 mg/kg) and moderate organic carbon (23.4 mg/kg) and Kjeldahl nitrogen (2.38 mg/kg) levels. Copper and nickel exceeded ISQG, and cadmium was close to its ISQG. Sediment in Redemption Lake has slightly lower total phosphorus, organic carbon and Kjeldahl nitrogen levels than Kinnikinnick Lake, with ISQG exceedances for copper, nickel and arsenic in all samples and PEL exceedances for arsenic in two of three replicate samples.

7.4.2 Aquatic Organisms

Chlorophyll *a* in Kinnikinnick Lake was low in June and September (1.40 and 1.14 µg/L, respectively) suggesting an oligotrophic lake. Phytoplankton richness was moderate in comparison to other lakes in the study area; however, diversity was relatively high. Blue-green algae (*Pseudanabaena* sp. and *Lyngbya* cf. *limnetica*), were predominant in Kinnikinnick Lake (see Table 7-4).

Zooplankton taxon richness was relatively low in Kinnikinnick Lake, with moderate diversity compared with other lakes in the study area. Rotifers were the predominant taxon (three species, dominated by *Keratella cochlearis*) and copepods were common.

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Table 7-4: Reference Group Lakes – Phytoplankton and Zooplankton Richness, Diversity and Predominant Taxa in June 2009

Station	Phytoplankton			Zooplankton		
	Richness	Diversity	Taxa	Richness	Diversity	Taxa
Kinnikinnick	67	0.74	Blue-green (71%) Green (6%)	15	0.65	Rotifers (73%) Copepods (22%)

7.4.3 Fisheries

All four of the potential reference lakes that were considered in 2008 and 2009 are fish bearing, but only one, Redemption, has a suitable fish species assemblage for comparison with the lakes that would be directly impacted by project activities (the list of impacted lakes depends upon the final project design; based on current understanding of the project design the critical potentially impacted lakes are Thor, Long, Elbow, and A). Redemption Lake and the potentially impacted lakes are known to have northern pike, lake whitefish, lake cisco, slimy sculpin and ninespine stickleback. Kinnikinnick Lake may be a suitable near-field reference lake for fisheries if lake trout are captured (northern pike, lake cisco, slimy sculpin, ninespine stickleback and lake chub were caught in Kinnikinnick). Lake trout, lake whitefish, lake cisco and ninespine stickleback were captured in Carrot Lake, but no northern pike. The presence of lake trout disqualifies Carrot as a potential reference lake for fisheries. U Lake was shallow and is only known to support northern pike; its shallow depth and lack of lake whitefish disqualify U as a potential reference lake for fisheries.

Catch rates in Redemption Lake were slightly lower than in the potentially impacted lakes for lake whitefish (0.5 fish/hour versus 0.4 – 2.2 fish/hour for A, Elbow, Thor and Long – Table 6-7). Catch rates for northern pike and lake cisco were within the ranges of these four lakes (0.3 fish/hour versus 0.1 – 0.5 fish/hour for northern pike; 0.8 fish/hour versus 0.1 – 1.6 fish/hour for lake cisco).

All size classes of fish present in other lakes in the study area were present in Redemption Lake (Table 6-9). The second largest (528 mm) and second smallest (110 mm) lake whitefish caught in the baseline study were caught at Redemption (a 542 mm lake whitefish was caught in Great Slave and a 71 mm lake whitefish was caught at Thor). The largest northern pike (825 mm) in the study was caught in Redemption, and while the lake cisco did not set study maxima or minima, a broad range of sizes were present (106-292 mm; whole project range 105-405 mm).

Redemption internal and external parasite frequencies were between the frequencies of the four potential impact lakes discussed here (Table 6-14). For example, the external parasitization frequency was 11% for Redemption, 1.5% for Thor and 38% for Elbow, while the internal parasitization frequency was 33% for Redemption, 25% for Long and 100% for Elbow.

7.5 Tardiff Group

The Tardiff Group includes North Tardiff and South Tardiff lakes, which are located south of Thor Lake and contained within the Lake Zone ore body. North Tardiff Lake has one outlet, which is primarily a peaty wetland with surface and subsurface flows but no defined channel; an inlet was not

located. South Tardiff has one defined outlet with surface and subsurface flows, draining south into Long through a discontinuous channel. North Tardiff and South Tardiff lakes have been identified as possible thermokarst lakes, formed from and currently affected by the meltwater of underlying thawing permafrost (see Volume 4 – Terrain, Soils and Permafrost)

7.5.1 Water and Sediment Chemistry

Water quality data have been collected from North and South Tardiff since March 2008. Generally, North and South Tardiff are highly colored with high dissolved organic carbon (DOC) levels, though they show lower mean values for conductivity, pH, hardness and alkalinity, and a reduced buffering capacity. Mean nutrient concentrations of the Tardiff lakes are comparable to other small shallow lakes in the study area, though they tend to have slightly greater mean nitrate and phosphate (total and ortho) concentrations. The Tardiff lakes exhibit strong season fluctuations in general chemistry, with conductivity, hardness, dissolved solids, nutrients and several metals increasing 2 to 32-fold in concentration during winter. Aluminum (total) and iron (total and dissolved) exceeded applicable guidelines during winter in both lakes; dissolved aluminum also exceeded the B.C. dissolved guideline in winter at North Tardiff.

High iron (total and dissolved) levels appear to be relatively consistent through all seasons at North Tardiff Lake (ranging from 232 to 3,110 µg/L dissolved iron). The dissolved iron guideline was also exceeded in June and September 2009. High iron concentrations through the year may be related to high DOC levels (mean of 56.9 mg/L), which provide organic compounds that act as chelators and prevent precipitation of iron from the water column in the open water season (Dodds 2002). South Tardiff also had a high mean DOC level (44.2 mg/L) but did not exhibit high iron in spring through fall. The disparity in iron concentrations between the Tardiff lakes may be an indication of differences in iron speciation, phytoplankton community composition and subsequent differences in phytoplankton-iron interactions (Öztürk, *et al.* 2003). High DOC levels, combined with higher nutrients and iron in the Tardiff lakes may be a result of their surrounding peatland environment, given that peatlands are a major source of DOC, phosphorus and iron (Dillon and Molot 1997), and may also be influenced by the release of carbon and nutrients from the thermokarst process (Mack, *et al.* 2004).

Both Tardiff lakes presented the two highest levels of sediment organic carbon (38.4 mg/kg at North Tardiff and 41.2 mg/kg at South Tardiff) and total Kjeldahl nitrogen (3.11 mg/kg at North Tardiff and 3.41 mg/kg at South Tardiff) across the study area; however, low levels of metals were generally observed in the sediment samples and no exceedances of the CCME ISQG occurred (iron was not included in sediment analyses as there are no CCME ISQG for iron).

7.5.2 Aquatic Organisms

The Tardiff lakes had relatively high chlorophyll *a* levels in June, and South Tardiff had highest chlorophyll *a* concentration of any study area lakes (5.73 µg/L). Chlorophyll *a* levels decreased in both lakes in September, though they remained high in South Tardiff Lake (3.33 µg/L).

In addition to being most productive, South Tardiff Lake also had high phytoplankton richness and diversity in June of any lakes sampled (Table 7-5). Phytoplankton taxa in both Tardiff lakes were

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dominated by various species of blue-green algae (*Anacystis* cf. *aeruginosa* in North Tardiff Lake and *Anabaena flos-aquae* in South Tardiff Lake), with differences in the common taxa.

Zooplankton taxon richness at the Tardiff lakes was among the highest across study area lakes; however, diversity was among the lowest, implying predominance of one or two species. A single rotifer (*Kellicottia longispina*) was predominant in both the Tardiff lakes, with the rotifer *Keratella cochlearis* also common in South Tardiff Lake; copepods were common in both lakes.

Table 7-5: Tardiff Group Lakes – Phytoplankton and Zooplankton Richness, Diversity and Predominant Taxa in June 2009

Station	Phytoplankton			Zooplankton		
	Richness	Diversity	Taxa	Richness	Diversity	Taxa
North Tardiff	64	0.78	Blue-green (44%) Cryptophytes (12%) Green (11%)	21	0.38	Rotifers (78%) Copepods (9%)
South Tardiff	77	0.81	Blue-green (36%) Yellow-brown (21%) Diatoms (8%)	21	0.48	Rotifers (82%) Copepods (11%)

7.5.3 Fisheries

The Tardiff lakes are not considered fish bearing because: 1) no fish were captured in either lake after two years of fishing effort; 2) the lakes are shallow and have low winter oxygen concentrations (<1 mg/L); and 3) neither lake is connected to fish bearing habitat by a passable watercourse.

7.6 Tributary Group

The Tributary Group includes all lakes considered upstream of the Thor Group, with the exception of the Tardiff lakes; it is comprised of Megan, Pistol, Porkchop, Thorn and Wasp lakes. Only Thorn Lake is situated partially within the Lake Zone ore body, while the others are located within the Thor Lake syenite.

Surface drainage has been investigated for Thorn and Megan lakes, which have no defined surface inlets or outlets. Surface drainage from Wasp, Pistol and Porkchop lakes are inferred from topographic maps. Wasp and Porkchop lakes appear to have one outlet each, flowing into the west end of Long Lake. Pistol Lake appears to have one outlet, flowing south through two small lakes into Porkchop Lake; this drainage appears to be the only inlet of Porkchop Lake.

7.6.1 Water and Sediment Chemistry

Water quality data within the Tributary Group have been collected since March 2008. Generally, large variations in mean levels of general parameters are observed within this group, due to the differences in lake morphometry. Pistol and Wasp are shallow lakes (maximum depths 2.1 m and 1.8 m, respectively) with strong seasonal fluctuations in water chemistry, while Thorn and Porkchop

are deeper lakes (maximum depth 5.9 and 17 m) with less seasonal variation. As mentioned in Section 6.2.1, Megan Lake is an exception, in that it is a deeper lake (maximum 6.6 m) with considerable seasonal variation compared to other lakes of similar depth.

Within this group, Megan Lake had the highest mean values of conductivity, pH, hardness and total dissolved solids, and higher levels of some nutrients and metals. These characteristics could be related to its possible closed basin, greater influence of groundwater (particularly in winter), or thermokarst processes of the adjacent peatland on the west shore, though this has not been confirmed.

Water chemistry in Pistol and Wasp lakes generally show higher mean values for conductivity, hardness, ammonia, total phosphate and total iron and arsenic than most other lakes in this group. Winter values of total and dissolved iron exceeded guidelines in both lakes. In contrast, Thorn and Porkchop lakes are similar to each other in general chemistry, with intermediate mean levels of conductivity, pH and hardness and low nutrient and metals levels. Porkchop Lake had a high value of dissolved copper in October 2008, though this value is considered an outlier and was excluded from statistical calculations.

Sediment chemistry also shows high variation among the lakes in this group. Thorn, Megan, Wasp and Porkchop lakes had median levels of organic carbon and nitrogen, while mean arsenic levels exceeded the CCME ISQG in all four lakes (range 6.36 to 14.07 mg/kg). Mean values for nickel and copper also exceeded their guidelines in Porkchop (21.9 and 49.0 mg/kg, respectively), while Thorn had an exceedance for mean nickel (16.7 mg/kg). Conversely, Pistol Lake exhibited relatively low values of total organic carbon (4.34 mg/kg) and Kjeldahl nitrogen (0.286 mg/kg) in comparison to other shallow lakes in the study area and metal exceedances were not observed.

7.6.2 Aquatic Organisms

Chlorophyll *a* in the Tributary lake group varied among lakes and seasons. In June, Wasp exhibited the highest chlorophyll *a* concentration of the group (3.36 µg/L) while Megan had the lowest (0.930 µg/L). Chlorophyll *a* concentrations increased in September in Thorn, Megan and Pistol lakes and decreased in Wasp and Porkchop lakes. Thorn Lake had the highest chlorophyll *a* in September (3.88 µg/L) and Porkchop the lowest (1.26 µg/L) within this group.

Phytoplankton richness and diversity were relatively high within the Tributary lake group and Porkchop Lake showed the highest diversity across the entire study area (see Table 7-6). Two blue-green algae species (*Anacystis* cf. *elachista* and *Agmenellum tenuissima*) were predominant in shallow Pistol and Wasp lakes, while one blue-green species (*Lyngbya limnetica*) was co-dominant with the diatom *Fragilaria crotonensis* in Porkchop Lake. Two species were predominant in Thorn Lake (the green alga *Gloeocystis ampla* and cryptophyte *Chroomonas acuta*). The yellow-brown *Dinobryon* was predominant in Megan Lake.

Zooplankton richness was greatest in Pistol Lake; however, diversity within the Tributary group lake and across the study area was greatest in Porkchop Lake. Four rotifer taxa were co-dominant in Porkchop Lake (*Kellicottia longispina*, unidentified rotifers, *Keratella cochlearis*, *Polyartha* spp.) and

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two copepod taxa were common. Copepods were dominant in Pistol and Wasp lakes, while rotifers (primarily *Kellicottia longispina*) and copepods were co-dominant in Thorn Lake.

Table 7-6: Tributary Group Lakes – Phytoplankton and Zooplankton Richness, Diversity and Predominant Taxa in June 2009

Station	Phytoplankton			Zooplankton		
	Richness	Diversity	Taxa	Richness	Diversity	Taxa
Megan	55	0.74	Yellow-brown (44%) Blue-green (23%) Diatoms (13%)	–	–	–
Pistol	57	0.80	Blue-green (54%) Yellow-brown (19%)	20	0.51	Copepods (75%) Rotifers (21%)
Pork-chop	77	0.89	Blue-green (21%) Diatoms (20%) Cryptophytes (12%) Green (6%)	18	0.84	Rotifers (68%) Copepods (29%)
Thorn	56	0.80	Green (36%) Cryptophyte (27%) Yellow-brown (18%)	17	0.69	Rotifers (53%) Copepods (42%)
Wasp	73	0.78	Blue-green (61%) Yellow-brown (14%)	17	0.48	Copepods (70%) Rotifers (20%)

7.6.3 Fisheries

Fisheries data were only collected for Megan and Thorn lakes, neither of which are considered fish habitat (Table 6-8). No fish were caught in either lake in two years of fishing effort; winter dissolved oxygen concentrations are 0.14 to 2.31 mg/L in Megan and 0.25 to 5.93 in Thorn; and no outlet watercourses were identified. The winter oxygen concentration in Thor was greater than the CCME (1999) guideline for the protection of aquatic life (5 mg/L) at the top of the water column. However, large bodied zooplankton were observed in Thorn Lake, supporting the non-fish bearing designation.

7.7 Blachford Group

The Blachford group of lakes includes Dinosaur Lake and the sampled bay in Blachford Lake. Both lakes are situated within the Blachford Lake Intrusive Complex, outside the Thor Lake syenite. Surface drainage from these lakes has not been investigated and is inferred from topographic maps. Dinosaur Lake appears to have one inlet and one outlet, draining approximately north through a series of lakes into Blachford Lake. The sampled bay in Blachford Lake appears to have one inlet, draining from several small lakes in the study area.

7.7.1 Water and Sediment Chemistry

Water quality data has been collected in the Blachford group since March 2008. Due to the size and depth differences of the two lakes, general chemistry is dissimilar. Blachford Lake is a large, clear,

lake and water quality in the sampled bay reflects this. Generally the Blachford sample station exhibited lower mean conductivity, hardness, and nutrients, with no metal exceedances; larger values for some nutrients and suspended solids shown at this station occurred in March 2008 when the station was located in a shallower area of the bay.

Dinosaur is a small lake, though with a maximum depth of 4.9 m, it is not considered shallow. Dinosaur Lake generally displayed seasonal variation in general chemistry parameters, with highest conductivity, hardness and dissolved solids levels in winter. Nutrient levels generally were low in Dinosaur Lake, though mean total phosphate was relatively high (29.6 µg/L) in comparison to other lakes across the study area. Total and dissolved iron exceeded applicable guidelines in winter and several other metals (i.e., manganese, strontium, uranium) also increased in concentration in winter.

Sediment chemistry is also dissimilar in these two lakes. Blachford Lake had low concentrations of organic carbon, Kjeldahl nitrogen and phosphorus, with no exceedances of guidelines for metals. Dinosaur Lake had relatively high values of organic carbon, Kjeldahl nitrogen and phosphorus, and arsenic exceeded its CCME ISQG.

7.7.2 Aquatic Organisms

Blachford Lake had relatively low chlorophyll *a* values in June and September (0.626 and 1.42 µg/L), while Dinosaur showed high values. Dinosaur also had the highest chlorophyll *a* across the study area in September (14.60 µg/L), increasing nearly three-fold from June (4.90 µg/L).

Phytoplankton richness, diversity and predominant taxa were similar in both lakes (Table 7-7), with slight differences in species composition. In Blachford Lake, one blue-green species (*Lyngbya limnetica*) was predominant and in Dinosaur Lake, two blue-green species (*Lyngbya contorta* and *L. cf. limnetica*) were predominant. *Dinobryon* spp. (yellow-brown algae) were common in both lakes.

Zooplankton richness and diversity were relatively high in both lakes, though higher in Blachford than Dinosaur (Table 6-15). Rotifers were predominant in both lakes, with four main species in Blachford (*Keratella cochlearis*, *Kellicottia longispina*, unidentified rotifers, *Polyartha* spp.) and two species in Dinosaur (*Keratella cochlearis*, *Kellicottia longispina*).

Table 7-7: Blachford Group Lakes – Phytoplankton and Zooplankton Richness, Diversity and Predominant Taxa in June 2009

Station	Phytoplankton			Zooplankton		
	Richness	Diversity	Taxa	Richness	Diversity	Taxa
Blachford	67	0.77	Blue-green (44%) Yellow-brown (19%) Green (8%)	18	0.77	Rotifers(79%) Copepods (12%)
Dinosaur	66	0.80	Blue-green (66%) Yellow-brown (9%) Diatoms (6%)	16	0.65	Rotifers (80%) Copepods (11%)

7.7.3 Fisheries

No fisheries data were collected in Dinosaur or Blachford lakes.

7.8 Elbow Lake

Elbow Lake is primarily situated on the Blachford Lake Intrusive Complex, outside of the Thor Lake syenite. Surface drainage has been investigated at Elbow; it is relatively isolated from other lakes in the study area. Elbow has one defined outlet at its south bay, draining through several wetland areas and overland into Great Slave (Elbow Out has no defined channel). Topography data do not indicate any surface inlets.

7.8.1 Water and Sediment Chemistry

Water quality data has been collected in Elbow Lake at two stations since March 2008. Overall, Elbow Lake shows intermediate values of mean conductivity, hardness and dissolved solids. Mean concentrations of some nutrients (nitrate and total phosphate) are higher in Elbow than other deep lakes of the study area (i.e., Long, Kinnikinnick) and greater variation through the dataset is observed. No metals exceeded CCME or BC guidelines through 2008 and 2009 in Elbow Lake, though one outlier was noted at Elbow South (total zinc at 40.3 µg/L).

Generally there is little variation in general chemistry between the two stations. Elbow South tends to show higher variation in pH and slightly higher mean levels of nutrients, including nitrate, total Kjeldahl nitrogen and total phosphate than Elbow North. Differences in sampled depth and lake morphometry at the two stations may explain observed differences in water quality.

Sediment quality is similar at the two Elbow stations, with the exception of mean organic carbon at Elbow South (twice the concentration of Elbow North). Metal concentrations were similar between the two Elbow stations; mean nickel was at the CCME ISQG at Elbow North (16.0 mg/kg) while just below the guideline at Elbow South (13.6 mg/kg).

7.8.2 Aquatic Organisms

Chlorophyll *a* concentration was intermediate in Elbow in June compared to other study area lakes, and increased in September. Elbow South generally had higher chlorophyll *a* concentrations than Elbow North in both June and September 2009, likely due to higher mean nutrient concentrations at this sample station.

Phytoplankton richness and diversity in Elbow was intermediate among study area lakes in June, and was similar among the two stations (Table 7-8). Both sample stations were dominated by two blue-green algal species (*Lyngbya* cf. *limnetica* and *Aphanizomenon flos-aquae*); *Dinobryon* spp. (yellow-brown algae) were also present at both stations.

Zooplankton richness was relatively low in Elbow Lake (Elbow North is one of the lowest among all study lakes) though diversity was high, implying more than one species is dominant. There were

three or four species of rotifers (*Keratella cochlearis*, *Kellicottia longispina*, *Keratella quadrata* and *Polyartha* spp.) predominant at both stations, and unidentified copepods were common.

Table 7-8: Elbow Lake – Phytoplankton and Zooplankton Richness, Diversity and Predominant Taxa in June 2009

Station	Phytoplankton			Zooplankton		
	Richness	Diversity	Taxa	Richness	Diversity	Taxa
Elbow North	64	0.65	Blue-green (77%) Yellow-brown (7%)	13	0.77	Rotifers(77%) Copepods (17%)
Elbow South	67	0.68	Blue-green (79%) Yellow-brown (5%)	15	0.72	Rotifers (77%) Copepods (19%)

7.8.3 Fisheries

Elbow Lake is fish bearing, with higher than average catch rates (Table 6-7) for northern pike (0.4-0.5 fish/hour versus 0.3 fish/hour) and lake whitefish (2.0-2.1 fish/hour versus 1.0 fish/hour), but a lower than average catch rate for lake cisco (0.2-0.6 fish/hour versus 1.1 fish/hour).

The most remarkable characteristic of the Elbow Lake fish was their very high parasitism frequency, the highest in the study area for the three large bodied species (Table 6-14). Elbow Lake was the only lake in which any parasites were observed on northern pike (3 of the 16 northern pike had external parasites), and it also had the highest rates of external (38%) and internal (100%) parasitization for lake whitefish. Rates of external and internal parasitization for lake whitefish at other lakes varied from 0 to 21% (21% in Long Lake) for external parasites and 0 to 83% for internal parasites (83% in Thor Lake).

7.9 Great Slave Lake

The small gravel bay on Great Slave Lake has been included in the study due the potential for construction and use of a wharf in this bay during mine operation. One defined inlet is present in this bay, receiving water from Elbow Lake and two small ponds.

7.9.1 Water and Sediment Chemistry

Water quality data has been collected from Great Slave Lake since October 2008. Low values for mean conductivity, hardness, dissolved solids, nutrients and metals are generally observed. Great Slave Lake has a relatively high mean nitrate concentration however, similar to that of Cressy and South Tardiff. This is likely a characteristic of Great Slave Lake.

The sediment in Great Slave Lake was relatively hard and difficult to sample; only one sample was obtained. Sediment chemistry shows low values for organic carbon, Kjeldahl nitrogen, phosphorus and most metals; nickel exceeded the CCME ISQG (22.6 mg/kg).

7.9.2 Aquatic Organisms

Chlorophyll *a* was similar at the sample station in June and September (1.03 µg/L and 1.08 µg/L, respectively) and was lower than at any of the other study lakes in September.

A replicate phytoplankton sample was taken at Great Slave in June; mean phytoplankton richness and diversity for the two samples was low in June, and was lower than in the other study lakes. The cryptophyte *Chroomonas acuta* was predominant in June and the blue-green alga *Lyngbya* spp. were common (Table 7-9). There were small differences in composition of the two replicates.

A replicate zooplankton sample was also taken at Great Slave Lake in June. Mean zooplankton richness was low and was one of the lowest among the study lakes. Mean zooplankton diversity was at an intermediate level and both replicate samples showed predominance of copepods (unidentified *Calanoida/Cyclopoida*, unidentified *Cyclopoida*, *Limnocalanus macrurus*). Two rotifer species were also present (*Keratella cochlearis*, *Kellicottia longispina*).

Table 7-9: Great Slave Lake – Phytoplankton and Zooplankton Richness, Diversity and Predominant Taxa in June 2009

Station	Phytoplankton			Zooplankton		
	Richness	Diversity	Taxa	Richness	Diversity	Taxa
Great Slave	39	0.48	Cryptophytes (71%) Blue-green (7%) Diatoms (5%)	13	0.68	Copepods (82%) Rotifers (8%)

7.9.3 Fisheries

More fish species were caught in Great Slave Lake than any other lake, as expected given the high known species and habitat diversity in Great Slave Lake (see Section 6.4.1). The fish caught in Great Slave Lake included the largest lake whitefish (542 mm) and the largest lake cisco (405 mm) in the fisheries study (Table 6-9). Catch rates were within the normal range for northern pike and lake whitefish, but were very high for lake cisco (8.4 fish/hour and 4.1 fish/hour in 2009 and 2008 respectively) compared to the study average (1.1 fish/hour). Parasite frequencies in Great Slave Lake were very low for all species (internal parasites were observed in one lake cisco of 20 dissected, and no other parasites were observed).

8 CLOSURE

Stantec has prepared this report for the sole benefit of Avalon Rare Metals Inc. for the purpose of documenting baseline conditions at its Thor Lake site. The report may not be relied upon by any other person or entity, other than for its intended purposes, without the express written consent of Stantec and Avalon. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties.

The information provided in this report was compiled from existing documents and data provided by Avalon and field data compiled by Stantec (formerly Jacques Whitford AXYS Ltd.). This report represents the best professional judgment of our personnel available at the time of its preparation. Stantec reserves the right to modify the contents of this report, in whole or in part, to reflect any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

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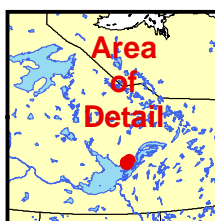
APPENDIX A

Maps



2008-2009 Baseline Studies for Avalon Ventures Ltd.
Proposed Thor Lake Rare Earth Metals Project

Fisheries and Aquatics Lake Sites



PREPARED BY



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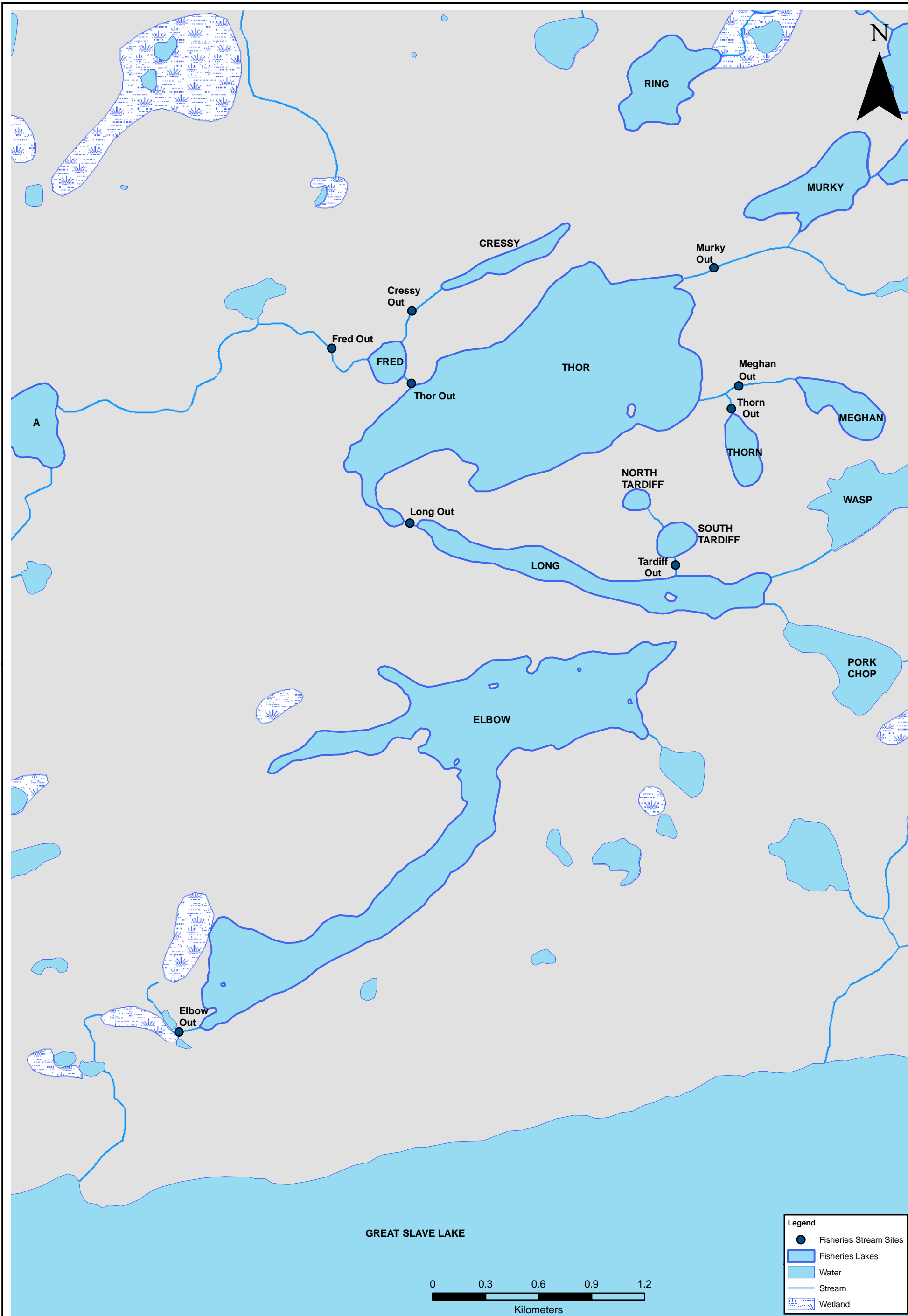
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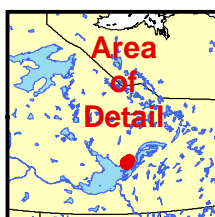
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2008-2009 Baseline Studies for Avalon Ventures Ltd.
Proposed Thor Lake Rare Earth Metals Project

Fisheries Stream Sites



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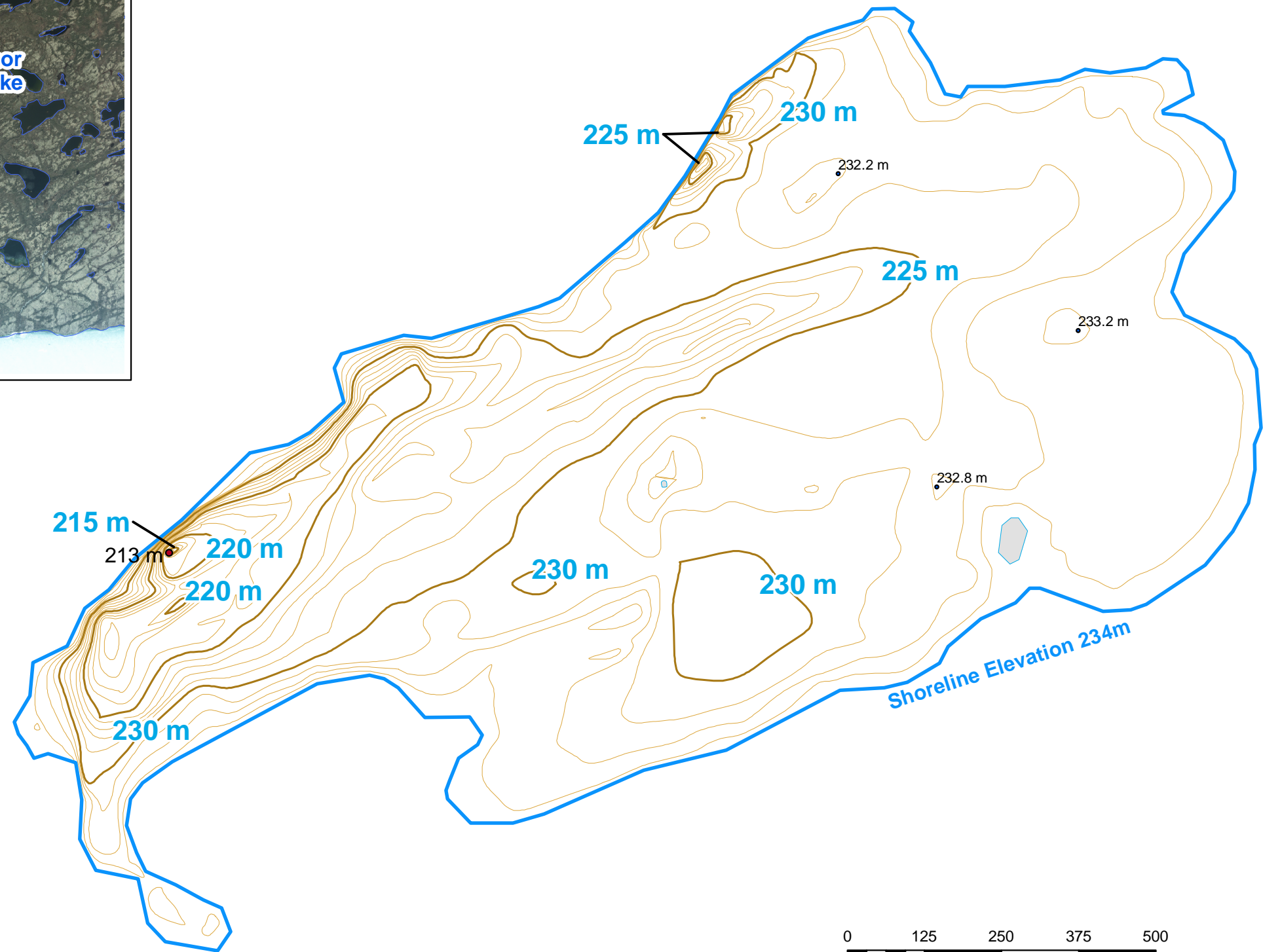
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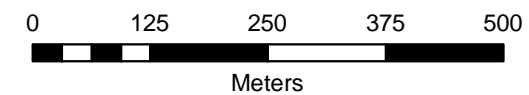
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Legend

- Island
- Contour 1 m
- Contour 5 m
- Shoreline




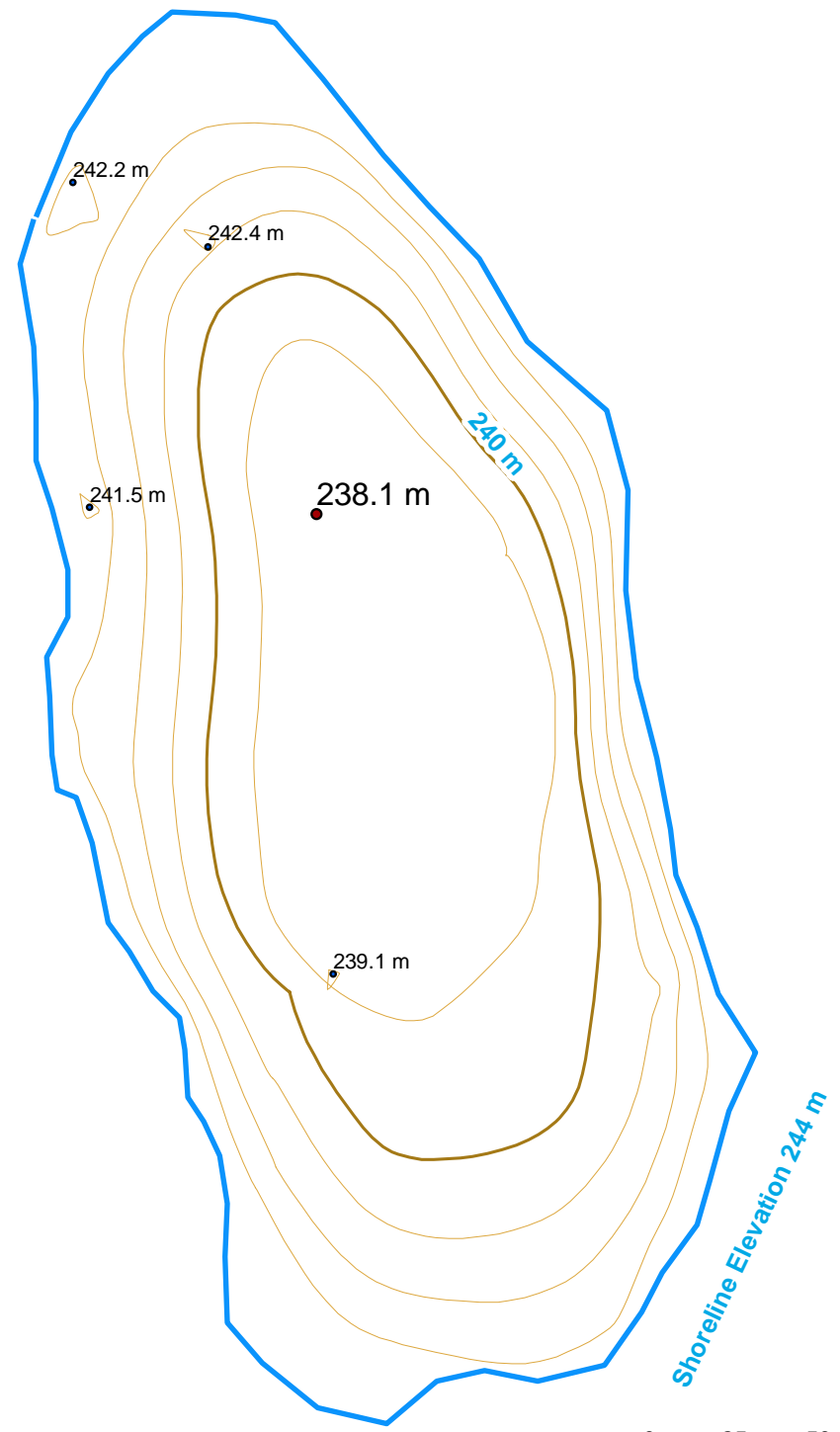
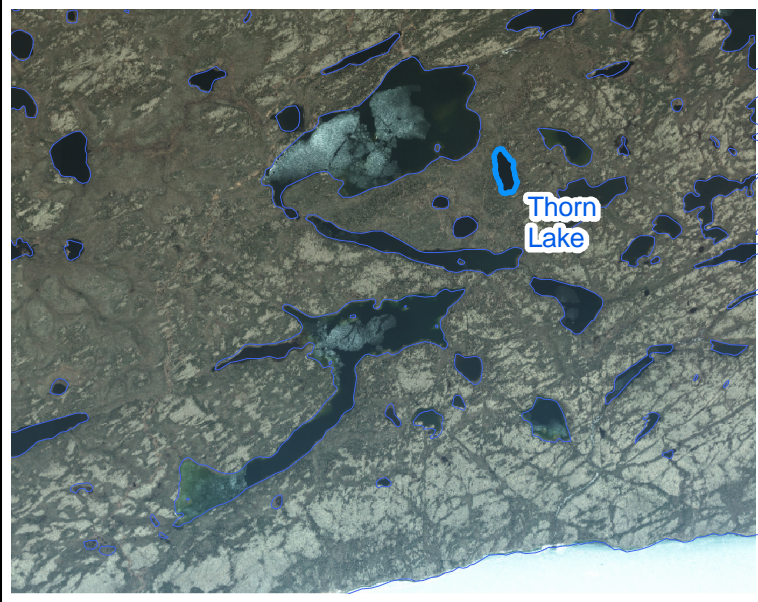
Lake Statistics	
Maximum Depth	16m
Total Surface Area	1,452,875 m ²
Littoral Zone Area 30%	436,939 m ²
Deep (>8 m) Area 6.8%	99,361 m ²
Lake Volume	5,054,270 m ³

1036222 - Thor Lake Rare Earth Metals Project

THOR LAKE BATHYMETRY

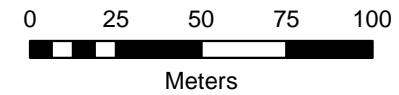


PREPARED BY		 Stantec	
DRAFT DATE	11/08/2009	SCALE	1:8,000
REVISION DATE		PROJECT	1036222
DRAWN	RH	CHECKED	SN
APPROVED	NL	VOL	
			6-1



Legend

- Contour 1m
- Contour 5m
- Shoreline




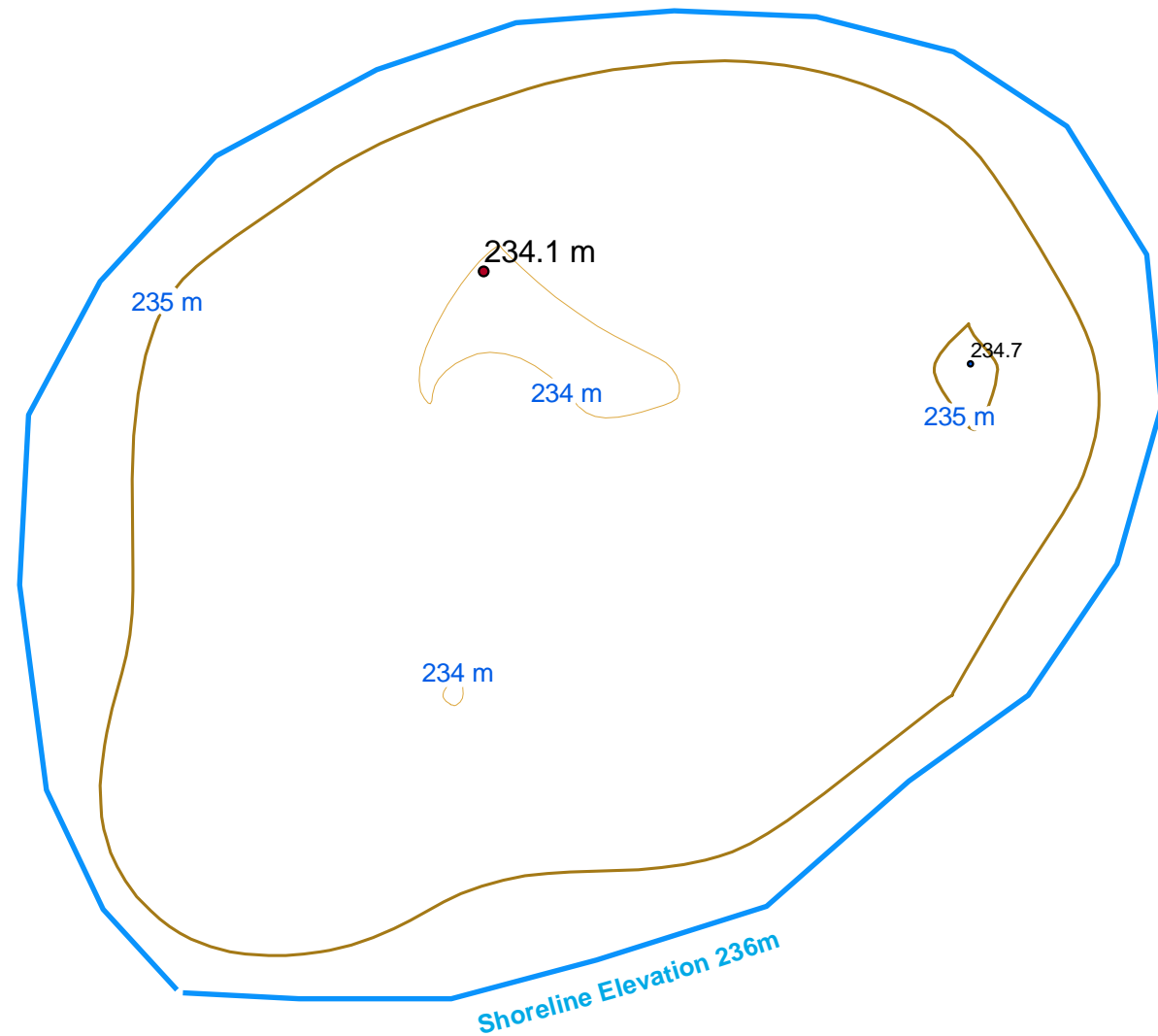
<u>Lake Statistics</u>	
Maximum Depth	5.9 m
Total Surface Area	59,249 m ²
Littoral Zone Area	34% 20,046 m ²
Deep (>8 m) Area	0% 0 m ²
Lake Volume	184,822 m ³

1036222-Thor Lake Rare Earth Metals Project

THORN LAKE BATHYMETRY

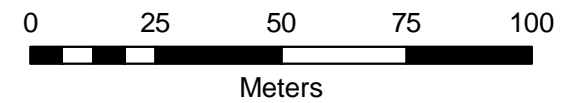


PREPARED BY				 Stantec	
DRAFT DATE		SCALE			
10/09/2009		1:2,200		FIGURE NO. 6-2	
REVISION DATE		PROJECT			
		1036222			
DRAWN	CHECKED	APPROVED	VOL		
RH	SN	NL			



Legend

- Contour 1 m
- Contour 5 m
- Shoreline



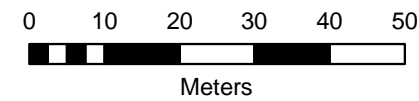
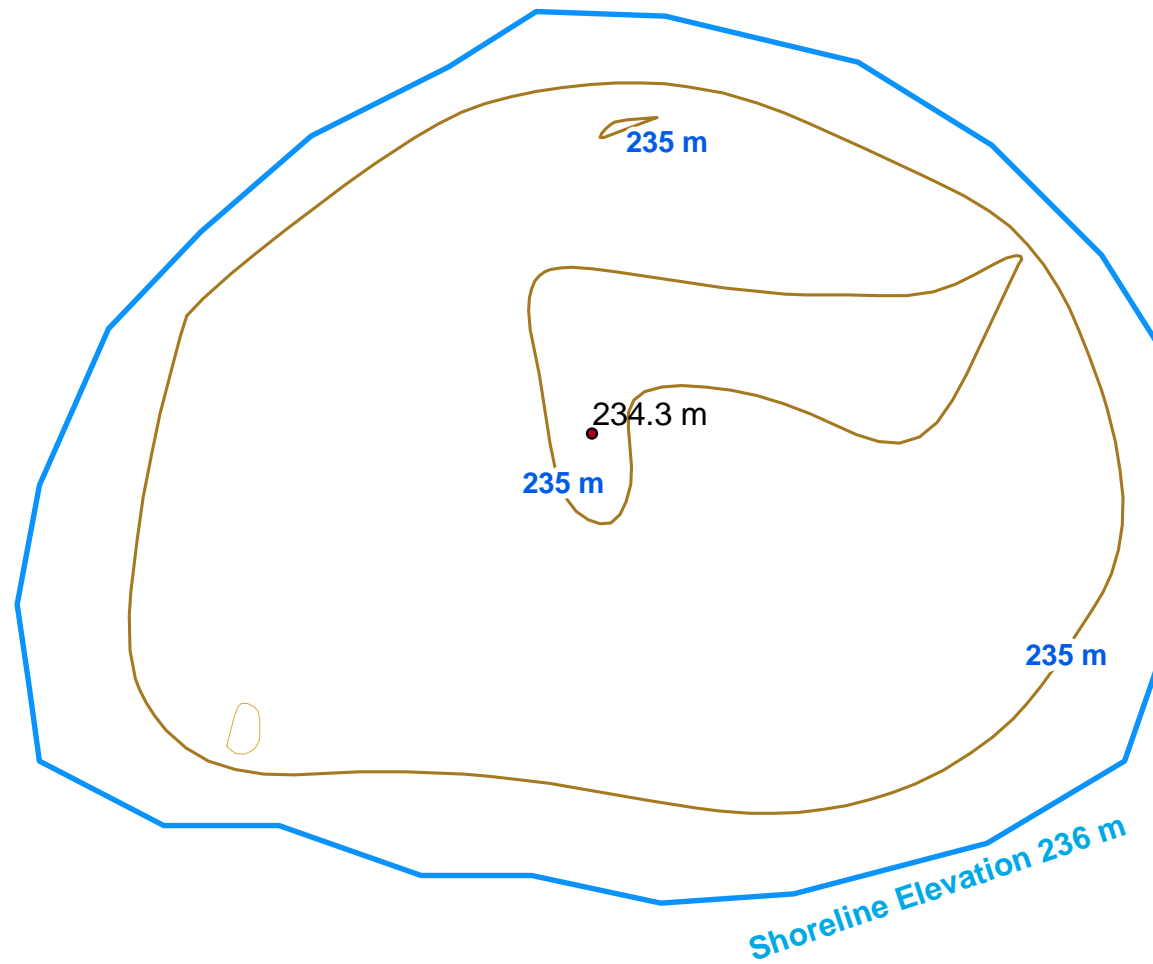
Lake Statistics	
Maximum Depth	1.9 m
Total Surface Area	37,018 m ²
Littoral Zone Area	100% 37,018 m ²
Deep (>8 m) Area	0% 0 m ²
Lake Volume	39,693 m ³

1036222-Thor Lake Rare Earth Metals Project

SOUTH TARDIFF LAKE BATHYMETRY



PREPARED BY			
DRAFT DATE	11/08/2009	SCALE	1:1,500
REVISION DATE		PROJECT	1036222
DRAWN	RH	CHECKED	SN
APPROVED	NL	VOL	
			6-3



Lake Statistics	
Maximum Depth	1.7 m
Total Surface Area	14,109 m ²
Littoral Zone Area	100% 14,109 m ²
Deep (>8 m) Area	0% 0 m ²
Lake Volume	14,260 m ³

Legend

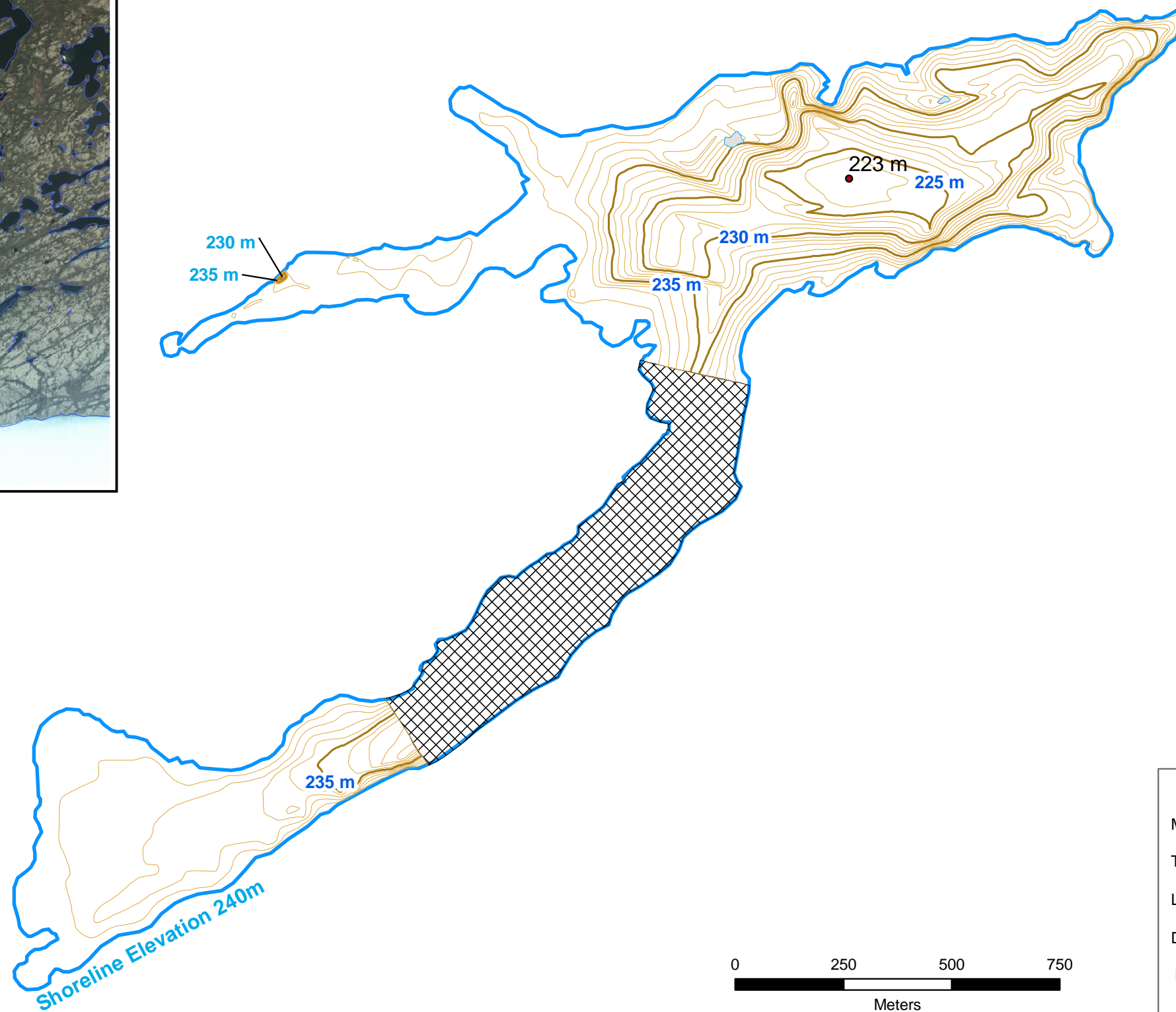
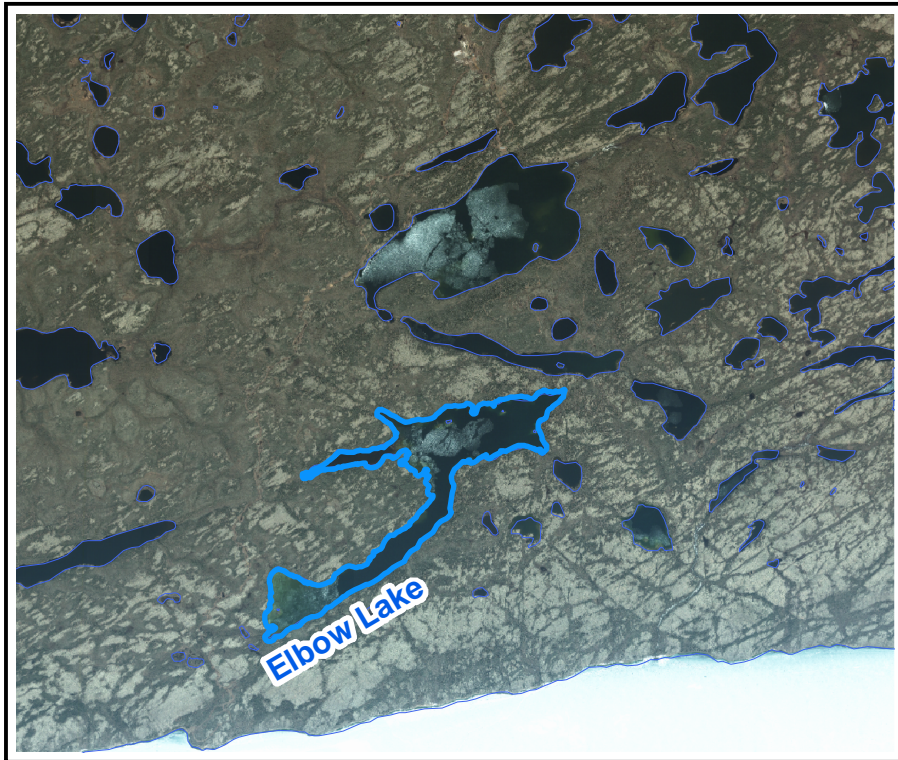
- Contour 1 m
- Contour 5 m
- Shoreline

1036222-Thor Lake Rare Earth Metals Project

NORTH TARDIFF LAKE BATHYMETRY



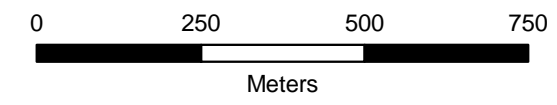
PREPARED BY			
DRAFT DATE	10/09/2009	SCALE	1:1,000
REVISION DATE		PROJECT	1036222
DRAWN	RH	CHECKED	SN
APPROVED	NL	VOL	
			6-4



Legend

- Island
- Contour 1 m
- Contour 5 m
- Shoreline
- Bathymetry Data to be Collected in 2009

Lake Statistics	
Maximum Depth	17 m
Total Surface Area	1,103,269 m ²
Littoral Zone Area	54% 596,510 m ²
Deep (>8 m) Area	22% 242,152 m ²
Lake Volume	5,091,965 m ³
Statistics relate to unhatched area	

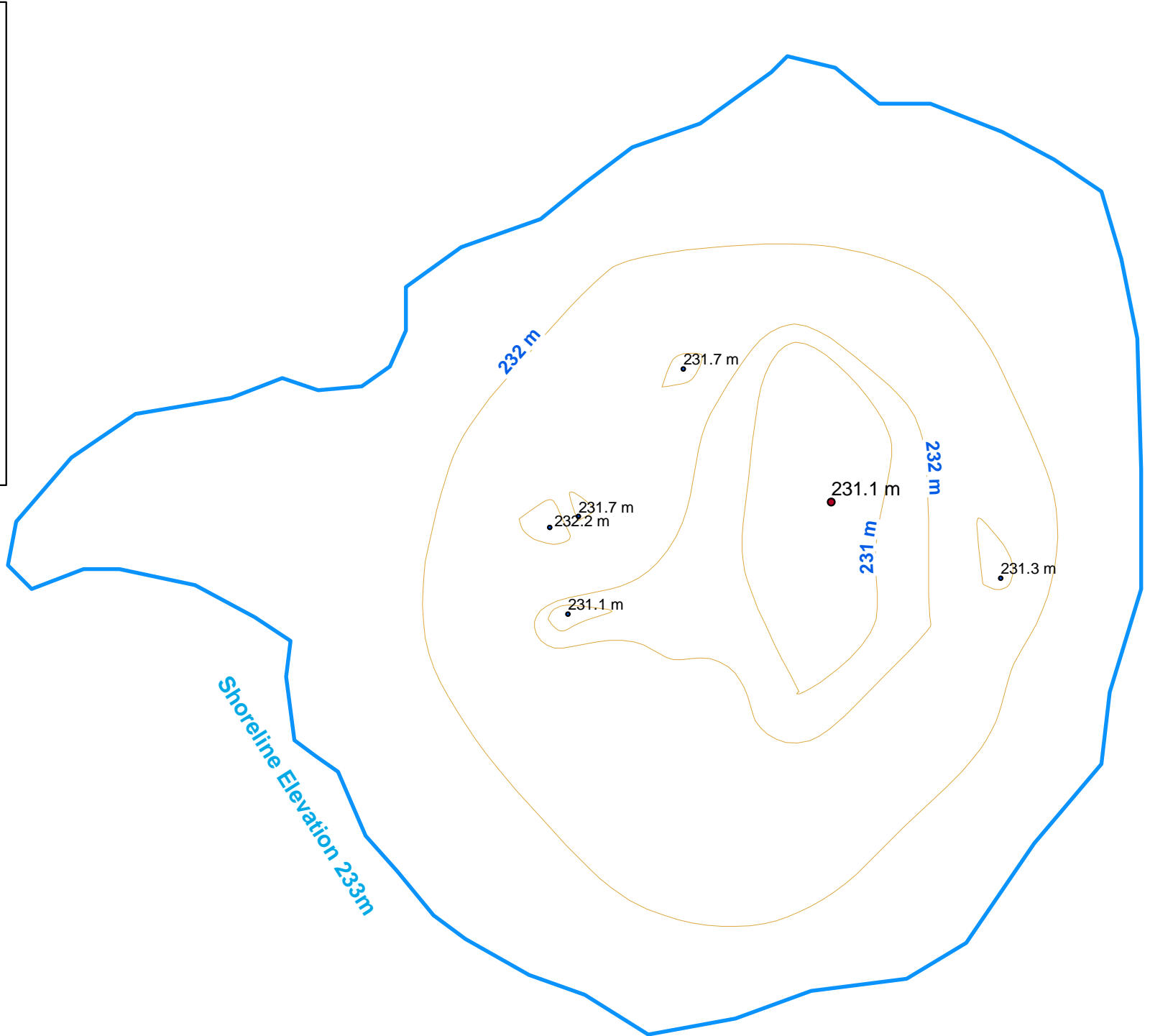
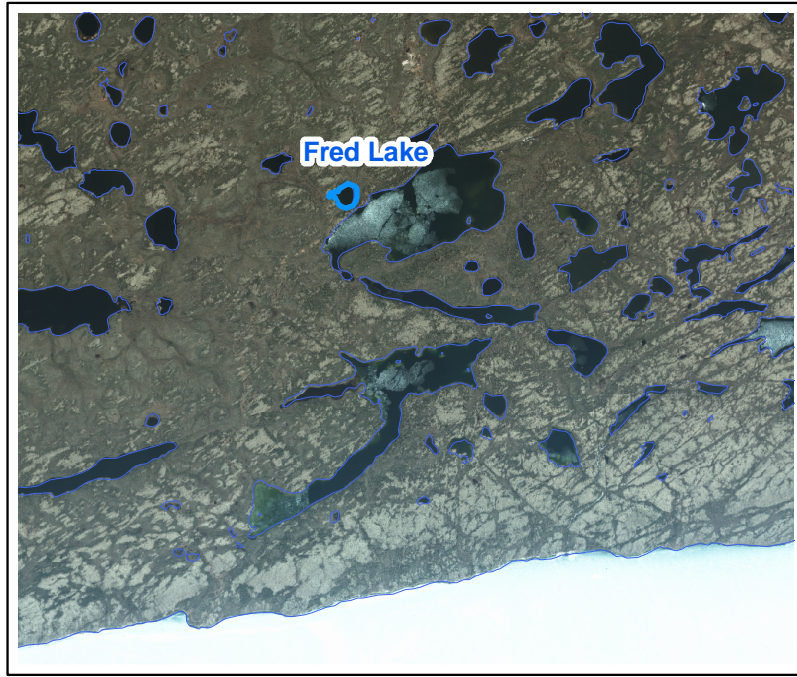


1036222 - Thor Lake Rare Earth Metals Project

ELBOW LAKE BATHYMETRY

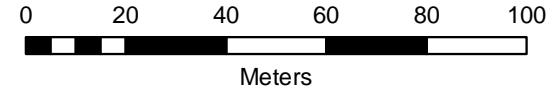


PREPARED BY		 Stantec	
DRAFT DATE 10/09/2009		SCALE 1:11,500	
REVISION DATE		PROJECT 1036222	FIGURE NO. 6-5
DRAWN RH	CHECKED SN	APPROVED NL	VOL



Legend

- Contour 1 m
- ShoreLine



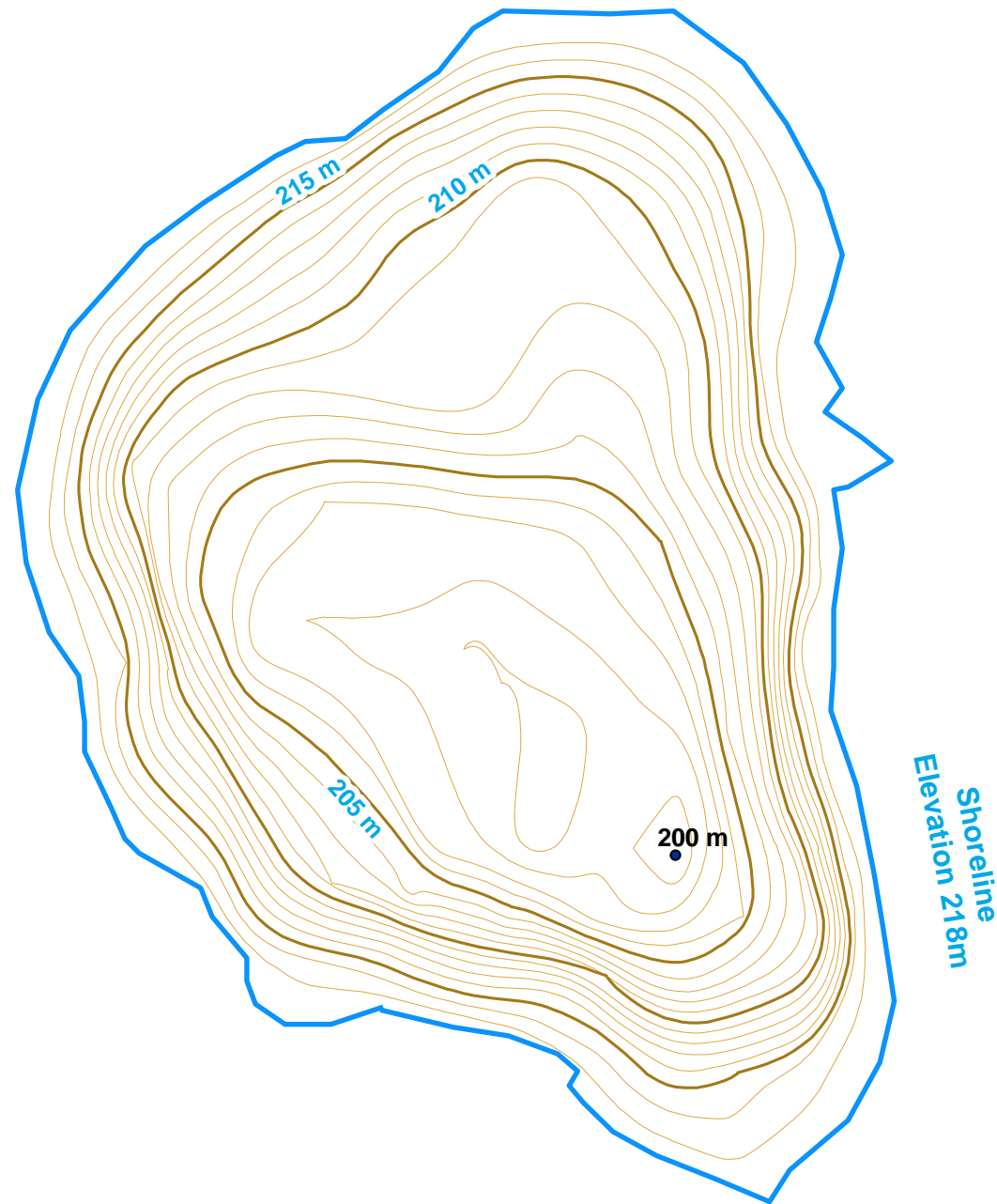
Lake Statistics	
Maximum Depth	1.9 m
Total Surface Area	49,499 m ²
Littoral Zone Area	100% 49,499 m ²
Deep (>8 m) Area	0% 0 m ²
Lake Volume	39,940 m ³

1036222 - Thor Lake Rare Earth Metals Project

FRED LAKE BATHYMETRY

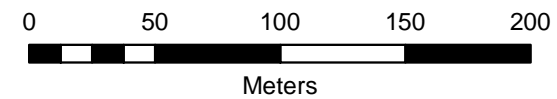


PREPARED BY			
DRAFT DATE	11/08/2009	SCALE	1:1,500
REVISION DATE		PROJECT	1036222
DRAWN	RH	CHECKED	SN
APPROVED	NL	VOL	
			6-6



Legend

- Contour 1 m
- Contour 5 m
- Shoreline



Lake Statistics	
Maximum Depth	18 m
Total Surface Area	132,751 m ²
Littoral Zone Area	19% 25,477 m ²
Deep (>8 m) Area	54% 71,083 m ²
Lake Volume	1,099,806 m ³

1036222 - Thor Lake Rare Earth Metals Project

LAKE A BATHYMETRY



PREPARED BY



DRAFT DATE 11/08/2009

SCALE 1:3,000

REVISION DATE

PROJECT 1036222

FIGURE NO.

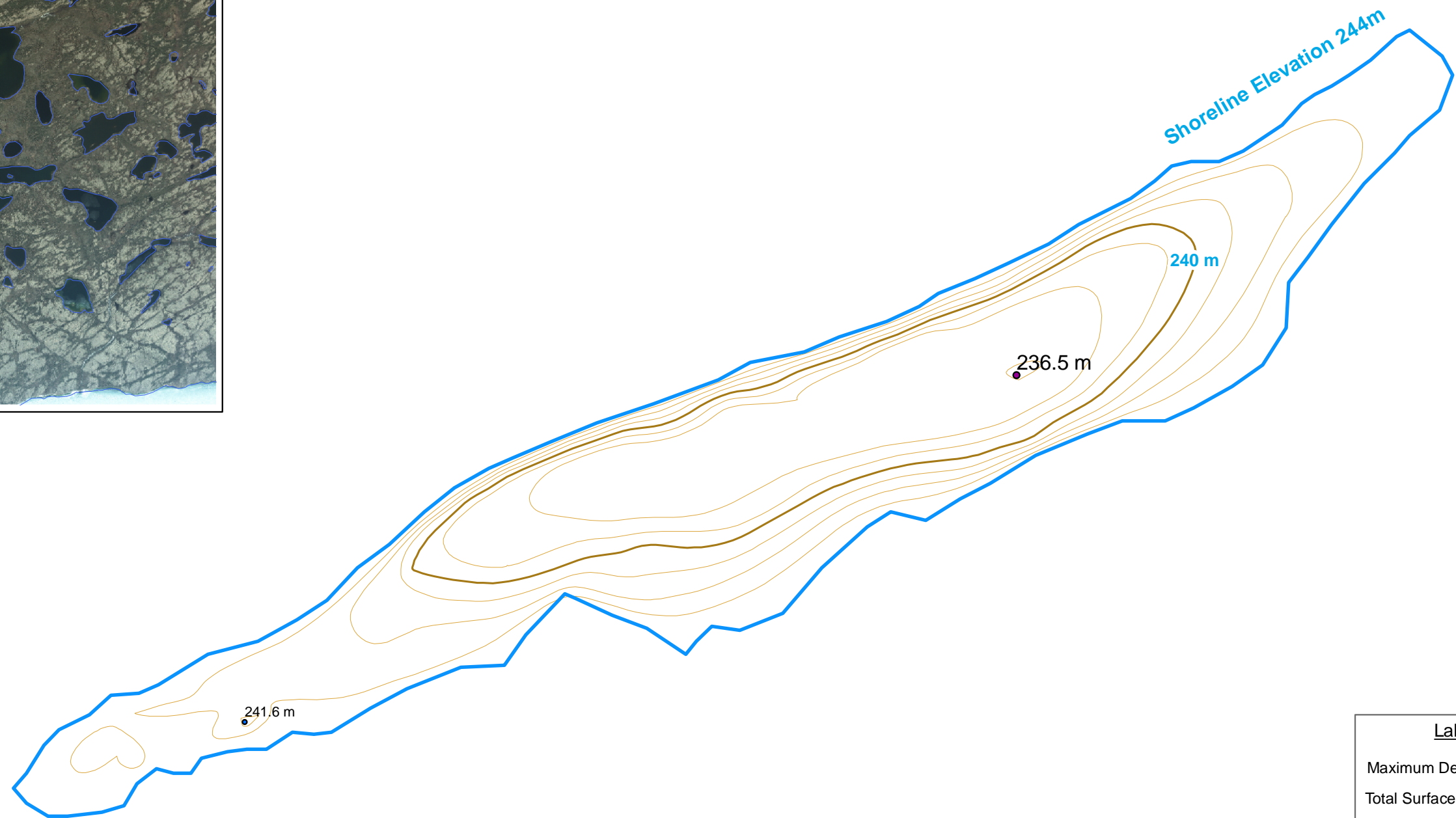
DRAWN RH

CHECKED SN

APPROVED NL

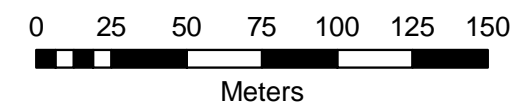
VOL

6-7



Legend

- Contour 1 m
- Contour 5 m
- Shoreline



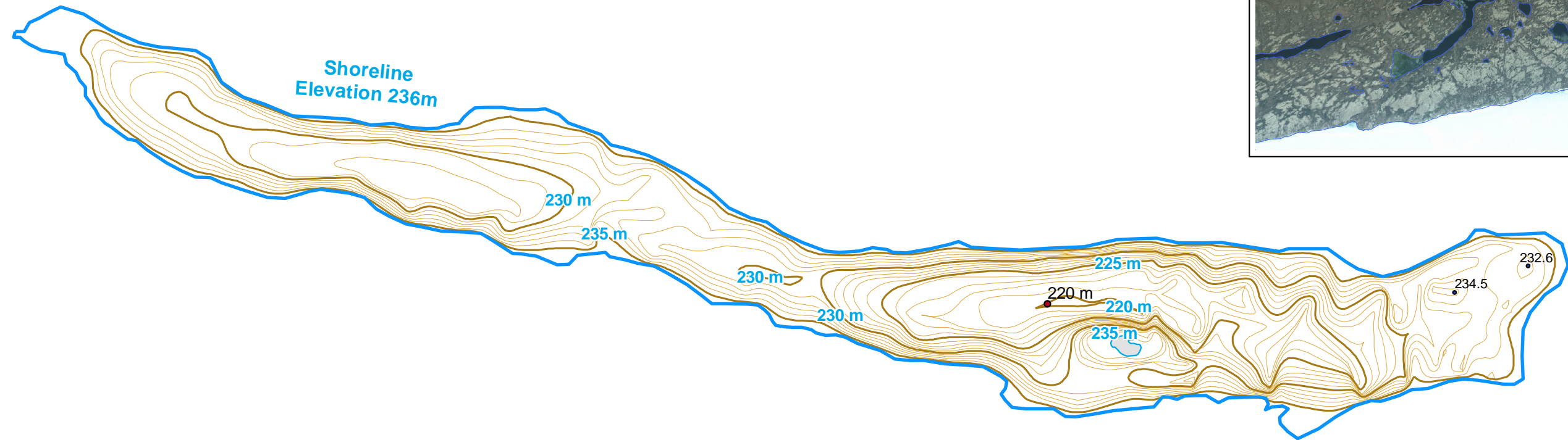
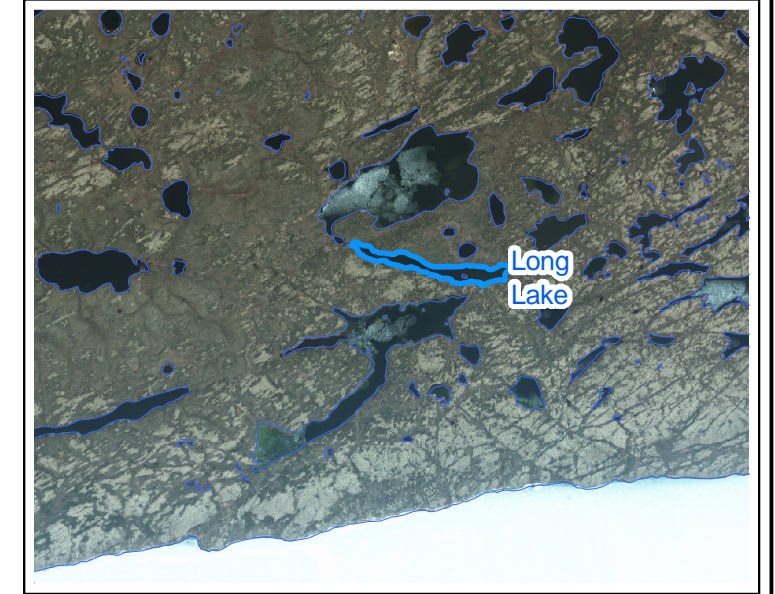
Lake Statistics	
Maximum Depth	7.5 m
Total Surface Area	64,366 m ²
Littoral Zone Area	40% 25,672 m ²
Deep (>8 m) Area	0% 0 m ²
Lake Volume	211,756 m ³

1036222 - Thor Lake Rare Earth Metals Project




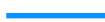
CRESSY LAKE BATHYMETRY

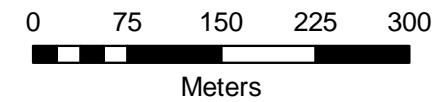


PREPARED BY			
DRAFT DATE	10/09/2009	SCALE	1:2,500
REVISION DATE		PROJECT	1036222
DRAWN	RH	CHECKED	SN
APPROVED	NL	VOL	
			6-8



Legend

-  Island
-  Contour 1 m
-  Contour 5 m
-  ShoreLines



Lake Statistics	
Maximum Depth	16 m
Total Surface Area	304,352 m ²
Littoral Zone Area	20% 60,821 m ²
Deep (>8 m) Area	25% 75,611 m ²
Lake Volume	1,745,591 m ³

1036222 - Thor Lake Rare Earth Metals Project

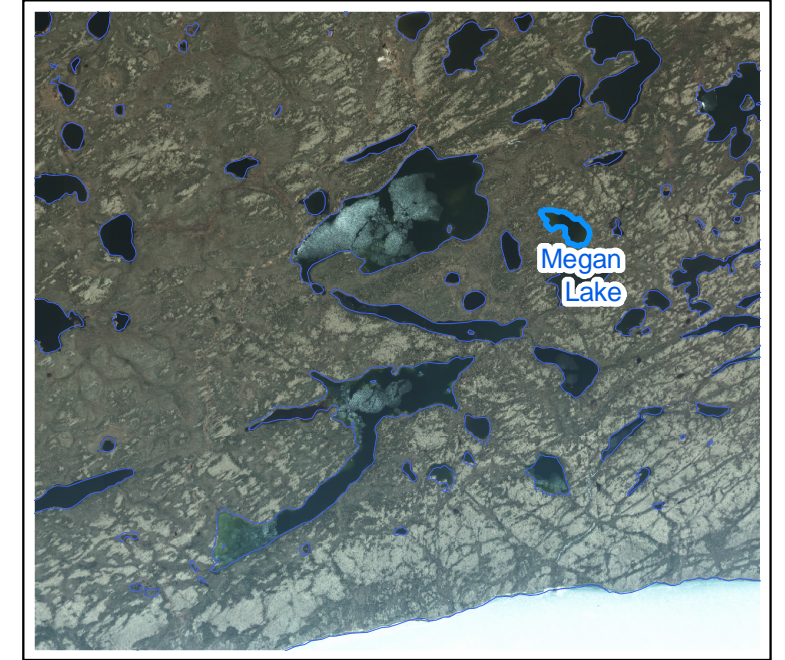
LONG LAKE BATHYMETRY



PREPARED BY

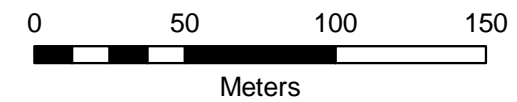


DRAFT DATE		10/09/2009		SCALE		1:6,000	
REVISION DATE				PROJECT		1036222	
DRAWN		RH		CHECKED		SN	
APPROVED		NL		VOL		6-9	



Legend

- Contour 1 m
- Contour 5 m
- Shoreline



Lake Statistics	
Maximum Depth	6.6 m
Total Surface Area	96,912 m ²
Littoral Zone Area	58% 56,302 m ²
Deep (>8 m) Area	0% 0 m ²
Lake Volume	241,419 m ³

1036222-Thor Lake Rare Earth Metals Project

MEGAN LAKE BATHYMETRY



PREPARED BY



DRAFT DATE
10/09/2009

SCALE
1:2,500

REVISION DATE

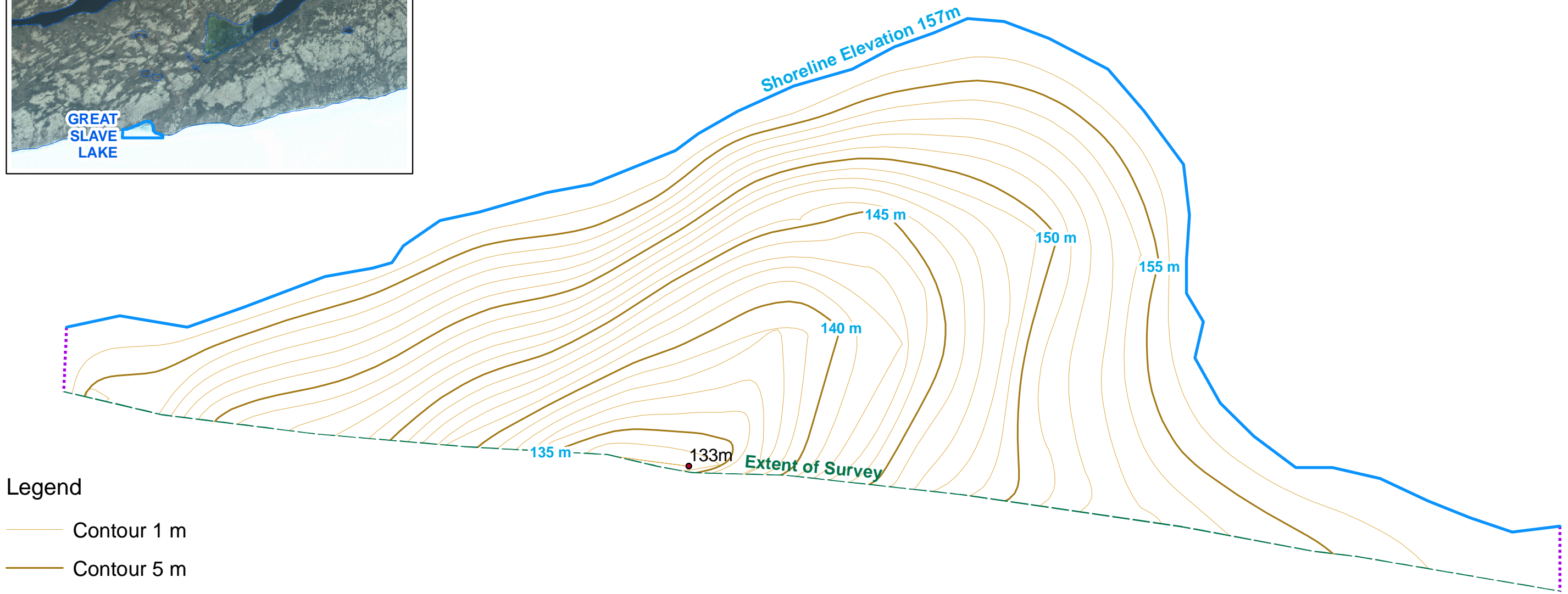
PROJECT
1036222

FIGURE NO.

6-10

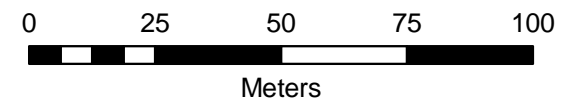
DRAWN RH	CHECKED SN	APPROVED NL
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VOL



Legend

- Contour 1 m
- Contour 5 m
- Shoreline
- Boundary
- - - Extent of Survey



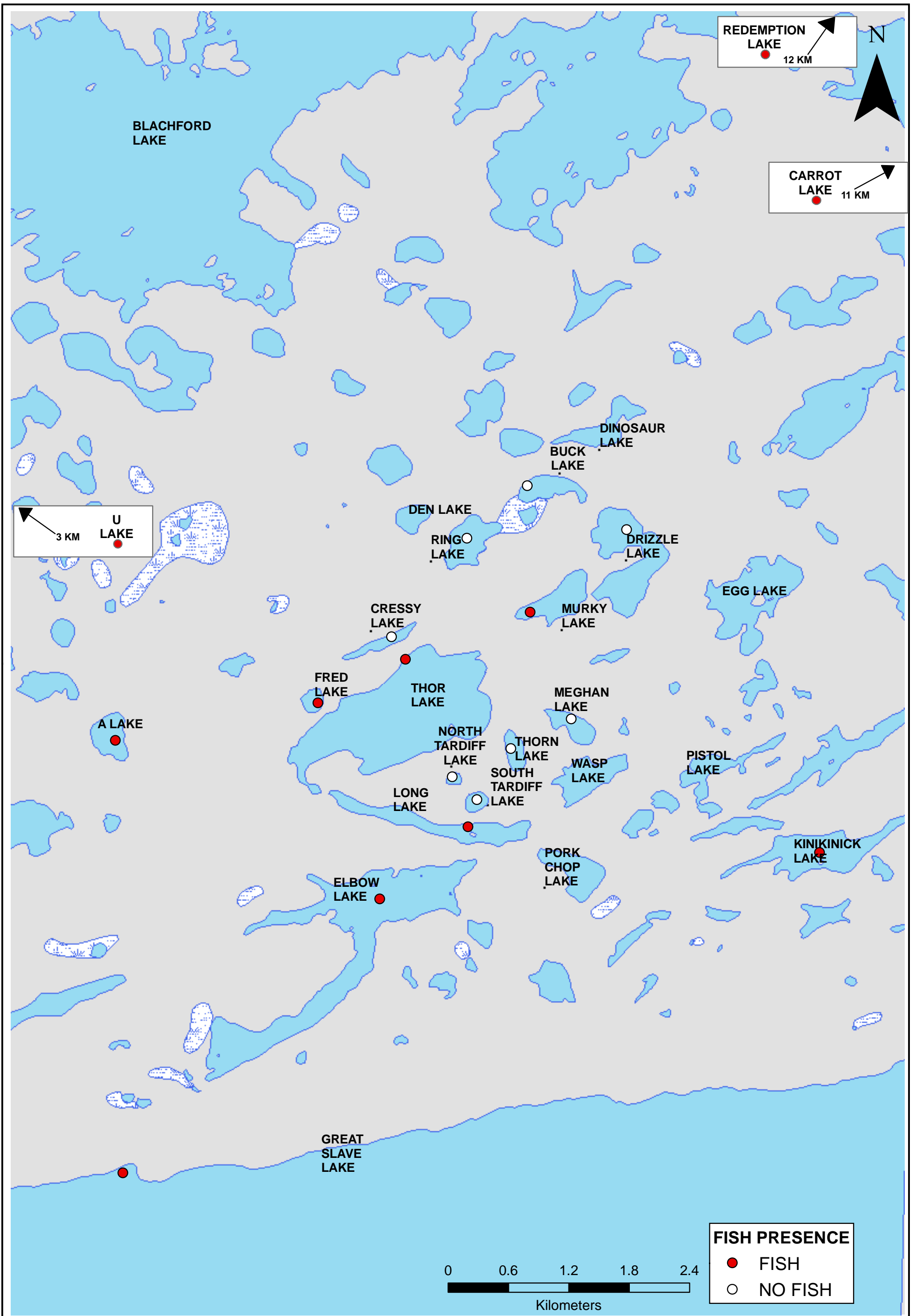
Lake Statistics	
Maximum Depth Surveyed 24 m	

1036222 - Thor Lake Rare Earth Metals Project

GREAT SLAVE LAKE BATHYMETRY

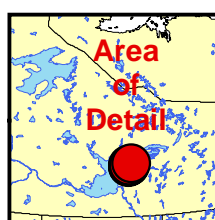


PREPARED BY					
DRAFT DATE		10/09/2009		SCALE	
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REVISION DATE			PROJECT		FIGURE NO.
			1036222		6-11
DRAWN	CHECKED	APPROVED	VOL		
RH	SN	NL			



Draft Technical Data Report
Thor Lake Project, Nechalacho Deposit

FISH PRESENCE



PREPARED BY



DRAFT DATE
21/12/2009

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1:35,000

REVISION DATE

PROJECT
1036222

FIGURE NO.

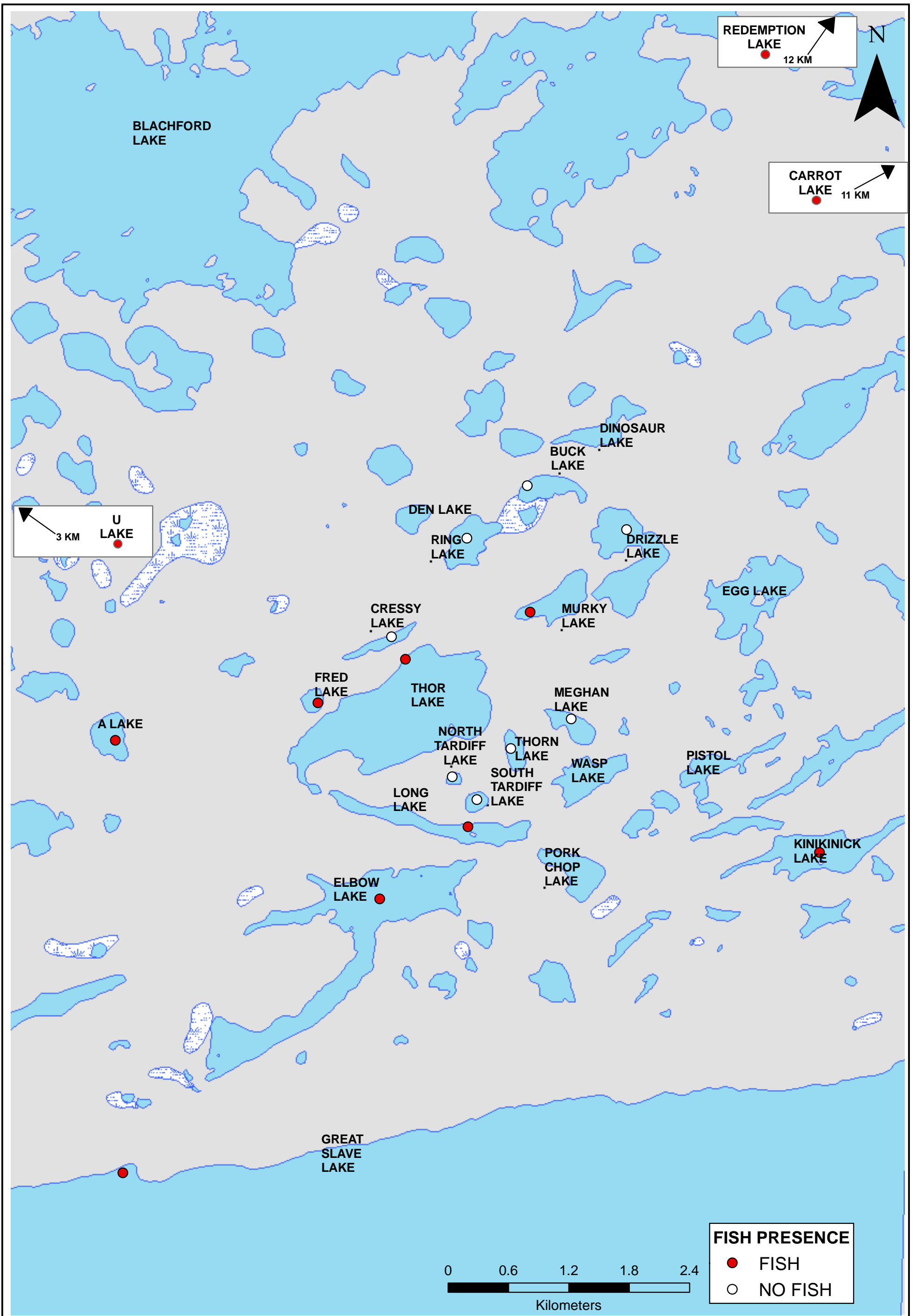
DRAWN
RH

CHECKED
SN

APPROVED
NL

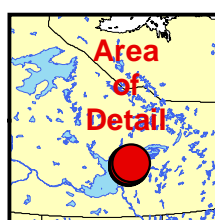
VOL

6-15



Draft Technical Data Report
Thor Lake Project, Nechalacho Deposit

FISH PRESENCE



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DRAFT DATE
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SCALE
1:35,000

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PROJECT
1036222

FIGURE NO.

DRAWN
RH

CHECKED
SN

APPROVED
NL

VOL

6-15



APPENDIX B

Historical Data

Table B-1: Surface Water General Chemistry in 1988 and 1998 Select Study Lakes

Thor Lake, NT

Project #: 1235-10050

Parameter	Units	September 1988 ^{a,c}								
		Thor Lake Surface	Thor Lake Bottom	Elbow Lake Surface	Elbow Lake Bottom	Fred Stream	Cressy Lake Surface	Cressy Lake Bottom	Ring Lake	Lake A
Micronutrients										
Ammonia-N	mg/L	0.07	0.09	0.09	0.07	0.09	0.09	0.11	0.17	0.08
Nitrate+Nitrite-N	mg/L	0.04	0.04	0.05	0.04	0.04	0.05	0.04	0.08	0.04
Total Kjeldahl Nitrogen	mg/L	1.1	0.73	0.64	0.66	0.69	0.79	0.93	1.8	0.66
Total Phosphorus (P)	mg/L	0.03	0.06	0.13	0.25	0.04	0.04	0.09	0.19	0.23
Orthophosphate (PO ₄ -P)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Inorganic Carbon	mg/L	36	35	36	39	36	24	24	29	33
Total Organic Carbon	mg/L	16	16	12	12	16	19	19	33	18
Major Ions & Inorganics										
pH	-	7.90	7.80	7.60	7.70	-	7.50	-	7.50	8.00
Chloride (Cl)	mg/L	5.4	5.4	1.7	1.7	5.4	0.9	0.9	1	4.8
Calcium (Ca)	mg/L	30	30	33	33	30	24	24	30	29
Potassium (K)	mg/L	2.1	2.1	2.3	2.3	2	2	2	2.6	1.6
Magnesium (Mg)	mg/L	18	18	19	19	18	11	11	14	17
Sodium (Na)	mg/L	6.5	6.6	4.1	4.1	6.3	2.5	2.5	2.1	5.7
Sulphate (SO ₄)	mg/L	0.4	0.4	0.8	0.7	0.6	3.8	3.8	0.9	1
Total Suspended Solids (TSS)	mg/L	2	2	2	3	-	4	3	8	1
Total Dissolved Solids (TDS)	mg/L	190	199	188	194	-	152	157	204	188
Hardness (as CaCO ₃)	mg/L	149	149	161	161	-	105	105	133	142
Bicarbonate (HCO ₃)	mg/L	181	180	183	197	182	122	122	148	167
Carbonate (CO ₃)	mg/L	2	2	7	NIL	NIL	NIL	NIL	NIL	NIL
Hydroxide (OH)	mg/L	-	-	-	-	-	-	-	-	-
Total Alkalinity (as CaCO ₃)	mg/L	73	78	84	83	-	51	51	63	71

Notes:

^a September 1988 data from SENES Consultants Ltd. Thor Lake Area Environmental Baseline Survey 1989 (prepared by the Saskatchewan Research Council)

^b June 1998 data from Highwood Resources Ltd. Environmental Survey of the Thor Lake Area 1998 (prepared by Golder Associates Ltd.)

^c Detection limits not reported; implied by less than (" $<$ ") values

Table B-1: Surface Water General Chemistry in 1988 and 1998 Select Study Lakes
Thor Lake, NT
Project #: 1235-10050

Parameter	Units	June 1998 ^{b,c}											
		Thor Lake Replicate 1	Thor Lake Replicate 2	Thor Lake Replicate 3	Elbow Lake Replicate 1	Elbow Lake Replicate 2	Elbow Lake Replicate 3	Blachford Replicate 1	Blachford Replicate 2	Blachford Replicate 3	Great Slave Replicate 1	Great Slave Replicate 2	Great Slave Replicate 3
Micronutrients													
Ammonia-N	mg/L	0.025	0.017	0.027	0.031	0.016	0.021	0.008	<0.005	0.015	<0.005	<0.005	<0.005
Nitrate+Nitrite-N	mg/L	<0.006	<0.006	<0.006	0.006	<0.006	<0.006	<0.006	<0.006	<0.006	0.085	0.085	0.127
Total Kjeldahl Nitrogen	mg/L	0.87	0.89	0.94	0.74	0.73	0.73	0.31	0.34	0.39	0.24	0.37	0.22
Total Phosphorus (P)	mg/L	-	-	-	-	-	-	0.007	0.007	0.007	0.004	0.003	0.003
Orthophosphate (PO ₄ -P)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Inorganic Carbon	mg/L	37	37	37	42	42	42	30	30	30	18	18	18
Total Organic Carbon	mg/L	15	15	15	12	12	12	7	7	7	5	5	5
Major Ions & Inorganics													
pH	-	8.70	-	-	8.67	-	-	-	-	-	8.70	-	-
Chloride (Cl)	mg/L	4.6	4.6	4.6	2.3	2.3	2.3	3.4	3.4	3.4	5.7	5.7	5.9
Calcium (Ca)	mg/L	29.1	29.2	29.1	31.4	31.5	31.5	24.7	24.5	24.7	22.8	22.7	22.5
Potassium (K)	mg/L	1.9	1.9	1.9	2.4	2.4	2.4	2.5	2.5	2.5	1.0	1.0	1.0
Magnesium (Mg)	mg/L	16.2	16.2	16.2	19	19.3	19	12.6	12.5	12.6	5.4	5.3	5.1
Sodium (Na)	mg/L	6	6	6	5	4	5	5	5	5	6	6	6
Sulphate (SO ₄)	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.5	5.4	6.0	15.2	16.0	16.0
Total Suspended Solids (TSS)	mg/L	5	2	<2	<2	5	5	<2	<2	7	6	5	<2
Total Dissolved Solids (TDS)	mg/L	143	143	144	158	156	156	122	122	123	96	98	97
Hardness (as CaCO ₃)	mg/L	139	140	139	157	158	157	14	113	114	79	79	77
Bicarbonate (HCO ₃)	mg/L	173	173	174	197	193	193	140	140	140	82	83	80
Carbonate (CO ₃)	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Hydroxide (OH)	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Alkalinity (as CaCO ₃)	mg/L	142	142	143	163	160	159	114	115	115	67	68	66

Table B-2: Surface Water Total Metals in 1988 and 1998 Select Study Lakes
Thor Lake, NT
Project #: 1235- 10050

Parameter	Units	September 1988 ^{a,c}								
		Thor Lake Surface	Thor Lake Bottom	Elbow Lake Surface	Elbow Lake Bottom	Fred Stream	Cressy Lake Surface	Cressy Lake Bottom	Ring Lake	Lake A
Aluminum (Al)	µg/L	14	<5	<5	<5	<5	<5	<5	<5	<5
Arsenic (As)	µg/L	<0.5	<0.5	<0.5	0.6	<0.05	1.9	2.0	<0.5	<0.05
Barium (Ba)	µg/L	72	80	85	84	59	15	20	59	41
Beryllium (Be)	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Boron (B)	µg/L	50	<50	90	<50	<50	<50	<50	<50	<50
Cadmium (Cd)	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cerium (Ce)	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium (Cr)	µg/L	7	9	15	8	4	5	2	5	4
Cobalt (Co)	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper (Cu)	µg/L	<1	2	<1	3	<1	<1	2	<1	<1
Iron (Fe)	µg/L	78	84	27	47	56	300	310	58	42
Lead (Pb)	µg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5
Manganese (Mn)	µg/L	35	39	50	76	25	54	56	17	3
Mercury (Hg)	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum (Mo)	µg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5
Nickel (Ni)	µg/L	<1	<1	<1	2	<1	1	<1	<1	<1
Niobium (Nb)	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tantalum (Ta)	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Thallium (Tl)	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tungsten (W)	µg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5
Uranium (U)	µg/L	<0.5	<0.05	<0.05	<0.5	<0.05	1.0 (±0.8)	1.1 (±0.8)	<0.5	<0.05
Vanadium (V)	µg/L	<10	<10	<10	<10	<10	<10	<10	<10	<10
Yttrium (Y)	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	3	2	<1	<1	1	2	2	3	2

Notes:

^a September 1988 data from SENES Consultants Ltd. Thor Lake Area Environmental Baseline Survey 1989 (prepared by the Saskatchewan Research Council)

^b June 1998 data from Highwood Resources Ltd. Environmental Survey of the Thor Lake Area 1998 (prepared by Golder Associates Ltd.)

^c Detection limits not reported; implied by less than (" $<$ ") values

Table B-2: Surface Water Total Metals in 1988 and 1998 Select Study Lakes
Thor Lake, NT
Project #: 1235- 10050

Parameter	Units	June 1998 ^{b,c}											
		Thor Lake Replicate 1	Thor Lake Replicate 2	Thor Lake Replicate 3	Elbow Lake Replicate 1	Elbow Lake Replicate 2	Elbow Lake Replicate 3	Blachford Replicate 1	Blachford Replicate 2	Blachford Replicate 3	Great Slave Replicate 1	Great Slave Replicate 2	Great Slave Replicate 3
Aluminum (Al)	µg/L	20	20	20	30	20	20	70	70	70	30	30	30
Arsenic (As)	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Barium (Ba)	µg/L	19	18	18	20	19	15	<1	<1	<1	<1	<1	<1
Beryllium (Be)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Boron (B)	µg/L	<1	<1	<1	<1	<1	<1	22	17	17	9	6	5
Cadmium (Cd)	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<0.2	<0.2	<0.2	<0.2
Cerium (Ce)	µg/L	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Chromium (Cr)	µg/L	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Cobalt (Co)	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Copper (Cu)	µg/L	1	<1	1	<1	<1	<1	<1	1	1	1	2	2
Iron (Fe)	µg/L	200	230	230	180	180	180	220	200	200	180	180	190
Lead (Pb)	µg/L	1.4	0.8	1.4	<0.1	<0.1	<0.1	0.1	0.2	0.2	<0.1	<0.1	0.1
Manganese (Mn)	µg/L	22.2	23.3	23.8	11.3	11.8	11.4	3.2	3.1	3.0	1.1	1.7	0.9
Mercury (Hg)	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Molybdenum (Mo)	µg/L	2.2	2.2	2.3	4.3	4.3	4.1	0.5	0.4	0.5	0.9	0.8	0.9
Nickel (Ni)	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	1	8.2	<0.2	<0.2	<0.2
Niobium (Nb)	µg/L	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Silver (Ag)	µg/L	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Tantalum (Ta)	µg/L	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Thallium (Tl)	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tungsten (W)	µg/L	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Uranium (U)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (V)	µg/L	0.4	0.4	0.4	0.4	0.4	0.3	0.5	0.5	0.5	0.4	0.4	0.4
Yttrium (Y)	µg/L	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Zinc (Zn)	µg/L	<4	<4	<4	<4	<4	<4	<4	6	<4	12	<4	<8

**Table B-3: Surface Radionuclides in 1988 and 1998 Select Study Lakes
Thor Lake, NT
Project #: 1235-10050**

Parameter	Units	September 1988 ^a								
		Thor Lake		Elbow Lake		Fred Stream	Cressy Lake		Ring Lake	Lake A
		Surface	Bottom	Surface	Bottom		Surface	Bottom		
Lead-210 (²¹⁰ Pb)	Bq/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Thorium-230 (²³⁰ Th)	Bq/L	<0.01	0.04	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium-238 (²³⁸ U)	Bq/L	-	-	-	-	-	-	-	-	-

Notes:

^a September 1988 data from SENES Consultants Ltd. Thor Lake Area Environmental Baseline Survey 1989 (prepared by the Saskatchewan Research Council)

^b June 1998 data from Highwood Resources Ltd. Environmental Survey of the Thor Lake Area 1998 (prepared by Golder Associates Ltd.)

^c June 1998 data reported as total radionuclide activity ± error

Table B-3: Surface Radionuclides in 1988 and 1998 Select Study Lakes
Thor Lake, NT
Project #: 1235-10050

Parameter	Units	June 1998 ^{b,c}			
		Thor Lake	Elbow Lake	Blachford	Great Slave Lake
Lead-210 (²¹⁰ Pb)	Bq/L	<0.07 (± 0.041)	<0.07 (± 0.041)	0.011 (± 0.041)	<0.07 (± 0.041)
Radium-226 (²²⁶ Ra)	Bq/L	0.022 (± 0.007)	0.015 (± 0.007)	0.011 (± 0.007)	0.022 (± 0.007)
Radium-228 (²²⁸ Ra)	Bq/L	0.019 (± 0.019)	0.004 (± 0.015)	0.004 (± 0.015)	0.019 (± 0.019)
Thorium-230 (²³⁰ Th)	Bq/L	0.004 (± 0.004)	0.019 (± 0.015)	0.011 (± 0.011)	0.011 (± 0.007)
Thorium-232 (²³² Th)	Bq/L	<0.004 (± 0.004)	<0.007 (± 0.004)	<0.011 (± 0.004)	0.004 (± 0.004)
Uranium-238 (²³⁸ U)	Bq/L	0.004 (± 0.007)	0.011 (± 0.007)	<0.007 (± 0.007)	0.007 (± 0.007)

**Table B-4: Sediment General Chemistry in 1998 Select Study Lakes
Thor Lakes, NT
Project #: 1235-10050**

Parameter	Units	June 1998 ^{a,b}								
		Thor			Elbow			Blachford		
		Replicate 1	Replicate 2	Replicate 3	Replicate 1	Replicate 2	Replicate 3	Replicate 1	Replicate 2	Replicate 3
Major Ions and Inorganics										
% Saturation	%	284	379	400	616	590	635	105	97	59
Total Alkalinity	mg/kg	56	52	48	110	42	91	33	59	59
Bicarbonate (HCO ₃)	mg/kg	69	64	58	134	51	111	40	72	72
Carbonate (CO ₃)	mg/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5
Conductivity	µS/cm	0.19	0.20	0.18	0.26	0.24	0.22	0.18	0.17	0.20
SAR	mg/kg	0.4	0.5	0.3	0.3	0.2	0.2	0.4	0.4	0.5
pH	-	6.70	6.80	6.90	7.70	7.60	7.60	6.10	6.30	6.50
Sulphate (SO ₄)	mg/kg	30.8	35.1	28.6	30.9	25.8	24.2	37.7	41.3	30.0
Silver (Ag)	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1
Aluminum (Al)	mg/kg	4900	5720	5630	1300	1400	1260	11300	8130	9750
Arsenic (As)	mg/kg	3.5	4.1	3.8	2.8	3.0	2.6	4.5	3.7	3.9
Boron (B)	mg/kg	12	13	13	29	35	31	10	6	5
Beryllium (Be)	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1
Calcium (Ca)	mg/kg	15.3	16.4	14.2	30.2	30	29.6	16.5	18.3	20.0
Cerium (Ce)	mg/kg	-	-	-	-	-	-	44	43	44.0
Cadmium (Cd)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloride (Cl)	mg/kg	9.3	9.8	8.7	6.8	6.1	11.3	7.8	8.8	9.1
Cobalt (Co)	mg/kg	5	6	6	2	2	2	5	5	6
Chromium (Cr)	mg/kg	11.2	13.1	13.0	3.5	3.7	3.2	19.0	14.5	18.5
Copper (Cu)	mg/kg	19	20	23	20	23	17	12	11	13
Iron (Fe)	mg/kg	12100	14100	14200	9700	11300	9800	11000	9230	11600
Mercury (Hg)	mg/kg	0.04	0.04	0.05	0.11	0.12	0.11	0.05	0.02	0.02
Potassium (K)	mg/kg	2.8	3.0	2.6	3.2	2.1	3.2	5.8	6.4	4.0
Magnesium (Mg)	mg/kg	5.8	5.9	5.0	10.6	10.0	8.9	6.7	6.9	8.2
Manganese (Mn)	mg/kg	249	271	284	863	1010	828	122	105	143
Molybdenum (Mo)	mg/kg	3	4	5	2	2	3	<1	<1	<1
Sodium (Na)	mg/kg	7	9	6	7	6	6	7	7	10
Niobium (Nb)	mg/kg	0.47	0.58	0.61	0.26	0.29	0.26	0.18	0.17	0.17

**Table B-4: Sediment General Chemistry in 1998 Select Study Lakes
Thor Lakes, NT
Project #: 1235-10050**

Parameter	Units	June 1998 ^{a,b}								
		Thor			Elbow			Blachford		
		Replicate 1	Replicate 2	Replicate 3	Replicate 1	Replicate 2	Replicate 3	Replicate 1	Replicate 2	Replicate 3
Nickel (Ni)	mg/kg	11	13	14	4	4	3	13	11	14
Lead (Pb)	mg/kg	<5	<5	<5	<5	<5	<5	6	5	7
Tantalum (Ta)	mg/kg	<0.05	<0.05	<0.05	0.05	0.08	<0.05	<0.05	<1.05	<0.05
Thallium (Tl)	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tungsten (W)	mg/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vanadium (V)	mg/kg	21	24	23	5	6	6	26	21	24
Ytterbium (Yb)	mg/kg	4.72	5.36	5.54	3.01	3.49	3.04	7.00	6.00	6.75
Zinc (Zn)	mg/kg	41.3	45.9	44.3	25.0	25.1	22.4	57.9	36.3	43.0

Notes:

^a June 1998 data from Highwood Resources Ltd. Environmental Survey of the Thor Lake Area 1998 (prepared by Golder Associates Ltd.)

^b Detection limits not reported; implied by less than ("<") values

**Table B-5: Sediment Radionuclides in 1998 Select Study Lakes
Thor Lake, NT
Project #: 1235-10050**

Parameter	Units	June 1998 ^{a,b,c}								
		Thor			Elbow			Blachford		
Lead-210 (²¹⁰ Pb)	Bq/g	0.330 (± 0.048)	0.348 (± 0.048)	0.333 (± 0.048)	0.293 (± 0.048)	0.344 (± 0.048)	0.322 (± 0.048)	0.022 (± 0.063)	0.052 (± 0.063)	0.085 (± 0.063)
Radium-226 (²²⁶ Ra)	Bq/g	0.070 (± 0.022)	<0.085 (± 0.052)	0.093 (± 0.019)	0.070 (± 0.019)	0.100 (± 0.030)	0.070 (± 0.019)	0.070 (± 0.015)	0.085 (± 0.022)	0.070 (± 0.015)
Radium-228 (²²⁸ Ra)	Bq/g	<0.048 (± n/r)	n/r (± 0.019)	0.093 (± 0.022)	<0.033 (± n/r)	<0.056 (± n/r)	0.044 (± 0.022)	0.093 (± 0.015)	0.052 (± 0.019)	0.089 (± 0.015)
Thorium-230 (²³⁰ Th)	Bq/g	0.030 (± 0.011)	0.030 (± 0.011)	0.070 (± 0.022)	0.015 (± 0.007)	0.015 (± 0.007)	0.015 (± 0.007)	0.030 (± 0.022)	0.056 (± 0.041)	0.026 (± 0.019)
Thorium-232 (²³² Th)	Bq/g	0.041 (± 0.015)	0.033 (± 0.011)	0.033 (± 0.015)	0.007 (± 0.004)	0.007 (± 0.004)	0.007 (± 0.004)	0.059 (± 0.026)	0.063 (± 0.041)	0.067 (± 0.030)
Uranium-238 (²³⁸ U)	Bq/g	0.052 (± 0.015)	0.059 (± 0.022)	0.093 (± 0.033)	0.115 (± 0.022)	0.089 (± 0.022)	0.078 (± 0.019)	0.059 (± 0.015)	0.037 (± 0.011)	0.037 (± 0.011)

Notes:

^a June 1998 data from Highwood Resources Ltd. Environmental Survey of the Thor Lake Area 1998 (prepared by Golder Associates Ltd.)

^b June 1998 data reported as total radionuclide activity ± error

^c n/r = result not reported

Table B-6: Chlorophyll Concentrations in 1988 Study Lakes^a
Thor Lake, NT
Project #: 1235-10050

Chlorophyll	Units	September 1988								
		Thor Lake Surface	Thor Lake Bottom	Elbow Lake Surface	Elbow Lake Bottom	Fred Stream	Cressy Lake Surface	Cressy Lake Bottom	Ring Lake	Lake A
Chlorophyll <i>a</i>	µg/L	3.45	3.98	0.68	0.78	-	5.08	6.48	0.60	0.95
Chlorophyll <i>b</i>	µg/L	3.20	2.18	4.10	2.00	-	2.78	4.63	1.56	2.45

Notes:

^a September 1988 data from SENES Consultants Ltd. Thor Lake Area Environmental Baseline Survey 1989 (prepared by the Saskatchewan Research Council)

Table B-7: Zooplankton Densities (organisms per litre) in 1998 Study Lakes^a
Thor Lake, NT
Project #: 1235-10050

Species/Groups	Lake				
	Thor	Elbow	A	Cressy	Ring
Copepoda					
- Calanoida					
<i>Limnocalanus macrurus</i>	-	0.033	0.006		
<i>Epischura lacustris</i>	0.002	-	-		
<i>Diaptomus sicilis</i>					
- adults	0.055	0.027	-		
- juveniles	0.024	0.019	-		
<i>Diaptomus pribilofensis</i>					
- adults	0.002	-	0.033		
- juveniles	-	-	0.035		
<i>Hetercope seprionalis</i>	-	-	-	0.026	0.082
- Cyclopoida					
<i>Cyclops scutifer</i>	0.749	0.146	-		
<i>Cyclops bicuspidatus thomasi</i> ^b	3.6	0.243	-	-	3.83
- Total naupliar juveniles	0.6	1.94	-	9.57	1.28
Cladocera					
<i>Daphnia galeata mendotae</i>	-	-	-	0.036	0.041
<i>Daphnia longiremis</i>	-	0.024	-		
<i>Daphnia longirostris</i>	3.3	0.243	-		
Diptera					
<i>Chaoborus americanus</i>	-	-	-	0.036	0.005
Rotifera					
<i>Kellicottia longispina</i>	3	-	7.28	14.6	-
Other small rotifers	27	12.1	72.8	87.4	-

Notes:

^a September 1988 data from SENES Consultants Ltd. Thor Lake Area Environmental Baseline Survey 1989 (prepared by the Saskatchewan Research Council)

^b May include juvenile copepodids of *Cyclops scutifer* in Thor and Elbow



APPENDIX C

Photographs



Photo 1: Aerial view of Fred Out, showing outlet from Fred and culvert under road. May 2009.



Photo 2: Aerial view of Fred Out, downstream from road, showing marsh sections with no fish passage. May 2009.



Photo 3 Fred Out, downstream from road, showing gauging station. May 2009.

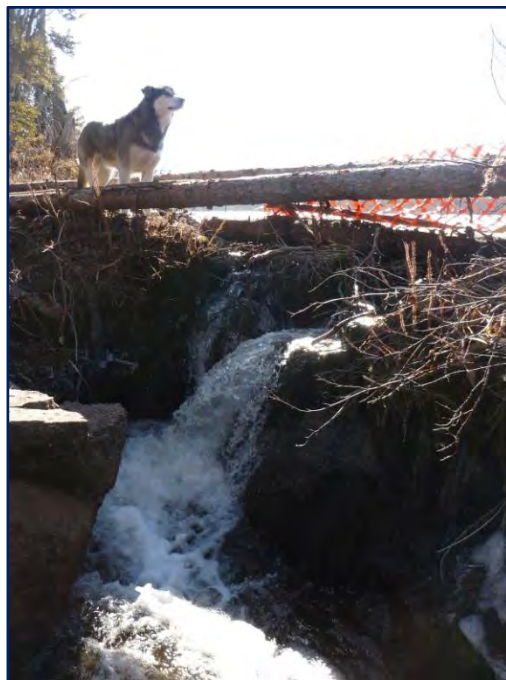


Photo 4: Thor Out looking upstream at Thor Lake and 1.2 m bedrock cascade. May 2009.



Photo 5: Thor Out looking downstream toward Fred Lake. May 2009.



Photo 6: Cressy Out showing wetted areas in a bog. The water in the puddle was visibly flowing. May 2009.



Photo 7: Cressy Out showing wetted area in bog and absence of defined channel. May 2009.



Photo 8: Northern pike captured in a deep section of Murky Out. May 2009.



Photo 9: Long Out looking upstream from Thor Lake. May 2009.



Photo 10: South Tardiff Out looking upstream at an earth dam. May 2009.



Photo 11: Megan Out showing lack of defined channel and discontinuous surface flow. May 2009.



Photo 12: Spruce forest in mapped location of Thorn Out. No visible channel. May 2009.



Photo 13: Looking upstream at Elbow Out flowing across the beach at Great Slave Lake. May 2009.



Photo 14: Looking downstream at Elbow Out; showing discontinuous surface flow through a swamp. May 2009.



Photo 15: A Lake showing inlet (Fred Out). September 2009.



Photo 16: Buck Lake showing black spruce riparian area and grassy shoreline. September 2009.



Photo 17: Carrot Lake showing bedrock islands and bedrock bluff in background. September 2009.



Photo 18: Cressy Out showing bedrock bluff. September 2009.



Photo 19: Dinosaur showing bedrock bluff. September 2009.



Photo 20: Drizzle showing emergent aquatic plants and black spruce forest. September 2009.



Photo 21: Aerial view looking southwest at Elbow Lake. October 2009.



Photo 22: Elbow Lake showing black spruce forest and grassy margin. Boulders are visible on the lake bottom. September 2009.



Photo 23: Aerial view looking southeast at Fred Lake, Thor Lake behind. September 2008.



Photo 24: Great Slave Lake, looking north toward dock site beach. September 2009.



Photo 25: Kinnikinnick Lake, showing bedrock bluff. September 2009.



Photo 26: Long Lake, showing aquatic vegetation in littoral area and field staff dip netting. September 2009.



Photo 27: Megan Lake showing black spruce forest and birch. September 2009.



Photo 28: Murky Lake showing floating aquatic vegetation and black spruce forest. September 2009.



Photo 29: North Tardiff Lake showing floating aquatic vegetation and floating vegetation mat around lake margin. September 2009.



Photo 30: Pistol Lake. Two bays and a bedrock bluff are visible in the background. September 2009.



Photo 31: Porkchop Lake showing black spruce forest and thunderheads. September 2009.

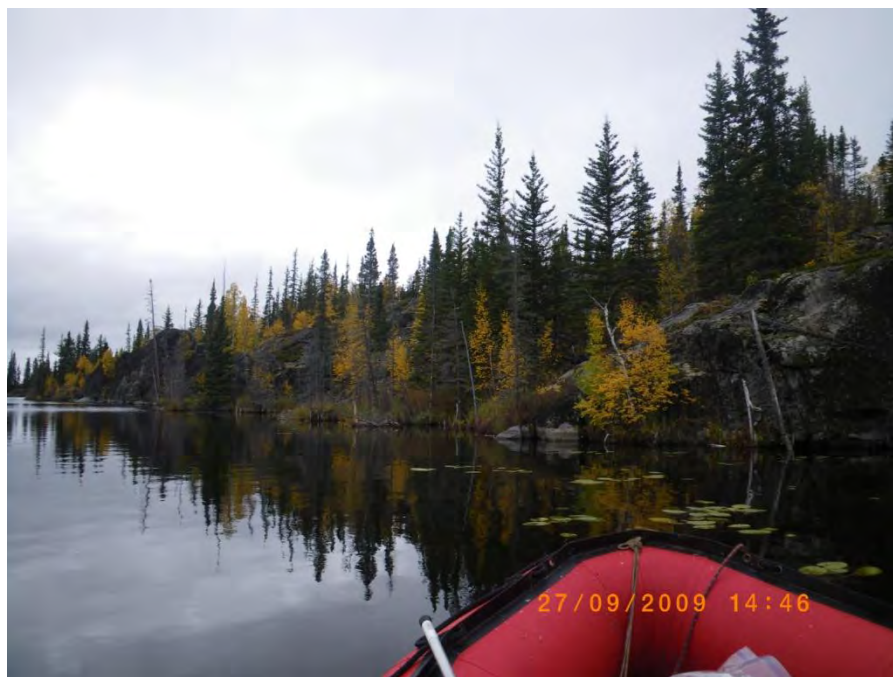


Photo 32: Redemption Lake showing bedrock bluff, black spruce forest and floating aquatic vegetation. September 2009.



Photo 33: Ring Lake showing black spruce forest; boulders visible in the water. September 2009.



Photo 34: South Tardiff Lake showing floating aquatic vegetation and floating mat of shoreline vegetation. September 2009.



Photo 35: Thor Lake showing black spruce forest and Thor Lake Camp in the background. September 2009.



Photo 36: Thorn Lake showing black spruce forest and a patch of emergent aquatic vegetation. September 2009.



Photo 37: U Lake showing black spruce forest and soft bottom sediments. September 2008.



Photo 38: External parasite on the caudal fin of a lake whitefish caught in Long Lake. September 2009.

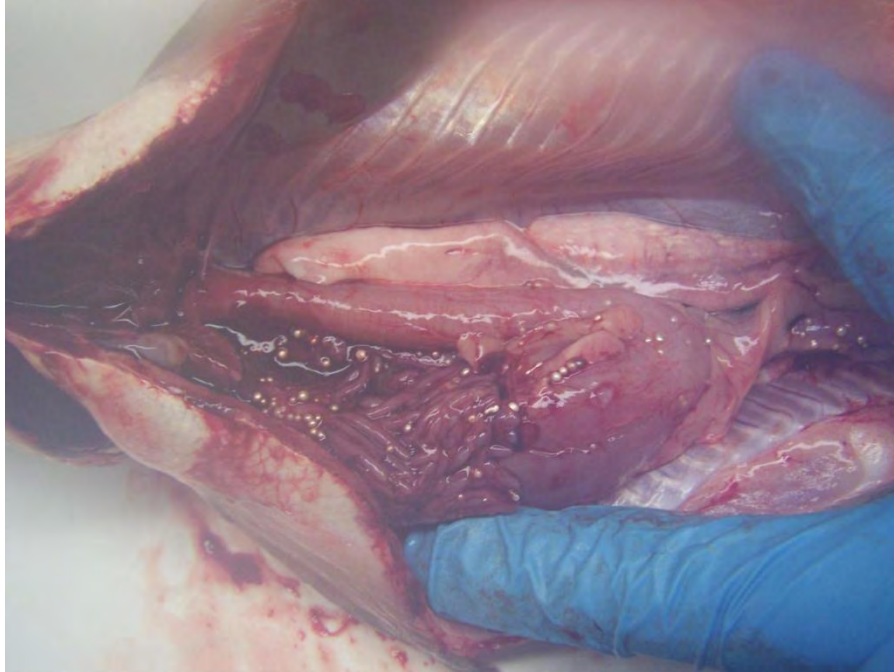


Photo 39: Cysts, assumed to be related to parasites, on the gastrointestinal tract of a male lake whitefish. September 2008.

Thor Lake Rare Earth Metals Baseline Project

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Final Interim Report



Appendix D – Laboratory Methods

APPENDIX D

Laboratory Methods



FRASER ENVIRONMENTAL SERVICES

METHODS MANUAL **JANUARY 1994**

By Linde Looy, R.P.Bio.

Fraser Environmental Services
9358 Cinnamon Drive
Surrey, B.C., V3V 1V2
Telephone and Fax (604) 588-9738
FRASER ENVIRONMENTAL SERVICES

METHODS MANUAL

Details of the analytical methods used by Fraser Environmental Services are described here. Our firm employs similar standard techniques to ensure consistency over time. The QA/QC procedures employed can be found in the QA/QC Manual.

Phytoplankton Identification and Enumeration

Scope :

This method describes the identification and enumeration of phytoplankton.

Summary :

The sample is settled overnight and the slide is examined. Using the appropriate keys and procedures, phytoplankton can then be identified and subsequently enumerated.

Apparatus :

1. Utermohl-type settling chambers
2. Inverted microscope
3. Compound microscope
4. Appropriate taxonomic keys

Reagents :

1. Lugol's Solution : prepared as outlined in **Standard Methods for the Examination of Water and Wastewater**.

Procedure :

1. Calibrate the microscope using stage and ocular micrometers (see Section 1, page 8 for procedure).
2. Confirm that the sample is appropriately preserved.
3. Settle out an appropriate sample volume randomly removed depending on the density of organisms (usually 100 mL) for approximately 24 hours. Use smaller or diluted volumes for densely populated samples or concentrate sparsely populated samples by centrifugation or by sedimentation.
4. Scan the entire slide at increasing powers of magnification to determine which species/genera are present. Identify the organisms observed to the requested level if possible.
5. Once the identifications are made, do the counts. Count at least 10 random fields,

continue counting until you get a total count of at least 100 for the dominant species. Statistical tests for randomness will be performed.

6. Enumerate the data by a total cell count (cells/mL). Calculate the per mL total for each species or genera by multiplying the actual count by the factor F as defined below :

$$F = \frac{A / r^2 \pi N}{V}$$

where A= the area of the settling chamber

r= the radius of the field

N= the number of fields counted

V= the volume settled

Taxonomic Keys :

1. Bourrelly, P. (1966)
2. Cleve-Euler, A. (1951)
3. Cleve-Euler, A. (1968)
4. Contant, H. (1978)
5. Dodd, J. (1947)
6. Germain, H. (1981)
7. Hustedt, F. (1930)
8. Hustedt, F. (1985)
9. Patrick, R. (1966)
10. Patrick, R. (1975)
11. Pennak, R. (1953)
12. Prescott, G. (1978)
13. Prescott, G. (1982)
14. Stein, J. (1975)
15. Ward, H.B. (1959)
16. Webber, C. (1966)

Note : Other taxonomic keys may be used but they will be cited in the data summary.

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Weber, Cornelius I. 1966. **A Guide to the Common Diatoms at Water Pollution Surveillance System Stations.** U.S. Environmental Protection Agency, National Environmental Research Center, Analytical Quality Control Laboratory, Cincinnati, Ohio 45268. Reprint 1971.

Wetzel, R.G. 1983. **Limnology: Second edition.**

Periphyton Identification and Enumeration

Scope :

This method describes the identification and enumeration of periphyton.

Summary :

The sample is settled for at least two hours and the slide is examined. The minimum settling time is dependent on the volume of the chamber used. Using the appropriate keys and procedures, periphyton can then be identified and subsequently enumerated.

Apparatus :

1. Utermohl-type settling chambers
2. Inverted microscope
3. Compound microscope
4. Appropriate taxonomic keys

Reagents :

1. Lugol's Solution : prepared as outlined in **Standard Methods for the Examination of Water and Wastewater**.
2. Hyrax mounting medium (or other medium with similar optical properties).

Procedure :

1. Calibrate the microscope using stage and ocular micrometers (see Section 1, page 8 for procedure).
2. Confirm that the sample is appropriately preserved. Measure and record the total volume of the sample.
3. Settle out an appropriate sample volume randomly removed, depending on the density of organisms (usually 25 mL) for approximately 4 hours. Use smaller or diluted volumes for densely populated samples or concentrate sparsely populated samples by centrifugation or by sedimentation.
4. Scan the entire slide at increasing powers of magnification to determine which species/genera are present. Identify the organisms observed to the requested level if possible.
5. Prepare three diatom slides using either pyrolysis or acid digestion to clear the frustules. See Standard Methods for the Examination of Water and Wastewater for further details of these procedures.
6. Examine the three diatom slides at increasing powers of magnification. Identify the organisms observed to the requested level if possible. Work on one slide and use the other two slides for confirmation.

7. Once the identifications are made, do the counts. From the settling chambers count at least 10 random fields, continue counting until you get a total count of at least 100 for the dominant species. Statistical tests for randomness will be performed.
8. Enumerate the data by a total cell count (cells/mL). Calculate the per mL total for each species or genera by multiplying the actual count by the factor F as defined below :

$$F = \frac{A / r^2 \pi N}{V}$$

where A= the area of the settling chamber
 r= the radius of the field
 N= the number of fields counted
 V= the volume settled

The cells per total sample can then be determined by multiplying by the total sample volume. Then divide by the area sampled to get cells per cm². In other words the count can be multiplied by factor P as defined below to get cells per cm² :

$$P = \frac{FD V_t}{A_s}$$

where F = the factor defined previously
 D = the dilution
 V_t = the total sample volume
 A_s = the area sampled (cm²)

Taxonomic keys:

1. Cleve-Euler, A. (1951)
2. Cleve-Euler, A. (1968)
3. Contant, H. (1978)
4. Dodd, J. (1947)
5. Geitler, L. (1932)
6. Germain, H. (1981)
7. Huber-Pestalozzi, G. (1938, 1941, 1961,1955, 1972 & 1983)
8. Hustedt, F. (1930)
9. Hustedt, F. (1985)
10. Komarek, J. and K. Anagnostidis. (1999)
11. Patrick, R. (1966)
12. Patrick, R. (1975)
13. Pennak, R. (1953)
14. Prescott, G. (1978)
15. Prescott, G. (1982)
16. Stein, J. (1975)
17. Ward, H.B and C. G. Whipple. (1959)
18. Webber, C. (1966)

Note : Other taxonomic keys may be used but they will be cited in the data summary.

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Huber-Pestalozzi, G. 1961. **Das Phytoplankton des Susswassers. Teil 5. Chlorophyceae : Volvocales.** In Die Binnengewasser (ed., A. Thienemann), E. Schweizerbart, Stuttgart. 744 pp. 158 pl.

Huber-Pestalozzi, G. and B. Fott. 1972. **Das Phytoplankton des Susswassers. Teil 6. Chlorophyceae : Tetrasporales.** In Die Binnengewasser (ed., A. Thienemann). E. Schweizerbart, Stuttgart. 116 pp. 47 pl.

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- A. Thienemann). E. Schweizerbart, Stuttgart. 1044 pp.
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Zooplankton Identification and Enumeration

Scope :

This method describes the identification and enumeration of zooplankton.

Summary :

The sample is settled and the slide is examined. Using the appropriate keys and procedures, zooplankton can then be identified and subsequently enumerated.

Apparatus :

1. Sedgwick-Rafters
2. Inverted microscope
3. Compound microscope
4. Stereoscopic microscope
5. Appropriate taxonomic keys

Reagents :

1. Preservative such as 70% ethanol or 10% buffered formalin
2. 0.04% rose bengal stain

Procedure :

1. Confirm that the sample is appropriately preserved. Measure and record the total volume of the sample.
2. Examine an appropriate sample volume depending on the density of organisms (usually 50 mL) in a petri dish. Use smaller or diluted volumes for densely populated samples or concentrate sparsely populated samples by centrifugation or by sedimentation.
3. Scan the entire dish at increasing powers of magnification to determine which species/genera are present. Identify the organisms observed to the requested level if possible.
4. Once the identifications are made, do the counts. Settle out a 1mL aliquot of a well mixed subsample in a Sedgwick-Rafter, allow to settle for at least 15 minutes. Count the entire cell using a strip counting method. Count at least 3 of the 1mL aliquots, continue counting until you get a total count of at least 200 zooplankton organisms.
5. Enumerate the data by calculating the total number of organisms per sample for each species or genera. Take an average count for each species or genera from all the aliquots counted. This gives you an organisms per mL count. Now the volume can then be multiplied in to give you a count of organisms per total sample. The counts may be expressed as a number/unit volume or a number/unit area, depending on the instructions in the requisition.

Taxonomic Keys :

1. Brandlova, J. et. al (1972)
2. Brooks, J.L. (1957)
3. Comita, G.W. et. al (1976)
4. Deevey, E.S. et. al (1971)
5. Edmondson, W.T. et. al (1982)
6. Fulton, J. (1968)
7. Green, J.D. et. al (1982)
8. Pennak, R.W. (1953)
9. Pinel-Alloul, B. et. al (1988)
10. Pontin, R.M. (1978)
11. Ruttner-Kolisko, A. (1974)
12. Smith, D.L. (1977)
13. Ward, H.B. et. al (1959)

Note : Other taxonomic keys may be used but they will be cited in the data summary.

References :

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Deevey, E.S. and G.B. Deevey. 1971. The American Species of *Eubosmina* Seligo (Crustacea, Cladocera). **Limnol. and Ocean.** vol.16(2). 1971.

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Pontin, R.M. 1978. **A key to British Freshwater Planktonic Rotifera.**

Ruttner-Kolisko, A. 1974. **Plankton Rotifers : Biology and Taxonomy.**

Smith, Deboyd L. 1977. **A Guide to Marine Coastal Plankton and Marine Invertebrate Larvae.**

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Wetzel, R.G. 1983. **Limnology: Second edition.**

Benthic Invertebrate Identification and Enumeration

Scope :

This method describes the identification and enumeration of benthic invertebrates.

Summary :

The sample is fractionated into various sizes. Invertebrates are removed, sorted, identified and enumerated using appropriate procedures and taxonomic keys.

Apparatus :

1. Nested screens of various sizes 1 - .001 mm
2. Dissecting microscope
3. Subsampling equipment (splitter, Stemple pipette, or gridded petri dish)
4. Compound microscope equipped with phase contrast

Reagents :

1. ethanol
2. mounting media (CMCP, Euparal)
3. KOH

Procedure :

1. Wash and decant animals and detritus from sediments and preservative.
2. Sieve through nested screens. Size classes are similar to Cummins et al. 1973.
3. Microscope sort for benthic invertebrates. Remove from detritus. Identify individuals to appropriate taxa.
4. Identified taxa will be sorted in 70% ethanol in glass vials.
5. If a sample unit contains a very large number of individuals in a given taxon, it may be necessary to subsample to obtain an estimate because the time required to count is prohibitive (Merritt and Cummins 1984). If subsampling is required, size fraction and subsample volumes will be based on the nature of the sample, especially the density of benthic invertebrates. For example, size fractions will be made up to a constant volume (500-1000 mL) and 1 - 3 subsamples (40 mL) will be randomly removed (Merritt and Cummins 1984). Statistical tests for randomness will be performed according to Elliot (1977). Subsamples will be identified as in procedure 3.
6. If permanent microscope slides are required to be made in order to identify benthic invertebrates to a particular level, the following two procedures will be used : a) direct slide mounting from water or ethanol if CMC or Euparal is used, or b) the clearing of opaque tissues by heating in 5-10% KOH solution until transparent, then transfer to distilled water and 95% ethanol 1 minute, then use mounting media.

Taxonomic Keys :

1. Clarke, A.H. (1973)
2. Curtis (1967)
3. Brinkhurst (1971)
4. Burch, J.B. (1972)
5. Burch, J.B. (1973)
6. Edmunds et al. (1978)
7. Ferris et al. (1973)
8. Forrest, H. (1963)
9. Johannsen (1934)
10. Kenk, R. (1972)
11. Klemm, D.J. (1972)
12. McAlpine et al. (1981)
13. Merritt and Cummins (1984)
14. Nimmo and Scudder (1978)
15. Pennak (1989)
16. Richards (1968)
17. Usinger (1963)
18. Wiggins (1977)
19. Scudder et al. (1976)

Note : Other taxonomic keys may be used but they will be cited in the data summary.

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Johannsen, O.A. 1969. **Aquatic Diptera.** Entomological Reprint Specialists. Michigan. p.80.

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Klemm, D.J. 1972. **Freshwater leeches (Annelida : Hirundinea) of North America.** Biota of freshwater ecosystems, U.S.E.P.A., Ident. Man. No. 8. Wash., D.C. p.53.

McAlpine, J.F., B.V. Peterson, G.E. Shewell, Teskey, H.J. Vockeroth, J.R., and D.M. Wood. **Manual of Nearctic Diptera.** 1981. Re. Branch. Agric. Can. Monogr. 27. Ottawa. p.674.

Merrit, R.W. and Cummins, K.W. **An introduction to the aquatic insects of North America, 2nd edition.** 1984. Kendall / Hunt Publishing Company. Iowa. p.722.

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Wiggins, G.B. **Larvae of the North American Caddisfly Genera (Trichoptera)**. 1977. University of Toronto Press. p.401.

Usinger, R.L. **Aquatic Insects of California with keys to North American Genera and California species**. 1963. University of California Press. Berkley. p.508.



D-2: The Aged Otolith



Photo 1: Cut and burned otolith showing annuli. Prepared by Hamaguchi Fish Aging Services



D-3: FISH AGING METHODOLOGY AND QUALITY CONTROL

North/South Consultants Inc.

Age determination techniques employed by North/South Consultants Inc. (NSC) have been developed by adopting a number of methodologies outlined in documents such as: Materials and methods used to age fish in Saskatchewan and Fish ageing methods for Alberta.

Methodologies vary between structures, species of fish, and potential age of fish (based on size). However, the methodologies outlined below are guidelines followed by NSC.

Otoliths

A number of procedures could be applied in the ageing of otoliths including thin sectioning, polishing, crack and toast, or whole. Whole is defined as an otolith in pristine or unaltered condition.

Viewing Whole:

- The otolith is placed in a shallow dish/well plate filled with a 'clearing medium' (i.e., oil of wintergreen).
- Using a dissecting microscope (Leica MS5) and reflected light, the otolith is viewed. Light intensity, magnification, and angle of otolith are adjusted throughout the viewing process.

Polishing:

- Larger otoliths often require surface polishing to reveal the underlying annuli.
- The convex surface of the otolith is wet polished on a carborundum stone to improve visibility, then viewed in a clearing medium as described for whole otoliths.

Crack and Toast:

- The otolith can either be toasted whole (where otoliths are either small, difficult to section, or cannot be ground) or cracked and then toasted.
- To toast an otolith whole, it is first placed a fine mesh screen. Using an alcohol filled Bunsen burner the screen is then slowly passed through the tip of the flame. Caution needs to be exercised at this point such that the otolith does not burn. If the otolith burns it is often becomes brittle and the annuli are obscured.
- Once cooled, the toasted otolith can be placed in a shallow dish/well plate filled with a 'clearing medium' (i.e., oil of wintergreen) and aged.
- To crack an otolith they are typically placed on a hard surface but seated on a piece of paper towel. The technician then places his/her thumb nail on the center of the otolith (length wise). A firm pressure is placed on the otolith until it snaps. The cracked otolith can then be toasted as described above.
- To age a cracked otolith it is typically inserted into plasticine. A drop of clearing medium is placed on the cracked surface and viewed under a dissecting microscope with reflected light.

Thin Sectioning or Focus Sectioned:

- Otoliths can be thin sectioned in the same manner as fin rays (see sectioning of fins below). The sectioning of otoliths depends on the size of the fish (relative age).
- Otoliths may also be set in epoxy and sectioned at/near the focus. This is conducted if the otolith in question is small, brittle, or at the request of the client. The epoxy holds the otolith together and allows it to be manipulated by the ageing technician.

Otolith ageing is species dependant, the most appropriate method is determined with consultation of the client after a review of the structures and life history of the fish in question..

Fins and/or Dorsal Rays

Pectoral fins, pelvic fins, and dorsal rays can be prepared in the same manner, and are generically referred to as fins.

- The fins are first dipped in an epoxy resin (Cold Cure™) and allowed to harden.
- Sections of fins are taken using a Struers Minotom™ (low speed sectioning saw). Sections can vary between 0.5 and 0.75 mm in thickness.
- The sections are then permanently mounted to a labelled glass slide using Cytoseal-60™.
- The mounted sections are then viewed under a dissecting microscope with transmitted light. Light intensity and magnification are adjusted throughout the viewing process.

Scales

- Scales are typically removed from their respective envelopes and pressed between two glass slides.
- Using a dissecting microscope (Leica MS5) and reflected light, the scales are viewed. Light intensity, magnification, and angle of scale are adjusted throughout the viewing process.

Cleithra:

- If required, cleithra may be boiled prior to ageing. The boiling process removes any tissue or oil residue that may be left on the structure after removal from the fish.
- Cleithra are typically read 'free hand' (i.e., without a microscope), however a dissecting microscope is sometimes utilized when required.

Age Determination and Quality Control

Regardless of the preparation method used, all structures are read a minimum of two times and, if consistency was not met between the first two readings, a third is taken. All readings are conducted as 'blind' (i.e., independent from each other). Second and third ageing technicians review a sub-sample (i.e., 10%) of the ages provided by the first ageing technician. These readings are conducted to look for consistency and accuracy. These quality control readings are also conducted as 'blind'.



APPENDIX E

In Situ Water Quality Data

**Table E1 Blachford Lake (BL-01) Surface Water *In situ* Water Quality
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
21-Mar-08 10:00		0.5	ICE	ICE	ICE		ICE	ICE		- Bottom at 2.1 m; ice approx. 54 cm
		1.0	-0.22	7.78	221		12.84	211.0		- sampled at 1.25 m
		1.5	-0.05	7.71	225		11.71	213.2		- Gen. chem from 1st grab, radionukes & replicate (BL-004) split btw 1st, 2nd and 3rd grabs; waypoint 438
		2.0	0.28	7.46	231		8.28	206.0		
4-Oct-08	3.9	0.5	7.04	8.35	463	107.7	12.19	99.3	0.22	- YSI & samples taken from new location; original station approx. 142 m S/SW
		1.0	7.03	8.35	462	101.7	12.33	99.3	0.22	
		1.5	6.97	8.36	462	100.7	12.22	99.4	0.22	- Secchi depth = 2.5 m
		2.0	6.93	8.36	462	100.4	12.19	99.7	0.22	- Did not sample radionuclides - ran out of bottles & was unable to get the correct ones sent
		2.5	6.91	8.36	462	100.3	12.19	100.0	0.22	- was lightly raining; water was brilliant aqua blue
		3.0	6.88	8.36	462	100.2	12.19	100.3	0.22	- Wypt is BL-02
		3.5	6.88	8.36	462	100.4	12.20	100.5	0.22	
27-Jun-09 14:45	4.30	0.5	14.31	8.38	205	103.2	10.64	107.0	0.10	
		1.0	13.94	8.39	205	100.5	10.29	106.5	0.10	
		1.5	13.42	8.39	205	97.1	10.13	106.2	0.10	
		2.0	13.32	8.38	205	96.4	10.08	105.3	0.10	
		2.5	13.29	8.37	204	96.2	10.07	104.4	0.10	
		3.0	13.25	8.38	205	96.0	10.05	104.2	0.10	
		3.5	13.20	8.36	205	95.5	10.01	104.6	0.10	
		4.0	13.12	8.35	205	94.9	9.97	105.0	0.10	
14-Mar-09 14:30	4.00	0.8	0.17	8.09	291	103.8	15.06	40.9	0.14	- sample depth = 2.0 m
		1.0	0.32	8.09	289	102.6	14.84	42.1	0.14	- Ice thickness = 0.74 m
		1.5	0.48	8.08	286	101.8	14.66	43.3	0.13	
		2.0	0.65	8.07	285	100.9	14.46	44.7	0.13	
		2.5	0.81	8.06	284	100.3	14.30	45.9	0.13	
		3.0	0.99	8.04	283	99.7	14.15	48.2	0.13	
		3.5	1.15	8.01	283	97.8	13.82	50.3	0.13	
		3.9	1.29	7.97	283	93.4	13.17	52.0	0.13	
21-Sep-09	4.25	0.5	11.68	8.19	225	106.9	11.59	123.1	0.11	
		1.0	11.69	8.19	225	103.7	11.24	123.4	0.11	
		1.5	11.65	8.19	225	101.5	11.01	123.5	0.11	
		2.0	11.63	8.18	225	100.2	10.88	124.6	0.11	
		2.5	11.62	8.18	225	98.4	10.69	125.4	0.11	
		3.0	11.59	8.18	225	98.0	10.65	125.4	0.11	
		3.5	11.51	8.18	225	97.3	10.59	126.2	0.11	
		4.0	11.30	8.18	225	96.0	10.50	126.4	0.11	

**Table E2 Elbow Lake North (EL-01) Surface Water *In situ* Water Quality
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
19-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- Bottom > 10 m; waypoint 432 - YSI meter shut itself off at 9 m - sampled at 6 m; sampled gen. chem., radionukes (4L) & Ra226 split (EL-011) - Gen. chem from 1st grab - Radionukes from 1st & 2nd grab - Ra226 from 2nd grab
16:15		1.0	0.28	7.70	334		8.92	163.3		
		1.5	1.27	7.71	338		8.38	163.9		
		2.0	1.72	7.72	340		8.03	163.8		
		2.5	2.01	7.74	343		7.65	163.5		
		3.0	2.11	7.73	344		7.34	164.5		
		3.5	2.23	7.72	345		7.17	165.3		
		4.0	2.32	7.71	346		7.08	166.1		
		4.5	2.35	7.69	346		7.06	166.9		
		5.0	2.34	7.68	348		6.61	167.3		
		5.5	2.31	7.68	349		6.53	168.0		
		6.0	2.32	7.67	351		6.51	168.7		
		6.5	2.30	7.66	352		6.55	169.2		
		7.0	2.28	7.69	353		6.29	166.9		
		7.5	2.27	7.68	354		5.83	168.6		
		8.0	2.27	7.67	355		5.62	169.7		
		8.5	2.27	7.67	356		5.42	170.5		
		9.0	2.30	7.68	358		5.10	170.5		
		9.5	2.28	7.63	359		5.33	174.4		
		10.0	2.28	7.69	359		5.41	171.5		
1-Oct-08	13.8	0.5	6.68	8.56	591	99.9	11.83	120.3	0.29	- First station after having trouble with conductivity calibration - Had to return to sample radionuclides (sampled at 14:14) - dropped cap in boat on to rainpants)
		1.0	6.67	8.60	591	96.8	11.82	120.5	0.29	
		1.5	6.66	8.60	591	96.7	11.83	120.7	0.29	
		2.0	6.65	8.60	591	96.7	11.83	120.5	0.29	
		2.5	6.65	8.60	591	96.6	11.81	120.8	0.29	
		3.0	6.65	8.60	592	96.9	11.85	121.5	0.29	
		3.5	6.65	8.60	592	96.7	11.82	121.6	0.29	
		4.0	6.65	8.59	591	96.7	11.82	121.7	0.29	
		4.5	6.65	8.59	591	96.8	11.82	121.8	0.29	
		5.0	6.65	8.60	591	96.6	11.80	121.9	0.29	
		5.5	6.65	8.59	591	96.4	11.79	122.0	0.29	
		6.0	6.66	8.59	592	96.5	11.79	122.4	0.29	
		6.5	6.66	8.59	592	96.4	11.78	122.6	0.29	
		7.0	6.66	8.59	591	96.4	11.78	122.7	0.29	
		7.5	6.66	8.59	591	96.4	11.79	122.8	0.29	
		8.0	6.66	8.59	592	96.4	11.78	123.0	0.29	
		8.5	6.65	8.59	591	96.5	11.80	123.3	0.29	
		9.0	6.66	8.59	592	96.6	11.80	123.4	0.29	
		9.5	6.66	8.59	591	96.5	11.79	123.5	0.29	
		10.0	6.66	8.58	591	96.5	11.79	123.8	0.29	
		10.5	6.66	8.58	591	96.5	11.80	123.9	0.29	
		11.0	6.66	8.58	591	96.6	11.80	124.0	0.29	
		11.5	6.66	8.58	592	96.6	11.80	124.1	0.29	

Date	Total Depth	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
		12.0	6.66	8.58	591	96.6	11.81	124.4	0.29	
		12.5	6.66	8.58	592	96.6	11.80	124.5	0.29	
		13.0	6.65	8.58	592	96.5	11.80	124.7	0.29	
		13.5	6.66	8.58	592	96.5	11.80	124.8	0.29	
16-Mar-09	12.50	1.0	0.67	7.96	302	79.1	11.34	69.6	0.14	-sample depth = 6.0 m - Ice thickness = 0.86 m
13:05		1.5	1.38	7.96	298	75.2	10.57	69.5	0.14	
		2.0	1.77	7.95	295	72.3	10.06	70.3	0.14	
		2.5	1.92	7.95	294	70.1	9.70	70.9	0.14	
		3.0	1.96	7.94	294	67.7	9.36	72.2	0.14	
		3.5	2.04	7.93	294	67.1	9.26	72.9	0.14	
		4.0	2.06	7.82	293	66.2	9.13	73.3	0.14	
		4.5	2.09	7.90	293	62.0	8.54	77.2	0.14	
		5.0	2.13	7.88	293	60.7	8.36	78.3	0.14	
		5.5	2.15	7.86	294	58.5	8.05	79.9	0.14	
		6.0	2.15	7.86	2984	57.5	7.91	80.5	0.14	
		6.5	2.15	7.86	296	58.1	7.99	80.9	0.14	
		7.0	2.15	7.86	297	58.5	8.05	81.7	0.14	
		7.5	2.16	7.85	298	57.1	7.86	82.6	0.14	
		8.0	2.18	7.83	298	56.1	7.69	83.3	0.14	
		8.5	2.13	7.83	300	54.9	7.58	84.2	0.14	
		9.0	2.14	7.83	300	55.2	7.60	84.6	0.14	
		9.5	2.19	7.82	299	54.1	7.44	85.3	0.14	
		10.0	2.21	7.80	299	51.7	7.10	86.2	0.14	
		10.5	2.17	7.80	302	51.9	7.13	86.7	0.14	
		11.0	2.18	7.81	302	52.2	7.18	87.2	0.14	
		11.5	2.20	7.80	302	52.1	7.16	87.8	0.14	
		12.0	2.26	7.79	302	51.2	7.02	88.4	0.14	
		12.5	2.38	7.78	301	49.5	6.78	88.9	0.14	
28-Jun-09	14.20	0.5	15.22	8.49	259	112.3	11.25	125.1	0.12	Did blank here (EL-03) Started to rain when sampling
9:15		1.0	15.14	8.50	259	110.6	11.11	125.5	0.12	
		1.5	15.00	8.50	259	109.5	11.04	125.9	0.12	
		2.0	14.96	8.49	260	109.1	11.01	126.3	0.12	
		2.5	14.87	8.49	260	108.2	10.93	126.9	0.12	
		3.0	14.77	8.48	260	107.5	10.87	127.6	0.12	
		3.5	14.21	8.47	261	105.1	10.77	128.7	0.12	
		4.0	13.87	8.46	261	103.7	10.71	129.8	0.12	
		4.5	13.86	8.46	261	103.7	10.71	130.1	0.12	
		5.0	13.67	8.46	261	102.8	10.66	130.7	0.12	
		5.5	13.61	8.46	261	102.7	10.66	131.2	0.12	
		6.0	13.47	8.45	261	101.4	10.56	131.9	0.12	
		6.5	12.06	8.38	266	92.9	9.99	135.7	0.13	
		7.0	11.19	8.32	269	86.9	9.57	138.0	0.13	
		7.5	9.54	8.20	277	99.0	9.07	143.1	0.13	
		8.0	7.22	8.04	291	71.0	8.56	149.7	0.14	
		8.5	6.41	7.96	291	67.2	8.27	152.5	0.14	
		9.0	6.17	7.89	292	64.2	7.95	155.1	0.14	
		9.5	5.92	7.85	293	61.0	7.60	156.6	0.14	
		10.0	5.74	7.81	294	58.0	7.26	158.5	0.14	

Date	Total Depth	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
		10.5	5.55	7.79	295	55.7	7.01	159.4	0.14	
		11.0	5.34	7.77	295	54.0	6.82	160.4	0.14	
		11.5	5.15	7.76	295	53.4	6.79	160.8	0.14	
		12.0	5.11	7.74	296	51.6	6.55	161.8	0.14	
		12.5	4.95	7.70	298	46.3	5.91	163.0	0.14	
		13.0	4.84	7.68	299	42.8	5.48	163.6	0.14	
		13.5	4.82	7.64	298	39.2	5.02	165.3	0.14	
		14.0	4.22	7.53	302	23.2	2.98	-124.1	0.14	
30-Sep-09	12.00	0.5	9.47	8.37	293	78.8	8.99	92.1	0.14	
		1.0	9.46	8.36	293	78.2	8.94	93.6	0.14	
		1.5	9.47	8.36	292	78.1	8.92	93.6	0.14	
		2.0	9.47	8.36	292	78.1	8.92	94.5	0.14	
		2.5	9.48	8.36	292	78.0	8.90	95.2	0.14	
		3.0	9.47	8.36	292	78.0	8.90	95.5	0.14	
		3.5	9.48	8.36	292	78.0	8.90	96.4	0.14	
		4.0	9.48	8.36	292	78.0	8.91	96.8	0.14	
		4.5	9.48	8.35	292	78.1	8.91	97.7	0.14	
		5.0	9.48	8.35	292	78.1	8.92	98.1	0.14	
		5.5	9.48	8.35	292	78.2	8.93	98.2	0.14	
		6.0	9.47	8.35	292	78.2	8.94	99.2	0.14	
		6.5	9.47	8.35	292	78.3	8.95	99.3	0.14	
		7.0	9.47	8.35	292	78.4	8.96	99.9	0.14	
		7.5	9.47	8.35	292	78.5	8.97	100.5	0.14	
		8.0	9.46	8.35	292	78.8	9.00	101.7	0.14	
		8.5	9.46	8.34	292	78.9	9.02	102.5	0.14	
		9.0	9.46	8.34	292	79.0	9.02	103.3	0.14	
		9.5	9.46	8.34	292	79.0	9.03	103.4	0.14	
		10.0	9.46	8.35	292	79.1	9.03	103.7	0.14	
		10.5	9.46	8.34	292	79.2	9.05	104.4	0.14	
		11.0	9.44	8.34	292	79.2	9.04	105.2	0.14	
		11.5	9.42	8.34	292	79.0	9.03	105.4	0.14	
		12.0	9.30	8.34	291	78.4	8.99	105.9	0.14	

**Table E3 Elbow Lake South (EL-02) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
21-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- Bottom at approx. 8.1 m
16:30		1.0	0.12	7.85	268		9.39	131.4		- ice approx. 68 cm
		1.5	0.89	7.84	271		8.96	130.7		- sampled at 4.5 m
		2.0	1.18	7.84	274		8.75	132.2		- Gen. chem from 1st grab; radionuke (4L) from 1st and 2nd grab
		2.5	1.47	7.84	276		8.72	132.2		- Waypoint 442
		3.0	1.47	7.82	279		8.58	137.6		
		3.5	1.47	7.81	283		8.49	133.4		
		4.0	1.49	7.78	285		8.35	134.0		
		4.5	1.52	7.72	289		6.96	135.9		
		5.0	1.65	7.66	291		6.30	136.7		
		5.5	1.80	7.63	293		6.01	137.6		
		6.0	1.83	7.65	293		5.87	136.2		
		6.5	2.05	7.62	295		5.24	137.5		
		7.0	2.11	7.58	301		4.58	140.3		
		7.5	2.32	7.54	304		4.37	140.4		
		8.0	2.53	7.50	310		3.63	105.4		
1-Oct-08	7.6	0.5	6.30	8.62	588	98.6	12.19	103.6	0.29	- General chemistry from 1st grab at 3.5 m
		1.0	6.27	8.62	588	97.8	12.04	103.8	0.29	- Radionuclide sample from 2nd grab at
		1.5	6.28	8.62	588	97.4	12.02	103.9	0.29	3.5 m
		2.0	6.28	8.62	589	97.3	12.01	104.1	0.29	
		2.5	6.26	8.62	589	97.2	12.00	104.1	0.29	
		3.0	6.25	8.62	589	96.9	11.97	104.4	0.29	
		3.5	6.25	8.62	589	97.0	11.98	104.2	0.29	
		4.0	6.23	8.62	589	97.0	11.98	104.6	0.29	
		4.5	6.22	8.62	589	96.8	11.96	104.7	0.29	
		5.0	6.20	8.62	590	96.8	11.96	105.0	0.29	
		5.5	6.19	8.62	590	96.6	11.95	105.1	0.29	
		6.0	6.19	8.61	590	96.5	11.93	105.3	0.29	
		6.5	6.19	8.61	590	96.5	11.93	105.5	0.29	
		7.0	6.18	8.61	590	96.3	11.91	105.7	0.29	
		7.5	6.18	8.54	590	82.9	10.67	106.7	0.29	

Date	Total Depth	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
16-Mar-09	8.00	0.7	0.25	7.97	309	74.7	10.84	120.1	0.15	- sample depth = 4.0 m - Ice thickness + 0.70 m
12:00		1.0	0.71	7.97	306	74.2	10.62	119.9	0.14	
		1.5	1.20	7.96	303	73.5	10.38	119.6	0.14	
		2.0	1.18	7.94	312	72.2	10.21	120.8	0.15	
		2.5	1.34	7.92	313	71.1	10.00	120.9	0.15	
		3.0	1.45	7.90	313	69.8	9.78	121.0	0.15	
		3.5	1.53	7.89	313	68.0	9.51	121.4	0.15	
		4.0	1.62	7.87	313	65.5	9.11	122.0	0.15	
		4.5	2.00	7.82	311	59.2	8.18	122.8	0.15	
		5.0	2.17	7.78	310	53.5	7.35	123.6	0.15	
		5.5	2.35	7.75	313	51.9	7.10	123.9	0.15	
		6.0	2.49	7.75	314	51.6	7.03	124.4	0.15	
		6.5	2.53	7.73	314	50.2	6.83	124.4	0.15	
		7.0	2.60	7.71	315	44.1	6.00	125.0	0.15	
		7.5	2.86	7.69	314	42.2	5.70	125.1	0.15	
29-Sep-09	7.50	0.5	8.99	8.30	289	102.3	11.82	136.3	0.14	
		1.0	8.99	8.31	289	101.2	11.69	136.3	0.14	
		1.5	9.00	8.32	289	100.4	11.60	136.1	0.14	
		2.0	9.00	8.32	289	99.8	11.53	136.1	0.14	
		2.5	9.00	8.32	290	99.3	11.47	136.3	0.14	
		3.0	9.00	8.33	289	98.7	11.40	135.7	0.14	
		3.5	9.00	8.34	289	98.3	11.36	135.8	0.14	
		4.0	8.98	8.34	289	98.1	11.34	136.0	0.14	
		4.5	8.97	8.34	290	98.0	11.32	136.2	0.14	
		5.0	8.95	8.34	290	97.8	11.31	136.2	0.14	
		5.5	8.94	8.35	290	97.9	11.32	136.4	0.14	
		6.0	8.93	8.35	290	97.8	11.31	136.3	0.14	
		6.5	8.92	8.35	290	97.7	11.30	136.6	0.14	
		7.0	8.63	8.35	291	95.7	11.17	137.2	0.14	
		7.5	8.59	8.32	290	93.5	10.92	112.2	0.14	

**Table E4 Fred Lake (FL-01) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
18-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- bottom at 2.75 m - sampled gen. chem at 1.5 m - waypoint 428
18:00		1.0	1.08	7.76	393		4.43	173.6		
		1.5	1.92	7.64	372		3.31	165.4		
		2.0	2.83	7.49	400		2.20	61.0		
		2.5	3.76	7.19	474		1.71	33.0		
7-Oct-08	0.96	0.25	7.03	8.45	560	95.6	11.58	60.3	0.27	- whole lake very shallow - lots of whitefish caught by Fisheries - deeper depths reported by sounder (see bathy)
		0.5	7.03	8.45	560	94.7	11.47	60.6	0.27	
		0.75	7.03	8.45	560	94.5	11.45	61.3	0.27	
13-Mar-09	1.80	1.0	0.73	7.49	16	34.6	4.98	-17.0	0.01	- sample depth = 1.0 m - estimated depths of measurement & bottom depth - depth sensor on YSI not working properly - Ice thickness = 0.64 m
14:45		1.25	1.90	7.24	18	4.4	0.58	-106.1	0.01	
		1.5	2.86	7.43	24	2.2	0.30	-174.2	0.01	
		1.75	3.49	7.27	32	1.8	0.24	-166.6	0.01	
24-Jun-09	1.94	0.25	14.00	8.39	225	94.4	9.72	120.3	0.11	no zooplankton net sampled TKN in 250ml clear glass jar sampled general chemistry, radionuclides and phytoplankton
8:45		0.50	13.99	8.40	225	94.0	9.68	119.5	0.11	
		0.75	13.99	8.40	225	93.7	9.65	120.0	0.11	
		1.00	13.99	8.40	225	93.4	9.62	119.3	0.11	
		1.25	13.96	8.41	225	93.3	9.62	119.0	0.11	
		1.50	13.78	8.40	224	92.8	9.59	119.2	0.11	
		1.75	12.93	8.24	219	80.8	8.55	105.0	0.10	
5-Sep-09	1.50	0.25	16.05	8.31	294	78.2	7.70	146.8	0.14	- Secchi depth = 1.5 m - Started to rain - Unfiltered sample lid accidentally put on filtered sample after it was preserved - watch for d-met results
		0.50	16.05	8.34	294	75.7	7.46	144.6	0.14	
		0.75	16.04	8.35	294	75.3	7.41	143.5	0.14	
		1.00	16.05	8.34	294	74.8	7.36	143.1	0.14	
		1.25	15.99	8.35	294	74.5	7.35	142.4	0.14	

**Table E5 Cressy Lake (FL-02) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
21-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- Bottom at approx. 6.15 m - Ice approx. 64 cm - Corixid came up to say hi - sampled at 4 m (gen. chem) - waypoint 441
13:15		1.0	0.57	7.28	209		3.50	124.2		
		1.5	1.22	7.29	213		3.39	125.3		
		2.0	1.74	7.30	216		3.02	126.3		
		2.5	2.04	7.32	219		2.92	125.9		
		3.0	2.28	7.31	221		2.34	128.8		
		3.5	2.42	7.26	223		1.13	130.7		
		4.0	2.64	7.23	227		0.44	132.2		
		4.5	2.74	7.25	230		0.18	131.5		
		5.0	2.82	7.23	233		0.14	133.5		
		5.5	3.24	7.41	252		0.10	-33.7		
		6.0	3.41	7.95	292		0.07	-162.2		
13-Mar-09	5.50	0.6	0.34	7.83	273	28.5	4.15	37.1	0.13	- sample depth = 2.5 m - radionuclides from 1st and 2nd grabs - general chemistry from 1st
13:30		1.0	1.34	7.82	269	24.8	3.50	39.0	0.13	
		1.5	2.30	7.81	266	23.7	3.23	40.5	0.13	
		2.0	2.93	7.78	266	22.5	3.03	42.5	0.13	
		2.5	3.25	7.78	265	21.6	2.87	43.6	0.13	
		3.0	3.41	7.77	265	18.1	2.43	46.1	0.13	
		3.5	3.63	7.73	265	11.0	1.41	47.1	0.13	
		4.0	3.77	7.70	268	3.4	0.47	48.1	0.13	
		4.5	3.90	7.68	277	1.7	0.21	48.7	0.13	
		5.0	4.16	7.67	293	1.2	0.18	48.1	0.14	
		5.5	4.45	7.84	317	1.6	0.21	-175.0	0.15	
24-Jun-09	6.00	0.50	15.08	8.20	199	100.3	10.03	100.9	0.09	sampled TKN in 250ml clear glass jar (no preservaties) no zooplankton net, did not sample on June 24 sampled general chemistry, radionuclides, phytoplankton (chl and tax)
16:30		1.0	15.01	8.18	199	97.1	9.76	102.5	0.09	
		1.5	14.82	8.16	198	95.3	9.63	104.4	0.09	
		2.00	14.74	8.15	198	94.6	9.58	105.1	0.09	
		2.5	14.73	8.15	198	94.2	9.54	105.8	0.09	
		3.0	14.66	8.14	198	93.4	9.48	106.5	0.09	
		3.50	13.20	8.08	199	88.3	9.25	110.8	0.09	
		4.0	11.02	7.79	203	65.0	7.18	120.3	0.10	
		4.5	8.35	7.72	207	56.1	6.51	125.1	0.10	
		5.00	7.43	7.64	208	47.8	5.66	128.0	0.10	
		5.5	7.10	7.56	211	38.4	4.53	129.6	0.10	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
8-Sep-09		0.5	12.92	7.98	242	68.8	7.24	133.9	0.12	-secchi depth= 2.4 m
		1.0	12.89	7.98	242	67.5	7.13	133.9	0.12	
		1.50	12.85	7.97	242	67.0	7.07	134.4	0.12	
		2.0	12.86	7.97	242	66.5	7.03	134.6	0.12	
		2.5	12.78	7.98	242	66.2	7.00	134.3	0.12	
		3.0	12.78	7.98	242	65.9	6.47	134.3	0.12	
		3.5	12.78	7.98	242	65.6	6.94	134.7	0.12	
		4.00	12.78	7.98	242	65.3	6.91	134.8	0.12	
		4.50	12.76	7.98	242	65.0	6.89	134.6	0.12	
		5.0	12.64	7.98	242	64.6	6.86	135.1	0.12	
		5.5	12.38	7.95	241	63.3	6.76	136.1	0.21	

**Table E6 Lake A (FL-03) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
23-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- Bottom > 10 m; ice approx. 69 cm - sampled gen. chem & radionukes (4L) at 5.5 m - Gen. chem from 1st grab; radionukes from 1st and 2nd grab - snow not v. deep on ice (< 30 cm) - YSI meter shut itself off at 9 m - Waypoint 446
10:30		1.0	0.05	7.49	226		9.15	205.5		
		1.5	0.70	7.55	227		8.97	207.8		
		2.0	1.20	7.57	229		8.81	208.5		
		2.5	1.63	7.57	231		8.61	209.0		
		3.0	1.83	7.60	232		8.34	207.1		
		3.5	2.01	7.58	233		8.40	208.6		
		4.0	2.07	7.58	234		8.60	209.2		
		4.5	2.10	7.59	234		8.61	208.7		
		5.0	2.11	7.59	235		8.67	208.8		
		5.5	2.13	7.59	235		8.64	209.1		
		6.0	2.14	7.59	235		8.50	209.0		
		6.5	2.15	7.57	235		8.43	209.9		
		7.0	2.17	7.56	236		8.18	210.3		
		7.5	2.19	7.55	236		8.26	210.8		
		8.0	2.21	7.55	236		7.63	210.7		
		8.5	2.22	7.54	236		7.49	211.3		
		9.0	2.28	7.55	237		6.71	211.2		
		9.5	2.29	7.52	237		6.76	211.0		
		10.0	2.28	7.50	238		6.66	213.6		
4-Oct-08	> 15.5	0.5	6.23	7.85	572	84.0	10.38	108.3	0.28	- Secchi depth 2.17 m - felt like fish were biting YSI - did replicate here - FL-04
		1.0	6.20	7.85	571	84.0	10.38	108.8	0.28	
		1.5	6.21	7.85	572	83.9	10.37	109.3	0.28	
		2.0	6.18	7.84	572	83.8	10.37	109.8	0.28	
		2.5	6.16	7.84	572	83.4	10.32	110.0	0.28	
		3.0	6.14	7.84	572	83.3	10.31	110.9	0.28	
		3.5	6.11	7.84	571	83.1	10.29	111.4	0.28	
		4.0	6.07	7.84	571	82.8	10.27	112.1	0.28	
		4.5	6.07	7.83	571	82.6	10.25	112.0	0.28	
		5.0	6.07	7.83	571	82.6	10.25	112.4	0.28	
		5.5	6.05	7.83	572	82.5	10.24	112.9	0.28	
		6.0	6.03	7.83	572	82.2	10.20	113.5	0.28	
		6.5	6.00	7.82	572	81.8	10.15	114.5	0.28	
		7.0	6.01	7.82	572	81.4	10.12	115.0	0.28	
		7.5	5.98	7.82	572	81.1	10.08	115.1	0.28	
		8.0	5.97	7.81	572	81.0	10.08	115.8	0.28	
		8.5	5.95	7.80	572	80.9	10.07	116.3	0.28	
		9.0	5.90	7.79	572	80.2	10.00	117.0	0.28	
		9.5	5.89	7.79	572	80.0	9.97	117.1	0.28	
		10.0	5.86	7.79	572	79.4	9.91	117.7	0.28	
		10.5	5.85	7.79	572	79.3	9.90	118.4	0.28	
		11.0	5.84	7.79	572	79.3	9.89	118.7	0.28	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
		11.5	5.82	7.79	572	78.9	9.84	118.6	0.28	
		12.0	5.68	7.75	574	75.6	9.48	120.2	0.28	
		12.5	5.67	7.74	574	74.8	9.37	120.4	0.28	
		13.0	5.66	7.74	574	74.7	9.36	121.4	0.28	
		13.5	5.65	7.74	574	74.3	9.31	121.3	0.28	
		14.0	5.59	7.72	576	73.0	9.17	122.0	0.28	
		14.5	5.49	7.69	578	70.0	8.83	123.2	0.28	
		15.0	5.29	7.62	583	60.4	7.64	126.3	0.28	
		15.5	4.41	7.38	612	15.7	2.03	54.1	0.30	
16-Mar-09	16.10	0.7	0.29	7.68	279	73.8	10.66	40.4	0.13	- sample depth = 8.0 m
16:30		1.0	0.48	7.67	278	71.9	10.35	42.7	0.13	- used secchi disc to determine total depth
		1.5	1.07	7.65	275	71.3	10.09	45.9	0.13	- Ice thickness = 0.64 m
		2.0	1.64	7.64	272	71.0	9.91	48.2	0.13	
		2.5	1.97	7.62	269	70.2	9.71	53.5	0.13	
		3.0	2.26	7.61	269	70.3	9.65	57.3	0.13	
		3.5	2.37	7.61	269	70.5	9.64	58.5	0.13	
		4.0	2.39	7.61	269	70.2	9.60	61.4	0.13	
		4.5	2.42	7.61	269	70.1	9.58	62.7	0.13	
		5.0	2.48	7.60	269	70.1	9.55	63.9	0.13	
		5.5	2.51	7.60	268	68.7	9.36	66.4	0.13	
		6.0	2.53	7.60	268	67.7	9.22	69.4	0.13	
		6.5	2.57	7.60	268	67.7	9.21	70.5	0.13	
		7.0	2.61	7.60	268	67.7	9.20	71.5	0.13	
		7.5	2.64	7.60	268	67.6	9.19	72.6	0.13	
		8.0	2.67	7.60	268	67.0	9.10	74.9	0.13	
		8.5	2.67	7.59	268	64.7	8.79	76.9	0.13	
		9.0	2.73	7.58	268	63.3	8.56	77.5	0.13	
		9.5	2.81	7.57	267	61.6	8.31	78.3	0.13	
		10.0	2.85	7.57	267	60.1	8.10	78.9	0.13	
		10.5	2.92	7.56	267	58.2	7.82	79.7	0.13	
		11.0	2.95	7.55	268	54.7	7.37	80.5	0.13	
		11.5	2.99	7.52	269	44.7	6.01	82.3	0.13	
		12.0	3.00	7.50	270	45.1	6.07	82.5	0.13	
		12.5	3.02	7.50	271	44.1	5.92	83.5	0.13	
		13.0	3.03	7.48	272	38.3	5.13	84.6	0.13	
		13.5	3.04	7.45	274	36.2	4.86	85.2	0.13	
		14.0	3.05	7.43	276	30.5	4.09	86.1	0.13	
		14.5	3.04	7.41	280	28.4	3.81	86.6	0.13	
		15.0	3.03	7.39	287	27.2	3.65	87.6	0.14	
		15.5	3.04	7.36	300	21.2	2.84	88.8	0.14	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
27-Jun-09 16:00	>15.5	0.5	16.35	8.09	217	102.2	10.00	120.6	0.10	
		1.0	16.29	8.08	218	101.2	9.92	121.6	0.10	
		1.5	15.81	8.08	218	98.7	9.78	122.9	0.10	
		2.0	15.16	8.03	217	95.2	9.56	124.8	0.10	
		2.5	14.79	8.00	217	92.6	9.36	126.8	0.10	
		3.0	12.86	7.85	219	81.3	8.58	132.9	0.10	
		3.5	9.92	7.77	226	74.1	8.40	138.5	0.11	
		4.0	8.02	7.73	231	70.9	8.45	141.6	0.11	
		4.5	5.78	7.68	237	66.3	8.28	145.6	0.11	
		5.0	5.10	7.61	244	61.0	7.75	149.0	0.12	
		5.5	4.45	7.57	253	56.8	7.31	150.4	0.12	
		6.0	4.04	7.55	261	54.0	7.03	151.8	0.12	
		6.5	3.69	7.52	269	51.4	6.75	152.9	0.13	
		7.0	3.45	7.52	274	48.5	6.42	153.8	0.13	
		7.5	3.33	7.50	277	46.4	6.18	154.4	0.13	
		8.0	3.26	7.49	278	45.0	5.98	154.3	0.13	
		8.5	3.21	7.48	279	43.5	5.80	154.8	0.13	
		9.0	3.14	7.48	280	42.4	5.67	155.2	0.13	
		9.5	3.13	7.46	281	41.2	5.52	155.4	0.13	
10.0	3.09	7.47	283	40.0	5.35	156.0	0.13			
10.5	3.05	7.45	283	39.0	5.23	156.4	0.13			
11.0	3.04	7.44	284	38.1	5.12	156.3	0.13			
11.5	3.04	7.44	284	36.0	4.80	157.1	0.13			
12.0	3.03	7.41	286	32.0	4.30	157.3	0.14			
12.5	3.01	7.41	289	28.9	3.85	157.9	0.14			
13.0	3.01	7.39	290	26.5	3.53	158.4	0.14			
13.5	2.98	7.38	293	24.4	3.24	158.5	0.14			
14.0	2.99	7.37	300	20.6	2.69	159.3	0.14			
14.5	2.99	7.35	307	13.3	1.79	-85.0	0.15			
15.0	2.99	7.35	320	7.8	1.04	-77.5	0.15			
15.5	3.00	7.33	336	7.1	0.96	-106.9	0.16			
20-Sep-09	5.00	0.5	11.86	7.99	263	100.0	10.80	160.3	0.13	
		1.0	11.86	7.99	263	98.9	10.69	160.4	0.13	
		1.5	11.85	8.00	263	98.2	10.61	160.4	0.13	
		2.0	11.86	8.00	263	97.4	10.53	160.3	0.13	
		2.5	11.86	8.00	263	97.1	10.49	160.2	0.13	
		3.0	11.85	8.01	263	96.8	10.45	160.5	0.13	
		3.5	11.83	8.01	263	96.5	10.43	160.6	0.13	
		4.0	11.84	8.01	263	96.3	10.41	160.8	0.13	
		4.5	11.84	8.01	263	96.1	10.38	161.0	0.13	
5.0	11.59	8.00	264	93.3	10.14	161.8	0.13			

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
20-Sep-09	>15.5m	0.5	11.84	8.00	263	98.8	10.66	162.5	0.13	
13:05		1.0	11.84	8.00	263	97.7	10.55	162.4	0.13	
		1.5	11.84	8.00	263	97.2	10.50	162.4	0.13	
		2.0	11.85	8.01	263	96.9	10.48	162.4	0.13	
		2.5	11.84	8.01	263	96.7	10.45	162.2	0.13	
		3.0	11.84	8.01	263	96.7	10.45	162.9	0.13	
		3.5	11.84	8.01	263	96.6	10.44	163.1	0.13	
		4.0	11.84	8.01	263	96.4	10.42	162.9	0.13	
		4.5	11.84	8.01	263	96.4	10.42	163.4	0.13	
		5.0	11.78	8.00	263	95.7	10.35	163.4	0.13	
		5.5	8.15	7.31	281	39.1	4.67	163.6	0.13	
		6.0	6.04	7.11	291	26.1	3.25	183.5	0.14	
		6.5	5.04	7.09	297	24.6	3.13	191.4	0.14	
		7.0	4.29	7.07	301	25.2	3.29	193.2	0.14	
		7.5	3.80	6.99	307	23.0	3.01	195.0	0.15	
		8.0	3.67	6.96	308	20.0	2.62	200.3	0.15	
		8.5	3.61	6.95	308	16.9	2.20	200.8	0.15	
		9.0	3.58	6.94	309	13.7	1.82	201.4	0.15	
		9.5	3.51	6.94	310	11.7	1.55	201.1	0.15	
		10.0	3.45	6.94	311	10.3	1.37	201.2	0.15	
		10.5	3.42	6.94	312	9.3	1.24	200.5	0.15	
		11.0	3.38	6.95	312	8.5	1.12	200.0	0.15	
		11.5	3.30	6.95	314	7.6	1.02	199.8	0.15	
		12.0	3.30	6.97	315	6.8	0.91	199.3	0.15	
		12.5	3.26	6.98	315	6.2	0.82	198.3	0.15	
		13.0	3.24	6.98	317	5.8	0.77	194.3	0.15	
		13.5	3.23	6.99	318	5.6	0.74	177.3	0.15	
		14.0	3.19	6.98	321	5.4	0.72	-17.8	0.15	
		14.5	3.14	7.01	333	4.8	0.65	-107.4	0.16	
		15.0	3.12	7.09	345	4.6	0.61	-137.4	0.16	
		15.5	3.12	7.18	350	4.4	0.60	-150.3	0.17	

**Table E7 Great Slave Lake (GL-01) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
1-Oct-08		0.5	7.80	8.36	364	101.9	12.11	107.1	0.17	- Oct. 1: Yellowknife weather forecast predicted 30 km winds from the SE; anchor did not hold boat in place
2-Oct-08	19.00	0.5	7.64	8.28	358	102.0	12.18	114.5	0.17	- Oct. 2: returned to sample again; sampled in a slightly different location from Oct. 1 - Secchi depth = 4.2 m - General chemistry from 1st grab radionuclides from 2nd grab at 9.5 m
		1.0	7.64	8.28	358	101.9	12.16	114.5	0.17	
		1.5	7.63	8.28	358	101.9	12.16	114.6	0.17	
		2.0	7.63	8.27	359	101.7	12.14	114.7	0.17	
		2.5	7.63	8.27	358	101.7	12.14	115.0	0.17	
		3.0	7.63	8.27	359	101.5	12.12	115.1	0.17	
		3.5	7.62	8.27	359	101.5	12.12	115.2	0.17	
		4.0	7.62	8.27	359	101.4	12.11	115.8	0.17	
		4.5	7.62	8.26	359	101.2	12.08	116.0	0.17	
		5.0	7.62	8.26	359	101.1	12.08	116.6	0.17	
		5.5	7.62	8.26	359	101.2	12.10	116.5	0.17	
		6.0	7.62	8.26	359	101.3	12.08	117.0	0.17	
		6.5	7.62	8.27	359	101.2	12.09	117.2	0.17	
		7.0	7.63	8.27	359	101.1	12.07	117.4	0.17	
		7.5	7.62	8.26	359	101.1	12.08	117.6	0.17	
		8.0	7.62	8.26	359	101.1	12.08	117.9	0.17	
		8.5	7.62	8.26	359	101.0	12.06	118.0	0.17	
		9.0	7.62	8.26	359	101.1	12.07	118.4	0.17	
		9.5	7.62	8.26	359	101.1	12.06	118.7	0.17	
		10.0	7.62	8.25	359	100.8	12.04	119.1	0.17	
		10.5	7.62	8.25	359	100.8	12.03	119.5	0.17	
		11.0	7.62	8.25	359	100.7	12.03	119.8	0.17	
		11.5	7.62	8.25	359	100.7	12.02	120.4	0.17	
		12.0	7.62	8.25	359	100.6	12.01	121.1	0.17	
		12.5	7.62	8.25	359	100.5	12.01	121.2	0.17	
		13.0	7.62	8.25	359	100.5	12.00	121.4	0.17	
		13.5	7.62	8.25	359	100.6	12.01	121.6	0.17	
		14.0	7.62	8.25	359	100.5	12.00	121.8	0.17	
		14.5	7.62	8.25	359	100.5	12.00	122.0	0.17	
		15.0	7.62	8.25	359	100.4	11.99	122.4	0.17	
		15.5	7.62	8.25	359	100.4	11.99	122.6	0.17	
16-Mar-09	18.00	1.0	0.12	7.93	188	106.0	15.41	70.2	0.09	- sample depth = 9.0 m - used secchi disc to determine total depth - secchi depth ~ 4 m - Ice thickness = 1.14 m
10:40		1.5	0.15	7.97	296	104.1	15.14	71.2	0.09	
		2.0	0.16	8.00	184	102.9	14.97	72.8	0.09	
		2.5	0.20	8.02	182	102.0	14.81	74.1	0.09	
		3.0	0.22	8.02	181	100.7	14.61	75.6	0.08	
		3.5	0.24	8.03	180	100.0	14.51	77.1	0.08	
		4.0	0.26	8.03	179	99.2	14.39	79.2	0.08	
		4.5	0.29	8.02	178	98.4	14.26	80.7	0.08	
		5.0	0.30	8.02	178	97.8	14.18	82.0	0.08	
		5.5	0.30	8.02	178	97.5	14.12	83.9	0.08	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
		6.0	0.34	8.01	177	96.1	13.90	86.8	0.08	
		6.5	0.37	8.01	1765	95.8	13.86	88.2	0.08	
		7.0	0.40	8.00	175	95.4	13.78	90.2	0.08	
		7.5	0.41	8.00	174	95.2	13.75	91.1	0.08	
		8.0	0.45	8.00	173	94.8	13.67	92.2	0.08	
		8.5	0.46	7.99	173	93.9	13.55	94.8	0.08	
		9.0	0.49	7.99	173	93.9	13.55	96.7	0.08	
		9.5	0.50	7.98	172	94.0	13.54	97.5	0.08	
		10.0	0.53	7.98	172	93.6	13.48	99.3	0.08	
		10.5	0.54	7.98	171	93.6	13.48	100.2	0.08	
		11.0	0.56	7.98	171	93.5	13.46	101.1	0.08	
		11.5	0.60	7.98	170	93.4	13.43	101.8	0.08	
		12.0	0.68	7.98	170	93.2	13.39	102.4	0.08	
		12.5	0.70	7.98	167	92.9	13.32	102.6	0.08	
		13.0	0.74	7.98	167	92.6	13.26	103.0	0.08	
		13.5	0.77	7.98	166	92.2	13.20	103.5	0.08	
		14.0	0.77	7.98	165	92.0	13.15	104.0	0.08	
		14.5	0.77	7.98	166	91.8	13.13	104.6	0.08	
		15.0	0.77	7.98	166	91.8	13.13	105.0	0.08	
		15.5	0.77	7.98	166	91.8	13.13	105.3	0.08	
28-Jun-09	>15.5	0.5	1.70	8.23	143	85.6	11.93	116.3	0.07	raining and cold here
12:16		1.0	1.69	8.20	143	85.6	11.93	117.1	0.07	
		1.5	1.68	8.18	143	95.7	11.96	117.4	0.07	
		2.0	1.66	8.15	143	85.8	11.98	118.4	0.07	
		2.5	1.67	8.15	143	86.0	12.01	118.5	0.07	
		3.0	1.65	8.13	142	86.1	12.02	118.9	0.07	
		3.5	1.66	8.13	145	86.2	12.02	119.3	0.07	
		4.0	1.67	8.13	143	86.3	12.04	119.8	0.07	
		4.5	1.67	8.13	142	86.3	12.04	120.3	0.07	
		5.0	1.67	8.13	142	86.5	12.06	121.3	0.07	
		5.5	1.67	8.12	142	86.5	12.07	122.0	0.07	
		6.0	1.67	8.12	144	86.5	12.07	122.5	0.07	
		6.5	1.70	8.13	143	86.6	12.07	123.2	0.07	
		7.0	1.67	8.13	142	86.6	12.07	123.2	0.07	
		7.5	1.74	8.12	145	86.6	12.06	123.4	0.07	
		8.0	1.75	8.12	143	86.6	12.06	124.1	0.07	
		8.5	1.75	8.11	143	86.7	12.07	124.1	0.07	
		9.0	1.77	8.11	144	86.7	12.06	124.3	0.07	
		9.5	1.78	8.11	144	86.7	12.06	124.4	0.07	
		10.0	1.77	8.12	144	86.8	12.07	125.0	0.07	
		10.5	1.87	8.11	144	86.8	12.05	125.4	0.07	
		11.0	1.90	8.11	145	86.9	12.04	125.5	0.07	
		11.5	1.93	8.10	145	86.9	12.04	125.9	0.07	
		12.0	1.93	8.11	145	87.0	12.05	126.9	0.07	
		12.5	1.94	8.10	145	87.0	12.05	126.4	0.07	
		13.0	1.96	8.11	145	87.0	12.04	127.1	0.07	
		13.5	1.97	8.10	145	87.0	12.04	127.2	0.07	
		14.0	1.96	8.11	145	87.0	12.04	127.5	0.07	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
		14.5	1.97	8.10	145	87.0	12.03	127.5	0.07	
		15.0	1.97	8.10	145	87.0	12.04	127.6	0.07	
		15.5	1.98	8.10	146	87.0	12.03	128.4	0.07	
30-Sep-09	15.50	0.5	7.60	8.01	170	99.3	11.84	133.2	0.08	
		1.0	7.60	7.98	170	96.3	11.52	133.7	0.08	
		1.5	7.58	7.97	170	94.9	11.34	134.2	0.08	
		2.0	7.56	7.96	170	93.7	11.22	134.3	0.08	
		2.5	7.56	7.95	170	93.1	11.14	134.6	0.08	
		3.0	7.55	7.94	170	92.5	11.07	134.9	0.08	
		3.5	7.54	7.94	170	92.0	11.01	135.2	0.08	
		4.0	7.54	7.93	170	91.8	10.99	135.7	0.08	
		4.5	7.55	7.93	170	91.7	10.98	135.6	0.08	
		5.0	7.54	7.93	170	91.5	10.96	135.8	0.08	
		5.5	7.54	7.93	170	91.4	10.94	136.3	0.08	
		6.0	7.54	7.93	170	91.3	10.93	136.7	0.08	
		6.5	7.54	7.92	170	91.2	10.92	136.9	0.08	
		7.0	7.54	7.92	170	91.1	10.91	137.0	0.08	
		7.5	7.54	7.92	170	91.1	10.91	137.3	0.08	
		8.0	7.54	7.92	170	91.1	10.91	137.9	0.08	
		8.5	7.54	7.92	170	91.1	10.91	137.9	0.08	
		9.0	7.54	7.92	170	91.0	10.90	138.2	0.08	
		9.5	7.54	7.92	170	91.0	10.90	138.4	0.08	
		10.0	7.54	7.91	170	91.0	10.90	139.8	0.08	
		10.5	7.54	7.91	170	91.0	10.90	139.6	0.08	
		11.0	7.54	7.91	170	91.0	10.90	139.4	0.08	
		11.5	7.53	7.91	170	90.9	10.88	139.7	0.08	
		12.0	7.53	7.91	170	90.9	10.88	139.9	0.08	
		12.5	7.53	7.91	170	90.9	10.88	140.4	0.08	
		13.0	7.53	7.90	170	90.9	10.88	140.7	0.08	
		13.5	7.53	7.90	170	90.9	10.89	141.2	0.08	
		14.0	7.53	7.90	170	90.8	10.87	141.5	0.08	
		14.5	7.53	7.90	170	90.8	10.87	141.7	0.08	
		15.0	7.53	7.90	170	90.8	10.87	142.0	0.08	
		15.5	7.53	7.90	170	90.8	10.87	142.3	0.08	

**Table E8 Long - 1 (LL-01) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
19-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		<ul style="list-style-type: none"> - Bottom at 7 m (or approx. 6.9 m) - sampled gen. chem & radionukes (4L) at 4 m - sampled replicate gen. chem. LL-002 - Routine of LL-002 from 2nd grab - Radionukes made up of 2nd & 3rd grab of van dorn - waypoint 429
11:30		1.0	0.55	7.77	310		12.75	199.8		
		1.5	1.27	7.74	309		9.50	202.2		
		2.0	1.67	7.72	310		7.34	202.2		
		2.5	2.10	7.56	311		6.89	207.8		
		3.0	2.31	7.57	311		6.89	207.7		
		3.5	2.58	7.55	311		6.56	208.9		
		4.0	2.63	7.54	311		6.72	209.0		
		4.5	2.66	7.56	311		6.45	208.9		
		5.0	2.67	7.54	311		6.53	209.3		
		5.5	2.68	7.54	311		6.05	210.0		
		6.0	2.69	7.51	311		6.24	211.9		
		6.5	2.70	7.50	312		5.99	211.5		
6-Oct-08	5.9	0.5	7.55	8.06	503	98.2	11.74	40.6	0.24	<ul style="list-style-type: none"> - total depth 5.9 m from YSI - total depth is 6.5 m with depth sounder - LL-01 is the original station on Long Lake - Secchi depth = 2.0 m - ORP reads very different (lower) here than LL-02 - meter problem? - sampled General chemistry only here
		1.0	7.55	8.06	503	97.5	11.66	42.1	0.24	
		1.5	7.54	8.06	503	97.0	11.60	44.2	0.24	
		2.0	7.54	8.06	503	96.5	11.54	47.2	0.24	
		2.5	7.54	8.06	503	96.2	11.51	49.3	0.24	
		3.0	7.36	8.04	504	95.1	11.44	52.5	0.24	
		3.5	7.12	8.01	506	93.6	11.32	53.7	0.24	
		4.0	7.11	8.01	506	92.6	11.19	55.3	0.24	
		4.5	7.09	8.00	506	92.1	11.14	56.8	0.24	
		5.0	7.04	8.00	506	91.7	11.10	58.3	0.25	
		5.5	7.04	8.00	506	91.3	11.05	59.5	0.25	

**Table E9 Long -2 (LL-02) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
6-Oct-08	16	0.5	7.51	8.08	504	90.6	10.84	129.4	0.24	- total depth is from depth sounder - raining - LL-02 is new station on Long Lake approx. 335 m SE of original (LL-01) - sampled general chemistry & radionuclides here
		1.0	7.52	8.09	505	90.6	10.84	129.2	0.24	
		1.5	7.49	8.10	505	90.6	10.84	129.0	0.24	
		2.0	7.49	8.10	504	90.5	10.84	129.3	0.24	
		2.5	7.48	8.10	505	90.5	10.84	129.3	0.24	
		3.0	7.45	8.10	505	90.4	10.83	129.5	0.24	
		3.5	7.46	8.09	505	90.4	10.83	130.2	0.24	
		4.0	7.29	8.07	507	89.6	10.79	131.2	0.25	
		4.5	7.27	8.07	507	89.6	10.79	131.6	0.25	
		5.0	7.26	8.07	507	89.5	10.77	132.2	0.25	
		5.5	7.26	8.07	507	89.5	10.79	132.4	0.25	
		6.0	7.24	8.07	507	89.5	10.79	133.1	0.25	
		6.5	7.19	8.07	507	89.6	10.80	133.2	0.25	
		7.0	7.18	8.07	507	89.5	10.80	133.4	0.25	
		7.5	7.18	8.06	507	89.5	10.80	133.8	0.25	
		8.0	7.17	8.06	507	89.5	10.80	134.3	0.25	
		8.5	7.17	8.06	507	89.5	10.80	134.8	0.25	
9.0	7.15	8.05	507	89.4	10.79	135.0	0.25			
9.5	7.14	8.05	507	89.2	10.78	135.3	0.25			
10.0	7.14	8.05	507	89.1	10.76	135.5	0.25			
10.5	7.13	8.05	507	89.0	10.75	136.2	0.25			
11.0	7.12	8.04	507	88.9	10.74	136.5	0.25			
11.5	7.10	8.03	507	88.5	10.70	137.2	0.25			
12.0	7.10	8.03	507	88.4	10.68	137.8	0.25			
12.5	7.10	8.03	507	88.4	10.69	138.1	0.25			
13.0	7.09	8.02	507	88.6	10.71	138.5	0.25			
13.5	7.09	8.02	507	88.6	10.71	139.2	0.25			
14.0	7.09	8.02	507	88.4	10.70	139.3	0.25			
14.5	7.08	8.02	507	88.3	10.68	139.6	0.25			
15.0	6.85	7.10	577	4.8	0.54	-107.8	0.28			
15-Mar-09 15:30	14.80	0.7	0.42	7.54	252	70.0	10.09	96.5	0.12	- sample depth = 7.0 m - used secchi disc to determine total depth - last 2 readings with YSI (15.0 m & 15.5 m) were in the sediment - Ice thickness = 0.65 m
		1.0	1.14	7.55	249	69.7	9.85	95.9	0.12	
		1.5	2.01	7.55	246	69.3	9.58	95.9	0.12	
		2.0	2.57	7.54	246	69.3	9.42	95.8	0.12	
		2.5	2.87	7.53	244	68.4	9.23	96.1	0.12	
		3.0	3.03	7.53	245	68.1	9.16	96.3	0.12	
		3.5	3.08	7.53	244	67.8	9.09	96.6	0.12	
		4.0	3.09	7.52	244	67.4	9.03	96.9	0.12	
		4.5	3.11	7.53	244	67.0	8.98	97.1	0.12	
		5.0	3.12	7.52	244	66.0	8.85	97.5	0.12	
5.5	3.13	7.51	244	63.2	8.46	98.5	0.12			
6.0	3.14	7.49	244	61.9	8.28	99.0	0.12			
6.5	3.18	7.49	244	61.0	8.17	99.1	0.12			

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
		7.0	3.20	7.48	244	59.7	7.97	99.6	0.12	
		7.5	3.18	7.47	244	58.6	7.85	100.1	0.12	
		8.0	3.20	7.47	244	57.3	7.63	100.5	0.12	
		8.5	3.22	7.45	244	56.1	7.49	101.0	0.12	
		9.0	3.23	7.45	244	54.8	7.32	101.2	0.12	
		9.5	3.25	7.44	244	53.7	7.16	101.8	0.12	
		10.0	3.28	7.42	244	51.5	6.84	102.4	0.12	
		10.5	3.29	7.40	244	47.7	6.35	103.0	0.12	
		11.0	3.32	7.39	244	46.2	6.16	103.2	0.12	
		11.5	3.35	7.37	244	44.2	5.86	103.9	0.12	
		12.0	3.38	7.36	245	41.0	5.41	104.3	0.12	
		12.5	3.44	7.33	245	34.8	4.50	105.4	0.12	
		13.0	3.41	7.33	246	29.9	4.15	104.7	0.12	
		13.5	3.49	7.31	246	29.5	3.86	105.5	0.12	
		14.0	3.56	7.29	247	27.0	3.58	105.8	0.12	
		14.5	3.73	7.32	301	7.2	0.91	-147.0	0.14	
		15.0	3.82	7.15	378	33.0	0.42	-185.9	0.18	
		15.5	3.83	7.12	454	1.9	0.25	-194.9	0.22	
25-Jun-09	15.5	0.5	17.15	8.18	220	108.9	10.49	131.2	0.10	-sampled gen chem, radios & phyto (1 m)
19:30		1.0	16.76	8.25	220	107.4	10.40	131.1	0.10	
		1.5	16.43	8.29	220	105.7	10.34	131.3	0.10	
		2.0	15.24	8.31	220	99.8	10.00	132.2	0.10	
		2.5	13.98	8.32	221	96.7	9.96	133.4	0.11	
		3.0	13.71	8.32	220	95.8	9.94	133.9	0.10	
		3.5	13.33	8.31	220	94.1	9.84	134.9	0.11	
		4.0	13.02	8.28	219	93.1	9.80	135.5	0.10	
		4.5	12.78	8.27	220	91.9	9.72	136.4	0.10	
		5.0	12.61	8.25	220	91.0	9.66	137.4	0.11	
		5.5	11.92	8.19	222	87.6	9.46	139.2	0.11	
		6.0	10.78	8.13	224	82.9	9.21	142.3	0.11	
		6.5	9.56	8.06	227	78.8	8.98	145.4	0.11	
		7.0	7.79	7.98	229	74.6	8.82	149.0	0.11	
		7.5	6.50	7.91	232	70.7	8.65	152.0	0.11	
		8.0	5.94	7.88	233	68.7	8.54	153.6	0.11	
		8.5	5.64	7.84	233	67.0	8.42	154.7	0.11	
		9.0	5.38	7.79	235	64.1	8.07	156.6	0.11	
		9.5	5.18	7.74	237	60.2	7.61	158.1	0.11	
		10.0	5.08	7.71	237	58.6	7.43	159.0	0.11	
		10.5	4.95	7.67	238	54.3	6.94	160.1	0.11	
		11.0	4.84	7.62	241	48.1	6.10	161.9	0.11	
		11.5	4.79	7.58	240	44.4	5.68	162.3	0.11	
		12.0	4.74	7.56	241	43.0	5.52	162.8	0.11	
		12.5	4.71	7.55	242	41.7	5.34	163.4	0.11	
		13.0	4.63	7.54	243	39.0	5.02	164.2	0.12	
		13.5	4.60	7.51	244	34.8	4.49	164.9	0.12	
		14.0	4.51	7.48	245	31.4	3.95	166.1	0.12	
		14.5	4.46	7.41	247	12.0	1.56	115.4	0.12	
		15.0	4.44	7.39	248	10.2	1.30	10.0	0.12	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
11-Sep-09	14.80	0.50	13.46	8.29	223	90.3				-secchi depth 3.6 m
		1.00	13.44	8.30	223	88.5				
		1.50	13.37	8.30	223	87.0				
		2.00	13.34	8.30	223	86.1				
		2.5	13.18	8.29	223	84.6				
		3.0	13.15	8.30	223	84.1				
		3.50	13.13	8.30	223	83.8				
		4.00	13.12	8.30	223	83.6				
		4.50	13.12	8.30	223	83.5				
		5.00	13.12	8.30	223	83.4				
		5.5	13.10	8.30	223	83.2				
		6.0	13.07	8.29	223	82.9				
		6.50	13.04	8.29	223	82.5				
		7.00	13.01	8.28	223	82.1				
		7.50	12.64	8.21	224	78.8				
		8.00	11.68	8.04	227	69.5				
		8.5	9.17	7.64	234	48.6				
		9.0	6.49	7.49	234	31.8				
		9.50	5.96	7.40	237	22.4				
		10.00	5.58	7.35	237	15.6				
		10.50	5.36	7.32	237	12.8				
		11.00	5.22	7.31	239	8.8				
		11.5	5.04	7.29	240	8.2				
		12.0	4.93	7.28	242	7.7				
		12.50	4.81	7.28	244	7.3				
		13.00	4.72	7.28	248	6.9				
		13.50	4.64	7.27	252	6.6				
		14.00	4.55	7.22	262	6.3				
		14.5	4.49	7.17	272	6.2				

**Table E10 North Tardiff Lake (NT-01) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
19-Mar-08		0.5	ICE	ICE	ICE		ICE	ICE		- Bottom at 1.25 m; v. shallow
14:00		1.0	0.94	6.78	256		0.80	-14.0		- water highly coloured (brown / yellow) with strong smell (sewage) - sampled at 0.5 b/c could not use van dorn; waypoint 430
5-Oct-08	0.9	0.25	8.71	7.46	181	94.7	11.02	127.4	0.09	- Shallow lake, tea colored water, bottom very soft
		0.5	8.67	7.43	180	94.4	11.00	128.4	0.09	- Secchi depth = 0.6 m
		0.75	8.65	7.41	180	93.5	10.90	128.5	0.09	- sampled by hand at 0.5 m
17-Mar-09	1.09	0.7	0.27	6.69	248	3.2	0.47	-74.7	0.12	- sample depth = 0.7 (by hand)
12:30		1.0	0.95	6.64	280	2.6	0.38	-78.1	0.13	- Avalon drilled and pumped water on this lake earlier in March/February - Ice thickness = 0.70 m
25-Jun-09	1.2	0.3	20.96	7.44	70	101.7	9.16	130.0	0.03	Sampled by hand
17:00		0.5	16.92	7.43	70	90.8	8.72	133.1	0.03	Went back on June 27 to re-sample for zooplankton
		0.8	15.22	7.24	68	74.2	7.37	142.8	0.03	
		1.0	14.39	6.92	63	52.1	5.32	146.3	0.03	
13-Sep-09	1.15	0.25	12.06	7.29	77	87.7	9.43	126.3	0.04	-secchi depth= 0.55 m
		0.50	12.04	7.23	77	85.8	9.24	125.4	0.04	
		0.75	11.96	7.21	77	84.7	9.13	125.2	0.04	
		1.00	11.91	7.15	77	83.1	8.97	105.2	0.04	

**Table E11 South Tardiff Lake (ST-01) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
19-Mar-08		0.5	ICE	ICE	ICE		ICE	ICE		- Bottom at 1.5 m; v. shallow
14:40		1.0	1.20	6.71	261		0.45	7.3		- water coloured brown/yellow - not as dark as NT-01
5-Oct-08	1.0	0.25	8.00	7.64	208	93.3	11.04	95.2	0.10	- water sampled by hand at 0.5 m
		0.5	8.00	7.61	208	93.5	11.06	99.6	0.10	- bottom very soft, water tea stained
		0.75	7.99	7.60	208	93.6	11.08	101.2	0.10	- Secchi depth = 1.0 m (bottom)
17-Mar-09	1.30	0.7	0.67	6.85	234	4.3	0.62	-52.5	0.11	- sample depth = 0.7 m (by hand)
11:45		1.0	1.73	6.84	244	3.4	0.48	-64.4	0.11	- Avalon drilling ~ 25 m to the E, pump shack located ~30 m to the W
		1.25	2.17	6.86	259	2.8	0.38	-79.4	0.12	- have been pumping 28 L/min from the lake for several days (for the drill; source = driller) - Ice thickness = 0.65 m
25-Jun-09	1.40	0.25	18.64	7.73	81	101.2	9.46	123.9	0.04	Sampled by hand
		0.50	18.75	7.60	81	99.3	9.29	127.4	0.04	Went back on June 27 to re-sample for zooplankton
		0.75	16.11	7.50	82	89.4	8.81	133.4	0.04	
		1.00	15.50	7.42	81	81.1	8.07	123.7	0.04	
		1.25	14.52	7.19	81	70.0	7.04	127.9	0.04	
13-Sep-09	1.25	0.25	13.33	7.46	92	86.8	9.08	133.6	0.04	-secchi depth= 1.65 m
		0.50	13.31	7.45	91	86.3	9.03	134.6	0.04	
		0.75	13.26	7.44	91	85.9	8.98	136.4	0.04	
		1.00	13.15	7.44	91	84.8	8.91	136.4	0.04	

Table E12 Thor - 1 (TL-01) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
18-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- bottom at 3 m; waypoint 426
14:00		1.0	0.20	7.85	219		6.85	187.0		- Sampled gen. chem at 1.5 m
		2.0	1.69	7.78	227		6.47	185.9		- sampled radionuclides at surface (0.5 m)
		2.5	2.03	7.58	229		6.11	178.7		- equipment freezing up; windchill is a problem
20-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- Bottom at 3 m; ice depth just < 1 m
18:15		1.0	0.49	7.56	288		7.42	136.0		- Re-sampled radionukes (4L) at 1.5 m
		1.5	1.42	7.57	289		6.87	138.3		- Did Ra266 split (TL-011)
		2.0	1.91	7.45	291		6.54	144.6		- Waypoint 426 (same hole as first TL-001)
		2.5	2.28	7.60	294		6.36	141.7		
6-Oct-08	2.5	0.25	7.38	8.40	538	103.1	12.38	38.2	0.26	- original station
		0.5	7.38	8.40	538	103.0	12.37	39.9	0.26	- total depth 2.5 m from YSI
		0.75	7.38	8.40	538	103.0	12.36	41.2	0.26	- total depth is 3.5 m on depth sounder
		1.0	7.38	8.40	538	102.9	12.36	42.3	0.26	- did not sample radionuclides
		1.25	7.39	8.40	538	102.9	12.35	43.4	0.26	
		1.5	7.38	8.41	538	102.8	12.34	44.8	0.26	
		1.75	7.38	8.40	538	102.8	12.34	45.9	0.26	
		2.0	7.38	8.40	538	102.8	12.33	46.8	0.26	
		2.25	7.38	8.40	538	102.8	12.34	47.1	0.26	

**Table E13 Thor - 2 (TL-02) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
18-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- bottom at 4.75 m; waypoint 427 - hit & scooped bottom with Van Dorn when went to sample left site & will re-sample - not sure on D.O. #'s! YSI meter cup was frozen before this site (unthawed before use though)
17:30		1.0	0.13	8.17	170		13.81	161.0		
		2.0	0.05	7.96	169		14.75	161.4		
		2.5	0.09	7.78	175		15.01	161.3		
		3.0	2.23	7.66	216		6.60	161.6		
		4.0	2.90	7.54	238		5.68	156.4		
19-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- Bottom at 4.75 m - Sampled gen. chem. & radionukes (4L) at 3 m - Radionuke sample composed of 1st and 2nd grabs with van dorn - waypoint 427
9:30		1.0	0.00	ICE	ICE		ICE	ICE		
		1.5	1.53	7.61	335		6.85	215.9		
		2.0	2.02	7.65	336		6.60	211.3		
		2.5	2.43	7.54	338		5.98	213.1		
		3.0	2.53	7.57	339		6.12	210.6		
		3.5	2.69	7.45	340		5.50	212.1		
		4.0	2.75	7.42	341		5.05	210.6		
		4.5	2.80	7.38	343		5.15	208.5		
6-Oct-08	3.4	0.5	7.41	8.37	536	103.0	12.36	47.3	0.26	- original station - did not sample radionuclides - bottom very clayey (on anchor when pulled up)
		1.0	7.41	8.38	536	102.7	12.33	49.2	0.26	
		1.5	7.41	8.38	536	102.6	12.31	50.3	0.26	
		2.0	7.41	8.38	536	102.4	12.29	51.4	0.26	
		2.5	7.41	8.38	536	102.5	12.29	53.8	0.26	
		3.0	7.40	8.39	536	102.4	12.29	55.3	0.26	

**Table E14 Thorn Lake (TL-03) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
22-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- Bottom at 4.9 m - ice approx. 59 cm - Corixids present - sampled gen. chem at 2.5 m
16:30		1.0	0.43	7.45	212		5.93	156.3		
		1.5	1.02	7.43	215		5.54	158.4		
		2.0	1.55	7.42	218		5.05	158.5		
		2.5	1.96	7.32	221		1.37	158.9		
		3.0	2.26	7.27	223		0.84	160.2		
		3.5	2.38	7.27	224		0.76	159.6		
		4.0	2.84	7.27	230		0.46	159.8		
		4.5	3.36	7.42	259		0.37	-3.1		
4-Oct-08	4.50	0.5	6.64	8.11	463	95.7	11.71	60.0	0.22	- Secchi depth = 2.12 m - bottom feels soft
		1.0	6.63	8.10	463	95.8	11.72	63.2	0.22	
		1.5	6.63	8.10	463	95.7	11.71	65.3	0.22	
		2.0	6.61	8.09	463	95.6	11.71	67.2	0.22	
		2.5	6.60	8.09	463	95.4	11.68	68.3	0.22	
		3.0	6.58	8.09	464	95.5	11.70	70.1	0.22	
		3.5	6.58	8.09	463	95.5	11.70	71.3	0.22	
		4.0	6.54	8.01	464	91.4	11.21	25.4	0.22	
17-Mar-09	4.80	0.6	0.68	7.24	257	37.2	5.32	129.6	0.12	- sample depth = 2.25 m - sampled ~2.3 m NW of TL-03 wypt - Ice thickness = 0.56 m
10:30		1.0	1.25	7.27	249	35.5	5.01	129.7	0.12	
		1.5	2.01	7.30	246	34.9	4.82	129.5	0.12	
		2.0	2.48	7.34	245	33.1	4.52	129.1	0.12	
		2.5	2.87	7.30	246	12.8	1.73	129.7	0.12	
		3.0	3.29	7.29	246	4.4	0.58	129.3	0.12	
		3.5	3.71	7.29	250	2.0	0.27	57.9	0.12	
		4.0	3.90	7.31	250	1.6	0.22	-62.5	0.12	
		4.5	4.12	7.51	275	1.9	0.25	-209.0	0.13	
27-Jun-09	4.80	0.5	15.93	8.29	200	112.1	11.08	112.2	0.09	sampled general chemistry, radios, phyto (1 m) and zoo (vertical tow)
9:30		1.0	15.92	8.30	199	110.0	10.86	112.4	0.09	
		1.5	15.90	8.31	199	108.6	10.73	112.3	0.09	
		2.0	15.89	8.30	199	107.4	10.61	113.4	0.09	
		2.50	14.75	8.08	201	97.0	9.77	120.1	0.10	
		3.0	12.71	7.89	209	81.1	8.59	128.0	0.10	
		3.5	10.80	7.78	217	67.4	7.44	133.3	0.10	
		4.0	9.30	7.65	224	54.0	6.09	137.9	0.11	
		4.5	8.34	7.49	232	25.4	2.96	-79.7	0.11	

**Table E15 Ring Lake (TL-04) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
21-Mar-08		0.5	ICE	ICE	ICE		ICE	ICE		- Bottom at 1.5 m; ice approx. 60 cm
12:00		1.0	0.44	7.22	405		1.50	-11.7		- sampled at approx. 0.6 - 0.7 m with Van Dorn; waypoint 440
		1.3	1.32	7.20	418		1.20	-41.5		- Gen. chem replicate (TL-006)
7-Oct-08	1.1	0.25	7.12	8.54	491	97.1	11.74	96.8	0.24	- whole lake is very shallow (< 2m)
		0.5	7.13	8.54	491	97.4	11.77	97.0	0.24	- did field blank here (TL-08)
		0.75	7.13	8.54	491	97.3	11.76	97.1	0.24	- total depth 1.1 m from YSI - total depth is 1.8 m on depth sounder - sampled by hand at 0.5 m
14-Mar-09	1.30	0.7	0.49	7.41	613	6.8	0.95	-133.2	0.29	- sample depth = 0.7 m (by hand)
17:00		1.0	1.44	7.40	607	4.2	0.59	-137.1	0.29	- Ice thickness = 0.63 m
		1.25	1.72	7.36	605	3.2	0.44	-138.6	0.29	
24-Jun-09	1.23	0.25	14.76	8.79	176	103.8	10.48	99.0	0.08	Sampled by hand
14:20		0.50	14.78	8.79	176	101.0	10.21	99.5	0.08	Sampled TKN in 250ml clear glass jar
		0.75	14.76	8.79	176	100.8	10.13	99.2	0.08	(no preservatives)
		1.00	14.75	8.78	176	99.2	10.03	99.4	0.08	No zooplankton net, did not sample; sampled general chemistry, radionuclides, phytoplankton (chl and tax)
9-Sep-09	1.3	0.25	11.71	8.37	197	79.9	8.65	148.9	0.09	
		0.5	11.70	8.42	197	77.6	8.41	147.9	0.09	
		0.75	11.70	8.43	196	76.4	8.29	147.8	0.09	
		1	11.70	8.42	196	75.4	8.19	6.9	0.09	
		1.25	12.14	7.03	235	20.5	2.20	-49.3	0.11	

**Table E16 Megan Lake (TL-05) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
20-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- Bottom at 5.75 m - sampled at 4 m - Gen. chem from 1st grab; radionukes (4L) from 1st & 2nd grab - Waypoint 436
15:00		1.0	1.34	7.75	438		2.31	155.5		
		1.5	1.88	7.71	441		2.38	157.5		
		2.0	2.39	7.73	447		1.65	159.1		
		2.5	2.60	7.68	452		0.91	163.8		
		3.0	2.65	7.84	456		0.81	165.2		
		3.5	2.71	7.62	461		0.69	156.7		
		4.0	2.83	7.62	472		0.40	83.0		
		4.5	2.96	7.63	478		0.30	30.0		
		5.0	3.38	7.63	488		0.21	-82.1		
		5.5	3.69	7.94	519		0.14	-188.5		
5-Oct-08	5.1	0.5	6.92	8.49	843	95.7	11.63	94.7	0.42	- Secchi depth = 2.12 m - sampled at wypt TL-051, approx. 55 m E of original TL-05 station
		1.0	6.91	8.52	843	94.8	11.51	94.2	0.41	
		1.5	6.91	8.53	840	94.8	11.51	94.2	0.41	
		2.0	6.91	8.53	841	94.8	11.50	94.2	0.41	
		2.5	6.90	8.53	841	94.8	11.51	94.3	0.41	
		3.0	6.88	8.53	842	94.7	11.50	94.1	0.41	
		3.5	6.89	8.53	842	94.7	11.50	94.5	0.41	
		4.0	6.88	8.52	841	94.8	11.51	94.8	0.41	
		4.5	6.88	8.52	840	94.9	11.52	94.7	0.41	
		5.0	6.89	8.30	845	72.6	8.87	-	0.42	
14-Mar-09	5.30	0.7	0.94	7.74	553	6.1	0.84	31.6	0.26	- sample depth = 2.5 m - Ice thickness = 0.68 m
11:45		1.0	1.70	7.79	557	3.1	0.43	11.4	0.37	
		1.5	2.34	7.81	545	2.5	0.34	-1.1	0.26	
		2.0	2.81	7.83	544	1.8	0.24	-40.4	0.26	
		2.5	2.94	7.83	548	1.7	0.23	-126.3	0.26	
		3.0	3.15	7.86	555	1.4	0.19	-134.6	0.27	
		3.5	3.28	7.85	562	1.4	0.19	-151.5	0.27	
		4.0	3.49	7.86	570	1.4	0.18	-170.4	0.27	
		4.5	3.75	7.92	576	1.3	0.18	-211.8	0.28	
		5.0	4.06	7.98	594	1.3	0.17	-249.1	0.29	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
25-Jun-09 12:00	5.30	0.50	16.42	8.66	351	107.1	10.46	150.7	0.17	- didn't write down sample depth!! Estimate between 2 - 3 m
		1.0	16.08	8.66	351	106.2	10.45	149.3	0.17	
		1.5	15.71	8.67	351	104.8	10.41	147.9	0.17	
		2.0	15.39	8.65	351	101.8	10.17	147.9	0.17	
		2.5	15.03	8.64	351	98.4	9.90	147.3	0.17	
		3.00	14.78	8.64	353	97.3	9.84	146.8	0.17	
		3.5	14.64	8.62	354	95.7	9.69	146.7	0.17	
		4.0	14.42	8.58	357	92.7	9.44	147.4	0.17	
		4.50	13.87	8.42	370	79.9	8.25	151.0	0.18	
		5.0	11.80	7.95	423	49.2	5.32	163.5	0.20	
14-Sep-09	5.30	0.50	13.84	8.56	399	73.9	7.65	108.2	0.19	-secchi depth= 2.4 m
		1.0	13.39	8.56	398	72.4	7.56	108.7	0.19	
		1.5	13.36	8.56	399	72.0	7.51	108.8	0.19	
		2.00	13.25	8.56	398	71.5	7.49	109.1	0.19	
		2.5	13.23	8.56	398	71.4	7.48	109.3	0.19	
		3.0	13.06	8.56	399	70.6	7.42	109.7	0.19	
		3.50	13.04	8.56	398	70.6	7.42	110.0	0.19	
		4.0	13.02	8.56	398	70.6	7.42	110.0	0.19	
		4.50	12.93	8.55	398	69.5	7.32	110.6	0.19	
	5.0	12.83	8.53	399	68.1	7.19	111.2	0.19		

**Table E17 Thor West (TL-06) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
6-Oct-08	12.1	0.5	7.46	8.37	536	102.3	12.25	94.6	0.26	- New station on Thor Lake - approx. 452 m W of TL-02 - total depth 12.1 m from YSI - total depth is 14 m with depth sounder - Secchi depth = 1.9 m - drifted approx. 30 m W (from wypt) at 1.5 m depth from 0.5 m depth
		1.0	7.46	8.38	536	102.1	12.24	95.0	0.26	
		1.5	7.46	8.38	536	101.6	12.17	96.3	0.26	
		2.0	7.47	8.37	536	101.6	12.17	96.7	0.26	
		2.5	7.46	8.38	536	101.6	12.18	96.8	0.26	
		3.0	7.46	8.38	536	101.6	12.17	97.1	0.26	
		3.5	7.47	8.38	536	101.5	12.16	97.5	0.26	
		4.0	7.44	8.38	536	101.6	12.17	97.7	0.26	
		4.5	7.43	8.38	536	101.5	12.17	98.3	0.26	
		5.0	7.42	8.38	536	101.6	12.18	98.8	0.26	
		5.5	7.43	8.38	536	101.6	12.18	99.3	0.26	
		6.0	7.45	8.38	536	101.5	12.17	99.4	0.26	
		6.5	7.47	8.38	536	101.7	12.19	100.0	0.26	
		7.0	7.48	8.38	536	101.6	12.17	100.2	0.26	
		7.5	7.43	8.38	536	101.5	12.18	100.3	0.26	
		8.0	7.43	8.38	536	101.7	12.19	100.5	0.26	
		8.5	7.44	8.38	536	101.7	12.19	101.1	0.26	
		9.0	7.43	8.38	536	101.6	12.18	101.2	0.26	
		9.5	7.44	8.38	536	101.7	12.19	101.4	0.26	
		10.0	7.44	8.38	536	101.6	12.18	101.7	0.26	
		10.5	7.43	8.38	536	101.7	12.20	102.0	0.26	
		11.0	7.44	8.37	536	101.7	12.19	102.3	0.26	
		11.5	7.44	8.37	536	101.7	12.19	102.9	0.26	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
17-Mar-09	12.50	0.8	0.53	7.58	293	55.0	7.91	14.1	0.14	- sample depth = 6.0 m - Ice thickness = 0.73 m - new station (deeper, in October 2008); replaced TL-02
15:30		1.0	1.15	7.57	287	53.0	7.48	16.3	0.14	
		1.5	2.03	7.56	281	52.2	7.19	18.1	0.13	
		2.0	2.60	7.53	280	51.5	7.00	23.1	0.13	
		2.5	2.91	7.52	279	51.1	6.89	25.5	0.13	
		3.0	3.07	7.49	280	46.7	6.27	28.9	0.13	
		3.5	3.11	7.46	282	41.6	5.58	32.6	0.13	
		4.0	3.13	7.45	285	41.0	5.50	34.1	0.14	
		4.5	3.11	7.45	287	42.2	5.66	35.9	0.14	
		5.0	3.16	7.43	288	38.5	5.14	37.5	0.14	
		5.5	3.17	7.43	290	37.6	5.03	38.1	0.14	
		6.0	3.15	7.44	291	37.5	5.03	38.6	0.14	
		6.5	3.17	7.43	292	36.9	4.95	39.3	0.14	
		7.0	3.15	7.43	295	36.1	4.84	40.3	0.14	
		7.5	3.15	7.42	297	36.3	4.86	41.4	0.14	
		8.0	3.14	7.42	298	36.5	4.89	41.9	0.14	
		8.5	3.16	7.41	299	35.7	4.77	42.6	0.14	
		9.0	3.18	7.40	300	33.3	4.46	37.6	0.14	
		9.5	3.18	7.40	301	32.6	4.36	44.0	0.14	
		10.0	3.21	7.39	302	32.1	4.30	44.5	0.14	
		10.5	3.27	7.37	303	27.2	3.60	45.7	0.14	
		11.0	3.32	7.35	304	20.5	2.73	46.3	0.14	
		11.5	3.36	7.34	306	18.1	2.41	46.7	0.15	
		12.0	3.36	7.34	308	18.6	2.50	44.9	0.15	
24-Jun-09	12.00	0.5	14.29	8.48	232	98.00	10.02	78.3	0.11	sampled TKN in 250ml clear glass jar (no preservatives) no zooplankton net, did not sample on June 24 sampled general chemistry, radionuclides, phytoplankton (chl and tax)
10:00		1.0	14.29	8.48	233	97.20	9.95	79.3	0.11	
		1.5	14.29	8.48	232	96.80	9.91	80.1	0.11	
		2.0	14.30	8.49	233	96.30	9.85	81.6	0.11	
		2.5	14.30	8.49	232	96.10	9.83	82.3	0.11	
		3.0	14.30	8.50	233	95.90	9.82	82.6	0.11	
		3.5	14.30	8.48	233	95.70	9.80	83.9	0.11	
		4.0	14.30	8.49	233	95.70	9.79	84.7	0.11	
		4.5	14.30	8.49	233	95.60	9.78	85.2	0.11	
		5.0	14.29	8.49	232	95.30	9.76	85.7	0.11	
		5.5	14.29	8.49	233	95.00	9.72	87.1	0.11	
		6.0	14.29	8.49	233	95.00	9.72	87.6	0.11	
		6.5	14.28	8.49	233	95.00	9.72	88.0	0.11	
		7.0	14.29	8.49	233	94.9	9.72	88.2	0.11	
		7.5	14.28	8.49	233	94.80	9.71	88.9	0.11	
		8.0	14.28	8.49	233	94.70	9.69	89.4	0.11	
		8.5	14.26	8.48	233	94.50	9.67	90.2	0.11	
		9.0	14.23	8.46	233	94.00	9.63	90.8	0.11	
		9.5	12.20	8.47	233	93.60	8.59	91.1	0.11	
		10.0	14.18	8.46	233	93.40	9.58	92.2	0.11	
		10.5	14.17	8.46	233	93.10	9.56	92.2	0.11	
		11.0	14.14	8.46	233	93.00	9.54	92.9	0.11	
		11.5	13.90	8.32	235	86.80	8.97	96.2	0.11	
		12.0	13.74	8.24	237	83.80	8.69	-174.0	0.11	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
6-Sep-09	12.3	0.5	14.12	8.29	286	93.6	9.61	113.0	0.14	
		1.0	14.13	8.27	286	91.3	9.35	114.1	0.14	
		1.5	14.13	8.27	285	90.0	9.24	114.5	0.14	
		2.0	14.13	8.27	286	89.0	9.14	115.3	0.14	
		2.5	14.13	8.26	286	88.0	9.03	115.0	0.14	
		3.0	14.13	8.26	286	87.3	8.95	115.1	0.14	
		3.5	14.13	8.27	286	86.3	8.86	114.8	0.14	
		4.0	14.13	8.27	286	85.7	8.79	114.8	0.14	
		4.5	14.13	8.28	286	85.0	8.72	114.4	0.14	
		5.0	14.13	8.29	285	84.7	8.69	114.4	0.14	
		5.5	14.13	8.28	286	84.4	8.67	114.3	0.14	
		6.0	14.13	8.28	286	84.2	8.65	114.7	0.14	
		6.5	14.13	8.29	285	84.0	8.62	114.7	0.14	
		7.0	14.13	8.29	286	83.8	8.60	114.6	0.14	
		7.5	14.13	8.29	286	83.6	8.58	114.4	0.14	
		8.0	14.13	8.29	286	83.4	8.56	115.0	0.14	
		8.5	14.12	8.29	286	83.2	8.55	115.0	0.14	
		9.0	14.12	8.29	286	83.1	8.54	114.9	0.14	
		9.5	14.08	8.30	285	83.0	8.53	114.6	0.14	
		10.0	14.06	8.30	286	82.9	8.53	115.0	0.14	
		10.5	14.05	8.31	285	82.9	8.53	114.7	0.14	
		11.0	14.04	8.31	286	82.8	8.53	114.7	0.14	
		11.5	14.06	8.31	285	82.8	8.52	114.9	0.14	
		12.0	14.04	8.31	285	82.9	8.52	114.8	0.14	

**Table E18 Thor East (TL-07) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
6-Oct-08	8.3	0.5	7.86	8.36	535	104.2	12.36	40.3	0.26	- new station; approx. 573 m NW of TL-01 - approx. 15 m S of large cliffs (15 m tall cliffs with vertical drop into Thor Lake) - total depth 8.3 m from YSI - total depth is 9.6 m on depth sounder
		1.0	7.88	8.36	534	103.1	12.23	42.4	0.26	
		1.5	7.81	8.37	535	102.8	12.22	43.8	0.26	
		2.0	7.80	8.37	535	102.6	12.19	44.8	0.26	
		2.5	7.78	8.37	535	102.5	12.18	46.0	0.26	
		3.0	7.77	8.37	535	102.4	12.17	47.1	0.26	
		3.5	7.79	8.37	535	102.3	12.16	48.6	0.26	
		4.0	7.75	8.37	535	102.2	12.16	50.3	0.26	
		4.5	7.75	8.37	535	102.2	12.16	51.3	0.26	
		5.0	7.73	8.37	535	102.1	12.16	52.3	0.26	
		5.5	7.72	8.38	535	103.5	12.31	54.3	0.26	
		6.0	7.71	8.37	535	102.5	12.20	55.3	0.26	
		6.5	7.72	8.37	535	102.1	12.17	56.4	0.26	
		7.0	7.72	8.38	535	102.1	12.16	57.6	0.26	
		7.5	7.70	8.38	535	102.1	12.16	58.7	0.26	
8.0	7.70	8.35	535	101.0	11.87	-46.4	0.26			
17-Mar-09	8.20	0.7	0.57	7.50	293	55.4	7.96	25.4	0.14	- sample depth = 4.0 m - new station (deeper, in October 2008); replaced TL-01 - Ice thickness = 0.69 m
		1.0	1.10	7.52	289	54.4	7.71	26.1	0.14	
		1.5	1.89	7.51	2865	54.0	7.48	26.7	0.14	
		2.0	2.55	7.51	285	53.0	7.22	27.9	0.13	
		2.5	2.74	7.50	284	50.0	6.77	29.5	0.13	
		3.0	2.40	7.46	285	44.4	6.00	31.6	0.13	
		3.5	3.08	7.44	284	39.2	5.27	33.0	0.13	
		4.0	3.16	7.41	284	36.7	4.91	34.6	0.14	
		4.5	3.17	7.39	286	32.7	4.73	36.5	0.14	
		5.0	3.18	7.37	287	29.0	3.88	38.8	0.14	
		5.5	3.21	7.35	289	23.2	3.10	38.8	0.14	
		6.0	3.21	7.35	292	22.8	3.05	39.2	0.14	
		6.5	3.19	7.36	293	22.9	3.07	39.7	0.14	
7.0	3.21	7.35	294	21.0	2.71	40.6	0.14			
7.5	3.23	7.35	296	20.1	2.69	41.4	0.14			
8.0	3.28	7.32	297	16.8	2.25	-51.9	0.14			
20-Mar-09	-	6.0	3.30	7.64	294	39.8	5.31	100.9	0.14	- YSI reading when sampled for TL-07-1, TL-07-2 & TL-07-3 (@ 08:30)

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
24-Jun-09 11:00	7.70	0.5	14.12	8.51	233	98.00	10.01	58.9	0.11	sampled TKN in 250ml clear glass jar (no preservatives) no zooplankton net, did not sample on June 24 sampled general chemistry, radionuclides, phytoplankton (chl and tax)
		1.0	14.12	8.50	232	96.00	9.85	60.6	0.11	
		1.5	14.12	8.50	232	95.60	9.81	61.8	0.11	
		2.0	14.12	8.50	233	95.20	9.78	63.2	0.11	
		2.5	14.11	8.49	233	95.10	9.77	64.6	0.11	
		3.0	14.11	8.50	232	94.90	9.76	65.0	0.11	
		3.5	14.11	8.50	232	94.80	9.74	66.0	0.11	
		4.0	14.12	8.50	232	94.70	9.73	66.7	0.11	
		4.5	14.11	8.50	232	94.60	9.72	67.8	0.11	
		5.0	14.09	8.50	232	94.50	9.71	68.6	0.11	
		5.5	14.08	8.51	232	94.40	9.71	69.5	0.11	
		6.0	14.09	8.50	232	94.40	9.70	70.1	0.11	
		6.5	14.10	8.50	232	94.30	9.69	71.2	0.11	
7.0	14.11	8.50	232	94.20	9.68	71.4	0.11			
		7.5	14.03	8.02	236	83.80	8.11	-189.1	0.11	
6-Sep-09	9.80	0.5	14.33	8.24	286	88.1	9.01	129.3	0.14	- Secchi depth = 2.4 m - Sampled for TKN in 500 mL plastic benthos jar - transferred to 250 mL amber glass bottles back at camp - Sampled for total metals out of radionuclides bottle - Preserved all samples back at camp
		1.0	14.34	8.25	287	86.7	8.85	128.1	0.14	
		1.5	14.34	8.26	286	85.5	8.77	127.2	0.14	
		2.0	14.34	8.25	286	85.1	8.70	127.0	0.14	
		2.5	14.31	8.26	287	84.7	8.66	126.1	0.14	
		3.0	14.33	8.27	286	83.0	8.47	125.5	0.14	
		3.5	14.28	8.27	286	81.5	8.34	125.3	0.14	
		4.0	14.25	8.27	286	81.0	8.29	124.5	0.14	
		4.5	14.26	8.27	286	80.7	8.26	124.9	0.14	
		5.0	14.28	8.27	286	80.5	8.23	124.4	0.14	
		5.5	14.28	8.27	286	80.1	8.20	124.2	0.14	
		6.0	14.27	8.27	286	79.9	8.18	124.2	0.14	
		6.5	14.29	8.27	286	79.6	8.14	124.0	0.14	
		7.0	14.29	8.28	287	79.6	8.14	123.4	0.14	
		7.5	14.30	8.28	286	79.4	8.11	123.3	0.14	
8.0	14.29	8.28	286	79.2	8.10	123.0	0.14			
8.5	14.24	8.28	286	78.9	8.08	122.9	0.14			
9.0	14.22	8.29	286	78.8	8.07	122.4	0.14			
		9.5	14.20	8.29	286	78.7	8.06	122.4	0.14	

**Table E19 Wasp Lake (UN-04) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
23-Mar-08		0.5	ICE	ICE	ICE		ICE	ICE		- Bottom at 1.5 m; ice approx. 67 cm - sampled at approx. 0.75 m with Van Dorn; waypoint 447
12:00		1.0	0.75	7.40	447		0.51	-41.1		
		1.3	1.75	7.48	461		0.25	-63.5		
4-Oct-08	1.20	0.5	7.60	8.24	568	97.4	11.63	117.7	0.28	- entire lake very shallow (< 1.5 m) - most of shoreline (to ~5-10 m out) has rooted veg floating at surface
		1.0	7.66	7.88	570	66.0	8.05	118.3	0.28	
14-Mar-09	1.40	0.7	1.07	7.62	638	18.3	2.54	-165.8	0.31	- sample depth = 0.75 m (with van Dorn) - amphipods came up with auger - smelly lake - Ice thickness = 0.67 m
12:45		1.0	1.97	7.61	634	12.6	1.75	-175.8	0.31	
		1.25	2.47	7.60	610	9.2	1.23	-176.9	0.29	
26-Jun-09	1.20	0.25	16.83	8.85	206	120.4	11.64	78.3	0.10	Sampled by hand
17:30		0.50	16.86	8.85	206	118.3	11.45	78.4	0.10	
		0.75	16.84	8.85	206	117.3	11.36	78.0	0.10	
		1.00	16.86	8.85	206	116.6	11.29	78.6	0.10	
23-Sep-09	1.00	0.25	10.03	8.15	257	102.1	11.50	133.7	0.12	
		0.50	10.02	8.15	257	100.8	11.36	133.1	0.12	
		0.75	10.03	8.16	257	100.2	11.30	132.6	0.12	
		1.00	10.04	8.16	257	99.9	11.25	132.6	0.12	

**Table E20 Pistol Lake (UN-05) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
23-Mar-08		0.5	ICE	ICE	ICE		ICE	ICE		- Bottom at 1.25 m; ice approx. 65 cm - sampled at 0.5 m b/c could not use Van Dorn; waypoint 448 - Amphipods present, Chaoborus observed
13:00		1.0	0.16	7.47	549		1.01	-73.7		
3-Oct-08	0.65	0.25	7.79	8.47	533	102.5	12.18	77.6	0.26	- On heli fly-over entire lake appeared very shallow; did pass of lake on boat & all is very shallow (< 2m)
		0.5	7.78	8.47	533	102.5	12.19	77.6	0.26	
15-Mar-09	1.00	0.7	0.55	7.42	710	7.3	1.05	-172.2	0.34	- sample depth = 0.7 m (by hand)
12:15		0.9	1.08	7.33	648	4.6	0.64	-169.1	0.31	- Ice thickness = 0.64 m
26-Jun-09	1.00	0.25	17.05	8.92	180	121.5	11.71	119.5	0.09	Sampled by hand
16:00		0.50	17.06	8.93	180	119.9	11.55	119.4	0.09	
		0.75	17.06	8.93	180	118.0	11.38	118.3	0.09	
18-Sep-09	1.00	0.25	11.38	8.28	235	94.9	10.36	142.1	0.11	- moved sampling station ~ 77 m from original UN-05 to deepest basin
		0.50	11.39	8.29	235	93.8	10.25	141.9	0.11	
		0.75	11.39	8.28	235	93.1	10.17	141.9	0.11	

**Table E21 Porkchop Lake (UN-07) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
22-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- Bottom at 4.25 m; ice approx. 71 cm - sampled gen. chem at 2.5 m - Waypoint 443
11:30		1.0	-0.02	7.68	197		9.34	181.8		
		1.5	0.57	7.67	199		9.00	183.4		
		2.0	1.29	7.64	202		8.41	184.7		
		2.5	1.56	7.61	203		8.66	185.2		
		3.0	1.80	7.59	204		8.17	185.3		
		3.5	1.98	7.58	205		8.12	185.0		
		4.0	2.05	7.56	205		8.09	185.4		
3-Oct-08	8.80	0.5	6.68	8.19	470	92.3	11.27	66.6	0.23	- Approx. 130 m SW of original UN-07 - Secchi depth = 2.2 m - Fish in lake - jumping
		1.0	6.68	8.19	470	92.2	11.27	69.2	0.23	
		1.5	6.66	8.19	470	92.2	11.28	71.6	0.23	
		2.0	6.64	8.19	469	92.1	11.26	72.8	0.23	
		2.5	6.65	8.19	470	92.1	11.27	74.5	0.23	
		3.0	6.65	8.19	470	92.2	11.27	75.5	0.23	
		3.5	6.61	8.19	469	91.9	11.26	77.3	0.23	
		4.0	6.57	8.18	469	91.8	11.25	78.7	0.23	
		4.5	6.57	8.18	470	91.8	11.25	79.7	0.23	
		5.0	6.55	8.19	469	91.8	11.25	81.3	0.23	
		5.5	6.56	8.19	469	91.8	11.25	82.5	0.23	
		6.0	6.55	8.19	469	91.9	11.26	83.6	0.23	
		6.5	6.55	8.19	469	91.8	11.26	84.2	0.23	
		7.0	6.55	8.19	469	91.8	11.26	85.4	0.23	
		7.5	6.54	8.19	469	91.7	11.25	86.2	0.23	
		8.0	6.54	8.19	469	91.7	11.25	87.1	0.23	
		8.5	6.54	8.19	469	91.8	11.25	88.2	0.23	
3-Oct-08	4.20	0.5	6.68	8.16	469	93.1	11.38	-	0.23	- Original location at Porkchop Lake - Profile only, no sampling
		1.0	6.67	8.17	469	92.7	11.33	-	0.23	
		1.5	6.67	8.17	469	92.6	11.31	-	0.23	
		2.0	6.67	8.18	469	92.6	11.32	-	0.23	
		2.5	6.66	8.18	469	92.6	11.32	-	0.23	
		3.0	6.66	8.18	469	92.6	11.32	-	0.23	
		3.5	6.65	8.18	469	92.5	11.31	-	0.23	
		4.0	6.65	8.18	469	91.7	11.20	-	0.23	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
15-Mar-09	9.40	0.7	0.65	7.63	247	74.8	10.71	74.0	0.12	- sample depth = 4.5 m - Ice thickness = 0.67 m
16:00		1.0	1.21	7.63	238	73.9	10.42	74.5	0.11	
		1.5	1.84	7.62	234	73.5	10.19	75.6	0.11	
		2.0	2.37	7.61	239	73.0	9.97	76.3	0.11	
		2.5	2.63	7.59	231	71.5	9.70	77.4	0.11	
		3.0	2.77	7.59	230	70.7	9.57	79.1	0.11	
		3.5	2.82	7.57	230	70.2	9.49	80.1	0.11	
		4.0	2.84	7.56	230	68.8	9.29	81.4	0.11	
		4.5	2.86	7.54	230	65.6	8.85	83.1	0.11	
		5.0	2.86	7.52	230	64.1	8.65	84.4	0.11	
		5.5	2.86	7.51	231	63.4	8.57	86.2	0.11	
		6.0	2.87	7.49	231	62.9	8.50	87.4	0.11	
		6.5	2.89	7.49	230	62.2	8.39	88.2	0.11	
		7.0	2.89	7.48	231	61.3	8.27	89.0	0.11	
		7.5	2.90	7.47	231	59.9	8.08	89.8	0.11	
		8.0	2.91	7.46	231	58.2	7.84	90.8	0.11	
		8.5	2.92	7.45	231	57.4	7.73	91.3	0.11	
		9.0	2.94	7.44	231	56.3	7.57	91.8	0.11	
26-Jun-09	9.30	0.5	15.75	8.30	201	103.5	10.26	95.4	0.10	possibly moving due to strong wind from the east sampled general chemistry, radios, phyto and zoo
19:00		1.0	15.74	8.30	201	103.2	10.24	96.4	0.10	
		1.5	15.73	8.30	201	103.2	10.24	97.3	0.10	
		2.0	15.73	8.30	201	103.1	10.23	98.3	0.10	
		2.5	15.72	8.30	201	103.0	10.22	100.3	0.10	
		3.0	15.62	8.30	201	102.8	10.22	101.3	0.10	
		3.5	13.89	8.24	201	94.9	9.81	105.3	0.10	
		4.0	12.93	8.20	203	89.3	9.44	107.5	0.10	
		4.5	11.37	8.08	204	81.9	8.99	113.2	0.10	
		5.0	7.92	7.88	207	71.9	8.52	121.8	0.10	
		5.5	6.27	7.78	207	68.3	8.43	126.1	0.10	
		6.0	6.03	7.75	208	67.4	8.38	127.3	0.10	
		6.5	5.63	7.73	209	65.1	8.16	128.5	0.10	
		7.0	5.47	7.69	209	64.0	8.06	130.2	0.10	
		7.5	5.33	7.68	210	63.1	7.97	131.1	0.10	
		8.0	5.23	7.66	211	62.0	7.84	132.0	0.10	
		8.5	5.08	7.62	213	59.9	7.60	133.2	0.10	
		9.0	5.03	7.61	213	58.0	7.39	133.9	0.10	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
24-Sep-09	15.50	0.5	11.07	7.70	226	75.9	8.35	204.6	0.11	
		1.0	11.06	7.86	225	75.3	8.29	202.3	0.11	
		1.5	11.05	7.94	225	74.9	8.25	200.6	0.11	
		2.0	11.05	7.99	225	74.8	8.24	199.7	0.11	
		2.5	11.05	8.02	225	74.8	8.23	198.9	0.11	
		3.0	11.05	8.05	225	74.7	8.23	197.2	0.11	
		3.5	11.05	8.06	225	74.8	8.23	196.9	0.11	
		4.0	11.05	8.06	225	74.8	8.23	197.2	0.11	
		4.5	11.05	8.08	225	74.9	8.24	196.2	0.11	
		5.0	11.05	8.08	225	75.0	8.26	195.6	0.11	
		5.5	11.05	8.08	225	74.8	8.25	195.9	0.11	
		6.0	10.80	7.97	226	69.8	7.77	198.0	0.11	
		6.5	10.36	7.83	228	61.0	6.82	101.0	0.11	
		7.0	9.55	7.51	231	36.9	4.24	209.2	0.11	
		7.5	7.44	7.32	239	17.6	2.13	218.6	0.11	
		8.0	6.06	7.04	241	7.9	0.98	226.8	0.11	
		8.5	5.50	6.99	243	7.1	0.90	225.3	0.12	
		9.0	5.03	6.94	245	6.6	0.84	192.1	0.12	
		9.5	4.85	6.89	247	6.1	0.78	71.9	0.12	
		10.0	4.95	7.05	246	7.6	0.97	58.0	0.12	
		10.5	4.72	6.98	249	6.0	0.77	11.0	0.12	
		11.0	4.48	6.94	252	5.6	0.72	4.9	0.12	
		11.5	4.37	6.92	255	5.2	0.67	-33.5	0.12	
		12.0	4.28	6.91	258	4.9	0.63	-57.5	0.12	
		12.5	4.21	6.90	260	4.6	0.60	-74.5	0.12	
		13.0	4.12	6.89	265	4.4	0.57	-95.5	0.13	
		13.5	4.07	6.90	268	4.2	0.55	-109.3	0.13	
		14.0	4.04	6.90	270	4.0	0.53	-119.6	0.13	
		14.5	4.02	6.91	271	3.9	0.51	-126.6	0.13	
		15.0	4.01	6.92	272	3.8	0.49	-130.1	0.13	
		15.5	4.00	6.89	276	3.7	0.48	-132.8	0.13	

**Table E22 Kinnikinnick Lake (UN-08) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
20-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- Bottom at 8.9 m - sampled at 5 m - ice depth to just < 1.0 m - Waypoint 437
16:15		1.0	0.25	7.46	163		9.77	108.6		
		1.5	0.77	7.48	164		9.38	113.8		
		2.0	1.36	7.41	166		9.08	117.3		
		2.5	1.78	7.43	167		8.92	117.8		
		3.0	2.15	7.41	168		8.65	120.7		
		3.5	2.42	7.39	169		8.45	122.0		
		4.0	2.53	7.42	171		8.14	121.3		
		4.5	2.65	7.45	171		7.95	119.8		
		5.0	2.66	7.44	171		7.62	121.9		
		5.5	2.71	7.41	171		8.04	123.6		
		6.0	2.76	7.39	172		8.01	124.8		
		6.5	2.80	7.40	171		7.63	125.3		
		7.0	2.82	7.37	171		6.90	126.2		
		7.5	2.85	7.35	172		6.95	126.8		
		8.0	2.89	7.35	172		6.36	127.7		
		8.5	2.90	7.39	172		6.68	124.5		
4-Oct-08	>15.5	0.5	7.12	8.03	328	94.9	11.48	63.3	0.16	- sampled at original location - loons calling! - UN-08 called Kinnikinnick Lake - YSI shut off at 14 m, halfway through measurement - Secchi depth = 3.33 m
		1.0	7.12	8.03	328	94.9	11.48	65.4	0.16	
		1.5	7.11	8.03	328	94.9	11.47	66.9	0.16	
		2.0	7.10	8.02	328	94.9	11.48	67.8	0.16	
		2.5	7.09	8.02	328	94.8	11.46	69.9	0.16	
		3.0	7.09	8.02	328	94.9	11.48	72.0	0.16	
		3.5	7.09	8.02	328	94.9	11.48	73.5	0.16	
		4.0	7.09	8.02	328	94.9	11.48	75.5	0.16	
		4.5	7.09	8.02	328	94.8	11.48	77.6	0.16	
		5.0	7.08	8.02	328	94.9	11.48	79.0	0.16	
		5.5	7.08	8.02	328	94.8	11.49	80.3	0.16	
		6.0	7.08	8.02	328	94.9	11.48	81.7	0.16	
		6.5	7.08	8.02	328	94.8	11.47	82.9	0.16	
		7.0	7.08	8.02	328	94.8	11.48	84.4	0.16	
		7.5	7.08	8.02	328	94.9	11.49	85.8	0.16	
		8.0	7.08	8.02	328	94.9	11.48	86.6	0.16	
		8.5	7.08	8.02	328	94.9	11.49	88.0	0.16	
		9.0	7.08	8.02	328	94.9	11.49	89.1	0.16	
		9.5	7.08	8.02	328	94.9	11.49	89.9	0.16	
		10.0	7.08	8.02	328	94.9	11.49	91.0	0.16	
		10.5	7.08	8.02	328	94.9	11.49	92.3	0.16	
		11.0	7.08	8.02	328	94.9	11.49	94.3	0.16	
		11.5	7.08	8.02	328	95.0	11.50	95.1	0.16	
		12.0	7.08	8.02	328	95.1	11.51	96.5	0.16	
		12.5	7.08	8.02	328	95.1	11.52	97.8	0.16	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
		13.0	7.08	8.02	328	95.1	11.51	98.9	0.16	
		13.5	7.08	8.02	328	95.1	11.51	99.3	0.16	
		14.0	7.07	8.02	329	95.5	11.56	101.8	0.16	
		14.5	7.07	8.02	329	95.1	11.51	102.4	0.16	
		15.0	7.07	8.02	329	95.1	11.51	103.8	0.16	
		15.5	7.08	8.02	329	95.2	11.52	104.8	0.16	
15-Mar-09	17.50	1.0	0.40	6.81	172	79.2	11.42	152.9	0.08	- sample depth = 8.5 m
11:00		1.5	0.82	6.92	168	78.7	11.23	150.3	0.08	- used secchi disc to determine total depth
		2.0	1.17	7.02	166	78.6	11.11	148.5	0.08	- sampled ~30 m from UN-08 wypt
		2.5	1.36	7.10	165	78.5	11.04	147.6	0.08	- Ice thickness = 0.90 m
		3.0	1.51	7.15	165	78.5	11.00	146.9	0.08	
		3.5	1.64	7.21	164	78.5	10.95	146.3	0.08	
		4.0	1.71	7.24	164	78.2	10.89	146.3	0.08	
		4.5	1.80	7.28	163	76.5	10.63	146.1	0.08	
		5.0	1.82	7.30	163	76.4	10.61	146.3	0.08	
		5.5	1.86	7.31	162	76.1	10.55	146.2	0.08	
		6.0	1.94	7.32	162	73.9	10.23	146.8	0.08	
		6.5	1.97	7.33	162	72.2	9.96	147.2	0.08	
		7.0	2.01	7.34	162	69.6	9.59	147.9	0.08	
		7.5	2.05	7.33	162	67.3	9.28	148.1	0.08	
		8.0	2.08	7.33	162	65.3	8.99	148.7	0.08	
		8.5	2.09	7.33	162	64.3	8.87	148.7	0.08	
		9.0	2.11	7.33	162	64.2	8.85	148.9	0.08	
		9.5	2.12	7.33	163	63.7	8.77	149.0	0.08	
		10.0	2.13	7.33	163	62.7	8.64	149.0	0.08	
		10.5	2.14	7.33	163	62.6	8.63	149.1	0.08	
		11.0	2.15	7.33	163	62.3	8.58	149.2	0.08	
		11.5	2.15	7.33	163	62.1	8.55	149.2	0.08	
		12.0	2.16	7.33	163	61.6	8.47	149.3	0.08	
		12.5	2.18	7.33	163	60.0	8.24	149.6	0.08	
		13.0	2.19	7.32	163	57.9	7.95	150.0	0.08	
		13.5	2.20	7.32	163	55.9	7.67	150.3	0.08	
		14.0	2.20	7.32	163	53.7	7.36	150.5	0.08	
		14.5	2.22	7.31	163	53.1	7.29	150.5	0.08	
		15.0	2.24	7.31	164	53.7	7.38	150.7	0.08	
		15.5	2.26	7.30	164	53.5	7.35	150.8	0.08	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
26-Jun-09 13:30	>15m	0.5	13.60	8.16	145	101.6	10.56	123.4	0.07	YSI depth meter frozen at 10.5 m; had to measure by hand Last measurement was more likely 15m instead of 13m - ran out of cord at "12.5 m" after measuring by hand Sampled general chemistry, radios, phyto, Zoo (vertical tow @ 3 m x 2)
		1.0	13.60	8.18	145	101.1	10.50	124.1	0.07	
		1.5	13.58	8.17	145	100.6	10.46	124.9	0.07	
		2.0	13.54	8.17	145	100.3	10.44	125.1	0.07	
		2.5	13.50	8.16	145	99.9	10.40	126.0	0.07	
		3.0	13.44	8.16	145	99.70	10.40	127.3	0.07	
		3.5	13.41	8.16	145	99.50	10.39	127.9	0.07	
		4.0	13.35	8.16	145	99.50	10.40	128.0	0.07	
		4.5	13.30	8.15	145	99.30	10.38	128.1	0.07	
		5.0	13.11	8.15	145	98.50	10.36	128.9	0.07	
		5.5	12.91	8.14	145	97.40	10.29	129.2	0.07	
		6.0	11.74	8.09	145	92.00	10.00	132.8	0.07	
		6.5	11.61	8.03	146	92.00	10.03	134.9	0.07	
		7.0	10.98	8.00	146	90.00	9.93	136.8	0.07	
		7.5	10.61	7.97	146	88.40	9.84	138.0	0.07	
		8.0	10.30	7.94	147	87.10	9.74	139.6	0.07	
		8.5	9.13	7.86	148	81.40	9.36	143.2	0.07	
		9.0	8.53	7.75	148	79.50	9.30	147.0	0.07	
		9.5	8.39	7.72	149	79.00	9.33	147.9	0.07	
		10.0	8.12	7.70	150	76.40	8.93	149.3	0.07	
10.5	8.51	7.74	150	74.10	8.62	147.8	0.07			
11.0	8.43	7.74	150	69.80	8.12	148.1	0.07			
11.5	8.36	7.73	151	65.70	7.68	148.3	0.07			
12.0	8.36	7.72	151	63.20	7.41	149.0	0.07			
12.5	8.27	7.70	151	61.90	7.28	149.3	0.07			
		13.0						0.07		
		13.5						0.07		
		14.0						0.07		
		14.5						0.07		
		15.0	8.27	7.71	151	7.15	7.15	149.9	0.07	
16-Sep-09	22.00	0.5	13.56	8.10	163	91.3	9.49	117.3	0.08	-YSI turned itself off at 12.5m- some numbers may have changed -took field blank (un-16) here: general chemistry, nutrients, t-met + d-met (DOC will use filtration blank from comp).'
		1.00	13.57	8.10	163	91.0	9.46	117.0	0.08	
		1.5	13.55	8.10	163	90.7	9.44	117.4	0.08	
		2.00	13.55	8.11	163	90.5	9.42	118.3	0.08	
		2.5	13.53	8.11	163	90.3	9.40	118.4	0.08	
		3.00	13.47	8.10	163	89.7	9.34	119.4	0.08	
		3.5	13.46	8.10	163	89.5	9.33	120.2	0.08	
		4.00	13.47	8.10	163	89.5	9.33	121.0	0.08	
		4.5	13.44	8.10	163	89.1	9.30	122.0	0.08	
		5.00	13.44	8.10	163	89.1	9.29	122.5	0.08	
		5.5	13.37	8.09	163	88.4	9.23	124.4	0.08	
		6.00	13.35	8.09	163	88.2	9.22	124.5	0.08	
		6.5	13.37	8.09	163	88.3	9.22	125.5	0.08	
		7.00	13.38	8.09	163	88.2	9.21	126.6	0.08	
		7.5	13.34	8.08	163	87.9	9.19	128.1	0.08	
8.00	13.34	8.08	163	87.9	9.18	128.0	0.08			
8.5	13.32	8.08	163	87.6	9.16	128.4	0.08			
9.00	13.28	8.06	163	87.0	9.11	129.8	0.08			

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
		9.5	13.09	8.01	163	84.5	8.89	131.6	0.08	
		10.00	12.91	7.94	164	81.4	8.59	133.8	0.08	
		10.5	12.85	7.90	164	80.5	8.51	134.5	0.08	
		11.00	12.85	7.89	164	80.4	8.50	135.0	0.08	
		11.5	12.84	7.87	164	80.3	8.48	135.6	0.08	
		12.00	12.84	7.87	164	80.2	8.48	136.3	0.08	
		12.5	12.13	7.74	164	73.1	7.86	140.8	0.08	
		13.00	10.61	7.50	167	53.7	5.96	149.4	0.08	
		13.5	6.74	7.37	173	30.5	3.63	157.0	0.08	
		14.0	5.72	7.29	173	21.8	2.74	159.2	0.08	
		14.50	5.44	7.23	173	18.2	2.29	160.6	0.08	
		15.0	5.37	7.19	173	16.5	2.08	161.7	0.08	
		15.5	5.27	7.14	174	15.1	1.91	163.3	0.08	

**Table E23 Dinosaur Lake (UN-09) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
20-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- Bottom at 2.25 m; waypoint 433 - sampled at 1.25 m - Note: cap of preservative bottle H2SO4 fell into TKN bottle
10:45		1.0	0.50	6.92	255		1.67	85.9		
		1.5	1.44	6.98	259		1.41	63.5		
		2.0	2.15	6.99	267		1.04	37.5		
3-Oct-08	3.70	0.5	6.17	8.39	344	101.2	12.54	49.5	0.16	- UN-01 lake, new deeper station
		1.0	6.17	8.39	344	100.9	12.49	52.8	0.16	
		1.5	6.17	8.38	344	100.8	12.48	55.4	0.16	
		2.0	6.17	8.37	344	100.5	12.46	57.9	0.16	
		2.5	6.16	8.37	344	100.6	12.46	59.4	0.16	
		3.0	6.16	8.36	344	100.6	12.46	61.4	0.16	
		3.5	6.17	8.17	344	77.9	9.64	-108.4	0.16	
19-Sep-09	3.3	0.5	12.1	8.12	160	102.0	10.98	116.9	0.08	
		1	11.98	8.12	161	99.7	10.76	119.4	0.08	
		1.5	11.95	8.11	161	98.9	10.66	120.3	0.08	
		2	11.92	8.1	161	97.8	10.54	123.2	0.08	
		2.5	11.91	8.1	161	97.1	10.48	124.9	0.08	
		3	11.9	8.1	161	96.8	10.45	126.1	0.08	
14-Mar-09	3.00	0.7	0.54	7.30	302	8.3	1.17	-109.2	0.14	- sample depth = 1.5 m - problems with depth sensor on YSI (again); estimated depths - slight smell to lake water - Ice thickness = 0.66 m
15:40		1.0	1.43	7.29	298	4.2	0.58	-113.4	0.14	
		1.5	3.29	7.23	297	2.6	0.34	-118.2	0.14	
		2.0	4.01	7.14	312	2.3	0.29	-117.5	0.15	
		2.5	4.29	7.04	323	1.9	0.25	-112.4	0.15	
		2.9	4.56	6.74	348	1.9	0.25	-105.9	0.17	
27-Jun-09	3.00	0.5	16.87	8.48	137	114.5	11.08	78.0	0.06	
13:15		1.0	16.70	8.48	137	111.6	10.84	79.5	0.06	
		1.5	16.68	8.49	137	110.6	10.75	79.5	0.06	
		2.0	16.67	8.48	137	110.1	10.71	80.6	0.06	
		2.5	16.66	8.50	137	109.4	10.64	81.6	0.06	

**Table E24 Murky Lake (UN-10) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
20-Mar-08		0.5	0.00	ICE	ICE		ICE	ICE		- Bottom at 1.6 m; waypoint 435
12:30		1.0	1.44	7.14	364		0.89	85.0		- Appears to have a soft bottom; chaoborus or simuliidae larvae & algae/debris came to surface after hit with YSI meter
		1.5	2.37	6.98	391		0.68	66.0		
3-Oct-08	1.20	0.5	6.63	8.46	483	101.0	12.35	2.2	0.23	- very shallow lake; YSI & samples taken at new station UN-10
		1.0	6.64	8.41	483	73.4	8.78	-4.3	0.23	
16-Mar-09	1.20	0.6	0.86	7.31	436	2.8	0.40	-146.3	0.21	- sample depth = 0.6 m (by hand)
		1.0	1.89	7.20	441	2.4	0.33	-135.1	0.21	- very smelly lake - green algae came up with auger & in hole - possible on under surface of ice - Ice thickness = 0.58 m
27-Jun-09	1.30	0.25	15.96	8.77	184	112.4	11.10	60.1	0.09	Sampled by hand
12:00		0.50	15.96	8.78	184	110.9	10.95	60.1	0.09	
		0.75	15.98	8.78	184	110.0	10.86	60.5	0.09	
		1.00	15.98	8.78	184	110.5	10.89	22.7	0.09	
17-Sep-09	1.8	0.25	12.08	8.39	227	100.4	10.78	130.6	0.11	
		0.5	12.08	8.39	227	98.6	10.60	130.9	0.11	
		0.75	12.08	8.39	227	97.4	10.46	130.6	0.11	
		1	12.08	8.39	227	96.1	10.32	131.1	0.11	
		1.25	12.06	8.39	227	95.6	10.28	131	0.11	
		1.5	12.06	8.39	227	95.0	10.22	130.7	0.11	
		1.75	12.06	8.39	227	94.5	10.16	131.4	0.11	

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
27-Jun-09	8.90	0.5	15.58	8.54	141	108.2	10.76	94.7	0.07	lost chl a sample, bottle broke between UN-03 & UN-01 transit
10:30		1.0	15.57	8.55	141	106.5	10.60	94.1	0.07	
		1.5	15.54	8.55	141	105.6	10.52	94.0	0.07	
		2.0	15.54	8.56	141	105.0	10.46	94.6	0.07	
		2.5	15.54	8.56	141	104.6	10.42	94.6	0.07	
		3.0	15.54	8.57	141	104.3	10.39	94.2	0.07	
		3.5	15.52	8.55	141	104.0	10.37	95.5	0.07	
		4.0	15.51	8.56	141	103.8	10.35	95.1	0.07	
		4.5	15.51	8.57	141	103.5	10.32	95.3	0.07	
		5.0	15.51	8.56	141	103.3	10.30	95.9	0.07	
		5.5	15.47	8.54	141	102.8	10.26	96.8	0.07	
		6.0	12.86	8.17	144	79.0	8.34	110.8	0.07	
		6.5	9.95	7.82	152	55.7	6.29	124.3	0.07	
		7.0	7.65	7.57	152	42.9	5.14	131.5	0.07	
		7.5	5.98	7.14	206	19.4	2.35	-67.3	0.10	
		8.0	5.64	7.01	289	11.3	1.40	-121.1	0.14	
		8.5	5.43	6.98	356	9.3	1.17	-142.1	0.17	
22-Sep-09	9.1	0.5	10.68	7.94	162	93.9	10.41	152.9	0.08	
		1	10.68	7.96	162	91.2	10.13	152.8	0.08	
		1.5	10.67	7.96	162	90.8	10.08	152.5	0.08	
		2	10.64	7.95	162	89.9	10.00	152.9	0.08	
		2.5	10.62	7.96	162	88.2	9.80	153.1	0.08	
		3	10.6	7.93	162	88.5	9.84	154.3	0.08	
		3.5	10.59	7.9	163	87.5	9.73	156.4	0.08	
		4	10.57	7.91	162	86.5	9.63	155.8	0.08	
		4.5	10.54	7.94	162	86.7	9.66	154.5	0.08	
		5	10.51	7.94	162	86.3	9.62	154.5	0.08	
		5.5	10.5	7.94	162	86.2	9.61	154.9	0.08	
		6	10.5	7.94	162	86.0	9.59	155.4	0.08	
		6.5	10.5	7.93	162	85.5	9.54	156.1	0.08	
		7	10.4	7.88	163	84.0	9.38	157.9	0.08	
		7.5	10.35	7.83	163	82.8	9.27	159.2	0.08	
		8	10.36	7.82	163	81.6	9.13	159.3	0.08	
		8.5	10.33	7.8	163	81.5	9.12	160.3	0.08	
		9	10.4	6.36	275	26.1	2.86	-58.4	0.08	

**Table E26 Buck Lake (UN-12) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
10-Sep-09	1.7	0.25	12.06	8.13	185	98.2	10.51	137.9	0.09	-secchi depth=1.2 m
		0.5	12.07	8.15	185	93.8	10.06	137.7	0.09	-completed water quality following lake bathymetry
		0.75	12.06	8.15	185	91.2	9.82	137.5	0.09	
		1	12.05	8.16	185	90.1	9.69	137.8	0.09	
		1.25	12.05	8.16	185	89.0	9.58	137.9	0.09	
		1.5	12.05	8.17	185	89.1	9.60	137.4	0.09	

**Table E27 Drizzle Lake (UN-13) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
19-Sep-09	1.9	0.25	11.56	7.99	226	98.8	10.75	149	0.11	
		0.5	11.56	7.98	226	94.7	10.28	149	0.11	
		0.75	11.56	7.98	226	93.1	10.12	149.3	0.11	
		1	11.56	7.97	226	92.2	10.03	149.5	0.11	
		1.25	11.56	7.96	226	91.3	9.93	149.7	0.11	
		1.5	11.56	7.97	226	90.8	9.87	150	0.11	
		1.75	11.58	7.94	226	90.5	9.82	149.6	0.11	

**Table E28 Redemption Lake (UN-14) Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
28-Sep-09	13	0.5	9.97	7.79	153	80.3	9.06	132.6	0.07	
		1	9.97	7.78	153	79.4	8.97	132.9	0.07	did replicate UN-16 here: general chemistry and radionuclides (WQ)
		1.5	9.97	7.77	153	79.2	8.94	133.8	0.07	
		2	9.96	7.76	153	78.7	8.89	134.8	0.07	
		2.5	9.97	7.75	153	78.7	8.89	135.9	0.07	
		3	9.96	7.75	153	78.9	8.86	136.4	0.07	
		3.5	9.97	7.74	153	78.4	8.86	137.5	0.07	
		4	9.96	7.75	153	78.4	8.86	137.6	0.07	
		4.5	9.97	7.73	153	78.4	8.85	138.7	0.07	
		5	9.97	7.75	153	78.4	8.86	138.5	0.07	
		5.5	9.96	7.75	153	78.4	8.85	139.1	0.07	
		6	9.96	7.74	153	78.4	8.86	139.9	0.07	
		6.5	9.94	7.74	153	78.1	8.83	140.7	0.07	
		7	9.92	7.73	153	77.6	8.77	141.4	0.07	
		7.5	9.88	7.73	153	77.3	8.75	142.2	0.07	
		8	9.81	7.73	153	77.2	8.76	143.8	0.07	
		8.5	9.74	7.69	153	75.0	8.51	145.8	0.07	
		9	9.68	7.65	154	72.1	8.21	147.9	0.07	
		9.5	9.34	7.57	155	63.0	7.18	151.1	0.07	
		10	6.43	7.23	165	12.6	1.53	-87.6	0.08	
		10.5	6.06	7.17	165	10.0	1.24	-96.3	0.08	
		11	5.79	7.12	168	8.5	1.06	-104.8	0.08	
		11.5	5.72	7.09	168	7.8	0.97	-109.6	0.08	
		12	5.65	7.08	169	7.4	0.92	-113.3	0.08	
		12.5	5.62	7.06	171	7.1	0.89	-116.5	0.08	
		13	5.57	7.05	174	6.9	0.86	-120.3	0.08	

**Table E29 U-Lake Surface Water *In situ* Water Quality
Avalon Rare Metals Ltd. Thor Lake Property
Thor Lake, NT
Project # 123510050**

Date	Total Depth (approx. m)	Depth (m)	Temperature (°C)	pH	Conductivity (µS/cm)	D.O. (%)	D.O. (mg/L)	ORP (mV)	Salinity (ppt)	Comments
15-Mar-09	6.90	0.7	0.63	7.66	467	11.3	1.62	105.9	0.22	- did not sample - did profile for potential Fisheries reference Lake - Ice thickness = 0.70 m
15:30		1.0	1.32	7.66	461	10.6	1.49	104.9	0.22	
		1.5	2.34	7.65	457	6.4	1.33	103.8	0.22	
		2.0	2.88	7.63	454	5.1	1.10	103.7	0.22	
		2.5	3.10	7.61	459	1.8	0.24	-5.9	0.22	
		3.0	3.19	7.59	464	1.7	0.22	-54.5	0.22	
		3.5	3.27	7.60	467	1.5	0.20	-62.9	0.22	
		4.0	3.30	7.60	470	1.3	0.18	-94.8	0.23	
		4.5	3.37	7.60	473	1.3	0.17	-114.9	0.23	
		5.0	3.29	7.60	477	1.3	0.17	-129.7	0.23	
		5.5	3.37	7.60	480	1.2	0.16	-143.9	0.23	
		6.0	3.41	7.61	490	1.1	0.15	-153.8	0.24	
		6.5	3.66	7.66	501	1.2	0.15	-197.5	0.24	



APPENDIX F

Water Chemistry Data

Table F1-1

Field and Travel Blank Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008		March 2009	June 2009	September 2009	
					22-Mar-08	Field Blank 7-Oct-08	Travel Blank -	15-Mar-09	28-Jun-09	Field Blank 16-Sep-09	Travel Blank -
Physicals											
Conductivity	µS/cm	0.5	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Hardness (as CaCO ₃)	mg/L	2	-	-	<0.50	<0.50	<0.50	<1.0	<1.0	<1.0	<1.0
pH	pH	0.01	-	-	5.39	5.58	5.59	5.63	5.76	5.56	5.51
Total Suspended Solids	mg/L	3.0	-	-	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	<10	<10	<10	<10	<10	<10	<10
Turbidity	NTU	0.1	-	-	<0.10	<0.10	<0.10	<0.10	0.35	0.14	<0.10
Anions											
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ammonia as N	mg/L	0.02	-	-	-	<0.020	0.050	<0.020	<0.020	<0.0050	<0.020
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	-	<0.05	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	0.5	-	600	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F)	mg/L	0.02	-	0.2 ^d	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Sulfate (SO ₄)	mg/L	0.5	-	100	<0.50	<0.50	<0.50	<0.50	<0.5	<0.50	<0.50
Nutrients											
Nitrate and Nitrite as N	mg/L	0.005	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	<0.0050	<0.0050	<0.0050	-	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.06 ^e	-	<0.0010	<0.0010	<0.0010	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Ortho Phosphate as P	mg/L	0.001	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.002	-	-	<0.0020	<0.0020	<0.0020	0.0215	<0.0020	<0.0020	<0.0020
Organics											
Total Organic Carbon (TOC)	mg/L	0.5	-	-	<0.50	-	-	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	36.8	<0.50	<0.50	<0.50	<0.50	-
Total Metals											
Aluminum (Al)	µg/L	** ^f	100 ^g	-	<1	<1	<1	<1	<1	<1	<1
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Barium (Ba)	µg/L	0.05	-	5000	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	<10	<10	<10	<10	<10	<10	<10
Cadmium (Cd)	µg/L	**	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.017	<0.017
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ⁱ	2 ^j	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Iron (Fe)	µg/L	30	300	1000	<30	<30	<30	<30	<30	<30	<30
Lead (Pb)	µg/L	0.05	1 - 7 ^k	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	<5	<5	<5	<5	<5	<5	<5
Manganese (Mn)	µg/L	0.05	-	544 ^l	<0.05	<0.05	<0.05	<0.05	<0.05	0.059	<0.05
Mercury (Hg)	µg/L	0.05	0.026	0.1	-	-	-	<0.05	<0.05	<0.01	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel (Ni)	µg/L	0.5	25 - 150 ^m	25 - 150	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ⁿ	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	30	-	<1	<1	<1	<1	<1	<1	<1

NOTES:

a. D.L. = laboratory detection limit

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008		March 2009	June 2009	September 2009	
					22-Mar-08	Field Blank	Travel Blank	15-Mar-09	28-Jun-09	Field Blank	Travel Blank
Calcium (Ca)	mg/L	0.05	-	-	<0.050	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
Magnesium (Mg)	mg/L	0.1	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium (K)	mg/L	2	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	<0.05	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
Sodium (Na)	mg/L	2	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dissolved Metals											
Aluminum (Al)	µg/L	1	-	100 ^o	-	<1	-	<1	<1	<1	-
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	-	<0.1	<0.1	<0.1	-
Arsenic (As)	µg/L	0.1	-	-	-	<0.1	-	<0.1	<0.1	<0.1	-
Barium (Ba)	µg/L	0.05	-	-	-	<0.05	-	0.229	<0.05	<0.05	-
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	-	<0.5	<0.5	<0.5	-
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	-	<0.5	<0.5	<0.5	-
Boron (B)	µg/L	10	-	-	-	<10	-	<10	<10	<10	-
Cadmium (Cd)	µg/L	**	-	-	-	<0.05	-	<0.05	<0.05	<0.017	-
Chromium (Cr)	µg/L	**	-	-	-	<0.5	-	<0.5	<0.5	<0.5	-
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	-	<0.1	<0.1	<0.1	-
Copper (Cu)	µg/L	0.1	-	-	-	<0.1	-	<0.1	<0.1	<0.1	-
Iron (Fe)	µg/L	30	-	350	-	<30	-	<30	<30	<30	-
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	-	<0.05	<0.05	<0.05	-
Lithium (Li)	µg/L	5	-	-	-	<5	-	<5	<5	<5	-
Manganese (Mn)	µg/L	0.05	-	-	-	<0.05	-	0.088	<0.05	<0.05	-
Mercury (Hg)	µg/L	**	-	-	-	-	-	<0.05	<0.05	<0.01	-
Molybdenum (Mo)	µg/L	0.05	-	-	-	<0.05	-	<0.05	<0.05	<0.05	-
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	-	<0.5	<0.5	<0.5	-
Phosphorus (P)	µg/L	300	-	-	-	<300	-	<300	<300	<300	-
Selenium (Se)	µg/L	1	-	-	-	<1	-	<1	<1	<1	-
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	-	<0.01	<0.01	<0.01	-
Strontium (Sr)	µg/L	0.1	-	-	-	<0.1	-	<0.1	<0.1	<0.1	-
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	-	<0.1	<0.1	<0.1	-
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	-	<0.1	<0.1	<0.1	-
Titanium (Ti)	µg/L	10	-	-	-	<10	-	<10	<10	<10	-
Uranium (U)	µg/L	0.01	-	-	-	<0.01	-	<0.01	<0.01	<0.01	-
Vanadium (V)	µg/L	1	-	-	-	<1	-	<1	<1	<1	-
Zinc (Zn)	µg/L	1	-	-	-	3.2	-	<1	<1	<1	-
Calcium (Ca)	mg/L	0.05	-	-	-	<0.05	-	<0.05	<0.050	<0.050	-
Magnesium (Mg)	mg/L	0.1	-	-	-	<0.1	-	<0.1	<0.1	<0.10	-
Potassium (K)	mg/L	2	-	-	-	<2.0	-	<2.0	<2.0	<2.0	-
Silicon (Si)	mg/L	0.05	-	-	-	<0.05	-	<0.05	<0.050	<0.050	-
Sodium (Na)	mg/L	2	-	-	-	<2.0	-	<2.0	<2.0	<2.0	-
Radionuclides											
GCDWQ MAC ^p											
Lead-210 (²¹⁰ Pb)	Bq/L ^q	0.02	0.1	-	<0.02	0.13	-	<0.02	<0.02	-	-
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	<0.005	<0.005	-	<0.005	<0.005	-	-
Radium-228 (²²⁸ Ra)	Bq/L	0.02	0.5	-	<0.02	<0.02	-	<0.02	<0.02	-	-
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	<0.01	0.01	-	<0.01	<0.01	-	-
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01	<0.01	-	<0.01	<0.01	-	-
Biota											
Chlorophyll a	µg/L	0.01	-	-	-	-	-	-	<0.01	<0.01	-
Pheopigments	µg/L	0.01	-	-	-	-	-	-	-	<0.01	-

- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.2 mg/L (maximum) where water hardness < 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.06 mg/L when chloride is < 2 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- j. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 0.4 mg/L
Copper Guideline = 2 µg/L
- k. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- l. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 0.4
Manganese Guideline = 0.544 mg/L
= 544 µg/L
- m. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- n. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is ≤ 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- o. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH ≥ 6.5
- p. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- q. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- r. **Bolded** result implies a guideline exceedance
- s. **Data outlier**; queries have been submitted to analytical laboratory, a response had not been received by the time of this report

Table F1-2

Replicate Water Chemistry & Relative Percent Differences (RPDs)
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008						October 2008			June 2009			September 2009					
					19-Mar-08			21-Mar-08			4-Oct-08			28-Jun-09			8-Sep-09			28-Sep-09		
					Long - 1	Replicate	RPD ^d	Ring	Replicate	RPD ^d	A	Replicate	RPD ^d	Great Slave	Replicate	RPD ^d	Cressy	Replicate	RPD ^d	Redemption	Replicate	RPD ^d
Physicals																						
Conductivity	µS/cm	0.5	-	-	294	297	1.02	569	545	4.31	303	305	0.66	171	170	0.01	249	248	0.40	171	171	0.00
Hardness (as CaCO ₃)	mg/L	2	-	-	157	156	0.64	301	309	2.62	171	170	0.59	74.3	74.4	0.00	139	139	0.00	89.2	87.7	1.70
pH		0.01	-	-	8.09	8.14	0.62	7.65	7.19	6.20	8.17	8.20	0.37	7.77	7.74	0.00	8.15	8.14	0.12	8.06	7.95	1.37
Total Suspended Solids	mg/L	3.0	-	-	<3.0	<3.0	-	40.5	63.1	43.63	<3.0	<3.0	-	<3.0	<3.0	-	<3.0	<3.0	-	<3.0	<3.0	-
Total Dissolved Solids	mg/L	10	-	-	174	173	0.58	386	347	10.64	188	188	0.00	99	95	0.04	158	158	0.00	106	112	5.50
Turbidity	NTU	0.1	-	-	0.46	0.49	-	25.3	52.9	70.59	0.91	0.96	5.35	0.48	0.49	-	1.14	1.16	-1.74	1.92	1.74	9.84
Anions																						
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	160	154	3.82	300	293	2.36	158	163	3.12	61.4	60.8	0.01	127	124	2.39	86.7	77.2	11.59
Ammonia as N	mg/L	0.02	-	-	-	-	-	-	-	-	0.022	<0.020	-	<0.020	<0.020	-	0.024	0.23	162.20	<0.02	<0.02	-
Bromide (Br)	mg/L	0.05	-	-	<0.05	<0.05	-	<0.05	<0.05	-	-	-	-	<0.050	<0.050	-	<0.050	<0.050	-	<0.05	<0.05	-
Chloride (Cl)	mg/L	0.5	-	600	3.75	3.75	0.00	1.91	2.01	-	4.71	4.73	0.42	5.34	5.31	0.01	0.64	0.66	-	1.41	1.41	-
Fluoride (F)	mg/L	0.02	-	0.2 ^e	1.2	1.2	0.00	1.57	1.48	5.90	1.04	1.04	0.00	0.049	0.049	-	0.960	0.965	-0.52	0.054	0.053	-
Sulfate (SO ₄)	mg/L	0.5	-	100	1.45	1.45	-	<0.50	<0.50	-	0.83	0.83	0.00	16.1	16.0	0.01	2.53	2.59	-2.34	6.69	6.66	0.45
Nutrients																						
Nitrate and Nitrite as N	mg/L	0.005	-	-	0.0693	0.0689	0.58	<0.0050	<0.0050	-	0.0097	0.0104	-	0.0752	0.0755	0.00	-	-	-	-	-	-
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	-	-	-	-	-	0.0087	0.0092	-	-	-	-	<0.0050	<0.0050	-	<0.005	<0.005	-
Nitrite (as N)	mg/L	0.001	0.06	0.06 ^f	-	-	-	-	-	-	0.001	0.0012	-	-	-	-	<0.0010	<0.0010	-	<0.001	<0.001	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	0.490	0.475	3.11	6.03	7.23	2.49	0.646	0.588	9.40	0.236	0.152	0.43	0.644	0.609	5.59	0.656	0.603	8.42
Ortho Phosphate as P	mg/L	0.001	-	-	<0.0010	<0.0010	-	<0.010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-	0.0021	0.0019	-
Total Phosphate as P	mg/L	0.002	-	-	0.0077	0.0069	-	0.022	0.011	-	0.0068	0.0069	-	0.0029	0.0028	0.04	0.0138	0.0105	27.16	0.0209	0.0206	1.45
Organics																						
Total Organic Carbon (TOC)	mg/L	0.5	-	-	13.1	13.3	1.52	7.69	65	157.68	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	-	-	-	-	-	16.2	15.9	1.87	3.87	3.80	0.02	17.7	Lost sample	-	14.3	14.4	0.70
Total Metals																						
Aluminum (Al)	µg/L	**g	100 ^h	-	<1	<1	-	6.9	15.9	78.95	6.8	7.3	7.09	10.1	<8	0.87	<6	<6	-	<9	<8	-
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	0.19	0.12	-	<0.1	<0.1	-	<0.1	<0.1	-
Arsenic (As)	µg/L	0.1	5.0	5.0	0.68	0.68	0.00	2.86	2.82	1.41	1.26	1.34	6.15	0.25	0.22	-	1.48	1.35	9.19	0.67	0.68	1.48
Barium (Ba)	µg/L	0.05	-	5000	54.1	55	1.65	165	164	0.61	48.7	49.6	1.83	33.3	32	0.04	22.7	21.3	6.36	12	12.3	2.47
Beryllium (Be)	µg/L	0.5	-	5.3 ⁱ	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Bismuth (Bi)	µg/L	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	-
Boron (B)	µg/L	10	-	1200	24	24	-	25	23	-	18	19	-	14	14	-	21	19	-	42	41	-
Cadmium (Cd)	µg/L	**	-	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.017	<0.017	-
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<1	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	-	0.19	0.19	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	0.1	<0.1	-
Copper (Cu)	µg/L	**	2 - 4 ^j	-	0.78	0.87	10.91	0.45	0.54	18.18	1.02	1.02	0.00	1.29	1.09	0.17	1.44	<0.8	-	0.40	0.45	-
Iron (Fe)	µg/L	30	300	1000	<30	<30	-	8910	10300	14.47	62	60	-	<30	<30	-	96	88	8.70	53	51	-
Lead (Pb)	µg/L	0.05	1 - 7 ^k	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-
Lithium (Li)	µg/L	5	-	870	<5	<5	-	6.2	6.1	-	5.1	5.2	-	<5	<5	-	8.2	7.5	8.92	<5	<5	-
Manganese (Mn)	µg/L	0.05	-	-	9.29	8.92	4.06	1270	1240	2.39	46.6	47.4	1.70	0.37	0.339	0.09	69.7	63.6	9.15	90.8	93.1	2.50
Mercury (Hg)	µg/L	0.05	0.026	0.1	-	-	-	-	-	-	-	-	-	<0.05	<0.05	-	<0.01	<0.01	-	<0.01	<0.01	-
Molybdenum (Mo)	µg/L	0.05	73	2000	4.35	4.33	0.46	1.23	1.24	0.81	1.73	1.82	5.07	0.635	0.62	0.02	2.05	1.95	5.00	0.14	0.131	-
Nickel (Ni)	µg/L	0.5	25 - 150 ^l	25 - 150	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	0.93	0.81	-	<0.5	<0.5	-	0.84	0.85	-
Phosphorus (P)	µg/L	300	-	-	<300	<300	-	<300	<300	-	<300	<300	-	<300	<300	-	<300	<300	-	<300	<300	-
Selenium (Se)	µg/L	1	1	2	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^m	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Strontium (Sr)	µg/L	0.1	-	-	57.7	56.8	1.57	96.2	95.6	0.63	53.3	54.3	1.86	87.1	84	0.04	49.1	45.3	8.05	37.6	38.6	2.62
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Tin (Sn)	µg/L	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	-
Titanium (Ti)	µg/L	10	-	2000	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	-
Uranium (U)	µg/L	0.01	-	300	0.95	0.92	3.21	0.105	0.115	9.09	0.529	0.537	1.50	0.366	0.345	0.06	2.1	2	4.88	0.041	0.039	-
Vanadium (V)	µg/L	1	-	6	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Zinc (Zn)	µg/L	1	30	-	<1	<1	-	3.4	2.9	-	<1	<1	-	<4	<3	-	1.3	1.4	-	1.2	<1	-
Calcium (Ca)	mg/L	0.05	-	-	32.5	32.5	0.00	67.7	70.3	3.77	37	36.3	1.91	20.4	20.3	0.00	29.8	26.9	10.23	17.6	17.7	0.57
Magnesium (Mg)	mg/L	0.1	-	-	18.3	18.1	1.10	31.9	32.4	1.56	19.4	19.4	0.00	4.84	4.75	0.02	16.2	15.6	3.77	10.1	10.1	0.00
Potassium (K)	mg/L	2	-	-	<2.0	<2.0	-	5.4	6	-	2.1	2.2	-	<2.0	<2.0	-	2.5	2.4	-	<2.0	<2.0	-
Silicon (Si)	mg/L	0.05	-	-	2.62	2.62	0.00	1.3	1.4	7.41	3.19	3.18	0.31	1.12	1.12	0.00	1.10	1.06	3.70	1.41	1.41	0.00
Sodium (Na)	mg/L	2	-	-	6.4	6.3	-	5	5.6	-	7.1	7.3	-	5.6	5.5	0.02	3.8	3.6	-	3.2	3.2	-

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008						October 2008			June 2009			September 2009						
					19-Mar-08			21-Mar-08			4-Oct-08			28-Jun-09			8-Sep-09			28-Sep-09			
					Long - 1	Replicate	RPD ^d	Ring	Replicate	RPD ^d	A	Replicate	RPD ^d	Great Slave	Replicate	RPD ^d	Cressy	Replicate	RPD ^d	Redemption	Replicate	RPD ^d	
Dissolved Metals																							
Aluminum (Al)	µg/L	1	-	100 ⁿ	-	-	-	-	-	-	-	2.4	1.2	-	1.1	<1	-	<1	1.3	-	1	<1	-
Antimony (Sb)	µg/L	0.1	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Arsenic (As)	µg/L	0.1	-	-	-	-	-	-	-	-	-	1.25	1.19	4.92	0.31	0.25	-	1.23	1.13	8.47	0.63	0.65	3.13
Barium (Ba)	µg/L	0.05	-	-	-	-	-	-	-	-	-	48.3	47.7	1.25	31.9	31.5	0.01	19.6	18.8	4.17	10.5	10.5	-
Beryllium (Be)	µg/L	0.5	-	-	-	-	-	-	-	-	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Bismuth (Bi)	µg/L	0.5	-	-	-	-	-	-	-	-	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Boron (B)	µg/L	10	-	-	-	-	-	-	-	-	-	18	18	0.00	11	11	0.00	18	17	-	34	35	-
Cadmium (Cd)	µg/L	**	-	-	-	-	-	-	-	-	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.017	<0.017	-
Chromium (Cr)	µg/L	**	-	-	-	-	-	-	-	-	-	<1	<1	-	<0.5	<0.5	-	<0.5	<0.5	-	<0.5	<0.5	-
Cobalt (Co)	µg/L	0.1	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Copper (Cu)	µg/L	0.1	-	-	-	-	-	-	-	-	-	0.74	0.86	15.00	0.93	0.87	0.07	0.37	0.35	-	0.31	0.28	-
Iron (Fe)	µg/L	30	-	350	-	-	-	-	-	-	-	<30	<30	-	<30	<30	-	<30	<30	-	<30	<30	-
Lead (Pb)	µg/L	0.05	-	-	-	-	-	-	-	-	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-	<0.05	<0.05	-
Lithium (Li)	µg/L	5	-	-	-	-	-	-	-	-	-	5	<5	-	<5	<5	-	7.4	7.2	-	<5	<5	-
Manganese (Mn)	µg/L	0.05	-	-	-	-	-	-	-	-	-	4.13	4.04	2.20	0.095	0.082	-	0.848	0.779	8.48	0.666	1.08	47.42
Mercury (Hg)	µg/L	**	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	-	<0.01	<0.01	-	<0.01	<0.01	-
Molybdenum (Mo)	µg/L	0.05	-	-	-	-	-	-	-	-	-	1.82	1.78	2.22	0.603	0.57	0.06	1.67	1.53	8.75	0.103	0.121	-
Nickel (Ni)	µg/L	0.5	-	-	-	-	-	-	-	-	-	<0.5	<0.5	-	1	0.69	-	<0.5	<0.5	-	0.72	0.65	-
Phosphorus (P)	µg/L	300	-	-	-	-	-	-	-	-	-	<300	<300	-	<300	<300	-	<300	<300	-	<300	<300	-
Selenium (Se)	µg/L	1	-	-	-	-	-	-	-	-	-	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Silver (Ag)	µg/L	0.01	-	-	-	-	-	-	-	-	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Strontium (Sr)	µg/L	0.1	-	-	-	-	-	-	-	-	-	53.0	53.1	0.19	81	81.5	0.01	40.3	38.3	5.09	35.2	35.6	1.13
Thallium (Tl)	µg/L	0.1	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Tin (Sn)	µg/L	0.1	-	-	-	-	-	-	-	-	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-
Titanium (Ti)	µg/L	10	-	-	-	-	-	-	-	-	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	-
Uranium (U)	µg/L	0.01	-	-	-	-	-	-	-	-	-	0.550	0.553	0.54	0.349	0.346	0.01	1.83	1.78	2.77	0.032	0.033	-
Vanadium (V)	µg/L	1	-	-	-	-	-	-	-	-	-	<1	<1	-	<1	<1	-	<1	<1	-	<1	<1	-
Zinc (Zn)	µg/L	1	-	-	-	-	-	-	-	-	-	1.7	4.4	-	1	<1	-	<1	<1	-	<1	<1	-
Calcium (Ca)	mg/L	0.05	-	-	-	-	-	-	-	-	-	36.9	35.8	3.03	21.5	21.5	0.00	29.6	29.6	0.00	18.3	18	1.65
Magnesium (Mg)	mg/L	0.1	-	-	-	-	-	-	-	-	-	19.1	19.4	1.56	5.01	5.04	0.01	15.8	15.8	0.00	10.5	10.4	0.96
Potassium (K)	mg/L	2	-	-	-	-	-	-	-	-	-	2.1	2.2	-	<2.0	<2.0	-	2.4	2.3	4.26	<2.0	<2.0	-
Silicon (Si)	mg/L	0.05	-	-	-	-	-	-	-	-	-	3.13	3.13	0.00	1.17	1.18	0.01	1.05	1.05	0.00	1.46	1.45	0.69
Sodium (Na)	mg/L	2	-	-	-	-	-	-	-	-	-	7	7.3	-	5.7	5.7	-	3.5	3.5	-	3.3	3.3	-
Radionuclides																							
GCDWQ MAC ^c																							
Lead-210 (²¹⁰ Pb)	Bq/L ^p	0.02	0.1	-	<0.02	-	-	-	-	-	-	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	<0.02	-
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	0.01	-	-	-	-	-	-	<0.005	0.007	-	0.006	0.007	-	<0.005	<0.005	-	<0.005	0.008	-
Radium-228 (²²⁸ Ra)	Bq/L	0.02	0.5	-	0.08	-	-	-	-	-	-	<0.04	N/R	-	<0.02	<0.02	-	<0.02	<0.02	-	<0.02	<0.02	-
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	<0.01	-	-	-	-	-	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01	-	-	-	-	-	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-
Biota																							
Chlorophyll a	µg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	1.05	1.01	-	3.75	3.02	21.57	-	-	-
Pheopigments	µg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.32	1.08	20.00	-	-	-

q.

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. RPD = Relative Percent Difference between replicate samples when both results are > 5x the detection limit
- e. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness ≥ 50 mg/L (as CaCO₃)
- f. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- g. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- h. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- i. BC WQG for Total Beryllium is Working chronic criterion
- j. CCME FAL Total Copper guideline:
 - 2 µg/L when [CaCO₃] is 0 - 120 mg/L
 - 3 µg/L when [CaCO₃] is 120 - 180 mg/L
 - 4 µg/L when [CaCO₃] is > 180 mg/L
- k. CCME FAL Total Lead guideline:
 - 1 µg/L when [CaCO₃] is 0 - 60 mg/L
 - 4 µg/L when [CaCO₃] is 120 - 180 mg/L
 - 7 µg/L when [CaCO₃] is > 180 mg/L
- l. CCME FAL Total Nickel guideline:
 - 25 µg/L when [CaCO₃] is 0 - 60 mg/L
 - 110 µg/L when [CaCO₃] is 120 - 180 mg/L
 - 150 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Silver:
 - 0.1 µg/L when [CaCO₃] is ≤ 100 mg/L
 - 3 µg/L when [CaCO₃] is > 100 mg/L
- n. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH ≥ 6.5
- o. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- p. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radio-activity present without consideration for what kind of radiation is emitted.
- q. **Bolded** result implies a guideline exceedance
- r. **Replicate** result where precision threshold (RPD > 25%) was exceeded
- s. **Data outlier**, excluded from summary statistics

Table F2-1

Blachford Lake (BL-01) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	246	310	270	250	30	14	11	0	0	0
Hardness (as CaCO ₃)	mg/L	5	123	158	138	128	18	8	13	0	0	0
pH	pH	5	8.14	8.32	8.22	8.17	0.09	0.04	1	0	0	0
Total Suspended Solids	mg/L	5	1.5	3.5	1.9	1.5	0.9	0.4	47	4	0	0
Total Dissolved Solids	mg/L	5	132	175	150	141	20	9	14	0	0	0
Turbidity	NTU	5	0.3	2.4	1.4	1.7	0.8	0.4	57	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	125	164	140	130	18	8	13	0	0	0
Ammonia as N	mg/L	4	0.01	0.02	0.02	0.02	0.01	0.00	33	1	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	3.2	4.1	3.5	3.3	0.4	0.2	13	0	0	0
Fluoride (F)	mg/L	5	0.22	0.34	0.29	0.28	0.05	0.02	18	0	0	0
Sulfate (SO ₄)	mg/L	5	5.7	7.0	6.3	5.9	0.7	0.3	10	0	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.038	0.016	0.003	0.018	0.008	116	3	0	0
Nitrate (as N)	mg/L	2	0.003	0.038	0.020	0.020	0.025	0.018	124	1	0	0
Nitrite (as N)	mg/L	2	0.001	0.001	0.000	0.001	0.000	0.000	0	2	0	0
Total Kjeldahl Nitrogen	mg/L	5	0.30	0.48	0.35	0.31	0.08	0.03	22	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.001	0.000	0.001	0.000	0.000	0	5	0	0
Total Phosphate as P	mg/L	5	0.007	0.016	0.010	0.009	0.003	0.002	35	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	8.1	8.1	8.1	8.1	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	6.83	7.59	7.18	7.14	0.33	0.16	5	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	3.5	82.7	36.1	26.9	30.1	13.4	83	1	0	0
Antimony (Sb)	µg/L	5	0.05	0.21	0.08	0.05	0.07	0.03	87	4	0	0
Arsenic (As)	µg/L	5	0.62	0.80	0.74	0.78	0.08	0.03	10	0	0	0
Barium (Ba)	µg/L	5	26.3	32.5	29.3	29.1	3.0	1.3	10	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	29	39	34	36	4	2	13	0	0	0
Cadmium (Cd)	µg/L	5	0.009	0.025	0.022	0.025	0.007	0.003	34	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Copper (Cu)	µg/L	5	0.45	1.22	0.83	0.85	0.29	0.13	35	1	0	0
Iron (Fe)	µg/L	5	15	49	32	39	16	7	50	2	0	0
Lead (Pb)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Lithium (Li)	µg/L	5	2.5	6.0	3.9	2.5	1.9	0.9	49	3	0	0
Manganese (Mn)	µg/L	5	1.9	4.5	3.5	3.8	1.0	0.5	29	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	5	0.383	0.511	0.455	0.453	0.050	0.022	11	0	0	0
Nickel (Ni)	µg/L	5	0.25	0.53	0.31	0.25	0.13	0.06	41	4	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.015	0.007	0.005	0.004	0.002	64	4	0	0
Strontium (Sr)	µg/L	5	50.6	73.9	59.9	60.1	9.6	4.3	16	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.292	0.429	0.367	0.364	0.058	0.026	16	0	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	0.5	2.7	1.6	1.4	0.8	0.4	53	2	0	0
Calcium (Ca)	mg/L	5	24.8	33.7	28.9	26.9	4.0	1.8	14	0	0	0
Magnesium (Mg)	mg/L	5	13.5	17.6	15.6	14.9	1.9	0.9	12	0	0	0
Potassium (K)	mg/L	5	2.4	3.2	2.9	3.0	0.3	0.1	11	0	0	0
Silicon (Si)	mg/L	5	1.09	1.65	1.37	1.38	0.23	0.10	16	0	0	0
Sodium (Na)	mg/L	5	4.7	6.6	5.6	5.5	0.7	0.3	13	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	0.5	2.9	1.8	2.0	1.0	0.5	55	1	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.63	0.83	0.72	0.71	0.10	0.05	14	0	0	0
Barium (Ba)	µg/L	4	24.1	31.9	26.7	25.3	3.6	1.8	13	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	28	35	31	30	3	1	10	0	0	0
Cadmium (Cd)	µg/L	4	0.009	0.025	0.021	0.025	0.008	0.004	40	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.50	0.31	0.25	0.13	0.06	40	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Copper (Cu)	µg/L	4	0.54	0.69	0.60	0.59	0.07	0.04	12	0	0	0
Iron (Fe)	µg/L	4	15	15	15	15	0	0	0	4	0	0
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	5.7	3.3	2.5	1.6	0.8	48	3	0	0
Manganese (Mn)	µg/L	4	0.025	0.680	0.236	0.119	0.303	0.152	129	1	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	0.355	0.468	0.399	0.387	0.049	0.024	12	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	46.1	65.3	53.7	51.7	8.2	4.1	15	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.287	0.403	0.334	0.322	0.050	0.025	15	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	1.4	0.7	0.5	0.5	0.2	62	3	0	0
Calcium (Ca)	mg/L	4	26.2	34.0	28.3	26.5	3.8	1.9	14	0	0	0
Magnesium (Mg)	mg/L	4	14.0	17.8	15.2	14.6	1.8	0.9	12	0	0	0
Potassium (K)	mg/L	4	2.4	3.1	2.8	2.8	0.3	0.2	12	0	0	0
Silicon (Si)	mg/L	4	1.06	1.58	1.28	1.24	0.22	0.11	17	0	0	0
Sodium (Na)	mg/L	4	4.8	5.6	5.2	5.2	0.5	0.2	9	0	0	0
Radionuclides												
Lead-210 (210Pb)	Bq/L	4	0.01	0.04	0.02	0.01	0.02	0.01	86	3	0	0
Radium-226 (226Ra)	Bq/L	4	0.003	0.006	0.003	0.003	0.002	0.001	52	3	0	0
Radium-228 (228Ra)	Bq/L	4	0.01	0.14	0.04	0.01	0.07	0.03	160	3	0	0
Thorium-230 (230Th)	Bq/L	4	0.005	0.010	0.006	0.005	0.003	0.001	40	3	0	0
Thorium-232 (232Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	2	0.626	1.420	1.023	1.023	0.561	0.397	55	-	-	-
Pheopigments	µg/L	1	0.379	0.379	0.379	0.38	-	-	-	-	-	-

Table F2-2

Elbow Lake North (EL-01) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	311	359	335	327	22	10	7	0	0	0
Hardness (as CaCO ₃)	mg/L	5	176	206	188	182	12	6	7	0	0	0
pH	pH	5	8.13	8.36	8.22	8.16	0.11	0.05	1	0	0	0
Total Suspended Solids	mg/L	5	1.5	1.5	0.0	1.5	0.0	0.0	0	5	0	0
Total Dissolved Solids	mg/L	5	186	211	196	194	10	4	5	0	0	0
Turbidity	NTU	5	0.37	1.30	0.72	0.60	0.39	0.17	53	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	171	222	195	185	23	10	12	0	0	0
Ammonia as N	mg/L	4	0.010	0.024	0.014	0.01	0.01	0.00	52	3	0	0
Bromide (Br)	mg/L	4	0.025	0.025	0.025	0.025	0.000	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	1.57	1.93	1.69	1.62	0.15	0.07	9	0	0	0
Fluoride (F)	mg/L	5	1.41	1.70	1.56	1.55	0.12	0.05	8	0	0	0
Sulfate (SO ₄)	mg/L	5	0.25	0.62	0.45	0.57	0.19	0.08	41	2	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	4	0.0025	0.1040	0.0523	0.0513	0.0575	0.0287	110	2	0	0
Nitrate (as N)	mg/L	3	0.0025	0.1000	0.0350	0.0025	0.0563	0.0325	161	2	0	0
Nitrite (as N)	mg/L	3	0.0005	0.0005	0.0005	0.0005	0.0000	0.0000	0	3	0	0
Total Kjeldahl Nitrogen	mg/L	5	0.371	0.469	0.429	0.444	0.037	0.017	9	0	0	0
Ortho Phosphate as P	mg/L	5	0.0005	0.0012	0.0006	0.0005	0.0003	0.0001	49	4	0	0
Total Phosphate as P	mg/L	5	0.0061	0.0175	0.0097	0.0085	0.0045	0.0020	46	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	11.3	11.3	11.3	11.3	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	10.5	11.7	11.2	11.4	0.5	0.3	5	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	0.5	3.0	1.5	1.1	1.0	0.4	63	3	0	0
Antimony (Sb)	µg/L	5	0.05	0.12	0.06	0.05	0.03	0.01	49	4	0	0
Arsenic (As)	µg/L	5	0.74	0.99	0.87	0.90	0.09	0.04	11	0	0	0
Barium (Ba)	µg/L	5	63.8	88.9	78.3	80.3	10.2	4.5	13	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	23	31	26	24	3	1	13	0	0	0
Cadmium (Cd)	µg/L	5	0.0085	0.0250	0.0217	0.0250	0.0074	0.0033	34	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.50	0.30	0.25	0.11	0.05	37	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Copper (Cu)	µg/L	5	0.26	1.58	0.61	0.45	0.55	0.25	90	0	0	0
Iron (Fe)	µg/L	5	15	57	29	15	20	9	69	3	0	0
Lead (Pb)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Lithium (Li)	µg/L	5	5.1	6.5	5.6	5.4	0.5	0.2	10	0	0	0
Manganese (Mn)	µg/L	5	12.7	59.4	26.6	15.0	19.8	8.9	75	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	5	3.79	4.23	4.00	3.98	0.16	0.07	4	0	0	0
Nickel (Ni)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.005	0.005	0.005	0.000	0.000	0	5	0	0
Strontium (Sr)	µg/L	5	47.7	62.9	57.1	59.6	6.5	2.9	11	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.395	0.548	0.481	0.464	0.063	0.028	13	0	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Calcium (Ca)	mg/L	5	33.4	40.7	36.7	36.4	3.1	1.4	8	0	0	0
Magnesium (Mg)	mg/L	5	20.4	25.0	22.9	22.8	1.8	0.8	8	0	0	0
Potassium (K)	mg/L	5	2.2	2.9	2.6	2.7	0.3	0.1	10	0	0	0
Silicon (Si)	mg/L	5	2.99	4.46	3.81	3.95	0.55	0.25	14	0	0	0
Sodium (Na)	mg/L	5	4.1	5.3	4.8	4.8	0.5	0.2	9	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	0.5	2.3	1.2	0.9	0.9	0.4	74	2	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.80	0.96	0.86	0.85	0.07	0.03	8	0	0	0
Barium (Ba)	µg/L	4	63.9	81.2	73.8	75.1	8.0	4.0	11	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	22	25	24	24	1	1	5	0	0	0
Cadmium (Cd)	µg/L	4	0.0085	0.0250	0.0209	0.0250	0.0083	0.0041	40	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.50	0.31	0.25	0.13	0.06	40	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	3	0	0
Copper (Cu)	µg/L	4	0.17	1.11	0.44	0.24	0.45	0.22	102	0	0	0
Iron (Fe)	µg/L	4	15	15	15	15	0	0	0	4	0	0
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	6.2	4.9	5.5	1.7	0.8	34	1	0	0
Manganese (Mn)	µg/L	4	0.140	0.392	0.257	0.248	0.132	0.066	51	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	3.70	4.27	3.92	3.86	0.26	0.13	7	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Strontium (Sr)	µg/L	4	47.6	61.9	54.0	53.3	5.9	3.0	11	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.422	0.554	0.49	0.488	0.068	0.034	14	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	6.8	2.1	0.5	3.2	1.6	152	3	0	0
Calcium (Ca)	mg/L	4	34.7	41.3	36.7	35.4	3.1	1.5	8	0	0	0
Magnesium (Mg)	mg/L	4	21.4	25.1	23.0	22.7	1.6	0.8	7	0	0	0
Potassium (K)	mg/L	4	2.3	2.8	2.7	2.8	0.2	0.1	9	0	0	0
Silicon (Si)	mg/L	4	3.10	4.48	3.78	3.77	0.57	0.28	15	0	0	0
Sodium (Na)	mg/L	4	4.3	5.0	4.7	4.8	0.3	0.2	7	0	0	0
Radionuclides												
Lead-210 (210Pb)	Bq/L	5	0.01	0.01	0.01	0.01	0.00	0.00	0	5	0	0
Radium-226 (226Ra)	Bq/L	5	0.0025	0.0090	0.0054	0.0060	0.0029	0.0013	53	2	0	0
Radium-228 (228Ra)	Bq/L	5	0.01	0.10	0.03	0.01	0.04	0.02	131	4	0	0
Thorium-230 (230Th)	Bq/L	5	0.005	0.005	0.005	0.005	0.000	0.000	0	5	0	0
Thorium-232 (232Th)	Bq/L	5	0.005	0.005	0.005	0.005	0.000	0.000	0	5	0	0
Biota												
Chlorophyll a	µg/L	2	0.675	2.420	1.548	1.548	1.234	0.873	80	0	0	0
Pheopigments	µg/L	1	0.662	0.662	0.662	0.662	-	-	-	0	0	0

Table F2-3

Elbow Lake South (EL-02) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	309	395	343	324	40	18	12	0	0	0
Hardness (as CaCO ₃)	mg/L	5	175	215	192	183	17	8	9	0	0	0
pH	pH	5	7.58	8.35	8.07	8.15	0.33	0.15	4	0	0	0
Total Suspended Solids	mg/L	5	1.5	1.5	1.5	1.5	0.0	0.0	0	5	0	0
Total Dissolved Solids	mg/L	5	184	225	201	195	18	8	9	0	0	0
Turbidity	NTU	5	0.43	1.05	0.71	0.67	0.26	0.12	37	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	160	230	192	180	28	13	15	0	0	0
Ammonia as N	mg/L	4	0.010	0.097	0.034	0.02	0.04	0.02	123	2	0	0
Bromide (Br)	mg/L	4	0.025	0.025	0.025	0.025	0.000	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	1.53	2.04	1.77	1.65	0.25	0.11	14	0	0	0
Fluoride (F)	mg/L	5	1.40	1.83	1.61	1.55	0.19	0.08	12	0	0	0
Sulfate (SO ₄)	mg/L	5	0.25	0.62	0.45	0.55	0.19	0.08	41	2	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	4	0.0025	0.1210	0.0554	0.0491	0.0620	0.0310	112	2	0	0
Nitrate (as N)	mg/L	3	0.0025	0.1210	0.0420	0.0025	0.0684	0.0395	163	2	0	0
Nitrite (as N)	mg/L	3	0.0005	0.0005	0.0005	0.0005	0.0000	0.0000	0	3	0	0
Total Kjeldahl Nitrogen	mg/L	5	0.076	1.730	0.622	0.428	0.639	0.286	103	0	0	0
Ortho Phosphate as P	mg/L	5	0.0005	0.0005	0.0005	0.0005	0.0000	0.0000	0	5	0	0
Total Phosphate as P	mg/L	5	0.0073	0.0318	0.0129	0.0083	0.0106	0.0047	82	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	12.2	12.2	12.2	12.2	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	11.1	11.8	11.5	11.5	0.3	0.1	3	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	0.5	3.5	1.8	1.3	1.2	0.5	69	3	0	0
Antimony (Sb)	µg/L	5	0.05	0.17	0.07	0.05	0.05	0.02	73	4	0	0
Arsenic (As)	µg/L	5	0.77	1.07	0.92	0.97	0.13	0.06	14	0	0	0
Barium (Ba)	µg/L	5	66.8	101.0	82.9	86.5	13.8	6.2	17	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	22	31	26	24	4	2	14	0	0	0
Cadmium (Cd)	µg/L	5	0.0085	0.0250	0.0217	0.0250	0.0074	0.0033	34	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.50	0.35	0.25	0.14	0.06	39	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Copper (Cu)	µg/L	5	0.24	0.70	0.39	0.27	0.20	0.09	51	0	0	0
Iron (Fe)	µg/L	5	15	32	22	15	9	4	43	3	0	0
Lead (Pb)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Lithium (Li)	µg/L	5	5.1	6.4	5.8	5.8	0.6	0.3	10	0	0	0
Manganese (Mn)	µg/L	5	14.3	37.5	23.5	22.6	8.5	3.8	36	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	5	3.90	4.52	4.20	4.23	0.25	0.11	6	0	0	0
Nickel (Ni)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.005	0.005	0.005	0.000	0.000	0	5	0	0
Strontium (Sr)	µg/L	5	51.1	69.3	59.6	61.8	7.9	3.5	13	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.415	0.584	0.510	0.503	0.065	0.029	13	0	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Calcium (Ca)	mg/L	5	33.9	43.7	37.9	36.6	4.4	2.0	12	0	0	0
Magnesium (Mg)	mg/L	5	20.7	26.7	23.4	22.9	2.3	1.1	10	0	0	0
Potassium (K)	mg/L	5	2.2	3.0	2.7	2.9	0.3	0.2	13	0	0	0
Silicon (Si)	mg/L	5	3.02	4.77	3.90	3.92	0.67	0.30	17	0	0	0
Sodium (Na)	mg/L	5	4.2	5.3	4.9	4.9	0.4	0.2	9	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	0.5	2.4	1.3	1.1	0.9	0.5	74	2	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.84	0.94	0.90	0.90	0.04	0.02	5	0	0	0
Barium (Ba)	µg/L	4	64.2	86.3	75.8	76.4	10.5	5.3	14	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	22	26	24	24	2	1	8	0	0	0
Cadmium (Cd)	µg/L	4	0.0085	0.0250	0.0209	0.0250	0.0083	0.0041	40	4	0	0
Chromium (Cr)	µg/L	4	0.25	7.96	2.24	0.38	3.82	1.91	170	3	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	3	0	0
Copper (Cu)	µg/L	4	0.17	0.78	0.37	0.27	0.28	0.14	75	0	0	0
Iron (Fe)	µg/L	4	15	15	15	15	0	0	0	4	0	0
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	6.1	4.8	5.3	1.6	0.8	33	1	0	0
Manganese (Mn)	µg/L	4	0.106	4.620	1.521	0.679	2.119	1.059	139	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	3.76	4.54	4.03	3.92	0.35	0.18	9	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Strontium (Sr)	µg/L	4	47.7	64.4	55.6	55.1	7.3	3.6	13	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.32	0.12	0.05	0.14	0.07	115	3	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.447	0.588	0.51	0.501	0.066	0.033	13	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	2.8	1.1	0.5	1.2	0.6	107	3	0	0
Calcium (Ca)	mg/L	4	34.6	42.9	37.2	35.7	3.8	1.9	10	0	0	0
Magnesium (Mg)	mg/L	4	21.2	26.2	23.3	22.8	2.1	1.1	9	0	0	0
Potassium (K)	mg/L	4	2.3	2.9	2.7	2.8	0.3	0.1	10	0	0	0
Silicon (Si)	mg/L	4	3.10	4.68	3.83	3.77	0.65	0.33	17	0	0	0
Sodium (Na)	mg/L	4	4.3	6.0	5.0	4.8	0.7	0.4	15	0	0	0
Radionuclides												
Lead-210 (210Pb)	Bq/L	5	0.01	0.05	0.02	0.01	0.02	0.01	99	4	0	0
Radium-226 (226Ra)	Bq/L	5	0.0025	0.0025	0.0025	0.0025	0.0000	0.0000	0	5	0	0
Radium-228 (228Ra)	Bq/L	5	0.01	0.04	0.02	0.01	0.01	0.01	75	5	0	0
Thorium-230 (230Th)	Bq/L	5	0.005	0.005	0.005	0.005	0.000	0.000	0	5	0	0
Thorium-232 (232Th)	Bq/L	5	0.005	0.005	0.005	0.005	0.000	0.000	0	5	0	0
Biota												
Chlorophyll a	µg/L	2	1.280	4.050	2.665	2.665	1.959	19.587	73	0	0	0
Pheopigments	µg/L	1	0.480	0.480	0.480	0.480	-	-	-	0	0	0

Table F2-4

Fred Lake (FL-01) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	268	401	333	305	59	27	18	0	0	0
Hardness (as CaCO ₃)	mg/L	5	149	219	182	166	32	14	18	0	0	0
pH	pH	5	7.07	8.33	7.89	7.90	0.51	0.23	6	0	0	0
Total Suspended Solids	mg/L	5	1.5	11.0	4.3	1.5	4.2	1.9	98	3	0	0
Total Dissolved Solids	mg/L	5	166	249	207	194	37	17	18	0	0	0
Turbidity	NTU	5	0.6	9.9	3.2	1.0	3.9	1.8	125	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	152	242	185	160	42	19	23	0	0	0
Ammonia as N	mg/L	4	0.01	0.70	0.19	0.02	0.34	0.17	184	2	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	3.6	5.2	4.4	4.2	0.6	0.3	14	0	0	0
Fluoride (F)	mg/L	5	0.92	1.36	1.15	1.14	0.18	0.08	16	0	0	0
Sulfate (SO ₄)	mg/L	5	0.3	0.7	0.3	0.3	0.2	0.1	60	4	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	4	0.003	0.092	0.034	0.021	0.042	0.021	124	2	0	0
Nitrate (as N)	mg/L	3	0.003	0.038	0.014	0.003	0.021	0.012	143	2	0	0
Nitrite (as N)	mg/L	3	0.001	0.002	0.001	0.001	0.001	0.000	80	2	0	0
Total Kjeldahl Nitrogen	mg/L	5	0.59	1.30	0.95	0.92	0.30	0.14	32	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.001	0.001	0.001	0.000	0.000	0	5	0	0
Total Phosphate as P	mg/L	5	0.005	0.011	0.008	0.009	0.002	0.001	28	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	19.7	19.7	19.7	19.7	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	14.60	19.20	16.73	16.55	1.90	0.95	11	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	2.5	11.7	5.7	3.5	4.0	1.8	70	3	0	0
Antimony (Sb)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Arsenic (As)	µg/L	5	0.76	1.56	1.13	1.01	0.35	0.15	31	0	0	0
Barium (Ba)	µg/L	5	44.6	129.0	78.4	72.4	34.7	15.5	44	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	19	28	23	23	3	2	15	0	0	0
Cadmium (Cd)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Copper (Cu)	µg/L	5	0.30	1.29	0.64	0.52	0.42	0.19	65	2	0	0
Iron (Fe)	µg/L	5	15	7860	1814	38	3415	1527	188	2	2	40
Lead (Pb)	µg/L	5	0.025	0.094	0.039	0.025	0.031	0.014	80	4	0	0
Lithium (Li)	µg/L	5	2.5	7.3	5.6	6.2	1.9	0.8	34	1	0	0
Manganese (Mn)	µg/L	5	6.2	848.0	258.0	25.4	370.1	165.5	143	1	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	5	1.640	2.420	2.036	2.040	0.317	0.142	16	0	0	0
Nickel (Ni)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.005	0.005	0.005	0.000	0.000	0	5	0	0
Strontium (Sr)	µg/L	5	43.1	75.5	61.3	66.2	12.8	5.7	21	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.312	0.511	0.397	0.401	0.084	0.037	21	0	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	1.0	3.7	1.7	1.2	1.1	0.5	66	1	0	0
Calcium (Ca)	mg/L	5	30.7	46.9	38.1	33.8	7.5	3.3	20	0	0	0
Magnesium (Mg)	mg/L	5	16.5	24.4	19.9	19.1	3.3	1.5	17	0	0	0
Potassium (K)	mg/L	5	1.0	2.7	2.1	2.2	0.7	0.3	31	1	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Silicon (Si)	mg/L	5	2.22	7.39	4.59	5.10	2.03	0.91	44	0	0	0
Sodium (Na)	mg/L	5	5.7	9.3	7.4	7.5	1.4	0.6	19	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	1.1	2.2	1.6	1.6	0.5	0.2	29	0	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.89	1.59	1.11	0.98	0.33	0.16	29	0	0	0
Barium (Ba)	µg/L	4	42.6	121.0	70.0	58.3	36.1	18.1	52	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	19	25	21	21	3	1	14	0	0	0
Cadmium (Cd)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Chromium (Cr)	µg/L	4	0.25	1.00	0.53	0.43	0.33	0.17	63	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	3	0	0
Copper (Cu)	µg/L	4	0.15	0.52	0.34	0.34	0.16	0.08	46	0	0	0
Iron (Fe)	µg/L	4	15	6990	1759	15	3488	1744	198	3	1	20
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	0	0	0
Lithium (Li)	µg/L	4	2.5	6.9	5.1	5.4	1.8	0.9	36	1	0	0
Manganese (Mn)	µg/L	4	0.401	766.000	192.665	2.129	382.227	191.113	198	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	1.630	2.160	1.823	1.750	0.236	0.118	13	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	40.6	67.0	54.4	55.0	11.8	5.9	22	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.15	0.08	0.05	0.05	0.03	67	3	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.185	0.391	0.299	0.311	0.085	0.043	28	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	2.1	0.9	0.5	0.8	0.4	89	3	0	0
Calcium (Ca)	mg/L	4	31.4	49.5	37.7	34.9	8.1	4.0	21	0	0	0
Magnesium (Mg)	mg/L	4	17.1	23.1	19.4	18.7	2.6	1.3	14	0	0	0
Potassium (K)	mg/L	4	1.0	2.5	2.0	2.2	0.7	0.3	34	1	0	0
Silicon (Si)	mg/L	4	2.29	7.46	4.51	4.14	2.29	1.15	51	0	0	0
Sodium (Na)	mg/L	4	5.8	7.9	7.0	7.2	0.9	0.5	13	0	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Radium-226 (²²⁶ Ra)	Bq/L	4	0.003	0.020	0.008	0.005	0.008	0.004	100	2	0	0
Radium-228 (²²⁸ Ra)	Bq/L	4	0.01	0.02	0.01	0.01	0.00	0.00	22	4	0	0
Thorium-230 (²³⁰ Th)	Bq/L	4	0.005	0.010	0.006	0.005	0.003	0.001	40	3	0	0
Thorium-232 (²³² Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	0	0.294	1.770	1.032	1.032	1.044	10.437	101			
Pheopigments	µg/L	0	1.39	1.39	1.39	1.39	-	-	-			

Table F2-5

Cressy Lake (FL-02) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	4	237	554	332	269	150	75	45	0	0	0
Hardness (as CaCO ₃)	mg/L	4	137	165	149	148	14	7	9	0	0	0
pH	pH	4	7.78	8.15	7.95	7.94	0.15	0.07	2	0	0	0
Total Suspended Solids	mg/L	4	1.5	1.5	1.5	1.5	0.0	0.0	0	4	0	0
Total Dissolved Solids	mg/L	4	154	182	169	170	15	8	9	0	0	0
Turbidity	NTU	4	0.4	2.4	1.3	1.2	0.8	0.4	66	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	4	126	180	147	142	24	12	17	0	0	0
Ammonia as N	mg/L	3	0.02	0.13	0.06	0.04	0.06	0.03	92	0	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	4	0.7	0.8	0.7	0.7	0.1	0.0	12	0	0	0
Fluoride (F)	mg/L	4	0.88	1.14	1.02	1.03	0.12	0.06	12	0	0	0
Sulfate (SO ₄)	mg/L	4	2.3	3.1	2.7	2.7	0.3	0.2	13	0	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	3	0.003	1.680	0.621	0.180	0.922	0.532	148	1	0	0
Nitrate (as N)	mg/L	2	0.003	0.180	0.091	0.091	0.126	0.089	138	1	0	0
Nitrite (as N)	mg/L	2	0.001	0.001	0.001	0.001	0.000	0.000	0	2	0	0
Total Kjeldahl Nitrogen	mg/L	4	0.51	6.82	2.14	0.61	3.12	1.56	146	0	0	0
Ortho Phosphate as P	mg/L	4	0.001	0.001	0.001	0.001	0.000	0.000	0	4	0	0
Total Phosphate as P	mg/L	4	0.006	0.170	0.050	0.012	0.080	0.040	160	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	16.2	16.2	16.2	16.2	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	3	14.80	15.60	15.20	15.20	0.57	0.33	4	0	0	0
Total Metals												
Aluminum (Al)	µg/L	4	2.0	12.0	5.1	3.2	4.7	2.3	92	2	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.95	1.42	1.11	1.04	0.21	0.10	19	0	0	0
Barium (Ba)	µg/L	4	20.6	25.8	22.8	22.5	2.2	1.1	10	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	16	20	18	18	2	1	10	0	0	0
Cadmium (Cd)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Copper (Cu)	µg/L	4	0.45	1.64	0.93	0.82	0.51	0.26	55	1	0	0
Iron (Fe)	µg/L	4	51	92	62	52	20	10	33	0	0	0
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	7.8	9.2	8.4	8.2	0.7	0.3	8	0	0	0
Manganese (Mn)	µg/L	4	17.2	163.0	66.2	42.3	68.5	34.3	104	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	1.820	2.030	1.960	1.995	0.095	0.047	5	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Strontium (Sr)	µg/L	4	38.3	48.1	44.9	46.5	4.5	2.2	10	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.08	0.06	0.05	0.01	0.01	22	4	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	2.050	2.800	2.428	2.430	0.364	0.182	15	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	1.4	2.6	1.9	1.9	0.6	0.3	31	1	0	0
Calcium (Ca)	mg/L	4	26.4	33.7	30.5	30.9	3.7	1.8	12	0	0	0
Magnesium (Mg)	mg/L	4	14.9	17.7	16.5	16.8	1.4	0.7	8	0	0	0
Potassium (K)	mg/L	4	1.0	2.5	2.0	2.3	0.7	0.3	34	1	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Silicon (Si)	mg/L	4	1.08	2.07	1.58	1.59	0.47	0.23	30	0	0	0
Sodium (Na)	mg/L	4	3.1	4.0	3.6	3.7	0.4	0.2	10	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	3	0.5	5.9	2.4	0.9	3.0	1.7	124	2	0	0
Antimony (Sb)	µg/L	3	0.05	0.05	0.05	0.05	0.00	0.00	0	3	0	0
Arsenic (As)	µg/L	3	1.04	1.18	1.13	1.17	0.08	0.05	7	0	0	0
Barium (Ba)	µg/L	3	19.2	23.0	20.5	19.2	2.2	1.3	11	0	0	0
Beryllium (Be)	µg/L	3	0.25	0.25	0.25	0.25	0.00	0.00	0	3	0	0
Bismuth (Bi)	µg/L	3	0.25	0.25	0.25	0.25	0.00	0.00	0	3	0	0
Boron (B)	µg/L	3	15	18	17	17	1	1	8	0	0	0
Cadmium (Cd)	µg/L	3	0.025	0.025	0.025	0.025	0.000	0.000	0	3	0	0
Chromium (Cr)	µg/L	3	0.25	0.25	0.25	0.25	0.00	0.00	0	3	0	0
Cobalt (Co)	µg/L	3	0.05	0.05	0.05	0.05	0.00	0.00	0	2	0	0
Copper (Cu)	µg/L	3	0.36	1.16	0.65	0.44	0.44	0.25	67	0	0	0
Iron (Fe)	µg/L	3	15	15	15	15	0	0	0	3	0	0
Lead (Pb)	µg/L	3	0.025	0.025	0.025	0.025	0.000	0.000	0	3	0	0
Lithium (Li)	µg/L	3	7.1	8.4	7.6	7.3	0.7	0.4	9	0	0	0
Manganese (Mn)	µg/L	3	0.814	10.700	4.905	3.200	5.159	2.979	105	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	3	1.590	1.890	1.693	1.600	0.170	0.098	10	0	0	0
Nickel (Ni)	µg/L	3	0.25	0.25	0.25	0.25	0.00	0.00	0	3	0	0
Phosphorus (P)	µg/L	3	150	150	150	150	0	0	0	3	0	0
Selenium (Se)	µg/L	3	0.5	0.5	0.5	0.5	0.0	0.0	0	3	0	0
Silver (Ag)	µg/L	3	0.01	0.01	0.01	0.01	0.00	0.00	0	3	0	0
Strontium (Sr)	µg/L	3	35.1	45.0	39.8	39.3	5.0	2.9	12	0	0	0
Thallium (Tl)	µg/L	3	0.05	0.05	0.05	0.05	0.00	0.00	0	3	0	0
Tin (Sn)	µg/L	3	0.05	0.05	0.05	0.05	0.00	0.00	0	3	0	0
Titanium (Ti)	µg/L	3	5	5	5	5	0	0	0	3	0	0
Uranium (U)	µg/L	3	1.805	2.670	2.132	1.920	0.470	0.271	22	0	0	0
Vanadium (V)	µg/L	3	0.5	0.5	0.5	0.5	0.0	0.0	0	3	0	0
Zinc (Zn)	µg/L	3	0.5	3.0	1.3	0.5	1.4	0.8	108	2	0	0
Calcium (Ca)	mg/L	3	29.3	35.9	31.6	29.6	3.7	2.2	12	0	0	0
Magnesium (Mg)	mg/L	3	15.4	18.2	16.5	15.8	1.5	0.9	9	0	0	0
Potassium (K)	mg/L	3	2.1	2.4	2.3	2.4	0.2	0.1	7	0	0	0
Silicon (Si)	mg/L	3	1.05	1.94	1.44	1.34	0.45	0.26	31	0	0	0
Sodium (Na)	mg/L	3	3.2	3.9	3.5	3.5	0.4	0.2	10	0	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	3	0.01	0.01	0.01	0.01	0.00	0.00	0	3	0	0
Radium-226 (²²⁶ Ra)	Bq/L	3	0.003	0.003	0.003	0.003	0.000	0.000	0	3	0	0
Radium-228 (²²⁸ Ra)	Bq/L	3	0.01	0.01	0.01	0.01	0.00	0.00	0	3	0	0
Thorium-230 (²³⁰ Th)	Bq/L	3	0.005	0.005	0.005	0.005	0.000	0.000	0	3	0	0
Thorium-232 (²³² Th)	Bq/L	3	0.005	0.005	0.005	0.005	0.000	0.000	0	3	0	0
Biota												
Chlorophyll a	µg/L	2	0.637	3.385	2.011	2.011	1.943	1.374	97			
Pheopigments	µg/L	1	1.2	1.2	1.2	1.20	-	-	-			

Table F2-6

Lake A (FL-03) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	257	329	301	304	29	13	10	0	0	0
Hardness (as CaCO ₃)	mg/L	5	139	180	160	168	18	8	11	0	0	0
pH	pH	5	7.85	8.28	8.08	8.05	0.17	0.07	2	0	0	0
Total Suspended Solids	mg/L	5	1.5	1.5	1.5	1.5	0.0	0.0	0	5	0	0
Total Dissolved Solids	mg/L	5	168	201	184	188	16	7	9	0	0	0
Turbidity	NTU	5	0.4	1.2	0.8	0.7	0.3	0.1	38	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	139	193	162	161	20	9	12	0	0	0
Ammonia as N	mg/L	4	0.01	0.03	0.02	0.01	0.01	0.01	63	3	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	3.9	5.5	4.7	4.7	0.6	0.3	12	0	0	0
Fluoride (F)	mg/L	5	0.86	1.10	1.01	1.04	0.10	0.05	10	0	0	0
Sulfate (SO ₄)	mg/L	5	0.7	1.2	0.9	0.8	0.2	0.1	19	0	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.066	0.027	0.010	0.031	0.014	113	2	0	0
Nitrate (as N)	mg/L	2	0.009	0.066	0.037	0.037	0.040	0.028	108	0	0	0
Nitrite (as N)	mg/L	2	0.001	0.001	0.001	0.001	0.000	0.000	53	1	0	0
Total Kjeldahl Nitrogen	mg/L	5	0.44	0.62	0.55	0.56	0.07	0.03	12	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.001	0.001	0.001	0.000	0.000	0	5	0	0
Total Phosphate as P	mg/L	5	0.005	0.007	0.006	0.006	0.001	0.000	15	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	15.2	15.2	15.2	15.2	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	14.50	16.05	15.24	15.20	0.75	0.38	5	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	3.5	22.0	10.2	7.1	7.8	3.5	76	1	0	0
Antimony (Sb)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Arsenic (As)	µg/L	5	0.87	1.30	1.06	1.03	0.17	0.08	16	0	0	0
Barium (Ba)	µg/L	5	39.6	57.6	50.7	53.0	6.9	3.1	14	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	17	22	20	20	2	1	10	0	0	0
Cadmium (Cd)	µg/L	5	0.009	0.025	0.022	0.025	0.007	0.003	34	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.38	0.28	0.25	0.06	0.03	20	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Copper (Cu)	µg/L	5	0.35	1.21	0.77	0.71	0.35	0.16	45	2	0	0
Iron (Fe)	µg/L	5	36	132	78	61	46	21	59	0	0	0
Lead (Pb)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Lithium (Li)	µg/L	5	2.5	6.1	4.3	5.1	1.7	0.7	39	2	0	0
Manganese (Mn)	µg/L	5	4.8	47.0	16.4	7.2	17.8	8.0	108	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	5	1.680	1.870	1.755	1.750	0.075	0.033	4	0	0	0
Nickel (Ni)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.024	0.009	0.005	0.008	0.004	97	4	0	0
Strontium (Sr)	µg/L	5	42.4	60.0	54.0	54.9	7.0	3.1	13	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.417	0.615	0.518	0.533	0.074	0.033	14	0	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	0.5	2.6	1.0	0.5	0.9	0.4	89	3	0	0
Calcium (Ca)	mg/L	5	28.5	36.7	34.0	35.3	3.4	1.5	10	0	0	0
Magnesium (Mg)	mg/L	5	14.9	20.3	18.3	19.4	2.2	1.0	12	0	0	0
Potassium (K)	mg/L	5	1.0	2.2	1.4	1.0	0.6	0.3	41	3	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Silicon (Si)	mg/L	5	2.47	3.46	2.96	2.96	0.39	0.17	13	0	0	0
Sodium (Na)	mg/L	5	5.4	7.5	6.5	6.5	0.9	0.4	13	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	1.0	9.2	3.5	2.0	3.8	1.9	108	0	0	0
Antimony (Sb)	µg/L	4	0.05	0.38	0.13	0.05	0.17	0.08	125	3	0	0
Arsenic (As)	µg/L	4	0.82	1.22	0.98	0.95	0.17	0.09	17	0	0	0
Barium (Ba)	µg/L	4	39.3	51.3	46.2	47.1	5.1	2.5	11	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	18	19	19	19	1	0	3	0	0	0
Cadmium (Cd)	µg/L	4	0.022	0.025	0.024	0.025	0.002	0.001	6	3	0	0
Chromium (Cr)	µg/L	4	0.25	0.50	0.31	0.25	0.13	0.06	40	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	3	0	0
Copper (Cu)	µg/L	4	0.63	0.88	0.75	0.74	0.11	0.06	15	0	0	0
Iron (Fe)	µg/L	4	15	91	49	45	40	20	81	2	0	0
Lead (Pb)	µg/L	4	0.025	0.481	0.139	0.025	0.228	0.114	164	3	0	0
Lithium (Li)	µg/L	4	2.5	6.0	3.7	3.1	1.7	0.8	45	2	0	0
Manganese (Mn)	µg/L	4	1.360	6.400	3.541	3.203	2.215	1.107	63	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	1.570	1.800	1.688	1.690	0.095	0.048	6	0	0	0
Nickel (Ni)	µg/L	4	0.25	1.43	0.55	0.25	0.59	0.30	108	2	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	41.7	57.5	50.2	50.8	6.7	3.4	13	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.50	0.16	0.05	0.23	0.11	138	4	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.355	0.590	0.490	0.508	0.104	0.052	21	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	3.3	2.1	2.4	1.3	0.6	61	1	0	0
Calcium (Ca)	mg/L	4	30.0	38.0	33.8	33.5	4.0	2.0	12	0	0	0
Magnesium (Mg)	mg/L	4	15.6	20.7	17.9	17.7	2.5	1.2	14	0	0	0
Potassium (K)	mg/L	4	1.0	2.2	1.3	1.0	0.6	0.3	45	3	0	0
Silicon (Si)	mg/L	4	2.50	3.56	2.94	2.84	0.51	0.25	17	0	0	0
Sodium (Na)	mg/L	4	5.5	7.2	6.2	6.2	0.7	0.4	12	0	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	5	0.01	0.01	0.01	0.01	0.00	0.00	0	5	0	0
Radium-226 (²²⁶ Ra)	Bq/L	5	0.003	0.006	0.004	0.003	0.002	0.001	45	3	0	0
Radium-228 (²²⁸ Ra)	Bq/L	5	0.01	0.01	0.01	0.01	0.00	0.00	29	5	0	0
Thorium-230 (²³⁰ Th)	Bq/L	5	0.005	0.020	0.008	0.005	0.007	0.003	84	4	0	0
Thorium-232 (²³² Th)	Bq/L	5	0.005	0.005	0.005	0.005	0.000	0.000	0	5	0	0
Biota												
Chlorophyll a	µg/L	0	0.908	1.910	1.409	1.409	0.709	7.085	50			
Pheopigments	µg/L	0	0.498	0.498	0.498	0.50	-	-	-			

Table F2-7

Great Slave Lake Dock Site (GL-01) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	4	171	207	190	192	15	8	8	0	0	0
Hardness (as CaCO ₃)	mg/L	4	74	97	86	86	9	5	11	0	0	0
pH	pH	4	7.76	8.17	8.00	8.05	0.18	0.09	2	0	0	0
Total Suspended Solids	mg/L	4	1.5	1.5	1.5	1.5	0.0	0.0	0	4	0	0
Total Dissolved Solids	mg/L	4	97	125	110	108	12	6	11	0	0	0
Turbidity	NTU	4	0.5	1.0	0.6	0.5	0.2	0.1	38	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	4	61	91	74	71	13	6	17	0	0	0
Ammonia as N	mg/L	4	0.01	0.02	0.01	0.01	0.01	0.00	43	3	0	0
Bromide (Br)	mg/L	3	0.03	0.03	0.03	0.03	0.00	0.00	0	3	0	0
Chloride (Cl)	mg/L	4	5.3	6.9	6.1	6.1	0.6	0.3	11	0	0	0
Fluoride (F)	mg/L	4	0.05	0.07	0.06	0.06	0.01	0.00	15	0	0	0
Sulfate (SO ₄)	mg/L	4	16.1	20.3	18.1	18.0	1.8	0.9	10	0	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	3	0.075	0.114	0.091	0.084	0.020	0.012	22	0	0	0
Nitrate (as N)	mg/L	3	0.077	0.114	0.092	0.084	0.020	0.011	22	0	0	0
Nitrite (as N)	mg/L	3	0.001	0.001	0.001	0.001	0.000	0.000	0	3	0	0
Total Kjeldahl Nitrogen	mg/L	4	0.10	0.19	0.16	0.17	0.04	0.02	25	0	0	0
Ortho Phosphate as P	mg/L	4	0.001	0.002	0.001	0.001	0.001	0.000	67	3	0	0
Total Phosphate as P	mg/L	4	0.003	0.005	0.004	0.004	0.001	0.000	23	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	0	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	4	3.84	4.58	4.20	4.20	0.32	0.16	8	0	0	0
Total Metals												
Aluminum (Al)	µg/L	4	7.1	26.8	14.6	12.4	8.6	4.3	58	1	0	0
Antimony (Sb)	µg/L	4	0.05	0.16	0.08	0.05	0.05	0.03	69	3	0	0
Arsenic (As)	µg/L	4	0.24	0.31	0.27	0.27	0.03	0.02	13	0	0	0
Barium (Ba)	µg/L	4	32.7	39.4	36.9	37.9	3.0	1.5	8	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	12	20	15	14	3	2	23	0	0	0
Cadmium (Cd)	µg/L	4	0.009	0.025	0.021	0.025	0.008	0.004	40	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Copper (Cu)	µg/L	4	1.04	1.71	1.29	1.21	0.29	0.15	23	0	0	0
Iron (Fe)	µg/L	4	15	15	15	15	0	0	0	4	0	0
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	2.5	2.5	2.5	0.0	0.0	0	4	0	0
Manganese (Mn)	µg/L	4	0.4	0.5	0.4	0.4	0.1	0.0	17	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	0.627	0.694	0.651	0.641	0.032	0.016	5	0	0	0
Nickel (Ni)	µg/L	4	0.80	0.93	0.87	0.87	0.05	0.03	6	0	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Strontium (Sr)	µg/L	4	85.6	108.0	99.6	102.5	9.8	4.9	10	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.347	0.404	0.367	0.358	0.025	0.013	7	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Zinc (Zn)	µg/L	4	0.5	1.8	0.8	0.5	0.6	0.3	77	4	0	0
Calcium (Ca)	mg/L	4	20.4	28.2	24.1	23.9	3.6	1.8	15	0	0	0
Magnesium (Mg)	mg/L	4	4.8	6.3	5.7	5.7	0.7	0.3	12	0	0	0
Potassium (K)	mg/L	4	1.0	1.0	1.0	1.0	0.0	0.0	0	4	0	0
Silicon (Si)	mg/L	4	1.12	1.57	1.34	1.33	0.19	0.10	15	0	0	0
Sodium (Na)	mg/L	4	5.6	6.8	6.4	6.6	0.6	0.3	9	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	0.5	3.6	1.6	1.1	1.4	0.7	89	2	0	0
Antimony (Sb)	µg/L	4	0.05	0.10	0.06	0.05	0.03	0.01	40	3	0	0
Arsenic (As)	µg/L	4	0.28	0.29	0.28	0.28	0.01	0.00	2	0	0	0
Barium (Ba)	µg/L	4	31.7	39.6	36.1	36.6	3.3	1.6	9	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	11	14	13	13	1	1	10	0	0	0
Cadmium (Cd)	µg/L	4	0.009	0.025	0.021	0.025	0.008	0.004	40	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	3	0	0
Copper (Cu)	µg/L	4	0.90	1.54	1.13	1.05	0.29	0.14	25	0	0	0
Iron (Fe)	µg/L	4	15	15	15	15	0	0	0	4	0	0
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	2.5	2.5	2.5	0.0	0.0	0	4	0	0
Manganese (Mn)	µg/L	4	0.089	0.610	0.243	0.138	0.246	0.123	101	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	0.587	0.699	0.625	0.607	0.051	0.026	8	0	0	0
Nickel (Ni)	µg/L	4	0.77	1.03	0.87	0.85	0.12	0.06	14	0	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	81.3	105.0	97.3	101.5	11.0	5.5	11	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.332	0.394	0.362	0.361	0.028	0.014	8	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	2.2	1.2	1.0	0.7	0.4	65	2	0	0
Calcium (Ca)	mg/L	4	21.5	28.3	24.7	24.6	2.9	1.4	12	0	0	0
Magnesium (Mg)	mg/L	4	5.0	6.3	5.8	5.9	0.6	0.3	10	0	0	0
Potassium (K)	mg/L	4	1.0	1.0	1.0	1.0	0.0	0.0	0	4	0	0
Silicon (Si)	mg/L	4	1.18	1.50	1.34	1.35	0.13	0.07	10	0	0	0
Sodium (Na)	mg/L	4	5.7	7.1	6.6	6.8	0.7	0.3	10	0	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Radium-226 (²²⁶ Ra)	Bq/L	4	0.003	0.007	0.004	0.004	0.002	0.001	50	2	0	0
Radium-228 (²²⁸ Ra)	Bq/L	4	0.01	0.05	0.02	0.01	0.02	0.01	93	4	0	0
Thorium-230 (²³⁰ Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Thorium-232 (²³² Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	2	1.030	1.080	1.043	1.055	0.035	0.025	3			
Pheopigments	µg/L	1	0.23	0.23	0.23	0.23	-	-	-			

Table F2-8

Long Lake - 1 (LL-01) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	2	275	296	285	285	14	10	5	0	0	0
Hardness (as CaCO ₃)	mg/L	2	150	157	153	153	5	3	3	0	0	0
pH	pH	2	8.12	8.33	8.22	8.22	0.15	0.11	2	0	0	0
Total Suspended Solids	mg/L	2	1.5	1.5	1.5	1.5	0.0	0.0	0	2	0	0
Total Dissolved Solids	mg/L	2	166	174	170	170	5	4	3	0	0	0
Turbidity	NTU	2	0.5	2.0	1.2	1.2	1.1	0.8	87	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	2	146	157	152	152	8	6	5	0	0	0
Ammonia as N	mg/L	1	0.01	0.01	0.01	0.01	-	-	-	1	0	0
Bromide (Br)	mg/L	1	0.03	0.03	0.03	0.03	-	-	-	1	0	0
Chloride (Cl)	mg/L	2	3.6	3.8	3.7	3.7	0.1	0.1	4	0	0	0
Fluoride (F)	mg/L	2	1.16	1.20	1.18	1.18	0.03	0.02	2	0	0	0
Sulfate (SO ₄)	mg/L	2	1.3	1.5	1.4	1.4	0.1	0.1	10	0	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	2	0.003	0.069	0.036	0.036	0.047	0.033	132	1	0	0
Nitrate (as N)	mg/L	1	0.003	0.003	0.003	0.003	-	-	-	1	0	0
Nitrite (as N)	mg/L	1	0.001	0.001	0.001	0.001	-	-	-	1	0	0
Total Kjeldahl Nitrogen	mg/L	2	0.48	0.54	0.51	0.51	0.04	0.03	8	0	0	0
Ortho Phosphate as P	mg/L	2	0.001	0.001	0.001	0.001	0.000	0.000	0	1	0	0
Total Phosphate as P	mg/L	2	0.007	0.013	0.010	0.010	0.004	0.003	37	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	13.2	13.2	13.2	13.2	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	0	13.00	13.00	13.00	13.00	-	-	-	0	0	0
Total Metals												
Aluminum (Al)	µg/L	2	0.5	9.9	5.2	5.2	6.6	4.7	128	1	0	0
Antimony (Sb)	µg/L	2	0.05	0.05	0.05	0.05	0.00	0.00	0	2	0	0
Arsenic (As)	µg/L	2	0.58	0.68	0.63	0.63	0.07	0.05	11	0	0	0
Barium (Ba)	µg/L	2	49.5	54.6	52.0	52.0	3.6	2.5	7	0	0	0
Beryllium (Be)	µg/L	2	0.25	0.25	0.25	0.25	0.00	0.00	0	2	0	0
Bismuth (Bi)	µg/L	2	0.25	0.25	0.25	0.25	0.00	0.00	0	2	0	0
Boron (B)	µg/L	2	23	24	24	24	1	1	3	0	0	0
Cadmium (Cd)	µg/L	2	0.025	0.025	0.025	0.025	0.000	0.000	0	2	0	0
Chromium (Cr)	µg/L	2	0.25	0.25	0.25	0.25	0.00	0.00	0	2	0	0
Cobalt (Co)	µg/L	2	0.05	0.10	0.08	0.08	0.04	0.03	47	1	0	0
Copper (Cu)	µg/L	2	0.61	0.83	0.72	0.72	0.15	0.11	21	0	0	0
Iron (Fe)	µg/L	2	15	116	66	66	71	51	109	1	0	0
Lead (Pb)	µg/L	2	0.025	0.025	0.025	0.025	0.000	0.000	0	2	0	0
Lithium (Li)	µg/L	2	2.5	5.2	3.9	3.9	1.9	1.4	50	1	0	0
Manganese (Mn)	µg/L	2	9.1	66.2	37.7	37.7	40.4	28.5	107	0	0	0
Mercury (Hg)	µg/L	0	-	-	-	-	-	-	-	-	-	-
Molybdenum (Mo)	µg/L	2	4.340	5.460	4.900	4.900	0.792	0.560	16	0	0	0
Nickel (Ni)	µg/L	2	0.25	0.25	0.25	0.25	0.00	0.00	0	2	0	0
Phosphorus (P)	µg/L	2	150	150	150	150	0	0	0	2	0	0
Selenium (Se)	µg/L	2	0.5	0.5	0.5	0.5	0.0	0.0	0	2	0	0
Silver (Ag)	µg/L	2	0.005	0.005	0.005	0.005	0.000	0.000	0	2	0	0
Strontium (Sr)	µg/L	2	51.4	57.3	54.3	54.3	4.1	2.9	8	0	0	0
Thallium (Tl)	µg/L	2	0.05	0.05	0.05	0.05	0.00	0.00	0	2	0	0
Tin (Sn)	µg/L	2	0.05	0.05	0.05	0.05	0.00	0.00	0	2	0	0
Titanium (Ti)	µg/L	2	5	5	5	5	0	0	0	2	0	0
Uranium (U)	µg/L	2	0.935	0.953	0.944	0.944	0.013	0.009	1	0	0	0
Vanadium (V)	µg/L	2	0.5	1.0	0.8	0.8	0.4	0.3	47	2	0	0
Zinc (Zn)	µg/L	2	1.0	3.7	2.4	2.4	1.9	1.4	81	1	0	0
Calcium (Ca)	mg/L	2	30.4	32.5	31.5	31.5	1.5	1.0	5	0	0	0
Magnesium (Mg)	mg/L	2	16.5	18.2	17.4	17.4	1.2	0.9	7	0	0	0
Potassium (K)	mg/L	2	1.0	1.0	1.0	1.0	0.0	0.0	0	2	0	0
Silicon (Si)	mg/L	2	2.39	2.62	2.51	2.51	0.16	0.12	6	0	0	0
Sodium (Na)	mg/L	2	5.9	6.4	6.1	6.1	0.3	0.2	5	0	0	0

Table F2-9

Long Lake - 2 (LL-02) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	4	260	291	275	275	13	6	5	0	0	0
Hardness (as CaCO ₃)	mg/L	4	143	162	151	149	8	4	5	0	0	0
pH	pH	4	7.76	8.43	8.14	8.19	0.31	0.15	4	0	0	0
Total Suspended Solids	mg/L	4	1.5	1.5	1.5	1.5	0.0	0.0	0	4	0	0
Total Dissolved Solids	mg/L	4	148	180	161	158	14	7	8	0	0	0
Turbidity	NTU	4	0.6	2.0	1.2	1.1	0.6	0.3	48	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	4	138	175	150	144	17	9	11	0	0	0
Ammonia as N	mg/L	4	0.01	0.03	0.01	0.01	0.01	0.00	55	3	0	0
Bromide (Br)	mg/L	3	0.03	0.03	0.03	0.03	0.00	0.00	0	3	0	0
Chloride (Cl)	mg/L	4	3.3	4.1	3.6	3.6	0.3	0.2	9	0	0	0
Fluoride (F)	mg/L	4	1.03	1.23	1.14	1.14	0.08	0.04	7	0	0	0
Sulfate (SO ₄)	mg/L	4	1.2	1.5	1.3	1.3	0.1	0.1	10	0	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	4	0.003	0.121	0.032	0.003	0.059	0.030	184	3	0	0
Nitrate (as N)	mg/L	2	0.003	0.121	0.062	0.062	0.084	0.059	136	1	0	0
Nitrite (as N)	mg/L	2	0.001	0.001	0.001	0.001	0.000	0.000	0	2	0	0
Total Kjeldahl Nitrogen	mg/L	4	0.444	0.559	0.503	0.505	0.063	0.031	12	0	0	0
Ortho Phosphate as P	mg/L	4	0.001	0.001	0.001	0.001	0.000	0.000	46	3	0	0
Total Phosphate as P	mg/L	4	0.005	0.012	0.008	0.007	0.003	0.002	39	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	0	-	-	-	-	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	11.40	13.00	12.53	12.85	0.76	0.38	6	0	0	0
Total Metals												
Aluminum (Al)	µg/L	4	4.5	20.1	9.8	7.2	7.1	3.6	73	1	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.54	0.60	0.57	0.57	0.02	0.01	4	0	0	0
Barium (Ba)	µg/L	4	44.0	54.2	49.9	50.6	4.4	2.2	9	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	23	28	25	25	2	1	9	0	0	0
Cadmium (Cd)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Copper (Cu)	µg/L	4	0.25	0.89	0.57	0.57	0.31	0.16	55	2	0	0
Iron (Fe)	µg/L	4	15	125	43	15	55	28	129	3	0	0
Lead (Pb)	µg/L	4	0.025	0.058	0.033	0.025	0.017	0.008	50	3	0	0
Lithium (Li)	µg/L	4	2.5	6.2	4.2	4.0	1.9	1.0	47	2	0	0
Manganese (Mn)	µg/L	4	13.7	74.3	30.5	17.0	29.3	14.6	96	0	0	0
Mercury (Hg)	µg/L	3	0.025	0.025	0.025	0.025	0.000	0.000	0	3	0	0
Molybdenum (Mo)	µg/L	4	4.440	5.020	4.703	4.675	0.241	0.120	5	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.005	0.012	0.007	0.005	0.004	0.002	52	3	0	0
Strontium (Sr)	µg/L	4	46.4	56.9	51.5	51.4	4.5	2.3	9	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.20	0.09	0.05	0.08	0.04	86	4	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.921	1.120	1.020	1.019	0.091	0.046	9	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	1.3	1.0	1.0	0.3	0.2	35	3	0	0
Calcium (Ca)	mg/L	4	29.5	32.4	31.0	31.0	1.2	0.6	4	0	0	0
Magnesium (Mg)	mg/L	4	16.1	17.7	16.7	16.6	0.7	0.3	4	0	0	0
Potassium (K)	mg/L	4	1.0	1.0	1.0	1.0	0.0	0.0	0	4	0	0
Silicon (Si)	mg/L	4	2.02	2.79	2.38	2.35	0.32	0.16	14	0	0	0
Sodium (Na)	mg/L	4	5.4	6.0	5.8	5.8	0.3	0.1	5	0	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Dissolved Metals												
Aluminum (Al)	µg/L	4	0.5	3.2	1.3	0.8	1.3	0.6	99	3	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.57	0.66	0.61	0.60	0.04	0.02	7	0	0	0
Barium (Ba)	µg/L	4	40.8	52.6	46.5	46.3	4.9	2.4	10	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	21	26	24	24	2	1	9	0	0	0
Cadmium (Cd)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Copper (Cu)	µg/L	4	0.34	0.44	0.39	0.40	0.05	0.02	13	0	0	0
Iron (Fe)	µg/L	4	15	15	15	15	0	0	0	4	0	0
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	5.6	3.3	2.5	1.6	0.8	47	3	0	0
Manganese (Mn)	µg/L	4	0.163	2.790	1.017	0.558	1.199	0.600	118	0	0	0
Mercury (Hg)	µg/L	3	0.025	0.025	0.025	0.025	0.000	0.000	0	3	0	0
Molybdenum (Mo)	µg/L	4	3.950	4.650	4.333	4.365	0.290	0.145	7	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	42.5	55.9	48.6	48.0	5.5	2.8	11	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.20	0.09	0.05	0.08	0.04	86	3	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.854	1.070	0.933	0.903	0.097	0.048	10	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	2.4	1.0	0.5	1.0	0.5	97	3	0	0
Calcium (Ca)	mg/L	4	29.9	34.5	32.0	31.8	2.0	1.0	6	0	0	0
Magnesium (Mg)	mg/L	4	16.6	18.5	17.2	16.9	0.9	0.4	5	0	0	0
Potassium (K)	mg/L	4	1.0	1.0	1.0	1.0	0.0	0.0	0	4	0	0
Silicon (Si)	mg/L	4	2.10	2.93	2.44	2.36	0.36	0.18	15	0	0	0
Sodium (Na)	mg/L	4	5.4	6.2	5.9	6.0	0.3	0.2	6	0	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Radium-226 (²²⁶ Ra)	Bq/L	4	0.003	0.003	0.003	0.003	0.000	0.000	0	4	0	0
Radium-228 (²²⁸ Ra)	Bq/L	4	0.01	0.03	0.02	0.01	0.01	0.01	67	4	0	0
Thorium-230 (²³⁰ Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Thorium-232 (²³² Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	2	0.816	2.070	1.443	1.443	0.887	0.627	61	0	-	-
Pheopigments	µg/L	1	1.07	1.07	1.07	1.07	-	-	-	0	-	-

Table F2-10

North Tardiff Lake (NT-01) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	82	290	157	98	92	41	59	0	0	0
Hardness (as CaCO ₃)	mg/L	5	50	193	100	62	62	28	62	0	0	0
pH	pH	5	7.34	7.77	7.58	7.71	0.22	0.10	3	0	0	0
Total Suspended Solids	mg/L	5	1.5	24.0	9.4	3.2	10.4	4.7	110	2	0	0
Total Dissolved Solids	mg/L	5	106	398	206	137	127	57	62	0	0	0
Turbidity	NTU	5	1.0	9.1	4.4	2.0	4.2	1.9	95	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	39	151	81	62	47	21	58	0	0	0
Ammonia as N	mg/L	4	0.03	1.71	0.47	0.08	0.83	0.41	174	0	0	0
Bromide (Br)	mg/L	4	0.03	0.25	0.16	0.19	0.11	0.05	67	4	0	0
Chloride (Cl)	mg/L	5	1.1	3.5	2.2	2.5	1.0	0.4	46	3	0	0
Fluoride (F)	mg/L	5	0.13	0.33	0.24	0.20	0.08	0.04	36	0	0	0
Sulfate (SO ₄)	mg/L	5	0.6	2.5	1.6	1.3	0.8	0.4	52	4	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.099	0.031	0.015	0.039	0.017	124	4	0	0
Nitrate (as N)	mg/L	2	0.013	0.025	0.019	0.019	0.009	0.006	47	2	0	0
Nitrite (as N)	mg/L	2	0.005	0.007	0.006	0.006	0.001	0.001	20	1	0	0
Total Kjeldahl Nitrogen	mg/L	5	1.71	6.30	3.25	1.77	2.14	0.96	66	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.018	0.006	0.005	0.007	0.003	124	4	0	0
Total Phosphate as P	mg/L	5	0.010	0.080	0.044	0.032	0.029	0.013	67	1	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	82.3	82.3	82.3	82.3	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	37.80	104.00	56.85	42.80	31.53	15.77	55	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	76.3	336.0	158.8	101.0	109.5	49.0	69	0	2	40
Antimony (Sb)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Arsenic (As)	µg/L	5	1.06	3.89	1.99	1.18	1.25	0.56	63	0	0	0
Barium (Ba)	µg/L	5	18.9	75.6	36.6	19.1	25.8	11.5	70	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	5	11	6	5	3	1	43	4	0	0
Cadmium (Cd)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Chromium (Cr)	µg/L	5	0.25	1.00	0.59	0.58	0.34	0.15	58	3	0	0
Cobalt (Co)	µg/L	5	0.05	0.50	0.19	0.05	0.20	0.09	109	3	0	0
Copper (Cu)	µg/L	5	0.35	1.38	0.86	0.72	0.48	0.21	55	1	0	0
Iron (Fe)	µg/L	5	262	4160	1534	425	1730	774	113	0	3	60
Lead (Pb)	µg/L	5	0.025	0.213	0.103	0.059	0.082	0.037	80	1	0	0
Lithium (Li)	µg/L	5	2.5	9.1	4.5	2.5	3.0	1.3	66	3	0	0
Manganese (Mn)	µg/L	5	5.5	389.0	146.8	18.6	185.2	82.8	126	0	0	0
Mercury (Hg)	µg/L	3	0.025	0.025	0.025	0.025	0.000	0.000	0	3	0	0
Molybdenum (Mo)	µg/L	5	0.191	0.580	0.322	0.282	0.155	0.069	48	0	0	0
Nickel (Ni)	µg/L	5	0.25	1.22	0.55	0.25	0.44	0.20	80	3	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.019	0.011	0.012	0.006	0.003	55	2	0	0
Strontium (Sr)	µg/L	5	16.5	57.8	30.5	18.9	18.5	8.3	61	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.247	0.863	0.438	0.288	0.262	0.117	60	0	0	0
Vanadium (V)	µg/L	5	0.5	1.9	0.9	0.5	0.6	0.3	68	3	0	0
Zinc (Zn)	µg/L	5	1.5	8.2	4.9	5.9	2.7	1.2	55	1	0	0
Calcium (Ca)	mg/L	5	7.0	28.4	13.9	7.7	9.6	4.3	69	0	0	0
Magnesium (Mg)	mg/L	5	7.9	29.8	15.7	10.5	9.3	4.2	59	0	0	0
Potassium (K)	mg/L	5	1.0	3.6	1.8	1.0	1.2	0.5	65	3	0	0
Silicon (Si)	mg/L	5	0.33	4.61	2.05	1.56	1.83	0.82	89	0	0	0
Sodium (Na)	mg/L	5	1.0	4.6	2.6	2.3	1.3	0.6	52	1	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	59.3	225.0	107.8	73.5	78.7	39.4	73	0	1	25
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	1.06	3.75	1.76	1.12	1.33	0.66	75	0	0	0
Barium (Ba)	µg/L	4	17.2	70.8	30.8	17.7	26.7	13.3	86	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Cadmium (Cd)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Chromium (Cr)	µg/L	4	0.25	1.32	0.52	0.25	0.54	0.27	103	3	0	0
Cobalt (Co)	µg/L	4	0.05	0.42	0.14	0.05	0.19	0.09	130	3	0	0
Copper (Cu)	µg/L	4	0.35	0.71	0.48	0.42	0.17	0.08	35	0	0	0
Iron (Fe)	µg/L	4	232	3110	1016	361	1398	699	138	0	3	0
Lead (Pb)	µg/L	4	0.025	0.084	0.040	0.025	0.030	0.015	74	3	0	0
Lithium (Li)	µg/L	4	2.5	9.0	4.1	2.5	3.3	1.6	79	3	0	0
Manganese (Mn)	µg/L	4	1.460	374.000	98.065	8.400	184.033	92.016	188	0	0	0
Mercury (Hg)	µg/L	3	0.025	0.025	0.025	0.025	0.000	0.000	0	3	0	0
Molybdenum (Mo)	µg/L	4	0.130	0.495	0.248	0.184	0.168	0.084	68	0	0	0
Nickel (Ni)	µg/L	4	0.25	1.10	0.46	0.25	0.43	0.21	92	3	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	15.0	57.2	26.1	16.2	20.7	10.4	79	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.32	0.12	0.05	0.14	0.07	115	3	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.218	0.768	0.359	0.225	0.273	0.136	76	0	0	0
Vanadium (V)	µg/L	4	0.5	1.2	0.7	0.5	0.4	0.2	52	3	0	0
Zinc (Zn)	µg/L	4	1.3	5.1	3.2	3.3	1.8	0.9	56	0	0	0
Calcium (Ca)	mg/L	4	7.0	28.4	12.7	7.6	10.5	5.2	83	0	0	0
Magnesium (Mg)	mg/L	4	7.9	29.8	14.6	10.3	10.2	5.1	70	0	0	0
Potassium (K)	mg/L	4	1.0	3.6	1.7	1.0	1.3	0.7	79	3	0	0
Silicon (Si)	mg/L	4	0.36	4.47	1.71	1.01	1.92	0.96	112	0	0	0
Sodium (Na)	mg/L	4	1.0	4.7	2.5	2.2	1.6	0.8	62	1	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	4	0.01	0.02	0.01	0.01	0.01	0.00	40	3	0	0
Radium-226 (²²⁶ Ra)	Bq/L	4	0.003	0.008	0.004	0.003	0.003	0.001	71	3	0	0
Radium-228 (²²⁸ Ra)	Bq/L	4	0.01	0.02	0.01	0.01	0.01	0.00	40	4	0	0
Thorium-230 (²³⁰ Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Thorium-232 (²³² Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	2	1.330	2.000	1.665	1.665	0.474	0.335	28			
Pheopigments	µg/L	1	2.72	2.72	2.72	2.72	-	-	-			

Table F2-11

South Tardiff Lake (ST-01) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	96	283	166	114	83	37	50	0	0	0
Hardness (as CaCO ₃)	mg/L	5	58	172	100	69	49	22	50	0	0	0
pH	pH	5	7.47	7.95	7.66	7.51	0.23	0.10	3	0	0	0
Total Suspended Solids	mg/L	5	1.5	14.0	5.1	3.7	5.2	2.3	101	2	0	0
Total Dissolved Solids	mg/L	5	107	317	180	127	90	40	50	0	0	0
Turbidity	NTU	5	1.1	5.6	2.8	1.6	2.2	1.0	77	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	47	149	84	57	45	20	54	0	0	0
Ammonia as N	mg/L	4	0.03	1.31	0.37	0.06	0.63	0.32	173	0	0	0
Bromide (Br)	mg/L	4	0.03	0.13	0.05	0.03	0.05	0.03	100	4	0	0
Chloride (Cl)	mg/L	5	1.1	2.8	1.5	1.3	0.7	0.3	49	2	0	0
Fluoride (F)	mg/L	5	0.18	0.44	0.33	0.32	0.11	0.05	35	0	0	0
Sulfate (SO ₄)	mg/L	5	0.3	1.3	0.9	1.3	0.5	0.2	49	4	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.146	0.047	0.015	0.059	0.026	126	3	0	0
Nitrate (as N)	mg/L	2	0.013	0.139	0.076	0.076	0.089	0.063	118	1	0	0
Nitrite (as N)	mg/L	2	0.003	0.007	0.005	0.005	0.003	0.002	68	1	0	0
Total Kjeldahl Nitrogen	mg/L	5	1.10	3.84	2.19	1.60	1.19	0.53	54	0	0	0
Ortho Phosphate as P	mg/L	5	0.005	0.011	0.006	0.005	0.003	0.001	43	4	0	0
Total Phosphate as P	mg/L	5	0.014	0.044	0.025	0.022	0.012	0.005	46	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	57.6	57.6	57.6	57.6	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	32.40	72.20	44.18	36.05	18.78	9.39	43	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	32.3	101.0	50.9	40.8	28.3	12.7	56	0	1	20
Antimony (Sb)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Arsenic (As)	µg/L	5	1.08	2.94	1.70	1.11	0.86	0.38	51	0	0	0
Barium (Ba)	µg/L	5	16.5	53.1	29.0	17.5	16.9	7.6	58	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	5	17	12	13	4	2	37	1	0	0
Cadmium (Cd)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.14	0.07	0.05	0.04	0.02	59	4	0	0
Copper (Cu)	µg/L	5	0.35	0.99	0.55	0.49	0.26	0.12	48	2	0	0
Iron (Fe)	µg/L	5	58	1570	575	133	686	307	119	0	2	40
Lead (Pb)	µg/L	5	0.025	0.082	0.047	0.025	0.030	0.013	64	3	0	0
Lithium (Li)	µg/L	5	2.5	6.5	3.3	2.5	1.8	0.8	54	4	0	0
Manganese (Mn)	µg/L	5	4.1	287.0	119.9	13.8	152.2	68.1	127	0	0	0
Mercury (Hg)	µg/L	3	0.025	0.025	0.025	0.025	0.000	0.000	0	3	0	0
Molybdenum (Mo)	µg/L	5	0.365	0.561	0.432	0.422	0.079	0.035	18	0	0	0
Nickel (Ni)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.005	0.005	0.005	0.000	0.000	0	5	0	0
Strontium (Sr)	µg/L	5	22.8	63.3	37.5	26.6	18.6	8.3	50	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.510	1.000	0.658	0.559	0.208	0.093	32	0	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	1.0	7.1	3.6	2.2	2.7	1.2	75	1	0	0
Calcium (Ca)	mg/L	5	7.9	26.4	14.5	9.0	8.4	3.8	58	0	0	0
Magnesium (Mg)	mg/L	5	8.9	25.6	15.1	11.6	7.0	3.1	46	0	0	0
Potassium (K)	mg/L	5	1.0	3.2	1.7	1.0	1.0	0.5	59	3	0	0
Silicon (Si)	mg/L	5	0.31	4.00	1.61	1.19	1.46	0.65	90	0	0	0
Sodium (Na)	mg/L	5	1.0	3.6	2.1	2.0	1.2	0.5	55	2	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	18.9	51.9	31.1	26.9	14.4	7.2	46	0	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	1.01	2.96	1.53	1.08	0.95	0.48	62	0	0	0
Barium (Ba)	µg/L	4	14.3	47.8	23.3	15.6	16.3	8.2	70	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	5	17	8	5	6	3	75	3	0	0
Cadmium (Cd)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.60	0.34	0.25	0.18	0.09	52	3	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Copper (Cu)	µg/L	4	0.26	0.42	0.32	0.30	0.07	0.04	23	0	0	0
Iron (Fe)	µg/L	4	48	1150	347	95	536	268	154	0	1	25
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	6.5	3.5	2.5	2.0	1.0	57	3	0	0
Manganese (Mn)	µg/L	4	1.000	6.480	3.225	2.710	2.469	1.234	77	0	0	0
Mercury (Hg)	µg/L	3	0.025	0.025	0.025	0.025	0.000	0.000	0	3	0	0
Molybdenum (Mo)	µg/L	4	0.279	0.520	0.357	0.315	0.110	0.055	31	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	19.8	62.7	31.6	22.0	20.7	10.4	66	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.427	0.949	0.564	0.439	0.257	0.129	46	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	4.2	1.8	1.2	1.7	0.9	98	2	0	0
Calcium (Ca)	mg/L	4	8.2	26.6	13.3	9.1	8.9	4.5	67	0	0	0
Magnesium (Mg)	mg/L	4	9.2	25.8	14.3	11.2	7.7	3.9	54	0	0	0
Potassium (K)	mg/L	4	1.0	3.2	1.6	1.0	1.1	0.6	71	3	0	0
Silicon (Si)	mg/L	4	0.31	3.96	1.55	0.96	1.66	0.83	107	0	0	0
Sodium (Na)	mg/L	4	1.0	3.6	1.7	1.0	1.3	0.7	79	3	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	4	0.01	0.03	0.02	0.01	0.01	0.01	67	3	0	0
Radium-226 (²²⁶ Ra)	Bq/L	4	0.003	0.010	0.004	0.003	0.004	0.002	86	3	0	0
Radium-228 (²²⁸ Ra)	Bq/L	4	0.01	0.10	0.03	0.01	0.05	0.02	138	4	0	0
Thorium-230 (²³⁰ Th)	Bq/L	4	0.005	0.010	0.006	0.005	0.003	0.001	40	3	0	0
Thorium-232 (²³² Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	2	3.330	5.730	4.530	4.530	1.697	1.200	37	0	-	-
Pheopigments	µg/L	1	1.71	1.71	1.71	1.71	-	-	-	0	-	-

Table F2-12

Thorn Lake (TL-03) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	238	310	270	249	34	15	12	0	0	0
Hardness (as CaCO ₃)	mg/L	5	140	176	156	148	18	8	12	0	0	0
pH	pH	5	7.77	8.26	8.03	7.98	0.20	0.09	2	0	0	0
Total Suspended Solids	mg/L	5	1.5	1.5	1.5	1.5	0.0	0.0	0	5	0	0
Total Dissolved Solids	mg/L	5	162	205	180	168	20	9	11	0	0	0
Turbidity	NTU	5	0.8	2.1	1.3	1.2	0.5	0.2	40	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	131	175	151	139	21	10	14	0	0	0
Ammonia as N	mg/L	4	0.02	0.14	0.05	0.03	0.06	0.03	104	0	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	0.3	0.8	0.6	0.8	0.2	0.1	37	1	0	0
Fluoride (F)	mg/L	5	1.03	1.38	1.21	1.18	0.16	0.07	13	0	0	0
Sulfate (SO ₄)	mg/L	5	0.6	0.8	0.7	0.7	0.1	0.0	15	0	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.183	0.077	0.012	0.095	0.042	123	1	0	0
Nitrate (as N)	mg/L	2	0.012	0.183	0.097	0.097	0.121	0.086	124	0	0	0
Nitrite (as N)	mg/L	2	0.001	0.001	0.001	0.001	0.000	0.000	0	2	0	0
Total Kjeldahl Nitrogen	mg/L	5	0.81	0.94	0.85	0.84	0.06	0.02	6	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.001	0.001	0.001	0.000	0.000	54	4	0	0
Total Phosphate as P	mg/L	5	0.008	0.013	0.010	0.009	0.002	0.001	22	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	23.6	23.6	23.6	23.6	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	20.40	22.30	21.43	21.50	1.02	0.51	5	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	1.5	9.0	4.5	4.0	2.8	1.2	62	2	0	0
Antimony (Sb)	µg/L	5	0.05	0.16	0.07	0.05	0.05	0.02	68	4	0	0
Arsenic (As)	µg/L	5	0.85	1.07	0.97	0.94	0.09	0.04	9	0	0	0
Barium (Ba)	µg/L	5	46.2	73.7	59.3	60.6	10.3	4.6	17	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	13	18	15	15	2	1	12	0	0	0
Cadmium (Cd)	µg/L	5	0.009	0.025	0.022	0.025	0.007	0.003	34	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Copper (Cu)	µg/L	5	0.30	0.64	0.47	0.51	0.14	0.06	30	2	0	0
Iron (Fe)	µg/L	5	45	121	74	72	30	14	41	0	0	0
Lead (Pb)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Lithium (Li)	µg/L	5	2.5	2.5	2.5	2.5	0.0	0.0	0	5	0	0
Manganese (Mn)	µg/L	5	10.2	160.0	56.3	28.1	63.0	28.2	112	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	5	1.460	1.910	1.656	1.550	0.226	0.101	14	0	0	0
Nickel (Ni)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.036	0.011	0.005	0.014	0.006	124	4	0	0
Strontium (Sr)	µg/L	5	33.2	42.8	37.6	35.8	4.4	2.0	12	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.150	0.260	0.203	0.200	0.046	0.021	23	0	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	0.5	1.5	0.8	0.5	0.5	0.2	57	4	0	0
Calcium (Ca)	mg/L	5	29.7	40.4	34.5	33.6	4.5	2.0	13	0	0	0
Magnesium (Mg)	mg/L	5	13.6	18.2	16.1	16.0	2.0	0.9	12	0	0	0
Potassium (K)	mg/L	5	1.0	2.1	1.2	1.0	0.5	0.2	40	4	0	0
Silicon (Si)	mg/L	5	1.41	2.67	2.11	2.06	0.51	0.23	24	0	0	0
Sodium (Na)	mg/L	5	2.4	3.5	2.9	2.9	0.4	0.2	14	2	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	0.5	4.1	1.6	1.0	1.7	0.9	105	2	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.90	1.01	0.96	0.97	0.05	0.02	5	0	0	0
Barium (Ba)	µg/L	4	45.6	61.7	53.8	54.0	6.8	3.4	13	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	13	15	14	14	1	0	7	3	0	0
Cadmium (Cd)	µg/L	4	0.009	0.025	0.021	0.025	0.008	0.004	40	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Copper (Cu)	µg/L	4	0.34	0.57	0.48	0.50	0.10	0.05	22	0	0	0
Iron (Fe)	µg/L	4	15	36	20	15	11	5	52	3	0	0
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	2.5	2.5	2.5	0.0	0.0	0	4	0	0
Manganese (Mn)	µg/L	4	0.191	59.100	15.390	1.134	29.152	14.576	189	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	1.330	1.840	1.520	1.455	0.222	0.111	15	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	32.9	41.6	35.5	33.8	4.1	2.0	11	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.23	0.10	0.05	0.09	0.05	95	3	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.136	0.245	0.190	0.189	0.045	0.022	24	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	2.2	0.9	0.5	0.9	0.4	92	3	0	0
Calcium (Ca)	mg/L	4	31.3	39.6	34.0	32.5	3.8	1.9	11	0	0	0
Magnesium (Mg)	mg/L	4	14.6	18.4	16.0	15.5	1.7	0.9	11	0	0	0
Potassium (K)	mg/L	4	1.0	2.0	1.3	1.0	0.5	0.3	40	3	0	0
Silicon (Si)	mg/L	4	1.48	2.79	2.05	1.96	0.55	0.27	27	0	0	0
Sodium (Na)	mg/L	4	2.5	3.1	2.8	2.8	0.3	0.1	9	3	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	4	0.01	0.02	0.01	0.01	0.01	0.00	40	3	0	0
Radium-226 (²²⁶ Ra)	Bq/L	4	0.003	0.007	0.005	0.004	0.002	0.001	52	2	0	0
Radium-228 (²²⁸ Ra)	Bq/L	4	0.01	0.05	0.02	0.01	0.02	0.01	93	4	0	0
Thorium-230 (²³⁰ Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Thorium-232 (²³² Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	2	2.460	3.880	3.170	3.170	1.004	0.710	32	0	-	-
Pheopigments	µg/L	1	1.67	1.67	1.67	1.67	-	-	-	0	-	-

Table F2-13

Ring Lake (TL-04) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	215	606	378	267	188	84	50	0	0	0
Hardness (as CaCO ₃)	mg/L	5	121	358	216	154	108	48	50	0	0	0
pH	pH	5	7.42	8.35	8.02	8.20	0.40	0.18	5	0	0	0
Total Suspended Solids	mg/L	5	3.2	51.8	23.4	7.3	25.6	11.5	110	0	0	0
Total Dissolved Solids	mg/L	5	171	457	277	205	128	57	46	0	0	0
Turbidity	NTU	5	1.3	45.9	18.2	2.8	22.3	10.0	123	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	123	345	208	148	104	47	50	0	0	0
Ammonia as N	mg/L	4	0.02	2.51	0.71	0.14	1.21	0.60	171	0	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	0.9	2.6	1.5	1.0	0.8	0.3	52	0	0	0
Fluoride (F)	mg/L	5	0.67	1.83	1.16	0.94	0.50	0.22	43	0	0	0
Sulfate (SO ₄)	mg/L	5	0.3	0.3	0.3	0.3	0.0	0.0	0	5	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.018	0.007	0.003	0.007	0.003	98	3	0	0
Nitrate (as N)	mg/L	2	0.009	0.018	0.013	0.013	0.006	0.004	47	0	0	0
Nitrite (as N)	mg/L	2	0.001	0.001	0.001	0.001	0.000	0.000	0	2	0	0
Total Kjeldahl Nitrogen	mg/L	5	1.39	6.63	3.57	2.19	2.48	1.11	69	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.005	0.002	0.001	0.002	0.001	109	4	0	0
Total Phosphate as P	mg/L	5	0.012	0.026	0.017	0.016	0.005	0.002	32	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	7.69	7.69	7.69	7.69	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	2.26	61.10	29.87	28.05	24.15	12.08	81	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	4.5	13.6	8.1	6.6	4.2	1.9	51	2	0	0
Antimony (Sb)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Arsenic (As)	µg/L	5	1.29	3.50	2.11	1.56	1.00	0.45	47	0	0	0
Barium (Ba)	µg/L	5	28.9	164.5	77.9	40.8	61.7	27.6	79	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	16	29	22	22	5	2	23	0	0	0
Cadmium (Cd)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.56	0.31	0.25	0.14	0.06	44	4	0	0
Cobalt (Co)	µg/L	5	0.05	0.22	0.11	0.05	0.09	0.04	76	3	0	0
Copper (Cu)	µg/L	5	0.42	0.53	0.48	0.50	0.04	0.02	9	2	0	0
Iron (Fe)	µg/L	5	46	11900	4342	94	5908	2642	136	0	2	40
Lead (Pb)	µg/L	5	0.025	0.057	0.037	0.025	0.016	0.007	45	3	0	0
Lithium (Li)	µg/L	5	2.5	6.9	4.1	2.5	2.2	1.0	54	3	0	0
Manganese (Mn)	µg/L	5	11.2	1255.0	484.2	33.1	639.6	286.0	132	0	0	0
Mercury (Hg)	µg/L	3	0.025	0.025	0.025	0.025	0.000	0.000	0	3	0	0
Molybdenum (Mo)	µg/L	5	0.456	1.470	0.878	0.707	0.451	0.201	51	0	0	0
Nickel (Ni)	µg/L	5	0.25	5.66	1.33	0.25	2.42	1.08	182	4	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.051	0.014	0.005	0.021	0.009	145	4	0	0
Strontium (Sr)	µg/L	5	34.0	95.9	60.3	41.4	30.0	13.4	50	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.030	0.137	0.077	0.065	0.045	0.020	58	0	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	1.0	4.2	2.8	3.2	1.4	0.6	52	1	0	0
Calcium (Ca)	mg/L	5	25.8	79.3	47.0	32.0	25.2	11.3	54	0	0	0
Magnesium (Mg)	mg/L	5	13.2	38.5	22.8	15.3	11.7	5.2	51	0	0	0
Potassium (K)	mg/L	5	2.2	6.5	3.9	2.6	2.0	0.9	52	0	0	0
Silicon (Si)	mg/L	5	0.07	1.62	0.71	0.30	0.71	0.32	100	0	0	0
Sodium (Na)	mg/L	5	1.0	5.3	3.4	2.7	1.9	0.8	56	1	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	0.5	5.6	2.5	1.9	2.2	1.1	90	1	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	1.31	3.68	2.02	1.55	1.11	0.56	55	0	0	0
Barium (Ba)	µg/L	4	27.6	104.0	49.7	33.6	36.5	18.2	73	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	14	27	18	16	6	3	33	0	0	0
Cadmium (Cd)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.50	0.31	0.25	0.13	0.06	40	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.19	0.09	0.05	0.07	0.04	82	3	0	0
Copper (Cu)	µg/L	4	0.26	0.31	0.28	0.28	0.02	0.01	8	0	0	0
Iron (Fe)	µg/L	4	15	5650	1429	25	2814	1407	197	2	1	25
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	6.5	3.5	2.5	2.0	1.0	57	3	0	0
Manganese (Mn)	µg/L	4	0.338	1060.000	266.942	3.715	528.710	264.355	198	0	0	0
Mercury (Hg)	µg/L	3	0.025	0.025	0.025	0.025	0.000	0.000	0	3	0	0
Molybdenum (Mo)	µg/L	4	0.420	1.370	0.693	0.491	0.454	0.227	66	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	31.7	86.8	48.2	37.1	25.9	12.9	54	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.58	0.22	0.12	0.25	0.13	115	2	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.025	0.134	0.058	0.036	0.052	0.026	90	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	4.4	1.9	1.4	1.8	0.9	97	2	0	0
Calcium (Ca)	mg/L	4	26.3	79.9	42.9	32.8	24.8	12.4	58	0	0	0
Magnesium (Mg)	mg/L	4	13.5	38.4	21.1	16.2	11.7	5.8	55	0	0	0
Potassium (K)	mg/L	4	2.3	6.5	3.8	3.1	1.9	1.0	51	0	0	0
Silicon (Si)	mg/L	4	0.08	1.57	0.55	0.27	0.69	0.34	126	0	0	0
Sodium (Na)	mg/L	4	2.0	5.2	3.2	2.7	1.4	0.7	45	0	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Radium-226 (²²⁶ Ra)	Bq/L	4	0.003	0.009	0.004	0.003	0.003	0.002	79	3	0	0
Radium-228 (²²⁸ Ra)	Bq/L	4	0.01	0.02	0.01	0.01	0.00	0.00	22	4	0	0
Thorium-230 (²³⁰ Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Thorium-232 (²³² Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	2	2.520	2.680	2.600	2.600	0.113	0.080	4	0	-	-
Pheopigments	µg/L	1	0.65	0.65	0.65	0.65	-	-	-	0	-	-

Table F2-14

Megan Lake (TL-05) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	419	582	493	449	78	35	16	0	0	0
Hardness (as CaCO ₃)	mg/L	5	252	335	288	260	42	19	14	0	0	0
pH	pH	5	8.09	8.62	8.35	8.46	0.24	0.11	3	0	0	0
Total Suspended Solids	mg/L	5	1.5	7.5	3.7	1.5	3.0	1.4	82	3	0	0
Total Dissolved Solids	mg/L	5	274	355	301	283	34	15	11	0	0	0
Turbidity	NTU	5	1.2	7.2	3.8	1.9	3.1	1.4	82	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	243	371	291	262	55	24	19	0	0	0
Ammonia as N	mg/L	4	0.04	1.19	0.41	0.22	0.53	0.26	127	0	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	1.9	2.7	2.2	2.1	0.3	0.2	16	0	0	0
Fluoride (F)	mg/L	5	2.66	3.60	3.11	3.01	0.40	0.18	13	0	0	0
Sulfate (SO ₄)	mg/L	5	0.3	0.3	0.3	0.3	0.0	0.0	0	5	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.008	0.004	0.003	0.002	0.001	67	4	0	0
Nitrate (as N)	mg/L	2	0.003	0.007	0.005	0.005	0.003	0.002	65	1	0	0
Nitrite (as N)	mg/L	2	0.001	0.001	0.001	0.001	0.000	0.000	53	1	0	0
Total Kjeldahl Nitrogen	mg/L	5	1.52	2.73	2.08	1.96	0.55	0.25	27	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.001	0.001	0.001	0.000	0.000	0	4	0	0
Total Phosphate as P	mg/L	5	0.007	0.037	0.019	0.010	0.014	0.006	72	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	65.9	65.9	65.9	65.9	65.9	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	29.80	35.00	32.70	33.30	2.65	1.33	8	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	0.5	7.1	2.7	2.0	2.6	1.1	97	3	0	0
Antimony (Sb)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Arsenic (As)	µg/L	5	1.73	2.50	2.07	2.03	0.33	0.15	16	0	0	0
Barium (Ba)	µg/L	5	100.0	187.0	140.2	130.0	36.3	16.2	26	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	48	58	52	52	5	2	9	0	0	0
Cadmium (Cd)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Copper (Cu)	µg/L	5	0.25	0.50	0.38	0.39	0.10	0.04	25	2	0	0
Iron (Fe)	µg/L	5	57	872	329	73	379	170	115	0	2	40
Lead (Pb)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Lithium (Li)	µg/L	5	9.3	15.5	11.8	10.9	2.5	1.1	21	0	0	0
Manganese (Mn)	µg/L	5	8.3	395.0	146.2	39.2	177.9	79.5	122	0	0	0
Mercury (Hg)	µg/L	3	0.025	0.025	0.025	0.025	0.000	0.000	0	3	0	0
Molybdenum (Mo)	µg/L	5	0.541	0.886	0.650	0.630	0.138	0.062	21	0	0	0
Nickel (Ni)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.243	0.053	0.005	0.106	0.048	202	4	0	0
Strontium (Sr)	µg/L	5	64.0	104.0	81.9	74.9	16.5	7.4	20	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.053	0.087	0.070	0.064	0.016	0.007	22	0	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	0.5	2.5	1.2	1.1	0.8	0.4	70	2	0	0
Calcium (Ca)	mg/L	5	26.8	40.8	33.8	31.2	6.0	2.7	18	0	0	0
Magnesium (Mg)	mg/L	5	40.6	56.8	48.4	45.2	7.3	3.3	15	0	0	0
Potassium (K)	mg/L	5	4.5	6.4	5.7	6.1	0.8	0.4	15	0	0	0
Silicon (Si)	mg/L	5	1.94	4.97	3.52	3.68	1.36	0.61	39	0	0	0
Sodium (Na)	mg/L	5	7.6	11.0	9.3	9.5	1.3	0.6	14	1	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	1.4	4.1	2.3	1.9	1.2	0.6	54	0	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	1.81	2.45	2.22	2.30	0.28	0.14	13	0	0	0
Barium (Ba)	µg/L	4	102.0	155.0	123.0	117.5	22.6	11.3	18	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	47	56	51	51	4	2	7	0	0	0
Cadmium (Cd)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.75	0.44	0.38	0.24	0.12	55	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Copper (Cu)	µg/L	4	0.27	0.58	0.39	0.35	0.14	0.07	35	0	0	0
Iron (Fe)	µg/L	4	15	46	23	15	16	8	68	3	0	0
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	9.4	14.1	11.4	11.1	2.0	1.0	17	0	0	0
Manganese (Mn)	µg/L	4	0.218	262.000	68.299	5.489	129.228	64.614	189	0	0	0
Mercury (Hg)	µg/L	3	0.025	0.025	0.025	0.025	0.000	0.000	0	3	0	0
Molybdenum (Mo)	µg/L	4	0.537	0.775	0.624	0.593	0.105	0.052	17	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.03	0.01	0.01	0.01	0.01	100	3	0	0
Strontium (Sr)	µg/L	4	66.6	88.7	74.8	71.9	9.9	4.9	13	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.34	0.12	0.05	0.15	0.07	118	3	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.049	0.086	0.064	0.060	0.016	0.008	26	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	3.9	2.1	2.0	1.8	0.9	88	2	0	0
Calcium (Ca)	mg/L	4	30.1	40.1	33.1	31.0	4.7	2.4	14	0	0	0
Magnesium (Mg)	mg/L	4	43.0	56.9	47.2	44.4	6.5	3.3	14	0	0	0
Potassium (K)	mg/L	4	4.7	6.1	5.6	5.8	0.7	0.3	12	0	0	0
Silicon (Si)	mg/L	4	2.07	4.97	3.26	3.00	1.33	0.67	41	0	0	0
Sodium (Na)	mg/L	4	7.9	9.6	8.9	9.0	0.8	0.4	9	0	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	5	0.01	0.03	0.01	0.01	0.01	0.00	64	4	0	0
Radium-226 (²²⁶ Ra)	Bq/L	5	0.003	0.010	0.004	0.003	0.003	0.002	84	4	0	0
Radium-228 (²²⁸ Ra)	Bq/L	5	0.01	0.05	0.02	0.01	0.02	0.01	85	5	0	0
Thorium-230 (²³⁰ Th)	Bq/L	5	0.005	0.020	0.008	0.005	0.007	0.003	84	4	0	0
Thorium-232 (²³² Th)	Bq/L	5	0.005	0.005	0.005	0.005	0.000	0.000	0	5	0	0
Biota												
Chlorophyll a	µg/L	2	0.930	3.210	2.070	2.070	1.612	1.140	78	0	-	-
Pheopigments	µg/L	1	0.45	0.45	0.45	0.45	-	-	-	0	-	-

Table F2-15

Thor Lake Original (TL-01 & TL-02) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value TL-01	Maximum Value TL-01	Mean Value TL-01	Median TL-01	Standard Deviation TL-01	Standard Error TL-01	Coefficient of Variation TL-01	No. < DL TL-01	No. > GL TL-01	% > GL TL-01	Minimum Value TL-02	Maximum Value TL-02	Mean Value TL-02	Median TL-02	Standard Deviation TL-02	Standard Error TL-02	Coefficient of Variation TL-02	No. < DL TL-02	No. > GL TL-02	% > GL TL-02
Physicals																						
Conductivity	mg/L	2	292	357	325	325	46	33	14	0	0	0	292	353	323	323	43	31	13	0	0	0
Hardness (as CaCO ₃)	uS/cm	2	156	191	174	174	25	18	14	0	0	0	158	185	172	172	19	14	11	0	0	0
pH	pH	2	8.11	8.39	8.25	8.25	0.20	0.14	2.40	0	0	0	8	8.43	8.26	8.26	0.24	0.17	2.91	0	0	0
Total Suspended Solids	mg/L	2	1.5	1.50	1.50	1.50	0.00	0.00	0.00	2	0	0	2	3.00	2.25	2.25	1.06	0.75	47.14	1	0	0
Total Dissolved Solids	mg/L	2	174	215	195	195	29	21	15	0	0	0	171	212	192	192	29	21	15	0	0	0
Turbidity	NTU	2	0.57	0.89	0.73	0.73	0.23	0.16	31.00	0	0	0	1	0.97	0.93	0.93	0.06	0.04	6.88	0	0	0
Anions																						
Alkalinity, Total (as CaCO ₃)	mg/L	2	157	202	180	180	32	23	18	0	0	0	147	199	173	173	37	26	21	0	0	0
Ammonia as N	mg/L	1	0.01	0.010	0.010	0.010	-	-	-	1	0	0	0	0.024	0.024	0.024	-	-	-	0	0	0
Bromide (Br)	mg/L	1	0.025	0.025	0.025	0.025	-	-	-	1	0	0	0	0.025	0.025	0.025	-	-	-	1	0	0
Chloride (Cl)	mg/L	2	4.12	5.01	4.57	4.57	0.63	0.45	13.79	0	0	0	4	4.97	4.54	4.54	0.61	0.43	13.39	0	0	0
Fluoride (F)	mg/L	2	1.08	1.27	1.18	1.18	0.13	0.09	11.43	0	0	0	1	1.25	1.17	1.17	0.12	0.09	10.32	0	0	0
Sulfate (SO ₄)	mg/L	2	0.25	0.25	0.25	0.25	0.00	0.00	0.00	2	0	0	0	0.25	0.25	0.25	0.00	0.00	0.00	2	0	0
Nutrients																						
Nitrate and Nitrite as N	mg/L	2	0.0025	0.1920	0.0973	0.0973	0.1340	0.0948	137.7858	1	0	0	0	0.2130	0.1078	0.1078	0.1488	0.1053	138.1401	1	0	0
Nitrate (as N)	mg/L	1	0.0025	0.0025	0.0025	0.0025	-	-	-	1	0	0	0	0.0025	0.0025	0.0025	-	-	-	1	0	0
Nitrite (as N)	mg/L	1	0.0005	0.0005	0.0005	0.0005	-	-	-	1	0	0	0	0.0005	0.0005	0.0005	-	-	-	1	0	0
Total Kjeldahl Nitrogen	mg/L	2	0.556	0.695	0.626	0.626	0.098	0.070	15.713	0	0	0	1	0.700	0.673	0.673	0.039	0.028	5.783	0	0	0
Ortho Phosphate as P	mg/L	2	0.0005	0.0005	0.0005	0.0005	0.0000	0.0000	0.0000	2	0	0	0	0.0005	0.0005	0.0005	0.0000	0.0000	0.0000	2	0	0
Total Phosphate as P	mg/L	2	0.0061	0.0071	0.0066	0.0066	0.0007	0.0005	10.7137	0	0	0	0	0.0076	0.0074	0.0074	0.0003	0.0002	3.8222	0	0	0
Organics																						
Total Organic Carbon (TOC)	mg/L	1	15.4	15.4	15.4	15.4	-	-	-	0	0	0	16	15.6	15.6	15.6	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	1	13.8	13.8	13.8	13.8	-	-	-	0	0	0	14	13.9	13.9	13.9	-	-	-	0	0	0
Total Metals																						
Aluminum (Al)	µg/L	2	3.2	3.9	3.6	3.6	0.5	0.4	13.9	0	0	0	1.7	4.0	2.9	2.9	1.6	1.2	57.1	0	0	0
Antimony (Sb)	µg/L	2	0.05	0.05	0.05	0.05	0.00	0.00	0.00	2	0	0	0.05	0.05	0.05	0.05	0.00	0.00	0.00	2	0	0
Arsenic (As)	µg/L	2	0.68	0.95	0.82	0.82	0.19	0.14	23.43	0	0	0	0.70	0.91	0.81	0.81	0.15	0.11	18.45	0	0	0
Barium (Ba)	µg/L	2	57.6	82.9	70.3	70.3	17.9	12.7	25.5	0	0	0	58.7	78.2	68.5	68.5	13.8	9.8	20.1	0	0	0
Beryllium (Be)	µg/L	2	0.25	0.25	0.25	0.25	0.00	0.00	0.00	2	0	0	0.25	0.25	0.25	0.25	0.00	0.00	0.00	2	0	0
Bismuth (Bi)	µg/L	2	0.25	0.25	0.25	0.25	0.00	0.00	0.00	2	0	0	0.25	0.25	0.25	0.25	0.00	0.00	0.00	2	0	0
Boron (B)	µg/L	2	26	26	26	26	0	0	0	0	0	0	25	26	26	26	1	1	3	0	0	0
Cadmium (Cd)	µg/L	2	0.025	0.025	0.025	0.025	0.000	0.000	0.000	2	0	0	0.025	0.025	0.025	0.025	0.000	0.000	0.000	2	0	0
Chromium (Cr)	µg/L	2	0.25	0.35	0.30	0.30	0.07	0.05	23.57	2	0	0	0.25	0.25	0.25	0.25	0.00	0.00	0.00	2	0	0
Cobalt (Co)	µg/L	2	0.05	0.05	0.05	0.05	0.00	0.00	0.00	2	0	0	0.05	0.05	0.05	0.05	0.00	0.00	0.00	2	0	0
Copper (Cu)	µg/L	2	0.29	0.29	0.29	0.29	-	-	-	0	1	50	0.33	0.84	0.59	0.59	0.36	0.26	61.65	0	0	0
Iron (Fe)	µg/L	2	15	77	46	46	44	31	95	1	0	0	47	58	53	53	8	6	15	0	0	0
Lead (Pb)	µg/L	2	0.025	0.228	0.127	0.127	0.144	0.102	113.472	1	0	0	0.025	0.025	0.025	0.025	0.000	0.000	0.000	2	0	0
Lithium (Li)	µg/L	2	5.8	6.0	5.9	5.9	0.1	0.1	2.4	0	0	0	5.7	5.9	5.8	5.8	0.1	0.1	2.4	0	0	0
Manganese (Mn)	µg/L	2	17.4	24.8	21.1	21.1	5.2	3.7	24.8	0	0	0	25.7	47.9	36.8	36.8	15.7	11.1	42.7	0	0	0
Mercury (Hg)	µg/L	0	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-	-	-	0	0
Molybdenum (Mo)	µg/L	2	2.01	2.17	2.09	2.09	0.11	0.08	5.41	0	0	0	2.04	2.12	2.08	2.08	0.06	0.04	2.72	0	0	0
Nickel (Ni)	µg/L	2	0.25	0.25	0.25	0.25	0.00	0.00	0.00	2	0	0	0.25	0.25	0.25	0.25	0.00	0.00	0.00	2	0	0
Phosphorus (P)	µg/L	2	150	150	150	150	0	0	0	2	0	0	150	150	150	150	0	0	0	2	0	0
Selenium (Se)	µg/L	2	0.5	0.5	0.5	0.5	0.0	0.0	0.0	2	0	0	0.5	0.5	0.5	0.5	0.0	0.0	0.0	2	0	0
Silver (Ag)	µg/L	2	0.005	0.005	0.005	0.005	0.000	0.000	0.000	2	0	0	0.005	0.005	0.005	0.005	0.000	0.000	0.000	2	0	0
Strontium (Sr)	µg/L	2	51.6	68.3	60.0	60.0	11.8	8.3	19.7	0	0	0	52.2	64.7	58.5	58.5	8.8	6.2	15.1	0	0	0
Thallium (Tl)	µg/L	2	0.05	0.05	0.05	0.05	0.00	0.00	0.00	2	0	0	0.05	0.05	0.05	0.05	0.00	0.00	0.00	2	0	0
Tin (Sn)	µg/L	2	0.05	0.20	0.13	0.13	0.11	0.08	84.85	1	0	0	0.05	0.05	0.05	0.05	0.00	0.00	0.00	2	0	0
Titanium (Ti)	µg/L	2	5	5	5	5	0	0	0	2	0	0	5	5	5	5	0	0	0	2	0	0
Uranium (U)	µg/L	2	0.309	0.378	0.344	0.344	0.049	0.034	14.204	0	0	0	0.315	0.367	0.341	0.341	0.037	0.026	10.783	0	0	0
Vanadium (V)	µg/L	2	0.5	0.5	0.5	0.5	0.0	0.0	0.0	2	0	0	0.5	0.5	0.5	0.5	0.0	0.0	0.0	2	0	0
Zinc (Zn)	µg/L	2	1.1	2.6	1.9	1.9	1.1	0.8	57.3	0	0	0	1.7	1.9	1.8	1.8	0.1	0.1	7.9	0	0	0
Calcium (Ca)	mg/L	2	32.2	40.5	36.4	36.4	5.9	4.2	16.1	0	0	0	33.1	39.2	36.2	36.2	4.3	3.0	11.9	0	0	0
Magnesium (Mg)	mg/L	2	17.3	21.9	19.6	19.6	3.3	2.3	16.6	0	0	0	17.5	21.2	19.4	19.4	2.6	1.8	13.5	0	0	0
Potassium (K)	mg/L	2	2.2	2.4	2.3	2.3	0.1	0.1	6.1	0	0	0	2.2	2.3	2.3	2.3	0.1	0.0	3.1	0	0	0
Silicon (Si)	mg/L	2	3.08	3.96	3.52	3.52	0.62	0.44	17.68	0	0	0	3.16	3.88	3.52	3.52	0.51	0.36	14.46	0	0	0
Sodium (Na)	mg/L	2	6.6	8.0	7.3	7.3	1.0	0.7	13.6	0	0	0	6.6	7.8	7.2	7.2	0.8	0.6	11.8	0	0	0
Dissolved Metals																						
Aluminum (Al)	µg/L	1	0.5	0.5	0.5	0.5	-	-	-	1	0	0	1.1	1.1	1.1	1.1	-	-	-	0	0	0

Table F2-16

Thor Lake East & West (TL-06 & TL-07) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value TL-06	Maximum Value TL-06	Mean Value TL-06	Median TL-06	Standard Deviation TL-06	Standard Error TL-06	Coefficient of Variation TL-06	No. < DL TL-06	No. > GL TL-06	% > GL TL-06	Minimum Value TL-07	Maximum Value TL-07	Mean Value TL-07	Median TL-07	Standard Deviation TL-07	Standard Error TL-07	Coefficient of Variation TL-07	No. < DL TL-07	No. > GL TL-07	% > GL TL-07
Physicals																						
Conductivity	mg/L	4	278	356	305	292	35	17	11	0	0	0	278	351	303	292	33	16	11	0	0	0
Hardness (as CaCO ₃)	uS/cm	4	155	193	167	160	17	9	10	0	0	0	154	190	166	159	17	8	10	0	0	0
pH	pH	4	7.77	8.43	8.14	8.18	0.29	0.15	4	0	0	0	8.02	8.39	8.19	8.17	0.18	0.09	2	0	0	0
Total Suspended Solids	mg/L	4	1.5	1.5	1.5	1.5	0.0	0.0	0	4	0	0	1.5	3.3	2.4	2.4	1.0	0.5	43	2	0	0
Total Dissolved Solids	mg/L	4	175	229	189	176	27	13	14	0	0	0	176	219	188	179	21	10	11	0	0	0
Turbidity	NTU	4	0.9	1.6	1.3	1.4	0.3	0.2	23	0	0	0	1.0	1.7	1.4	1.4	0.3	0.1	20	0	0	0
Anions																						
Alkalinity, Total (as CaCO ₃)	mg/L	4	144	205	165	156	27	14	17	0	0	0	140	204	167	161	27	13	16	0	0	0
Ammonia as N	mg/L	4	0.01	0.06	0.02	0.02	0.02	0.01	94	2	0	0	0.01	0.04	0.02	0.02	0.01	0.01	53	1	0	0
Bromide (Br)	mg/L	3	0.03	0.03	0.03	0.03	0.00	0.00	0	3	0	0	0.03	0.03	0.03	0.03	0.00	0.00	0	3	0	0
Chloride (Cl)	mg/L	4	3.7	5.1	4.3	4.2	0.6	0.3	14	0	0	0	3.1	5.0	4.0	3.9	0.8	0.4	20	0	0	0
Fluoride (F)	mg/L	4	0.94	1.26	1.08	1.06	0.13	0.07	12	0	0	0	0.76	1.24	1.00	1.01	0.20	0.10	20	0	0	0
Sulfate (SO ₄)	mg/L	4	0.3	0.3	0.3	0.3	0.0	0.0	0	4	0	0	0.3	0.3	0.3	0.3	0.0	0.0	0	4	0	0
Nutrients																						
Nitrate and Nitrite as N	mg/L	3	0.003	0.226	0.077	0.003	0.129	0.075	168	2	0	0	0.003	0.386	0.130	0.003	0.221	0.128	170	2	0	0
Nitrate (as N)	mg/L	3	0.003	0.226	0.077	0.003	0.129	0.075	168	2	0	0	0.003	0.386	0.130	0.003	0.221	0.128	170	2	0	0
Nitrite (as N)	mg/L	3	0.001	0.001	0.001	0.001	0.000	0.000	0	3	0	0	0.001	0.001	0.001	0.001	0.000	0.000	0	3	0	0
Total Kjeldahl Nitrogen	mg/L	4	0.58	2.49	1.08	0.62	0.94	0.47	88	0	0	0	0.56	0.60	0.59	0.60	0.02	0.01	4	0	0	0
Ortho Phosphate as P	mg/L	4	0.001	0.001	0.001	0.001	0.000	0.000	0	4	0	0	0.001	0.001	0.001	0.001	0.000	0.000	0	4	0	0
Total Phosphate as P	mg/L	4	0.005	0.008	0.007	0.007	0.001	0.001	17	0	0	0	0.005	0.013	0.008	0.008	0.004	0.002	47	0	0	0
Organics																						
Total Organic Carbon (TOC)	mg/L	0	-	-	-	-	-	-	-	-	0	0	-	-	-	-	-	-	-	-	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	13.80	14.80	14.18	14.05	0.43	0.22	3	0	0	0	12.00	14.80	13.48	13.55	1.15	0.58	9	0	0	0
Total Metals																						
Aluminum (Al)	µg/L	4	1.5	3.9	2.6	2.5	1.0	0.5	38	3	0	0	0.5	13.3	4.6	2.3	5.9	2.9	128	3	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.64	0.83	0.74	0.75	0.08	0.04	11	0	0	0	0.67	0.87	0.77	0.77	0.09	0.04	11	0	0	0
Barium (Ba)	µg/L	4	47.8	73.4	63.3	66.0	12.2	6.1	19	0	0	0	47.8	73.6	62.4	64.2	11.4	5.7	18	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	21	28	26	27	3	2	12	0	0	0	22	28	25	26	3	1	10	0	0	0
Cadmium (Cd)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.50	0.31	0.25	0.13	0.06	40	4	0	0	0.25	0.50	0.31	0.25	0.13	0.06	40	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Copper (Cu)	µg/L	4	0.20	0.39	0.30	0.30	0.09	0.04	29	2	0	0	0.11	0.44	0.30	0.33	0.14	0.07	46	1	0	0
Iron (Fe)	µg/L	4	41	131	81	77	40	20	50	0	0	0	53	232	121	100	77	39	64	0	0	0
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	5.1	6.8	5.9	5.8	0.9	0.4	15	0	0	0	5.0	6.7	5.7	5.6	0.7	0.4	13	0	0	0
Manganese (Mn)	µg/L	4	26.7	130.0	70.1	61.9	45.0	22.5	64	0	0	0	37.9	82.6	59.5	58.7	18.9	9.4	32	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	1.880	2.370	2.143	2.160	0.207	0.103	10	0	0	0	1.910	2.510	2.268	2.325	0.271	0.135	12	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Strontium (Sr)	µg/L	4	44.5	63.7	56.1	58.2	9.1	4.6	16	0	0	0	44.5	66.2	56.7	58.0	10.3	5.1	18	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.312	0.429	0.370	0.369	0.062	0.031	17	0	0	0	0.309	0.477	0.382	0.371	0.078	0.039	20	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	1.6	0.9	0.8	0.5	0.3	58	3	0	0	0.5	3.1	1.5	1.2	1.1	0.6	77	2	0	0
Calcium (Ca)	mg/L	4	31.4	40.2	34.4	33.0	4.0	2.0	12	0	0	0	31.4	41.0	34.6	32.9	4.4	2.2	13	0	0	0
Magnesium (Mg)	mg/L	4	16.9	21.5	18.5	17.8	2.0	1.0	11	0	0	0	16.8	21.4	18.2	17.4	2.1	1.1	12	0	0	0
Potassium (K)	mg/L	4	1.0	2.4	2.0	2.3	0.7	0.3	33	1	0	0	1.0	2.3	1.9	2.2	0.6	0.3	32	1	0	0
Silicon (Si)	mg/L	4	2.39	4.16	3.15	3.02	0.75	0.37	24	0	0	0	2.40	4.15	3.13	2.99	0.75	0.37	24	0	0	0
Sodium (Na)	mg/L	4	5.8	7.0	6.6	6.8	0.5	0.3	8	0	0	0	5.8	6.7	6.4	6.6	0.4	0.2	7	0	0	0
Dissolved Metals																						
Aluminum (Al)	µg/L	4	0.5	1.5	0.8	0.5	0.5	0.3	67	3	0	0	0.5	1.4	0.7	0.5	0.5	0.2	62	3	0	0

Parameter	Units	n	Minimum Value TL-06	Maximum Value TL-06	Mean Value TL-06	Median TL-06	Standard Deviation TL-06	Standard Error TL-06	Coefficient of Variation TL-06	No. < DL TL-06	No. > GL TL-06	% > GL TL-06	Minimum Value TL-07	Maximum Value TL-07	Mean Value TL-07	Median TL-07	Standard Deviation TL-07	Standard Error TL-07	Coefficient of Variation TL-07	No. < DL TL-07	No. > GL TL-07	% > GL TL-07
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.76	0.82	0.80	0.81	0.03	0.01	3	0	0	0	0.77	0.80	0.79	0.79	0.01	0.01	2	0	0	0
Barium (Ba)	µg/L	4	46.5	68.6	59.4	61.2	10.6	5.3	18	0	0	0	45.6	67.7	58.1	59.6	11.1	5.5	19	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	21	25	24	25	2	1	8	0	0	0	20	25	23	24	2	1	10	0	0	0
Cadmium (Cd)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.50	0.38	0.38	0.10	0.05	28	4	0	0	0.25	0.50	0.34	0.30	0.12	0.06	35	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	3	0	0	0.05	0.05	0.05	0.05	0.00	0.00	0	3	0	0
Copper (Cu)	µg/L	4	0.16	0.24	0.20	0.19	0.03	0.02	18	0	0	0	0.17	0.22	0.19	0.18	0.02	0.01	13	0	0	0
Iron (Fe)	µg/L	4	15	15	15	15	0	0	0	4	0	0	15	15	15	15	0	0	0	4	0	0
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	6.5	4.9	5.2	1.7	0.8	35	1	0	0	2.5	6.7	4.2	3.9	2.1	1.0	49	2	0	0
Manganese (Mn)	µg/L	4	0.121	10.700	3.993	2.575	4.978	2.489	125	0	0	0	0.149	7.890	2.222	0.425	3.781	1.891	170	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	1.810	2.060	1.928	1.920	0.126	0.063	7	0	0	0	1.710	2.200	1.928	1.900	0.233	0.116	12	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	42.5	64.2	53.0	52.7	9.5	4.8	18	0	0	0	42.2	64.6	52.3	51.2	10.1	5.1	19	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.79	0.24	0.05	0.37	0.19	157	3	0	0	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.224	0.412	0.299	0.280	0.080	0.040	27	0	0	0	0.243	0.478	0.320	0.279	0.107	0.054	34	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	3.1	1.2	0.5	1.3	0.7	113	3	0	0	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Calcium (Ca)	mg/L	4	33.2	41.7	36.0	34.6	3.9	1.9	11	0	0	0	33.0	40.9	35.6	34.3	3.6	1.8	10	0	0	0
Magnesium (Mg)	mg/L	4	17.4	21.6	18.7	17.9	2.0	1.0	11	0	0	0	17.4	21.5	18.6	17.8	1.9	1.0	10	0	0	0
Potassium (K)	mg/L	4	1.0	2.4	1.9	2.2	0.6	0.3	33	0	0	0	1.0	2.3	1.9	2.2	0.6	0.3	32	0	0	0
Silicon (Si)	mg/L	4	2.52	4.23	3.23	3.08	0.73	0.37	23	0	0	0	2.50	4.14	3.20	3.07	0.70	0.35	22	0	0	0
Sodium (Na)	mg/L	4	5.9	6.7	6.4	6.5	0.4	0.2	6	0	0	0	5.9	6.6	6.4	6.5	0.3	0.2	5	0	0	0
Radionuclides																						
Lead-210 (210Pb)	Bq/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Radium-226 (226Ra)	Bq/L	4	0.003	0.010	0.005	0.004	0.004	0.002	68	2	0	0	0.003	0.010	0.004	0.003	0.004	0.002	86	3	0	0
Radium-228 (228Ra)	Bq/L	4	0.01	0.03	0.02	0.02	0.01	0.00	49	4	0	0	0.01	0.03	0.02	0.02	0.01	0.00	49	4	0	0
Thorium-230 (230Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Thorium-232 (232Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota																						
Chlorophyll a	µg/L	2	1.760	2.230	1.995	1.995	0.332	0.235	17	0	-	-	2.010	2.040	2.025	2.025	0.021	0.015	1	0	-	-
Pheopigments	µg/L	1	1.43	1.43	1.43	1.43	-	-	-	0	-	-	0.712	0.712	0.712	0.71	-	-	-	0	-	-

Table F2-17

Wasp Lake (UN-04) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	247	638	420	302	197	88	47	0	0	0
Hardness (as CaCO ₃)	mg/L	5	146	378	242	174	112	50	46	0	0	0
pH	pH	5	7.65	8.48	8.10	8.24	0.33	0.15	4	0	0	0
Total Suspended Solids	mg/L	5	1.5	129.0	37.9	6.0	54.7	24.5	145	1	0	0
Total Dissolved Solids	mg/L	5	186	434	280	208	113	50	40	0	0	0
Turbidity	NTU	5	0.9	81.0	26.1	2.3	35.9	16.1	138	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	144	365	236	172	108	48	46	0	0	0
Ammonia as N	mg/L	4	0.05	3.72	1.23	0.58	1.71	0.86	139	0	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	0.5	2.1	1.2	0.8	0.7	0.3	60	0	0	0
Fluoride (F)	mg/L	5	1.08	2.59	1.72	1.40	0.67	0.30	39	0	0	0
Sulfate (SO ₄)	mg/L	5	0.3	0.3	0.3	0.3	0.0	0.0	0	5	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.016	0.007	0.007	0.006	0.002	77	1	0	0
Nitrate (as N)	mg/L	2	0.003	0.014	0.008	0.008	0.008	0.006	99	1	0	0
Nitrite (as N)	mg/L	2	0.001	0.002	0.001	0.001	0.001	0.001	85	1	0	0
Total Kjeldahl Nitrogen	mg/L	5	1.21	6.43	3.41	2.51	2.35	1.05	69	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.024	0.005	0.001	0.011	0.005	202	4	0	0
Total Phosphate as P	mg/L	5	0.010	0.123	0.038	0.014	0.048	0.022	126	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	55.8	55.8	55.8	55.8	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	25.90	45.40	32.50	29.35	9.19	4.60	28	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	3.4	21.6	9.0	5.0	7.5	3.4	83	1	0	0
Antimony (Sb)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Arsenic (As)	µg/L	5	0.97	2.64	1.66	1.20	0.79	0.35	47	0	0	0
Barium (Ba)	µg/L	5	53.6	280.0	144.2	91.7	99.5	44.5	69	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	18	32	25	25	6	2	22	0	0	0
Cadmium (Cd)	µg/L	5	0.009	0.025	0.022	0.025	0.007	0.003	34	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.26	0.12	0.05	0.10	0.05	83	3	0	0
Copper (Cu)	µg/L	5	0.20	0.54	0.41	0.45	0.15	0.07	37	2	0	0
Iron (Fe)	µg/L	5	45	11000	4269	49	5787	2588	136	0	2	40
Lead (Pb)	µg/L	5	0.025	0.060	0.032	0.025	0.016	0.007	49	4	0	0
Lithium (Li)	µg/L	5	2.5	10.4	6.0	5.7	3.6	1.6	60	2	0	0
Manganese (Mn)	µg/L	5	7.9	581.0	218.5	17.5	285.9	127.8	131	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	5	0.521	1.810	1.008	0.913	0.499	0.223	50	0	0	0
Nickel (Ni)	µg/L	5	0.25	0.53	0.31	0.25	0.13	0.06	41	4	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.044	0.013	0.005	0.017	0.008	136	4	0	0
Strontium (Sr)	µg/L	5	45.1	142.0	89.3	64.4	44.0	19.7	49	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.036	0.166	0.089	0.095	0.054	0.024	61	0	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	0.5	3.2	1.6	1.5	1.2	0.5	73	3	0	0
Calcium (Ca)	mg/L	5	31.2	84.9	54.2	39.1	25.6	11.5	47	0	0	0
Magnesium (Mg)	mg/L	5	14.1	40.9	25.4	18.4	12.4	5.5	49	0	0	0
Potassium (K)	mg/L	5	1.0	3.3	1.9	1.0	1.2	0.6	65	3	0	0
Silicon (Si)	mg/L	5	0.23	4.15	2.10	1.04	1.87	0.84	89	0	0	0
Sodium (Na)	mg/L	5	3.0	8.9	5.6	4.5	2.6	1.2	47	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	1.0	5.7	2.5	1.7	2.2	1.1	88	2	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	1.07	2.54	1.52	1.24	0.69	0.35	46	0	0	0
Barium (Ba)	µg/L	4	53.9	174.0	95.5	77.0	53.8	26.9	56	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	15	30	22	21	6	3	29	0	0	0
Cadmium (Cd)	µg/L	4	0.009	0.025	0.021	0.025	0.008	0.004	40	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.21	0.09	0.05	0.08	0.04	89	3	0	0
Copper (Cu)	µg/L	4	0.20	0.40	0.30	0.30	0.10	0.05	33	0	0	0
Iron (Fe)	µg/L	4	15	2660	676	15	1323	661	196	3	1	25
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	9.7	4.3	2.5	3.6	1.8	84	3	0	0
Manganese (Mn)	µg/L	4	0.745	450.000	113.551	1.730	224.300	112.150	198	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	0.485	1.710	0.911	0.725	0.548	0.274	60	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	44.8	126.0	72.3	59.2	36.5	18.2	50	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.41	0.17	0.12	0.17	0.08	98	2	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.032	0.157	0.075	0.055	0.058	0.029	78	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	4.2	1.9	1.4	1.8	0.9	95	2	0	0
Calcium (Ca)	mg/L	4	33.4	84.4	48.4	37.9	24.1	12.1	50	0	0	0
Magnesium (Mg)	mg/L	4	15.2	40.6	22.9	17.9	11.9	6.0	52	0	0	0
Potassium (K)	mg/L	4	1.0	3.1	1.5	1.0	1.1	0.5	69	3	0	0
Silicon (Si)	mg/L	4	0.22	3.91	1.54	1.02	1.62	0.81	105	0	0	0
Sodium (Na)	mg/L	4	3.2	7.7	4.7	4.0	2.0	1.0	43	0	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	4	0.01	0.04	0.02	0.01	0.02	0.01	86	4	0	0
Radium-226 (²²⁶ Ra)	Bq/L	4	0.003	0.025	0.013	0.013	0.011	0.005	81	2	0	0
Radium-228 (²²⁸ Ra)	Bq/L	4	0.01	0.39	0.10	0.01	0.19	0.10	184	3	0	0
Thorium-230 (²³⁰ Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Thorium-232 (²³² Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	2	2.290	3.050	2.670	2.670	0.537	0.380	20	0	-	-
Pheopigments	µg/L	1	0.851	0.851	0.851	0.85	-	-	-	0	-	-

Table F2-18

Pistol Lake (UN-05) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	215	806	474	288	302	135	64	0	0	0
Hardness (as CaCO ₃)	mg/L	5	123	478	272	171	171	76	63	0	0	0
pH	pH	5	7.64	8.56	8.12	8.26	0.37	0.16	5	0	0	0
Total Suspended Solids	mg/L	5	1.5	73.5	29.4	1.5	38.2	17.1	130	3	0	0
Total Dissolved Solids	mg/L	5	154	552	311	194	187	84	60	0	0	0
Turbidity	NTU	5	0.5	99.0	37.2	1.4	49.8	22.3	134	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	123	465	266	160	171	77	64	0	0	0
Ammonia as N	mg/L	4	0.06	4.51	1.34	0.40	2.14	1.07	159	0	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	0.3	2.5	1.3	0.8	1.1	0.5	81	1	0	0
Fluoride (F)	mg/L	5	1.25	3.90	2.47	1.80	1.32	0.59	53	0	0	0
Sulfate (SO ₄)	mg/L	5	0.3	0.3	0.3	0.3	0.0	0.0	0	5	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.013	0.006	0.003	0.005	0.002	83	3	0	0
Nitrate (as N)	mg/L	2	0.008	0.011	0.010	0.010	0.002	0.002	23	0	0	0
Nitrite (as N)	mg/L	2	0.001	0.002	0.001	0.001	0.001	0.001	85	1	0	0
Total Kjeldahl Nitrogen	mg/L	5	1.20	8.02	4.15	2.24	3.54	1.58	85	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.001	0.001	0.001	0.000	0.000	0	5	0	0
Total Phosphate as P	mg/L	5	0.007	0.026	0.013	0.009	0.008	0.004	60	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	65.1	65.1	65.1	65.1	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	21.40	52.70	31.90	26.75	14.41	7.20	45	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	2.7	24.2	12.8	14.2	8.0	3.6	62	1	0	0
Antimony (Sb)	µg/L	5	0.05	0.10	0.06	0.05	0.02	0.01	37	5	0	0
Arsenic (As)	µg/L	5	0.93	3.49	2.00	1.23	1.23	0.55	61	0	0	0
Barium (Ba)	µg/L	5	37.9	281.0	129.9	57.5	115.1	51.5	89	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.50	0.30	0.25	0.11	0.05	37	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.50	0.30	0.25	0.11	0.05	37	5	0	0
Boron (B)	µg/L	5	13	23	18	16	4	2	24	0	0	0
Cadmium (Cd)	µg/L	5	0.009	0.050	0.027	0.025	0.015	0.007	56	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.50	0.35	0.25	0.14	0.06	39	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.35	0.16	0.05	0.15	0.07	95	3	0	0
Copper (Cu)	µg/L	5	0.05	0.50	0.28	0.37	0.21	0.10	77	2	0	0
Iron (Fe)	µg/L	5	15	18500	7102	59	9692	4334	136	1	2	40
Lead (Pb)	µg/L	5	0.025	0.050	0.030	0.025	0.011	0.005	37	5	0	0
Lithium (Li)	µg/L	5	2.5	9.0	4.3	2.5	2.8	1.3	66	4	0	0
Manganese (Mn)	µg/L	5	1.7	1900.0	719.3	8.8	980.5	438.5	136	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	5	0.562	2.680	1.498	0.956	1.071	0.479	71	0	0	0
Nickel (Ni)	µg/L	5	0.25	0.50	0.30	0.25	0.11	0.05	37	5	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	1.0	0.6	0.5	0.2	0.1	37	5	0	0
Silver (Ag)	µg/L	5	0.005	0.010	0.006	0.005	0.002	0.001	37	5	0	0
Strontium (Sr)	µg/L	5	32.1	119.0	70.5	42.0	44.0	19.7	62	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.10	0.06	0.05	0.02	0.01	37	5	0	0
Tin (Sn)	µg/L	5	0.05	0.10	0.06	0.05	0.02	0.01	37	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.023	0.142	0.080	0.063	0.057	0.025	71	0	0	0
Vanadium (V)	µg/L	5	0.5	1.0	0.6	0.5	0.2	0.1	37	5	0	0
Zinc (Zn)	µg/L	5	0.5	4.7	2.4	1.5	1.8	0.8	75	2	0	0
Calcium (Ca)	mg/L	5	25.2	102.0	57.5	34.2	37.0	16.5	64	0	0	0
Magnesium (Mg)	mg/L	5	13.6	55.6	31.3	19.9	19.7	8.8	63	0	0	0
Potassium (K)	mg/L	5	1.0	4.0	2.2	1.0	1.6	0.7	74	3	0	0
Silicon (Si)	mg/L	5	0.05	1.58	0.63	0.13	0.74	0.33	118	0	0	0
Sodium (Na)	mg/L	5	1.0	7.4	4.1	3.1	2.7	1.2	67	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	2.7	12.6	5.8	4.0	4.6	2.3	80	0	0	0
Antimony (Sb)	µg/L	4	0.05	0.10	0.06	0.05	0.03	0.01	40	4	0	0
Arsenic (As)	µg/L	4	0.98	3.28	1.70	1.26	1.08	0.54	64	0	0	0
Barium (Ba)	µg/L	4	36.1	185.0	80.5	50.5	70.1	35.1	87	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.50	0.31	0.25	0.13	0.06	40	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.50	0.31	0.25	0.13	0.06	40	4	0	0
Boron (B)	µg/L	4	10	22	15	15	5	2	33	0	0	0
Cadmium (Cd)	µg/L	4	0.009	0.050	0.027	0.025	0.017	0.009	63	4	0	0
Chromium (Cr)	µg/L	4	0.50	0.50	0.50	0.50	0.00	0.00	0	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.32	0.12	0.05	0.14	0.07	115	3	0	0
Copper (Cu)	µg/L	4	0.10	0.42	0.26	0.26	0.13	0.07	51	0	0	0
Iron (Fe)	µg/L	4	15	10700	2686	15	5343	2671	199	3	1	25
Lead (Pb)	µg/L	4	0.025	0.050	0.031	0.025	0.013	0.006	40	4	0	0
Lithium (Li)	µg/L	4	2.5	5.0	3.1	2.5	1.3	0.6	40	3	0	0
Manganese (Mn)	µg/L	4	0.680	1610.000	403.069	0.799	804.621	402.310	200	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	0.542	2.400	1.103	0.735	0.876	0.438	79	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.50	0.31	0.25	0.13	0.06	40	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	1.0	0.6	0.5	0.3	0.1	40	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	40	4	0	0
Strontium (Sr)	µg/L	4	30.7	115.0	56.3	39.7	39.4	19.7	70	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.10	0.06	0.05	0.03	0.01	40	4	0	0
Tin (Sn)	µg/L	4	0.05	0.63	0.21	0.08	0.28	0.14	136	3	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.022	0.140	0.061	0.041	0.054	0.027	89	0	0	0
Vanadium (V)	µg/L	4	0.5	1.0	0.6	0.5	0.3	0.1	40	4	0	0
Zinc (Zn)	µg/L	4	0.5	1.1	0.8	0.8	0.3	0.2	41	3	0	0
Calcium (Ca)	mg/L	4	26.2	100.0	48.7	34.3	34.5	17.2	71	0	0	0
Magnesium (Mg)	mg/L	4	13.9	55.3	26.5	18.5	19.3	9.7	73	0	0	0
Potassium (K)	mg/L	4	1.0	4.1	1.8	1.0	1.6	0.8	87	3	0	0
Silicon (Si)	mg/L	4	0.07	1.52	0.45	0.11	0.71	0.36	157	0	0	0
Sodium (Na)	mg/L	4	1.0	6.6	3.2	2.7	2.4	1.2	74	1	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Radium-226 (²²⁶ Ra)	Bq/L	4	0.003	0.010	0.004	0.003	0.004	0.002	86	3	0	0
Radium-228 (²²⁸ Ra)	Bq/L	4	0.01	0.02	0.01	0.01	0.01	0.00	40	4	0	0
Thorium-230 (²³⁰ Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Thorium-232 (²³² Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	2	1.260	3.360	2.310	2.310	1.485	1.050	64	0	-	-
Pheopigments	µg/L	1	0.721	0.721	0.721	0.72	-	-	-	0	-	-

Table F2-19

Porkchop Lake (UN-07) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	239	285	259	253	18	8	7	0	0	0
Hardness (as CaCO ₃)	mg/L	5	133	155	144	143	9	4	6	0	0	0
pH	pH	5	7.93	8.28	8.11	8.08	0.13	0.06	2	0	0	0
Total Suspended Solids	mg/L	5	1.5	1.5	1.5	1.5	0.0	0.0	0	5	0	0
Total Dissolved Solids	mg/L	5	151	176	159	153	11	5	7	0	0	0
Turbidity	NTU	5	0.3	1.3	0.8	0.8	0.5	0.2	57	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	133	156	143	139	10	5	7	0	0	0
Ammonia as N	mg/L	4	0.01	0.03	0.02	0.02	0.01	0.01	59	2	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	2.4	3.0	2.7	2.6	0.3	0.1	9	0	0	0
Fluoride (F)	mg/L	5	1.10	1.35	1.24	1.25	0.10	0.04	8	0	0	0
Sulfate (SO ₄)	mg/L	5	0.9	1.1	1.0	1.0	0.1	0.0	9	0	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.078	0.028	0.003	0.036	0.016	129	3	0	0
Nitrate (as N)	mg/L	2	0.003	0.078	0.040	0.040	0.054	0.038	133	1	0	0
Nitrite (as N)	mg/L	2	0.001	0.001	0.001	0.001	0.000	0.000	58	1	0	0
Total Kjeldahl Nitrogen	mg/L	5	0.49	0.53	0.51	0.51	0.02	0.01	3	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.001	0.001	0.001	0.000	0.000	43	4	0	0
Total Phosphate as P	mg/L	5	0.005	0.009	0.007	0.007	0.002	0.001	25	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	13.9	13.9	13.9	13.9	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	3	13.00	15.50	14.23	14.20	1.05	0.61	7	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	0.5	9.0	3.7	3.3	3.6	1.6	97	3	0	0
Antimony (Sb)	µg/L	5	0.05	0.36	0.11	0.05	0.14	0.06	124	4	0	0
Arsenic (As)	µg/L	5	0.69	1.00	0.79	0.74	0.13	0.06	16	0	0	0
Barium (Ba)	µg/L	5	35.5	41.6	39.2	39.2	2.4	1.1	6	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	15	17	16	15	1	0	7	0	0	0
Cadmium (Cd)	µg/L	5	0.020	0.025	0.024	0.025	0.002	0.001	9	4	0	0
Chromium (Cr)	µg/L	5	0.25	0.77	0.35	0.25	0.23	0.10	66	4	0	0
Cobalt (Co)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Copper (Cu)	µg/L	5	0.30	0.67	0.48	0.50	0.14	0.06	30	1	0	0
Iron (Fe)	µg/L	5	15	122	51	38	41	18	81	1	0	0
Lead (Pb)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Lithium (Li)	µg/L	5	2.5	2.5	2.5	2.5	0.0	0.0	0	5	0	0
Manganese (Mn)	µg/L	5	8.6	89.3	29.0	12.2	34.4	15.4	119	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	5	4.070	4.460	4.326	4.420	0.162	0.073	4	0	0	0
Nickel (Ni)	µg/L	5	0.25	0.83	0.37	0.25	0.26	0.12	71	4	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.012	0.006	0.005	0.003	0.001	49	4	0	0
Strontium (Sr)	µg/L	5	41.1	50.3	45.8	45.3	3.8	1.7	8	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.254	0.293	0.269	0.266	0.015	0.007	6	0	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	0.5	5.8	1.9	1.4	2.2	1.0	114	3	0	0
Calcium (Ca)	mg/L	5	27.0	33.9	31.4	32.7	2.9	1.3	9	0	0	0
Magnesium (Mg)	mg/L	5	14.0	17.1	15.7	15.5	1.3	0.6	8	0	0	0
Potassium (K)	mg/L	5	1.0	1.0	1.0	1.0	0.0	0.0	0	5	0	0
Silicon (Si)	mg/L	5	2.01	2.83	2.41	2.46	0.35	0.16	14	0	0	0
Sodium (Na)	mg/L	5	3.8	5.2	4.4	4.2	0.5	0.2	12	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	0.5	7.4	2.5	1.0	3.3	1.7	136	2	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.69	0.90	0.76	0.73	0.10	0.05	13	0	0	0
Barium (Ba)	µg/L	4	34.2	41.2	37.0	36.2	3.1	1.5	8	0	0	0
Beryllium (Be)	µg/L	4	0.25	2.11	0.72	0.25	0.93	0.47	130	3	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	14	16	15	15	1	0	5	0	0	0
Cadmium (Cd)	µg/L	4	0.009	0.025	0.021	0.025	0.008	0.004	40	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.22	0.09	0.05	0.09	0.04	92	3	0	0
Copper (Cu)	µg/L	4	0.43	0.54	0.47	0.45	0.06	0.03	12	0	0	0
Iron (Fe)	µg/L	4	15	35	20	15	10	5	50	3	0	0
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	2.5	2.5	2.5	0.0	0.0	0	4	0	0
Manganese (Mn)	µg/L	4	0.307	18.300	5.080	0.856	8.828	4.414	174	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	3.680	4.540	4.228	4.345	0.390	0.195	9	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	40.0	49.7	44.5	44.1	4.1	2.0	9	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.239	0.310	0.267	0.259	0.030	0.015	11	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	1.2	0.7	0.5	0.4	0.2	52	3	0	0
Calcium (Ca)	mg/L	4	29.5	33.4	31.3	31.1	1.7	0.8	5	0	0	0
Magnesium (Mg)	mg/L	4	14.5	16.7	15.5	15.5	0.9	0.5	6	0	0	0
Potassium (K)	mg/L	4	1.0	1.0	1.0	1.0	0.0	0.0	0	4	0	0
Silicon (Si)	mg/L	4	2.08	2.80	2.37	2.31	0.33	0.16	14	0	0	0
Sodium (Na)	mg/L	4	3.8	4.6	4.2	4.1	0.3	0.2	8	0	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Radium-226 (²²⁶ Ra)	Bq/L	4	0.003	0.009	0.004	0.003	0.003	0.002	79	3	0	0
Radium-228 (²²⁸ Ra)	Bq/L	4	0.01	0.10	0.03	0.01	0.04	0.02	131	4	0	0
Thorium-230 (²³⁰ Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Thorium-232 (²³² Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	1	1.260	1.310	1.285	1.285	-	-	-	0	-	-
Pheopigments	µg/L	1	0.381	0.381	0.381	0.38	-	-	-	0	-	-

Table F2-20

Kinnikinnick Lake (UN-08) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	176	197	186	184	10	4	5	0	0	0
Hardness (as CaCO ₃)	mg/L	5	89	103	95	94	6	3	6	0	0	0
pH	pH	5	7.82	8.17	8.01	8.01	0.13	0.06	2	0	0	0
Total Suspended Solids	mg/L	5	1.5	1.5	1.5	1.5	0.0	0.0	0	5	0	0
Total Dissolved Solids	mg/L	5	99	117	107	103	8	4	7	0	0	0
Turbidity	NTU	5	0.4	1.1	0.7	0.6	0.3	0.1	48	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	92	125	103	97	13	6	13	0	0	0
Ammonia as N	mg/L	4	0.01	0.02	0.01	0.01	0.01	0.00	52	2	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	2.2	2.6	2.4	2.3	0.2	0.1	7	0	0	0
Fluoride (F)	mg/L	5	0.56	0.66	0.61	0.61	0.05	0.02	8	0	0	0
Sulfate (SO ₄)	mg/L	5	0.7	1.0	0.9	0.9	0.1	0.1	14	0	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.073	0.029	0.003	0.036	0.016	126	3	0	0
Nitrate (as N)	mg/L	2	0.003	0.073	0.038	0.038	0.050	0.035	132	1	0	0
Nitrite (as N)	mg/L	2	0.001	0.001	0.001	0.001	0.000	0.000	0	2	0	0
Total Kjeldahl Nitrogen	mg/L	5	0.34	0.46	0.37	0.35	0.05	0.02	14	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.001	0.001	0.001	0.000	0.000	49	4	0	0
Total Phosphate as P	mg/L	5	0.005	0.017	0.008	0.007	0.005	0.002	61	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	39.0	39.0	39.0	39.0	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	3	7.18	7.75	7.46	7.46	0.32	0.18	4	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	0.5	4.0	2.0	2.0	1.3	0.6	67	2	0	0
Antimony (Sb)	µg/L	5	0.05	0.30	0.10	0.05	0.11	0.05	112	4	0	0
Arsenic (As)	µg/L	5	0.30	0.38	0.34	0.32	0.03	0.02	10	0	0	0
Barium (Ba)	µg/L	5	26.0	28.6	27.0	27.0	1.1	0.5	4	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	14	18	16	15	2	1	10	0	0	0
Cadmium (Cd)	µg/L	5	0.009	0.025	0.022	0.025	0.007	0.003	34	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Copper (Cu)	µg/L	5	0.24	0.46	0.35	0.37	0.08	0.04	23	0	0	0
Iron (Fe)	µg/L	5	15	40	20	15	11	5	56	4	0	0
Lead (Pb)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Lithium (Li)	µg/L	5	2.5	2.5	2.5	2.5	0.0	0.0	0	5	0	0
Manganese (Mn)	µg/L	5	7.7	20.1	12.6	11.6	4.6	2.1	37	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	5	0.703	0.755	0.720	0.707	0.022	0.010	3	0	0	0
Nickel (Ni)	µg/L	5	0.25	1.36	0.47	0.25	0.50	0.22	105	4	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.010	0.006	0.005	0.002	0.001	37	4	0	0
Strontium (Sr)	µg/L	5	35.3	39.8	37.1	35.8	2.3	1.0	6	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.071	0.096	0.085	0.087	0.010	0.005	12	0	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	0.5	2.0	0.8	0.5	0.7	0.3	84	5	0	0
Calcium (Ca)	mg/L	5	18.3	22.3	20.3	20.2	1.5	0.7	7	0	0	0
Magnesium (Mg)	mg/L	5	9.2	11.3	10.6	10.7	0.9	0.4	8	0	0	0
Potassium (K)	mg/L	5	1.0	1.0	1.0	1.0	0.0	0.0	0	5	0	0
Silicon (Si)	mg/L	5	1.58	2.16	1.85	1.81	0.27	0.12	14	0	0	0
Sodium (Na)	mg/L	5	3.4	4.3	3.9	4.0	0.4	0.2	10	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	0.5	2.1	1.2	1.1	0.7	0.3	57	1	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.32	0.34	0.33	0.33	0.01	0.00	2	0	0	0
Barium (Ba)	µg/L	4	24.8	28.6	26.3	25.9	1.6	0.8	6	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	14	16	15	15	1	0	5	0	0	0
Cadmium (Cd)	µg/L	4	0.009	0.025	0.021	0.025	0.008	0.004	40	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Copper (Cu)	µg/L	4	0.24	0.37	0.32	0.33	0.06	0.03	20	0	0	0
Iron (Fe)	µg/L	4	15	15	15	15	0	0	0	4	0	0
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	2.5	2.5	2.5	0.0	0.0	0	4	0	0
Manganese (Mn)	µg/L	4	0.115	1.170	0.641	0.640	0.577	0.288	90	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	0.666	0.711	0.691	0.694	0.019	0.009	3	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	34.6	39.7	36.1	35.1	2.4	1.2	7	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	1.26	0.35	0.05	0.61	0.30	172	3	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.081	0.097	0.090	0.091	0.008	0.004	9	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	2.0	0.9	0.5	0.8	0.4	86	3	0	0
Calcium (Ca)	mg/L	4	19.4	22.6	20.5	19.9	1.5	0.7	7	0	0	0
Magnesium (Mg)	mg/L	4	9.8	11.4	10.5	10.4	0.7	0.3	7	0	0	0
Potassium (K)	mg/L	4	1.0	1.0	1.0	1.0	0.0	0.0	0	4	0	0
Silicon (Si)	mg/L	4	1.59	2.18	1.80	1.72	0.27	0.13	15	0	0	0
Sodium (Na)	mg/L	4	3.6	4.0	3.8	3.8	0.2	0.1	5	0	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Radium-226 (²²⁶ Ra)	Bq/L	4	0.003	0.003	0.003	0.003	0.000	0.000	0	4	0	0
Radium-228 (²²⁸ Ra)	Bq/L	4	0.01	0.04	0.02	0.01	0.01	0.01	75	4	0	0
Thorium-230 (²³⁰ Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Thorium-232 (²³² Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	1	1.140	1.400	1.270	1.270	-	-	-	0	-	-
Pheopigments	µg/L	1	0.191	0.191	0.191	0.19	-	-	-	0	-	-

Table F2-21

Dinosaur Lake (UN-01 & UN-09) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	164	306	228	187	71	32	31	0	0	0
Hardness (as CaCO ₃)	mg/L	5	90	168	123	102	38	17	31	0	0	0
pH	pH	5	7.60	8.08	7.84	7.80	0.21	0.09	3	0	0	0
Total Suspended Solids	mg/L	5	10.3	27.5	19.5	18.2	6.6	2.9	34	0	0	0
Total Dissolved Solids	mg/L	5	141	233	175	151	42	19	24	0	0	0
Turbidity	NTU	5	4.4	10.3	6.4	5.4	2.3	1.0	36	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	86	188	129	104	49	22	38	0	0	0
Ammonia as N	mg/L	4	0.02	1.51	0.41	0.05	0.74	0.37	181	0	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	0.8	1.8	1.2	1.0	0.4	0.2	36	0	0	0
Fluoride (F)	mg/L	5	0.74	1.32	0.99	0.91	0.26	0.11	26	0	0	0
Sulfate (SO ₄)	mg/L	5	0.3	0.3	0.3	0.3	0.0	0.0	0	5	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.003	0.003	0.003	0.000	0.000	0	5	0	0
Nitrate (as N)	mg/L	2	0.003	0.003	0.003	0.003	0.000	0.000	0	2	0	0
Nitrite (as N)	mg/L	2	0.001	0.001	0.001	0.001	0.000	0.000	0	2	0	0
Total Kjeldahl Nitrogen	mg/L	5	1.05	3.75	2.41	2.18	1.03	0.46	42	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.001	0.001	0.001	0.000	0.000	0	5	0	0
Total Phosphate as P	mg/L	5	0.026	0.034	0.030	0.030	0.003	0.002	12	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	44.0	44.0	44.0	44.0	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	3	25.70	31.90	28.40	27.60	3.18	1.83	11	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	11.6	26.3	19.6	22.7	6.8	3.0	35	0	0	0
Antimony (Sb)	µg/L	5	0.05	0.13	0.07	0.05	0.04	0.02	54	4	0	0
Arsenic (As)	µg/L	5	1.03	1.92	1.43	1.26	0.42	0.19	29	0	0	0
Barium (Ba)	µg/L	5	26.7	72.8	48.3	38.1	20.4	9.1	42	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	16	21	19	20	2	1	13	0	0	0
Cadmium (Cd)	µg/L	5	0.009	0.025	0.022	0.025	0.007	0.003	34	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.12	0.07	0.05	0.03	0.02	45	3	0	0
Copper (Cu)	µg/L	5	0.25	1.02	0.52	0.47	0.31	0.14	59	1	0	0
Iron (Fe)	µg/L	5	143	6230	2262	278	2902	1298	128	0	2	40
Lead (Pb)	µg/L	5	0.025	0.102	0.040	0.025	0.034	0.015	85	4	0	0
Lithium (Li)	µg/L	5	2.5	5.8	3.8	2.5	1.8	0.8	46	3	0	0
Manganese (Mn)	µg/L	5	28.1	428.0	178.3	39.5	197.6	88.4	111	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	5	0.507	0.841	0.645	0.637	0.145	0.065	22	0	0	0
Nickel (Ni)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.020	0.008	0.005	0.007	0.003	84	4	0	0
Strontium (Sr)	µg/L	5	31.7	60.8	46.1	39.9	13.4	6.0	29	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.044	0.093	0.066	0.069	0.021	0.009	32	5	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	1.5	3.2	2.0	1.8	0.7	0.3	34	1	0	0
Calcium (Ca)	mg/L	5	18.8	39.0	27.4	21.9	9.6	4.3	35	0	0	0
Magnesium (Mg)	mg/L	5	9.2	17.4	13.1	11.6	3.7	1.6	28	0	0	0
Potassium (K)	mg/L	5	1.0	2.5	1.6	1.0	0.8	0.4	50	3	0	0
Silicon (Si)	mg/L	5	0.18	0.88	0.45	0.22	0.34	0.15	76	0	0	0
Sodium (Na)	mg/L	5	2.2	4.4	3.3	3.3	0.9	0.4	27	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	2.6	13.7	6.5	4.9	5.1	2.6	79	2	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	1.05	1.90	1.44	1.40	0.36	0.18	25	0	0	0
Barium (Ba)	µg/L	4	24.7	65.3	38.4	31.7	18.3	9.1	48	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	12	19	16	16	3	1	19	0	0	0
Cadmium (Cd)	µg/L	4	0.009	0.025	0.021	0.025	0.008	0.004	40	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.50	0.38	0.38	0.14	0.07	38	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Copper (Cu)	µg/L	4	0.15	1.14	0.53	0.41	0.45	0.23	85	0	0	0
Iron (Fe)	µg/L	4	15	5870	1511	80	2906	1453	192	2	1	25
Lead (Pb)	µg/L	4	0.025	0.063	0.035	0.025	0.019	0.010	55	3	0	0
Lithium (Li)	µg/L	4	2.5	2.5	2.5	2.5	0.0	0.0	0	4	0	0
Manganese (Mn)	µg/L	4	0.158	328.000	86.342	8.604	161.297	80.649	187	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	0.438	0.784	0.546	0.481	0.162	0.081	30	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.63	0.35	0.25	0.19	0.10	55	3	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	29.9	56.5	38.8	34.3	12.1	6.0	31	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	1.73	0.58	0.26	0.80	0.40	138	2	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.033	0.087	0.054	0.049	0.023	0.012	43	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	4.0	2.3	2.4	1.6	0.8	69	1	0	0
Calcium (Ca)	mg/L	4	20.0	38.8	25.2	21.1	9.1	4.5	36	0	0	0
Magnesium (Mg)	mg/L	4	9.7	17.2	12.3	11.2	3.4	1.7	27	0	0	0
Potassium (K)	mg/L	4	1.0	2.5	1.4	1.0	0.8	0.4	55	3	0	0
Silicon (Si)	mg/L	4	0.15	0.87	0.35	0.19	0.35	0.17	99	0	0	0
Sodium (Na)	mg/L	4	2.4	3.9	3.1	3.0	0.7	0.3	22	0	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Radium-226 (²²⁶ Ra)	Bq/L	4	0.003	0.003	0.003	0.003	0.000	0.000	0	4	0	0
Radium-228 (²²⁸ Ra)	Bq/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Thorium-230 (²³⁰ Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Thorium-232 (²³² Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	1	4.900	14.600	9.750	9.750	-	-	-	0	-	-
Pheopigments	µg/L	1	7.74	7.74	7.74	7.74	-	-	-	0	-	-

Table F2-22

Murky Lake (UN-02 & UN-10) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	221	495	333	258	125	56	37	0	0	0
Hardness (as CaCO ₃)	mg/L	5	116	267	177	144	63	28	36	0	0	0
pH	pH	5	7.75	8.27	8.04	8.21	0.27	0.12	3	0	0	0
Total Suspended Solids	mg/L	5	5.3	52.5	19.6	10.7	19.3	8.6	98	0	0	0
Total Dissolved Solids	mg/L	5	161	331	224	179	75	33	33	0	0	0
Turbidity	NTU	5	1.5	36.5	11.3	3.2	14.8	6.6	130	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	115	270	176	141	68	30	39	0	0	0
Ammonia as N	mg/L	4	0.03	2.65	0.70	0.07	1.30	0.65	184	0	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	3.7	8.1	5.3	4.4	1.9	0.8	35	0	0	0
Fluoride (F)	mg/L	5	0.74	1.39	1.04	0.98	0.26	0.12	25	0	0	0
Sulfate (SO ₄)	mg/L	5	0.3	0.3	0.3	0.3	0.0	0.0	0	5	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.024	0.007	0.003	0.009	0.004	126	3	0	0
Nitrate (as N)	mg/L	2	0.005	0.024	0.014	0.014	0.013	0.009	89	0	0	0
Nitrite (as N)	mg/L	2	0.001	0.001	0.001	0.001	0.000	0.000	0	2	0	0
Total Kjeldahl Nitrogen	mg/L	5	1.08	4.84	2.54	1.96	1.55	0.70	61	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.001	0.001	0.001	0.000	0.000	0	5	0	0
Total Phosphate as P	mg/L	5	0.015	0.023	0.019	0.021	0.004	0.002	18	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	40.4	40.4	40.4	40.4	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	21.50	36.20	26.58	24.30	6.68	3.34	25	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	3.0	14.2	8.6	10.7	4.8	2.2	57	2	0	0
Antimony (Sb)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Arsenic (As)	µg/L	5	0.83	2.24	1.37	1.13	0.59	0.26	43	0	0	0
Barium (Ba)	µg/L	5	23.6	109.0	60.6	39.4	38.8	17.4	64	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	21	29	26	27	3	2	13	0	0	0
Cadmium (Cd)	µg/L	5	0.009	0.025	0.022	0.025	0.007	0.003	34	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.22	0.10	0.05	0.08	0.03	75	3	0	0
Copper (Cu)	µg/L	5	0.25	0.56	0.42	0.38	0.13	0.06	32	2	0	0
Iron (Fe)	µg/L	5	84	12700	3417	148	5464	2444	160	0	2	40
Lead (Pb)	µg/L	5	0.025	0.025	0.025	0.025	0.000	0.000	0	5	0	0
Lithium (Li)	µg/L	5	2.5	8.2	6.0	6.2	2.3	1.0	38	0	0	0
Manganese (Mn)	µg/L	5	24.2	659.0	265.0	29.4	328.3	146.8	124	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	5	0.842	1.850	1.167	0.974	0.416	0.186	36	0	0	0
Nickel (Ni)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.049	0.014	0.005	0.020	0.009	143	4	0	0
Strontium (Sr)	µg/L	5	35.4	80.9	55.9	44.7	20.2	9.0	36	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.046	0.134	0.090	0.104	0.036	0.016	40	0	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	1.5	3.7	2.6	2.5	1.0	0.5	40	2	0	0
Calcium (Ca)	mg/L	5	23.3	58.5	38.6	32.4	14.7	6.6	38	0	0	0
Magnesium (Mg)	mg/L	5	11.9	26.8	18.6	15.8	6.3	2.8	34	0	0	0
Potassium (K)	mg/L	5	1.0	3.3	2.1	2.1	1.1	0.5	51	2	0	0
Silicon (Si)	mg/L	5	0.39	4.37	1.90	1.43	1.53	0.68	81	0	0	0
Sodium (Na)	mg/L	5	5.0	10.0	7.6	7.2	2.1	0.9	28	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	0.5	5.2	2.5	2.1	2.3	1.2	96	2	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.94	1.87	1.26	1.11	0.43	0.21	34	0	0	0
Barium (Ba)	µg/L	4	23.6	72.7	40.8	33.5	21.9	11.0	54	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	18	31	23	22	6	3	24	0	0	0
Cadmium (Cd)	µg/L	4	0.009	0.025	0.021	0.025	0.008	0.004	40	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.12	0.07	0.05	0.04	0.02	52	3	0	0
Copper (Cu)	µg/L	4	0.16	0.43	0.31	0.32	0.11	0.06	37	0	0	0
Iron (Fe)	µg/L	4	15	1750	462	42	859	429	186	2	1	25
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	9.3	5.5	5.2	2.8	1.4	51	1	0	0
Manganese (Mn)	µg/L	4	0.445	428.000	111.575	8.927	211.099	105.549	189	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	0.794	1.860	1.083	0.838	0.519	0.259	48	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.55	0.33	0.25	0.15	0.08	46	3	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	46	3	0	0
Strontium (Sr)	µg/L	4	35.2	73.5	47.8	41.2	17.4	8.7	36	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.92	0.27	0.05	0.44	0.22	163	3	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.039	0.114	0.074	0.072	0.033	0.017	45	0	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	2.3	1.4	1.3	1.0	0.5	73	2	0	0
Calcium (Ca)	mg/L	4	25.3	59.2	36.7	31.2	15.3	7.6	42	0	0	0
Magnesium (Mg)	mg/L	4	12.9	28.9	18.2	15.6	7.2	3.6	40	0	0	0
Potassium (K)	mg/L	4	1.0	3.4	1.6	1.0	1.2	0.6	75	3	0	0
Silicon (Si)	mg/L	4	0.40	4.18	1.78	1.27	1.66	0.83	93	0	0	0
Sodium (Na)	mg/L	4	5.4	10.3	7.3	6.7	2.1	1.1	29	0	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Radium-226 (²²⁶ Ra)	Bq/L	4	0.003	0.010	0.006	0.005	0.004	0.002	67	2	0	0
Radium-228 (²²⁸ Ra)	Bq/L	4	0.01	0.02	0.01	0.01	0.01	0.00	40	4	0	0
Thorium-230 (²³⁰ Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Thorium-232 (²³² Th)	Bq/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	2	2.140	8.220	5.180	5.180	4.299	3.040	83	0	-	-
Pheopigments	µg/L	1	4.11	4.11	4.11	4.11	-	-	-	0	-	-

Table F2-23

Egg Lake (UN-03 & UN-11) Baseline Water Chemistry Summary Statistics
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Physicals												
Conductivity	uS/cm	5	169	267	211	183	46	20	22	0	0	0
Hardness (as CaCO ₃)	mg/L	5	91	144	112	99	24	11	22	0	0	0
pH	pH	5	7.75	8.16	7.97	8.04	0.19	0.08	2	0	0	0
Total Suspended Solids	mg/L	5	1.5	8.5	4.0	3.7	2.9	1.3	72	2	0	0
Total Dissolved Solids	mg/L	5	125	193	149	129	31	14	21	0	0	0
Turbidity	NTU	5	1.6	12.9	4.2	1.8	4.9	2.2	118	0	0	0
Anions												
Alkalinity, Total (as CaCO ₃)	mg/L	5	91	170	120	98	36	16	30	0	0	0
Ammonia as N	mg/L	4	0.04	1.08	0.33	0.09	0.51	0.25	155	0	0	0
Bromide (Br)	mg/L	4	0.03	0.03	0.03	0.03	0.00	0.00	0	4	0	0
Chloride (Cl)	mg/L	5	0.3	1.1	0.7	0.8	0.3	0.1	43	1	0	0
Fluoride (F)	mg/L	5	0.80	1.26	1.00	0.95	0.19	0.09	19	0	0	0
Sulfate (SO ₄)	mg/L	5	0.3	0.3	0.3	0.3	0.0	0.0	0	5	0	0
Nutrients												
Nitrate and Nitrite as N	mg/L	5	0.003	0.013	0.006	0.006	0.004	0.002	70	2	0	0
Nitrate (as N)	mg/L	2	0.007	0.013	0.010	0.010	0.005	0.003	47	0	0	0
Nitrite (as N)	mg/L	2	0.001	0.001	0.001	0.001	0.000	0.000	0	2	0	0
Total Kjeldahl Nitrogen	mg/L	5	0.85	2.67	1.55	1.34	0.69	0.31	45	0	0	0
Ortho Phosphate as P	mg/L	5	0.001	0.011	0.003	0.001	0.005	0.002	181	4	0	0
Total Phosphate as P	mg/L	5	0.010	0.021	0.012	0.010	0.005	0.002	41	0	0	0
Organics												
Total Organic Carbon (TOC)	mg/L	1	26.6	26.6	26.6	26.6	-	-	-	0	0	0
Dissolved Organic Carbon (DOC)	mg/L	4	19.70	25.40	22.80	23.05	2.47	1.23	11	0	0	0
Total Metals												
Aluminum (Al)	µg/L	5	0.5	4.6	2.9	3.7	1.7	0.8	61	2	0	0
Antimony (Sb)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Arsenic (As)	µg/L	5	0.67	0.92	0.80	0.83	0.10	0.05	13	0	0	0
Barium (Ba)	µg/L	5	30.6	60.5	42.8	34.5	13.4	6.0	31	0	0	0
Beryllium (Be)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Bismuth (Bi)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Boron (B)	µg/L	5	12	16	14	13	2	1	11	0	0	0
Cadmium (Cd)	µg/L	5	0.009	0.025	0.022	0.025	0.007	0.003	34	5	0	0
Chromium (Cr)	µg/L	5	0.25	0.25	0.25	0.25	0.00	0.00	0	5	0	0
Cobalt (Co)	µg/L	5	0.05	0.10	0.06	0.05	0.02	0.01	37	4	0	0
Copper (Cu)	µg/L	5	0.20	0.50	0.36	0.35	0.13	0.06	38	1	0	0
Iron (Fe)	µg/L	5	80	1480	432	213	589	264	136	0	1	20
Lead (Pb)	µg/L	5	0.025	0.118	0.044	0.025	0.042	0.019	95	4	0	0
Lithium (Li)	µg/L	5	2.5	2.5	2.5	2.5	0.0	0.0	0	5	0	0
Manganese (Mn)	µg/L	5	17.4	649.0	160.6	28.9	274.2	122.6	171	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	5	0.230	0.341	0.266	0.256	0.044	0.020	16	0	0	0
Nickel (Ni)	µg/L	5	0.25	1.14	0.43	0.25	0.40	0.18	93	4	0	0
Phosphorus (P)	µg/L	5	150	150	150	150	0	0	0	5	0	0
Selenium (Se)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Silver (Ag)	µg/L	5	0.005	0.023	0.010	0.005	0.008	0.003	80	3	0	0
Strontium (Sr)	µg/L	5	23.2	34.0	28.1	26.3	4.8	2.2	17	0	0	0
Thallium (Tl)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0

Parameter	Units	n	Minimum Value	Maximum Value	Mean Value	Median	Standard Deviation	Standard Error	Coefficient of Variation	No. < DL	No. > GL	% > GL
Tin (Sn)	µg/L	5	0.05	0.05	0.05	0.05	0.00	0.00	0	5	0	0
Titanium (Ti)	µg/L	5	5	5	5	5	0	0	0	5	0	0
Uranium (U)	µg/L	5	0.005	0.005	0.005	0.005	0.000	0.000	0	5	0	0
Vanadium (V)	µg/L	5	0.5	0.5	0.5	0.5	0.0	0.0	0	5	0	0
Zinc (Zn)	µg/L	5	0.5	2.0	1.0	0.5	0.7	0.3	70	4	0	0
Calcium (Ca)	mg/L	5	20.1	35.2	26.1	22.4	6.7	3.0	26	0	0	0
Magnesium (Mg)	mg/L	5	8.8	14.4	11.4	10.7	2.4	1.1	21	0	0	0
Potassium (K)	mg/L	5	1.0	1.0	1.0	1.0	0.0	0.0	0	5	0	0
Silicon (Si)	mg/L	5	0.25	1.34	0.70	0.56	0.42	0.19	60	0	0	0
Sodium (Na)	mg/L	5	2.3	3.5	2.9	3.1	0.5	0.2	18	0	0	0
Dissolved Metals												
Aluminum (Al)	µg/L	4	0.5	2.4	1.2	0.9	0.9	0.4	77	2	0	0
Antimony (Sb)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Arsenic (As)	µg/L	4	0.60	0.85	0.72	0.71	0.11	0.06	15	0	0	0
Barium (Ba)	µg/L	4	27.7	53.4	35.3	30.0	12.1	6.1	34	0	0	0
Beryllium (Be)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Bismuth (Bi)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Boron (B)	µg/L	4	5	14	11	12	4	2	37	0	0	0
Cadmium (Cd)	µg/L	4	0.009	0.025	0.021	0.025	0.008	0.004	40	4	0	0
Chromium (Cr)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Cobalt (Co)	µg/L	4	0.05	0.10	0.06	0.05	0.03	0.01	40	3	0	0
Copper (Cu)	µg/L	4	0.17	0.72	0.34	0.23	0.26	0.13	77	0	0	0
Iron (Fe)	µg/L	4	15	83	47	44	37	18	79	2	1	25
Lead (Pb)	µg/L	4	0.025	0.025	0.025	0.025	0.000	0.000	0	4	0	0
Lithium (Li)	µg/L	4	2.5	2.5	2.5	2.5	0.0	0.0	0	4	0	0
Manganese (Mn)	µg/L	4	0.266	2.280	1.311	1.349	1.104	0.552	84	0	0	0
Mercury (Hg)	µg/L	3	0.005	0.025	0.018	0.025	0.012	0.007	63	3	0	0
Molybdenum (Mo)	µg/L	4	0.195	0.265	0.219	0.207	0.032	0.016	14	0	0	0
Nickel (Ni)	µg/L	4	0.25	0.25	0.25	0.25	0.00	0.00	0	4	0	0
Phosphorus (P)	µg/L	4	150	150	150	150	0	0	0	4	0	0
Selenium (Se)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Silver (Ag)	µg/L	4	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Strontium (Sr)	µg/L	4	20.8	34.5	25.1	22.5	6.4	3.2	26	0	0	0
Thallium (Tl)	µg/L	4	0.05	0.05	0.05	0.05	0.00	0.00	0	4	0	0
Tin (Sn)	µg/L	4	0.05	0.19	0.09	0.05	0.07	0.04	82	3	0	0
Titanium (Ti)	µg/L	4	5	5	5	5	0	0	0	4	0	0
Uranium (U)	µg/L	4	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Vanadium (V)	µg/L	4	0.5	0.5	0.5	0.5	0.0	0.0	0	4	0	0
Zinc (Zn)	µg/L	4	0.5	2.0	0.9	0.5	0.8	0.4	86	3	0	0
Calcium (Ca)	mg/L	4	21.2	34.2	24.8	21.9	6.3	3.1	25	0	0	0
Magnesium (Mg)	mg/L	4	9.3	14.3	10.9	10.1	2.3	1.2	21	0	0	0
Potassium (K)	mg/L	4	1.0	1.0	1.0	1.0	0.0	0.0	0	4	0	0
Silicon (Si)	mg/L	4	0.24	1.30	0.64	0.52	0.46	0.23	72	0	0	0
Sodium (Na)	mg/L	4	2.4	3.3	2.8	2.7	0.4	0.2	16	0	0	0
Radionuclides												
Lead-210 (²¹⁰ Pb)	Bq/L	5	0.01	0.01	0.01	0.01	0.00	0.00	0	4	0	0
Radium-226 (²²⁶ Ra)	Bq/L	5	0.003	0.003	0.003	0.003	0.000	0.000	0	4	0	0
Radium-228 (²²⁸ Ra)	Bq/L	5	0.01	0.02	0.01	0.01	0.01	0.00	48	4	0	0
Thorium-230 (²³⁰ Th)	Bq/L	5	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Thorium-232 (²³² Th)	Bq/L	5	0.005	0.005	0.005	0.005	0.000	0.000	0	4	0	0
Biota												
Chlorophyll a	µg/L	1	2.690	2.690	2.690	2.690	-	-	-	0	-	-
Pheopigments	µg/L	1	0.4	0.4	0.4	0.40	-	-	-	0	-	-

Table F3-1

Blachford Lake (BL-01) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008 21-Mar-08	October 2008 4-Oct-08	March 2009 14-Mar-09	June 2009 27-Jun-09	September 2009 21-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	310	249	296	246	250
Hardness (as CaCO ₃)	mg/L	2	-	-	156	128	158	123	124
pH	pH	0.01	-	-	8.15	8.32	8.14	8.17	8.31
Total Suspended Solids	mg/L	3.0	-	-	3.5	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	175	134	169	141	132
Turbidity	NTU	0.1	-	-	2.39	0.95	0.29	1.68	1.88
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	156	130	164	126	125
Ammonia as N	mg/L	0.02	-	-	-	0.023	<0.020	0.024	0.021
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	<0.05	<0.05	<0.05
Chloride (Cl)	mg/L	0.5	-	600	3.94	3.20	4.08	3.15	3.29
Fluoride (F)	mg/L	0.02	-	0.3 ^d	0.337	0.277	0.34	0.22	0.268
Sulfate (SO ₄)	mg/L	0.5	-	100	7.03	5.83	7.00	5.88	5.74
Nutrients									
Nitrate and Nitrite as N	mg/L	0.005	-	-	0.0339	<0.005	0.0379	<0.005	<0.005
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	<0.005	0.0379	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	<0.001	<0.001	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	0.481	0.298	0.313	0.301	0.341
Ortho Phosphate as P	mg/L	0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001
Total Phosphate as P	mg/L	0.002	-	-	0.0155	0.0078	0.0088	0.0068	0.0108
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	8.13	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	7.02	7.59	6.83	7.26
Total Metals									
Aluminum (Al)	µg/L	**f	100 ^g	-	26.9	21.8	<7	45.8	82.7
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	0.2	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	0.78	0.8	0.8	0.6	0.7
Barium (Ba)	µg/L	0.05	-	5000	32.1	26.3	32.5	26.5	29.1
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	39	29	36	30	36
Cadmium (Cd)	µg/L	**	0.044 ⁱ	0.044	<0.05	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	15 ^k	1.22	0.66	<0.9	1.0	0.85
Iron (Fe)	µg/L	30	300	1000	39	<30	<30	42	49
Lead (Pb)	µg/L	0.05	1 - 7 ^l	123 ^m	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	6	<5	6	<5	<5
Manganese (Mn)	µg/L	0.05	-	2059 ⁿ	3.76	4.13	1.9	3.3	4.48
Mercury (Hg)	µg/L	0.05	0.026	0.1	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	0.511	0.383	0.491	0.438	0.453
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	0.015
Strontium (Sr)	µg/L	0.1	-	-	73.9	51.4	63.3	50.6	60.1
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					21-Mar-08	4-Oct-08	14-Mar-09	27-Jun-09	21-Sep-09
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.420	0.292	0.429	0.364	0.332
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	30	69 ^d	2.7	<1	1.4	<4	1.2
Calcium (Ca)	mg/L	0.05	-	-	33.7	26.9	32.6	24.8	26.3
Magnesium (Mg)	mg/L	0.1	-	-	17.6	14.9	17.6	13.5	14.3
Potassium (K)	mg/L	2	-	-	3.2	3	3.2	2.4	2.8
Silicon (Si)	mg/L	0.05	-	-	1.65	1.22	1.53	1.09	1.38
Sodium (Na)	mg/L	2	-	-	6.6	5.5	5.9	4.7	5.2
Dissolved Metals									
Aluminum (Al)	µg/L	1	-	100 ^f	-	2.1	<1	1.8	2.9
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	0.78	0.83	0.63	0.63
Barium (Ba)	µg/L	0.05	-	-	-	25.6	31.9	24.1	25
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	30	35	28	30
Cadmium (Cd)	µg/L	**	-	-	-	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	**	-	-	-	<0.5	<1	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	0.55	0.69	0.63	0.54
Iron (Fe)	µg/L	30	-	350	-	<30	<30	<30	<30
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	<5	5.7	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	-	0.062	0.68	<0.05	0.176
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	-	0.38	0.5	0.393	0.355
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	51.8	65.3	46.1	51.6
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	0.308	0.403	0.336	0.287
Vanadium (V)	µg/L	1	-	-	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	<1	1.4	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	26.6	34	26.2	26.3
Magnesium (Mg)	mg/L	0.1	-	-	-	15	17.8	14	14.1
Potassium (K)	mg/L	2	-	-	-	3	3.1	2.4	2.6
Silicon (Si)	mg/L	0.05	-	-	-	1.2	1.58	1.06	1.27
Sodium (Na)	mg/L	2	-	-	-	5.6	5.6	4.8	4.8
Radionuclides									
GCDWQ MAC^s									
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	<0.02	-	<0.02	0.04	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	<0.005	-	<0.005	<0.005	0.006
Radium-228 (²²⁸ Ra)	Bq/L	0.02	0.5	-	0.14	-	<0.02	<0.02	<0.01
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	<0.01	-	0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01	-	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	-	0.626	1.42
Pheopigments	µg/L	0.01	-	-	-	-	-	-	0.379

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{[0.86(\text{Log}(\text{hardness})) - 3.2]}$
Average hardness = 138 mg/L
Cadmium Guideline = 0.044 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 138 mg/L
Copper Guideline = 15 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times \ln(\text{hardness})) - 1.460$
Average hardness = 138 mg/L
Lead Guideline = 123 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 138
Manganese Guideline = 2.059 mg/L
= 2059 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
110 µg/L when [CaCO₃] is 120 - 180 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 138 mg/L
Zinc Guideline = 69 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-2

Elbow Lake (EL-01 & EL-02) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008		October 2008		March 2009		June 2009		September 2009	
					19-Mar-08 EL-01	21-Mar-08 EL-02	1-Oct-08 EL-01	EL-02	16-Mar-09 EL-01	EL-02	28-Jun-09 EL-01	EL-02	30-Sep-09 EL-01	29-Sep-09 EL-02
Physicals														
Conductivity	µS/cm	0.5	-	-	359	395	322	312	358	377	311	309	327	324
Hardness (as CaCO ₃)	mg/L	2	-	-	196	205	181	183	206	215	176	175	182	181
pH	pH	0.01	-	-	8.16	7.91	8.36	8.35	8.13	8.15	8.30	8.34	8.13	7.58
Total Suspended Solids	mg/L	3.0	-	-	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	200	215	186	186	211	225	194	195	189	184
Turbidity	NTU	0.1	-	-	0.43	0.67	0.60	0.49	0.37	0.43	0.92	0.90	1.30	1.05
Anions														
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	222	213	179	180	216	230	185	178	171	160
Ammonia as N	mg/L	0.02	-	-	-	-	<0.02	<0.02	<0.02	0.097	0.024	<0.02	<0.02	0.02
Bromide (Br)	mg/L	0.05	-	-	<0.05	<0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chloride (Cl)	mg/L	0.5	-	600	1.75	2.03	1.6	1.58	1.93	2.04	1.57	1.53	1.62	1.65
Fluoride (F)	mg/L	0.02	-	0.3 ^d	1.65	1.83	1.55	1.55	1.7	1.79	1.41	1.4	1.47	1.49
Sulfate (SO ₄)	mg/L	0.5	-	100	0.57	0.59	<0.50	<0.50	0.62	0.62	0.58	0.55	<0.5	<0.5
Nutrients														
Nitrate and Nitrite as N	mg/L	0.005	-	-	0.104	0.0956	<0.0050	<0.0050	0.1	0.121	<0.0050	<0.0050	-	-
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	-	<0.0050	<0.0050	0.1	0.121	-	-	<0.005	<0.005
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	-	<0.0010	<0.0010	<0.0010	<0.0010	-	-	<0.001	<0.001
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	0.469	0.076	0.418	1.730	0.371	0.408	0.445	0.428	0.444	0.470
Ortho Phosphate as P	mg/L	0.001	-	-	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001
Total Phosphate as P	mg/L	0.002	-	-	0.0078	0.0318	0.0087	0.0092	0.0061	0.0083	0.0175	0.0073	0.0085	0.008
Organics														
Total Organic Carbon (TOC)	mg/L	0.5	-	-	11.3	12.2	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	-	11.7	11.8	10.5	11.1	11.2	11.4	11.5	11.6
Total Metals														
Aluminum (Al)	µg/L	** ^f	100 ^g	-	1.1	1.3	1.1	1	<1	<1	<6	<7	<4	<5
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.12	0.17	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	0.9	1.07	0.99	0.99	0.91	0.97	0.74	0.77	0.83	0.79
Barium (Ba)	µg/L	0.05	-	5000	85.8	101.0	72.8	71.5	80.3	86.5	63.8	66.8	88.9	88.9
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	23	24	24	22	26	27	24	24	31	31
Cadmium (Cd)	µg/L	**	0.058 ⁱ	0.058	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.017	<0.017
Chromium (Cr)	µg/L	**	8.9	8.9	<0.5	<0.5	<0.5	<1	<1	<1	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	2 - 4 ^j	20 ^k	0.45	0.27	1.58	0.7	0.26	0.24	0.48	0.5	0.29	0.26
Iron (Fe)	µg/L	30	300	1000	<30	<30	45	32	<30	<30	<30	32	57	<30
Lead (Pb)	µg/L	0.05	1 - 7 ^l	185 ^m	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	5.4	6.3	5.7	5.1	6.5	6.4	5.1	5.4	5.4	5.8
Manganese (Mn)	µg/L	**	-	2680 ⁿ	15	37.5	31.2	20.3	12.7	23	14.5	14.3	59.4	22.6
Mercury (Hg)	µg/L	0.05	0.026	0.1	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	3.94	4.34	3.98	3.90	4.23	4.52	3.79	4.03	4.07	4.23
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	62.9	69.3	53.3	51.8	62.2	63.9	47.7	51.1	59.6	61.8
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.461	0.503	0.395	0.415	0.548	0.584	0.538	0.557	0.464	0.492
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	108 ^q	<1	<1	<1	<1	<1	<1	<3	40.3	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	38.9	41.4	36.4	36.6	40.7	43.7	33.4	34	34.3	33.9
Magnesium (Mg)	mg/L	0.1	-	-	24.1	24.7	22.8	22.9	25	26.7	20.4	20.7	22.3	22
Potassium (K)	mg/L	2	-	-	2.7	3	2.9	3	2.7	2.9	2.2	2.2	2.6	2.6
Silicon (Si)	mg/L	0.05	-	-	4.04	4.26	3.95	3.92	4.46	4.77	2.99	3.02	3.59	3.51
Sodium (Na)	mg/L	2	-	-	5.3	5.3	5	5.2	4.6	4.9	4.1	4.2	4.8	4.7
Dissolved Metals														
Aluminum (Al)	µg/L	1	-	100 ^r	-	-	<1	2.4	<1	<1	1.3	1.7	2.3	<1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008		October 2008		March 2009		June 2009		September 2009		
					19-Mar-08	21-Mar-08	1-Oct-08		16-Mar-09		28-Jun-09		30-Sep-09		
					EL-01	EL-02	EL-01	EL-02	EL-01	EL-02	EL-01	EL-02	EL-01	EL-02	
Antimony (Sb)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Arsenic (As)	µg/L	0.1	-	-	-	-	0.96	0.92	0.86	0.94	0.83	0.88	0.8	0.84	
Barium (Ba)	µg/L	0.05	-	-	-	-	71.0	69.7	79.2	86.3	63.9	64.2	81.2	83.0	
Beryllium (Be)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Bismuth (Bi)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Boron (B)	µg/L	10	-	-	-	-	24	23	24	25	22	22	25	26	
Cadmium (Cd)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.017	<0.017	
Chromium (Cr)	µg/L	**	-	-	-	-	<0.5	7.96	<1	<1	<0.5	<0.5	<0.5	<0.5	
Cobalt (Co)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Copper (Cu)	µg/L	0.1	-	-	-	-	1.11	0.78	0.24	0.26	0.24	0.27	0.17	0.17	
Iron (Fe)	µg/L	30	-	350	-	-	<30	<30	<30	<30	<30	<30	<30	<30	
Lead (Pb)	µg/L	0.05	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Lithium (Li)	µg/L	5	-	-	-	-	5.8	5.3	6.2	6.1	5.1	<5	<5	5.3	
Manganese (Mn)	µg/L	0.05	-	-	-	-	0.14	0.106	0.392	4.62	0.147	1.15	0.348	0.208	
Mercury (Hg)	µg/L	**	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	
Molybdenum (Mo)	µg/L	0.05	-	-	-	-	3.95	3.99	4.27	4.54	3.76	3.76	3.7	3.84	
Nickel (Ni)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Phosphorus (P)	µg/L	300	-	-	-	-	<300	<300	<300	<300	<300	<300	<300	<300	
Selenium (Se)	µg/L	1	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	
Silver (Ag)	µg/L	0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Strontium (Sr)	µg/L	0.1	-	-	-	-	52.5	52.1	61.9	64.4	47.6	47.7	54.1	58.1	
Thallium (Tl)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Tin (Sn)	µg/L	0.1	-	-	-	-	<0.1	0.32	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Titanium (Ti)	µg/L	10	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	
Uranium (U)	µg/L	0.01	-	-	-	-	0.422	0.464	0.554	0.588	0.538	0.538	0.438	0.447	
Vanadium (V)	µg/L	1	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	
Zinc (Zn)	µg/L	1	-	-	-	-	6.8	2.8	<1	<1	<1	<1	<1	<1	
Calcium (Ca)	mg/L	0.05	-	-	-	-	35.6	36	41.3	42.9	35.2	35.3	34.7	34.6	
Magnesium (Mg)	mg/L	0.1	-	-	-	-	22.3	22.6	25.1	26.2	21.4	21.2	23	23	
Potassium (K)	mg/L	2	-	-	-	-	2.8	2.9	2.7	2.8	2.3	2.3	2.8	2.7	
Silicon (Si)	mg/L	0.05	-	-	-	-	3.85	3.85	4.48	4.68	3.1	3.1	3.68	3.68	
Sodium (Na)	mg/L	2	-	-	-	-	4.9	6	4.6	4.7	4.3	4.3	5	4.9	
Radionuclides		GCDWQ MAC^s													
Lead-210 (²¹⁰ Pb)	Bq/L ¹	0.02	0.1	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	0.007	<0.005	<0.005	<0.005	0.006	<0.005	0.009	<0.005	<0.005	<0.005	
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	<0.02	<0.02	<0.2	<0.07	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Biota															
Chlorophyll a	µg/L	0.01	-	-	-	-	-	-	-	-	0.675	1.28	2.42	4.05	
Pheopigments	µg/L	0.01	-	-	-	-	-	-	-	-	-	-	0.662	0.48	

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 190 mg/L
Cadmium Guideline = 0.058 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 190 mg/L
Copper Guideline = 20 µg/L

- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $(1.273 \times [\text{LN}(\text{hardness})] - 1.460)$
Average hardness = 190 mg/L
Lead Guideline = 185 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 194
Manganese Guideline = 2.680 mg/L
= 2680 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
110 µg/L when [CaCO₃] is 120 - 180 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L

- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 190 mg/L
Zinc Guideline = 108 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality
Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radio-activity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance
- v. **Data outlier**, excluded from summary statistics

Table F3-3

Fred Lake (FL-01) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008 18-Mar-08	October 2008 7-Oct-08	March 2009 13-Mar-09	June 2009 24-Jun-09	September 2009 5-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	401	305	391	268	299
Hardness (as CaCO ₃)	mg/L	2	-	-	214	166	219	149	163
pH	pH	0.01	-	-	7.90	8.33	7.86	7.07	8.30
Total Suspended Solids	mg/L	3.0	-	-	6	<3.0	11	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	243	194	249	166	182
Turbidity	NTU	0.1	-	-	3.34	0.88	9.94	0.64	1.02
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	220	160	242	152	153
Ammonia as N	mg/L	0.02	-	-	-	<0.020	0.698	0.025	<0.020
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	<0.05	<0.05	<0.050
Chloride (Cl)	mg/L	0.5	-	600	5.18	4.19	4.87	3.63	4.16
Fluoride (F)	mg/L	0.02	-	0.3 ^d	1.36	1.14	1.29	0.918	1.05
Sulfate (SO ₄)	mg/L	0.5	-	100	<0.5	0.71	<0.50	<0.50	<0.50
Nutrients									
Nitrate and Nitrite as N	mg/L	0.005	-	-	0.0915	<0.0050	0.0399	<0.0050	-
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	<0.0050	0.0381	-	<0.0050
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	<0.0010	0.0018	-	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	1.3	0.921	1.2	0.588	0.718
Ortho Phosphate as P	mg/L	0.001	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.002	-	-	0.0109	0.0095	0.0086	0.0050	0.0069
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	19.7	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	19.2	16.3	14.6	16.8
Total Metals									
Aluminum (Al)	µg/L	**f	100 ^g	-	7.8	11.7	<7	<6	<5
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	1.42	0.89	1.56	0.76	1.01
Barium (Ba)	µg/L	0.05	-	5000	95.5	50.3	129	44.6	72.4
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	25	23	19	21	28
Cadmium (Cd)	µg/L	0.05	0.055 ⁱ	0.055	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	19 ^k	1.29	0.52	<0.6	0.81	<0.6
Iron (Fe)	µg/L	30	300	1000	1140	38	7860	<30	<30
Lead (Pb)	µg/L	0.05	1 - 7 ^l	175 ^m	0.094	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	7.3	6.2	6.8	<5	5.3
Manganese (Mn)	µg/L	0.05	-	2548 ⁿ	401	9.16	848	<12.4	25.4
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	2.26	2.04	1.64	1.82	2.42
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	75.5	53.6	67.9	43.1	66.2
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.511	0.439	0.312	0.401	0.320
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	102 ^q	1	3.7	1.7	<2	1.2
Calcium (Ca)	mg/L	0.05	-	-	45.4	33.8	46.9	30.7	33.6
Magnesium (Mg)	mg/L	0.1	-	-	24.4	19.1	22.2	16.5	17.4
Potassium (K)	mg/L	2	-	-	2.7	2.2	2.5	<2.0	2.1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					18-Mar-08	7-Oct-08	13-Mar-09	24-Jun-09	5-Sep-09
Silicon (Si)	mg/L	0.05	-	-	5.22	5.1	7.39	2.22	3.03
Sodium (Na)	mg/L	2	-	-	9.3	8	7.5	5.7	6.5
Dissolved Metals									
Aluminum (Al)	µg/L	1	-	100 ^f	-	1.4	1.8	2.2	1.1
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	1.04	1.59	0.89	0.92
Barium (Ba)	µg/L	0.05	-	-	-	46.2	121	42.6	70.3
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	22	19	19	25
Cadmium (Cd)	µg/L	0.05	-	-	-	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	**	-	-	-	<0.5	<1	<0.7	<2
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	0.29	0.15	0.52	0.39
Iron (Fe)	µg/L	30	-	350	-	<30	6990	<30	<30
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	5.3	6.9	<5	5.5
Manganese (Mn)	µg/L	0.05	-	-	-	0.468	766	3.79	0.401
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	-	1.8	1.63	1.7	2.16
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	49.3	67	40.6	60.7
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	0.15
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	0.391	0.315	0.185	0.306
Vanadium (V)	µg/L	1	-	-	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	2.1	<1	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	34.5	49.5	31.4	35.3
Magnesium (Mg)	mg/L	0.1	-	-	-	19.3	23.1	17.1	18.1
Potassium (K)	mg/L	2	-	-	-	2.2	2.5	<2.0	2.2
Silicon (Si)	mg/L	0.05	-	-	-	5.11	7.46	2.29	3.17
Sodium (Na)	mg/L	2	-	-	-	7.9	7.5	5.8	6.8
Radionuclides									
GCDWQ MAC^s									
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	-	<0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	**	0.6	-	-	0.008	0.02	<0.005	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	-	<0.03	<0.02	<0.02	<0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	-	<0.01	<0.01	<0.01	0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	-	<0.01	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	-	0.294	1.77
Pheopigments	µg/L	0.01	-	-	-	-	-	-	1.39

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{0.86[\text{Log}(\text{hardness})] - 3.2}$
Average hardness = 182 mg/L
Cadmium Guideline = 0.055 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 182 mg/L
Copper Guideline = 19 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 182 mg/L
Lead Guideline = 175 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 182
Manganese Guideline = 2.548 mg/L
= 2548 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
110 µg/L when [CaCO₃] is 120 - 180 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 182 mg/L
Zinc Guideline = 102 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-4

Cressy Lake (FL-02) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009	
					21-Mar-08	-	13-Mar-09	24-Jun-09	FL-02	8-Sep-09 Replicate
Physicals										
Conductivity	µS/cm	0.5	-	-	554	-	289	237	249	248
Hardness (as CaCO ₃)	mg/L	2	-	-	156	-	165	137	139	139
pH	pH	0.01	-	-	7.95	-	7.93	7.78	8.15	8.14
Total Suspended Solids	mg/L	3.0	-	-	<3.0	-	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	182	-	182	154	158	158
Turbidity	NTU	0.1	-	-	2.4	-	0.37	1.15	1.14	1.16
Anions										
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	151	-	180	132	127	124
Ammonia as N	mg/L	0.02	-	-	-	-	0.023	0.035	0.024	0.23
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	<0.05	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	0.5	-	600	0.74	-	0.83	0.65	0.64	0.66
Fluoride (F)	mg/L	0.02	-	0.3 ^d	1.1	-	1.14	0.875	0.960	0.965
Sulfate (SO ₄)	mg/L	0.5	-	100	2.79	-	3.09	2.27	2.53	2.59
Nutrients										
Nitrate and Nitrite as N	mg/L	0.005	-	-	1.68	-	0.18	<0.0050	-	-
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	-	0.18	-	<0.0050	<0.0050
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	-	<0.0010	-	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	6.82	-	0.514	0.588	0.644	0.609
Ortho Phosphate as P	mg/L	0.001	-	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.002	-	-	0.17	-	0.0063	0.0120	0.0138	0.0105
Organics										
Total Organic Carbon (TOC)	mg/L	0.5	-	-	16.2	-	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	-	15.6	14.8	17.7	-
Total Metals										
Aluminum (Al)	µg/L	**f	100 ^g	-	3.3	-	<4	12	<6	<6
Antimony (Sb)	µg/L	0.1	-	20	<0.1	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	0.95	-	1.02	1.05	1.48	1.35
Barium (Ba)	µg/L	0.05	-	5000	25.8	-	22.9	20.6	22.7	21.3
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	18	-	17	16	21	19
Cadmium (Cd)	µg/L	**	0.047 ⁱ	0.047	<0.05	-	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	-	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1	-	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	16 ^k	0.45	-	1.64	0.71	1.44	<0.8
Iron (Fe)	µg/L	30	300	1000	51	-	52	52	96	88
Lead (Pb)	µg/L	0.05	1 - 7 ^l	136 ^m	<0.05	-	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	9.2	-	8.6	7.8	8.2	7.5
Manganese (Mn)	µg/L	0.05	-	2185 ⁿ	163	-	18	17.2	69.7	63.6
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	<0.05	<0.05	<0.01	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	1.99	-	2.03	1.82	2.05	1.95
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	-	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	-	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	48.1	-	45.8	38.3	49.1	45.3
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	-	<0.1	<0.1	0.1	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	2.67	-	2.8	2.19	2.1	2
Vanadium (V)	µg/L	1	-	6	<1	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	77 ^q	2.6	-	2.2	<3	1.3	1.4
Calcium (Ca)	mg/L	0.05	-	-	33.4	-	33.7	26.4	29.8	26.9
Magnesium (Mg)	mg/L	0.1	-	-	17.7	-	17.6	14.9	16.2	15.6
Potassium (K)	mg/L	2	-	-	2.3	-	2.3	<2.0	2.5	2.4

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009	
					21-Mar-08	-	13-Mar-09	24-Jun-09	FL-02	Replicate
Silicon (Si)	mg/L	0.05	-	-	2.07	-	1.87	1.30	1.10	1.06
Sodium (Na)	mg/L	2	-	-	4	-	3.7	3.1	3.8	3.6
Dissolved Metals										
Aluminum (Al)	µg/L	1	-	100 ^f	-	-	<1	5.9	<1	1.3
Antimony (Sb)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	-	1.04	1.17	1.23	1.13
Barium (Ba)	µg/L	0.05	-	-	-	-	23	19.2	19.6	18.8
Beryllium (Be)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	-	17	15	18	17
Cadmium (Cd)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	-	1.16	0.44	0.37	0.35
Iron (Fe)	µg/L	30	-	350	-	-	<30	<30	<30	<30
Lead (Pb)	µg/L	0.05	-	-	-	-	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	-	8.4	7.1	7.4	7.2
Manganese (Mn)	µg/L	0.05	-	-	-	-	10.7	3.2	0.848	0.779
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.01	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	-	-	1.89	1.59	1.67	1.53
Nickel (Ni)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	-	45	35.1	40.3	38.3
Thallium (Tl)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	-	2.67	1.92	1.83	1.78
Vanadium (V)	µg/L	1	-	-	-	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	-	3	<1	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	-	35.9	29.3	29.6	29.6
Magnesium (Mg)	mg/L	0.1	-	-	-	-	18.2	15.4	15.8	15.8
Potassium (K)	mg/L	2	-	-	-	-	2.4	2.1	2.4	2.3
Silicon (Si)	mg/L	0.05	-	-	-	-	1.94	1.34	1.05	1.05
Sodium (Na)	mg/L	2	-	-	-	-	3.9	3.2	3.5	3.5
Radionuclides										
GCDWQ MAC^s										
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	-	-	<0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	-	-	<0.005	<0.005	<0.005	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	0.02	0.5	-	-	-	<0.02	<0.02	<0.02	<0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	-	-	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	-	-	<0.01	<0.01	<0.01	<0.01
Biota										
Chlorophyll a	µg/L	0.01	-	-	-	-	-	0.637	3.75	3.02
Pheopigments	µg/L	0.01	-	-	-	-	-	-	1.32	1.08

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 149 mg/L
Cadmium Guideline = 0.047 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 149 mg/L
Copper Guideline = 16 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 149 mg/L
Lead Guideline = 136 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 149
Manganese Guideline = 2.185 mg/L
= 2185 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
110 µg/L when [CaCO₃] is 120 - 180 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 149 mg/L
Zinc Guideline = 77 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance
- v. **Replicate** result where precision threshold (RPD > 25%) was exceeded

Table F3-5

Lake A (FL-03) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008		March 2009	June 2009	September 2009
					21-Mar-08	FL-03	4-Oct-08 Replicate	16-Mar-09	27-Jun-09	23-Sep-09
Physicals										
Conductivity	µS/cm	0.5	-	-	329	303	305	324	257	293
Hardness (as CaCO ₃)	mg/L	2	-	-	168	171	170	180	139	143
pH	pH	0.01	-	-	8.01	8.17	8.20	8.05	7.85	8.28
Total Suspended Solids	mg/L	3.0	-	-	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	197	188	188	201	168	168
Turbidity	NTU	0.1	-	-	0.44	0.91	0.96	0.66	1.23	0.70
Anions										
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	167	158	163	193	139	151
Ammonia as N	mg/L	0.02	-	-	-	0.022	<0.020	<0.02	<0.020	0.033
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	-	<0.05	<0.050	<0.050
Chloride (Cl)	mg/L	0.5	-	600	4.99	4.71	4.73	5.47	3.92	4.40
Fluoride (F)	mg/L	0.02	-	0.3 ^d	1.10	1.04	1.04	1.10	0.859	0.972
Sulfate (SO ₄)	mg/L	0.5	-	100	0.95	0.83	0.83	1.16	0.82	0.72
Nutrients										
Nitrate and Nitrite as N	mg/L	0.005	-	-	0.0559	0.0097	0.0104	0.0658	<0.0050	<0.0050
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	0.0087	0.0092	0.0658	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	0.001	0.0012	<0.0010	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	0.597	0.646	0.588	0.442	0.544	0.563
Ortho Phosphate as P	mg/L	0.001	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.002	-	-	0.0062	0.0068	0.0069	0.0059	0.0063	0.0045
Organics										
Total Organic Carbon (TOC)	mg/L	0.5	-	-	15.2	-	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	16.2	15.9	15.7	14.7	14.5
Total Metals										
Aluminum (Al)	µg/L	** ^f	100 ^g	-	3.5	6.8	7.3	<9	22	14
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	1.15	1.26	1.34	1.03	0.87	0.93
Barium (Ba)	µg/L	0.05	-	5000	57.6	48.7	49.6	53	39.6	54.3
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	17	18	19	20	21	22
Cadmium (Cd)	µg/L	**	0.050 ⁱ	0.050	<0.05	<0.05	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	**	8.9	8.9	<0.5	<0.5	<1	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	17 ^k	1.21	1.02	1.02	<1.1	0.71	<0.7
Iron (Fe)	µg/L	30	300	1000	38	62	60	132	122	36
Lead (Pb)	µg/L	0.05	1 - 7 ^l	149 ^m	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	5.1	5.1	5.2	6.1	<5	<5
Manganese (Mn)	µg/L	0.05	-	2305 ⁿ	5.91	46.6	47.4	17.1	7.19	4.84
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	1.87	1.73	1.82	1.75	1.7	1.68
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	<0.01	0.024
Strontium (Sr)	µg/L	0.1	-	-	60	53.3	54.3	58.9	42.4	54.9
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.543	0.529	0.537	0.615	0.483	0.417
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	30	86 ^q	<1	<1	<1	1	2.6	<1
Calcium (Ca)	mg/L	0.05	-	-	35.3	37	36.3	36.5	28.5	32.8
Magnesium (Mg)	mg/L	0.1	-	-	19.4	19.4	19.4	20.3	14.9	17.3
Potassium (K)	mg/L	2	-	-	2	2.1	2.2	<2.0	<2.0	<2.0

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008		March 2009	June 2009	September 2009
					21-Mar-08	4-Oct-08	Replicate	16-Mar-09	27-Jun-09	23-Sep-09
Silicon (Si)	mg/L	0.05	-	-	2.96	3.19	3.18	3.46	2.47	2.7
Sodium (Na)	mg/L	2	-	-	7.5	7.1	7.3	6.5	5.4	6
Dissolved Metals										
Aluminum (Al)	µg/L	1	-	100 ^f	-	2.4	1.2	2.1	9.2	1
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1	0.38
Arsenic (As)	µg/L	0.1	-	-	-	1.25	1.19	0.91	0.98	0.82
Barium (Ba)	µg/L	0.05	-	-	-	48.3	47.7	51.3	39.3	46.1
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	18	18	19	18	19
Cadmium (Cd)	µg/L	**	-	-	-	<0.05	<0.05	<0.05	<0.05	0.022
Chromium (Cr)	µg/L	**	-	-	-	<1	<1	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	0.74	0.86	0.68	0.63	0.88
Iron (Fe)	µg/L	30	-	350	-	<30	<30	91	75	<30
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	<0.05	<0.05	<0.05	0.481
Lithium (Li)	µg/L	5	-	-	-	5	<5	6	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	-	4.13	4.04	6.40	2.32	1.36
Mercury (Hg)	µg/L	**	-	-	-	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	-	1.82	1.78	1.71	1.67	1.57
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	1.43	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	53.0	53.1	57.5	41.7	48.5
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1	0.5
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	0.550	0.553	0.590	0.464	0.355
Vanadium (V)	µg/L	1	-	-	-	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	1.7	4.4	<1	1.7	3.3
Calcium (Ca)	mg/L	0.05	-	-	-	36.9	35.8	38	30	30.7
Magnesium (Mg)	mg/L	0.1	-	-	-	19.1	19.4	20.7	15.6	16.1
Potassium (K)	mg/L	2	-	-	-	2.1	2.2	<2	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	-	3.13	3.13	3.56	2.55	2.5
Sodium (Na)	mg/L	2	-	-	-	7	7.3	6.5	5.5	5.8
Radionuclides										
GCDWQ MAC^s										
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	<0.005	<0.005	0.007	<0.005	0.006	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	0.02	0.5	-	<0.02	<0.04	N/R	<0.02	<0.02	<0.01
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Biota										
Chlorophyll a	µg/L	0.01	-	-	-	-	-	-	0.908	1.91
Pheopigments	µg/L	0.01	-	-	-	-	-	-	-	0.498

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{0.86[\text{Log}(\text{hardness})] - 3.2}$
Average hardness = 160 mg/L
Cadmium Guideline = 0.050 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 160 mg/L
Copper Guideline = 17 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 160 mg/L
Lead Guideline = 149 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 160
Manganese Guideline = 2.305 mg/L
= 2305 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
110 µg/L when [CaCO₃] is 120 - 180 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 160 mg/L
Zinc Guideline = 86 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-6

Great Slave Lake Dock Site (GL-01) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	October 2008 2-Oct-08	March 2009 16-Mar-09	June 2009 28-Jun-09 GL-01	September 2009 30-Sep-09 Replicate	September 2009 30-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	193	207	171	170	190
Hardness (as CaCO ₃)	mg/L	2	-	-	87.8	96.7	74.3	74.4	83.6
pH	pH	0.01	-	-	8.09	8.00	7.77	7.74	8.17
Total Suspended Solids	mg/L	3.0	-	-	<3.0	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	109	125	99	95	107
Turbidity	NTU	0.1	-	-	0.53	0.97	0.48	0.49	0.48
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	73.8	91.1	61.4	60.8	68.7
Ammonia as N	mg/L	0.02	-	-	<0.020	<0.020	<0.020	<0.020	0.021
Bromide (Br)	mg/L	0.05	-	-	-	<0.05	<0.050	<0.050	<0.05
Chloride (Cl)	mg/L	0.5	-	600	6.09	6.90	5.34	5.31	6.02
Fluoride (F)	mg/L	0.02	-	0.3 ^d	0.065	0.072	0.049	0.049	0.064
Sulfate (SO ₄)	mg/L	0.5	-	100	18.5	20.3	16.1	16.0	17.5
Nutrients									
Nitrate and Nitrite as N	mg/L	0.005	-	-	0.0836	0.114	0.0752	0.0755	-
Nitrate (as N)	mg/L	0.005	2.9	31.3	0.0836	0.114	-	-	0.0769
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	<0.0010	<0.0010	-	-	<0.001
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	0.168	0.103	0.236	0.152	0.167
Ortho Phosphate as P	mg/L	0.001	-	-	<0.0010	0.0015	<0.0010	<0.0010	<0.001
Total Phosphate as P	mg/L	0.002	-	-	0.0049	0.0036	0.0029	0.0028	0.0043
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	-	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	4.58	4.08	3.87	3.80	4.31
Total Metals									
Aluminum (Al)	µg/L	**f	100 ^g	-	13.7	26.8	10.1	<8	11
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	0.19	0.12	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	0.31	0.29	0.25	0.22	0.25
Barium (Ba)	µg/L	0.05	-	5000	37.7	39.4	33.3	32	38
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	12	14	14	14	20
Cadmium (Cd)	µg/L	**	0.029 ⁱ	0.029	<0.05	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	10 ^k	1.71	1.22	1.29	1.09	1.04
Iron (Fe)	µg/L	30	300	1000	<30	<30	<30	<30	<30
Lead (Pb)	µg/L	0.05	1 - 7 ^l	67 ^m	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	<5	<5	<5	<5	<5
Manganese (Mn)	µg/L	0.05	-	1484 ⁿ	0.519	0.452	0.37	0.339	0.388
Mercury (Hg)	µg/L	**	0.026	0.1	-	<0.05	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	0.627	0.694	0.635	0.62	0.655
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	0.8	0.93	0.93	0.81	0.86
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	101	104	87.1	84	108
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.36	0.404	0.366	0.345	0.347
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	October 2008	March 2009	June 2009		September 2009
					2-Oct-08	16-Mar-09	GL-01	Replicate	30-Sep-09
Zinc (Zn)	µg/L	**	30	30 ^d	<1	<1	<4	<3	<1
Calcium (Ca)	mg/L	0.05	-	-	25.8	28.2	20.4	20.3	21.9
Magnesium (Mg)	mg/L	0.1	-	-	5.92	6.34	4.84	4.75	5.56
Potassium (K)	mg/L	2	-	-	<2	<2.0	<2.0	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	1.4	1.57	1.12	1.12	1.25
Sodium (Na)	mg/L	2	-	-	6.8	6.5	5.6	5.5	6.7
Dissolved Metals									
Aluminum (Al)	µg/L	1	-	100 ^f	1.4	3.6	1.1	<1	<1
Antimony (Sb)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	0.1
Arsenic (As)	µg/L	0.1	-	-	0.29	0.28	0.31	0.25	0.28
Barium (Ba)	µg/L	0.05	-	-	36.5	39.6	31.9	31.5	36.7
Beryllium (Be)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	12	13	11	11	14
Cadmium (Cd)	µg/L	**	-	-	<0.05	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	1.54	1.13	0.93	0.87	0.96
Iron (Fe)	µg/L	30	-	350	<30	<30	<30	<30	<30
Lead (Pb)	µg/L	0.05	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	<5	<5	<5	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	0.152	0.61	0.095	0.082	0.123
Mercury (Hg)	µg/L	**	-	-	-	<0.05	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	0.619	0.699	0.603	0.57	0.594
Nickel (Ni)	µg/L	0.5	-	-	0.77	0.91	1	0.69	0.79
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	99	104	81	81.5	105
Thallium (Tl)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	-	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	0.374	0.394	0.349	0.346	0.332
Vanadium (V)	µg/L	1	-	-	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	2.2	1.2	1	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	25.5	28.3	21.5	21.5	23.6
Magnesium (Mg)	mg/L	0.1	-	-	5.88	6.33	5.01	5.04	6
Potassium (K)	mg/L	2	-	-	<2	<2	<2.0	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	1.35	1.5	1.17	1.18	1.34
Sodium (Na)	mg/L	2	-	-	7.1	6.5	5.7	5.7	7.1
Radionuclides									
GCDWQ MAC^s									
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	<0.02	<0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	0.006	<0.005	0.006	0.007	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	<0.09	<0.02	<0.02	<0.02	<0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01	<0.01	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	1.05	1.01	1.08
Pheopigments	µg/L	0.01	-	-	-	-	-	-	0.23

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 86 mg/L
Cadmium Guideline = 0.029 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = $0.094 \times (\text{hardness}) + 2$
Average hardness = 86 mg/L
Copper Guideline = 10 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 86 mg/L
Lead Guideline = 67 µg/L
- n. BC WQG for Total Manganese should be less than or equal to $0.01102 \times (\text{hardness}) + 0.54$
Average hardness = 86 mg/L
Manganese Guideline = 1.484 mg/L
= 1484 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
110 µg/L when [CaCO₃] is 120 - 180 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = $33 + 0.75 \times (\text{hardness} - 90)$
Average hardness = 86 mg/L
Zinc Guideline = 30 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-7

Long Lake (LL-01 & LL-02) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008		October 2008		March 2009	June 2009	September 2009
					19-Mar-08	Replicate	6-Oct-08	LL-02	15-Mar-09	25-Jun-09	13-Sep-09
					LL-01		LL-01		LL-02	LL-02	LL-02
Physicals											
Conductivity	µS/cm	0.5	-	-	294	297	275	275	291	260	275
Hardness (as CaCO ₃)	mg/L	2	-	-	157	156	150	147	162	143	150
pH	pH	0.01	-	-	8.09	8.14	8.33	8.34	8.03	7.76	8.43
Total Suspended Solids	mg/L	3.0	-	-	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	174	173	166	148	180	156	160
Turbidity	NTU	0.1	-	-	0.46	0.49	2.01	1.97	0.63	1.02	1.1
Anions											
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	160	154	146	149	175	138	139
Ammonia as N	mg/L	0.02	-	-	-	-	<0.020	<0.020	<0.020	<0.020	0.025
Bromide (Br)	mg/L	0.05	-	-	<0.05	<0.05	-	-	<0.05	<0.050	<0.050
Chloride (Cl)	mg/L	0.5	-	600	3.75	3.75	3.56	3.56	4.08	3.27	3.57
Fluoride (F)	mg/L	0.02	-	0.3 ^d	1.2	1.2	1.16	1.15	1.23	1.03	1.13
Sulfate (SO ₄)	mg/L	0.5	-	100	1.45	1.45	1.26	1.26	1.50	1.18	1.30
Nutrients											
Nitrate and Nitrite as N	mg/L	0.005	-	-	0.0693	0.0689	<0.0050	<0.0050	0.121	<0.0050	<0.0050
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	-	<0.0050	<0.0050	0.121	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	-	<0.0010	<0.0010	<0.0010	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	0.490	0.475	0.537	0.555	0.454	0.559	0.444
Ortho Phosphate as P	mg/L	0.001	-	-	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.002	-	-	0.0077	0.0069	0.0125	0.0122	0.006	0.0088	0.0053
Organics											
Total Organic Carbon (TOC)	mg/L	0.5	-	-	13.1	13.3	-	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	-	13	13	11.4	13.0	12.7
Total Metals											
Aluminum (Al)	µg/L	** ^f	100 ^g	-	<1	<1	9.9	5.6	8.8	<9	20.1
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	0.68	0.68	0.58	0.6	0.57	0.57	0.54
Barium (Ba)	µg/L	0.05	-	5000	54.1	55	49.5	52	54.2	44	49.2
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	24	24	23	28	24	23	26
Cadmium (Cd)	µg/L	**	0.047 ⁱ	0.047	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	16 ^k	0.78	0.87	0.61	0.78	<0.5	0.89	<0.7
Iron (Fe)	µg/L	30	300	1000	<30	<30	116	125	<30	<30	<30
Lead (Pb)	µg/L	0.05	1 - 7 ^l	139 ^m	<0.05	<0.05	<0.05	<0.05	<0.05	0.058	<0.05
Lithium (Li)	µg/L	5	-	870	<5	<5	5.2	6.2	5.4	<5	<5
Manganese (Mn)	µg/L	**	-	2210 ⁿ	9.29	8.92	66.2	74.3	13.7	16.4	17.5
Mercury (Hg)	µg/L	0.05	0.026	0.1	-	-	-	-	<0.05	<0.05	<0.05
Molybdenum (Mo)	µg/L	0.05	73	2000	4.35	4.33	5.46	5.02	4.71	4.44	4.64
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.012
Strontium (Sr)	µg/L	0.1	-	-	57.7	56.8	51.4	53.2	56.9	46.4	49.6
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.95	0.92	0.953	0.967	1.12	1.07	0.921
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	79 ^q	<1	<1	3.7	<1	1.3	<2	1
Calcium (Ca)	mg/L	0.05	-	-	32.5	32.5	30.4	30.9	32.4	29.5	31.1
Magnesium (Mg)	mg/L	0.1	-	-	18.3	18.1	16.5	16.7	17.7	16.4	16.1
Potassium (K)	mg/L	2	-	-	<2.0	<2.0	<2	<2	<2.0	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	2.62	2.62	2.39	2.43	2.79	2.26	2.02
Sodium (Na)	mg/L	2	-	-	6.4	6.3	5.9	6	6	5.4	5.6

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008		October 2008		March 2009	June 2009	September 2009
					19-Mar-08	Replicate	6-Oct-08	LL-02	15-Mar-09	25-Jun-09	13-Sep-09
					LL-01		LL-01		LL-02	LL-02	LL-02
Physicals											
Dissolved Metals											
Aluminum (Al)	µg/L	1	-	100 ^f	-	-	<1	<1	1	3.2	<1
Antimony (Sb)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	-	0.6	0.62	0.57	0.66	0.58
Barium (Ba)	µg/L	0.05	-	-	-	-	44	45.6	52.6	40.8	47
Beryllium (Be)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	-	27	26	24	21	23
Cadmium (Cd)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	**	-	-	-	-	<0.5	<0.5	<0.5	<0.6	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	-	0.47	0.44	0.34	0.43	0.36
Iron (Fe)	µg/L	30	-	350	-	-	<30	<30	<30	<30	<30
Lead (Pb)	µg/L	0.05	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	-	5.1	<5	5.6	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	-	-	0.173	0.163	0.659	2.79	0.456
Mercury (Hg)	µg/L	**	-	-	-	-	-	-	<0.05	<0.05	<0.05
Molybdenum (Mo)	µg/L	0.05	-	-	-	-	4.24	4.33	4.65	3.95	4.4
Nickel (Ni)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	-	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	-	46.4	47.4	55.9	42.5	48.5
Thallium (Tl)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1	0.2
Titanium (Ti)	µg/L	10	-	-	-	-	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	-	0.822	0.854	1.07	0.929	0.877
Vanadium (V)	µg/L	1	-	-	-	-	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	-	1	<1	2.4	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	-	31.7	31	34.5	29.9	32.5
Magnesium (Mg)	mg/L	0.1	-	-	-	-	17.2	16.9	18.5	16.6	16.8
Potassium (K)	mg/L	2	-	-	-	-	<2	<2	<2	<2	<2
Silicon (Si)	mg/L	0.05	-	-	-	-	2.47	2.44	2.93	2.28	2.1
Sodium (Na)	mg/L	2	-	-	-	-	5.9	6	6.2	5.4	5.9
Radionuclides											
GCDWQ MAC^s											
Lead-210 (²¹⁰ Pb)	Bq/L ¹	0.02	0.1	-	<0.02	-	-	<0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	0.01	-	-	<0.005	<0.005	<0.005	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	0.08	-	-	<0.06	<0.02	<0.02	<0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01	-	-	<0.01	<0.01	<0.01	<0.01
Biota											
Chlorophyll a	µg/L	0.01	-	-	-	-	-	-	-	0.816	2.07
Pheopigments	µg/L	0.01	-	-	-	-	-	-	-	-	1.07

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 152 mg/L
Cadmium Guideline = 0.047 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 152 mg/L
Copper Guideline = 16 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 152 mg/L
Lead Guideline = 139 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 152
Manganese Guideline = 2.210 mg/L
= 2210 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 152 mg/L
Zinc Guideline = 79 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on ac = 33 + 0.75 x (hardness - 90) of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-8

North Tardiff Lake (NT-01) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008 19-Mar-08	October 2008 5-Oct-08	March 2009 17-Mar-09	June 2009 25-Jun-09	September 2009 13-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	218	98.4	290	82.4	96.7
Hardness (as CaCO ₃)	mg/L	2	-	-	133	61.6	193	50.1	61.1
pH	pH	0.01	-	-	7.34	7.71	7.34	7.75	7.77
Total Suspended Solids	mg/L	3.0	-	-	17	3.2	24	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	273	137	398	114	106
Turbidity	NTU	0.1	-	-	9.11	0.95	8.82	2.04	1.14
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	107	46.5	151	39.3	61.9
Ammonia as N	mg/L	0.02	-	-	-	0.032	1.71	0.034	0.119
Bromide (Br)	mg/L	**f	-	-	<0.05	-	<0.05	<0.25	<0.50
Chloride (Cl)	mg/L	0.5	-	600	1.07	3.5	<5.0	<2.5	<5.0
Fluoride (F)	mg/L	0.02	-	0.3 ^d	0.325	0.20	0.32	0.13	0.20
Sulfate (SO ₄)	mg/L	**	-	100	0.59	<2.5	<5.0	<2.5	<5.0
Nutrients									
Nitrate and Nitrite as N	mg/L	**	-	-	<0.005	<0.03	<0.050	<0.030	0.099
Nitrate (as N)	mg/L	**	2.9	31.3	-	<0.025	<0.050	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^g	-	0.0066	<0.010	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	4.74	1.77	6.30	1.74	1.71
Ortho Phosphate as P	mg/L	**	-	-	<0.010	<0.010	0.018	<0.0010	<0.0010
Total Phosphate as P	mg/L	**	-	-	0.080	0.032	0.069	0.0290	<0.020
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	82.3	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	43.7	104.0	37.8	41.9
Total Metals									
Aluminum (Al)	µg/L	1	100 ^g	-	194	86.7	336	76.3	101
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	2.65	1.06	3.89	1.18	1.15
Barium (Ba)	µg/L	0.05	-	5000	50.7	19.1	75.6	18.9	18.9
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	<10	<10	<10	<10	11
Cadmium (Cd)	µg/L	**	0.033 ⁱ	0.033	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	**	8.9	8.9	0.86	<0.5	<2	<0.5	0.58
Cobalt (Co)	µg/L	0.1	-	110	0.28	<0.1	0.5	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	11 ^k	1.38	0.72	1.35	0.52	<0.7
Iron (Fe)	µg/L	30	300	1000	2460	262	4160	363	425
Lead (Pb)	µg/L	0.05	1 - 7 ^l	81 ^m	0.213	0.059	0.169	0.051	<0.05
Lithium (Li)	µg/L	5	-	870	6.1	<5	9.1	<5	<5
Manganese (Mn)	µg/L	0.05	-	1639 ⁿ	305	5.54	389	18.6	16.1
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	<0.05	<0.05	<0.05
Molybdenum (Mo)	µg/L	**	73	2000	0.339	0.282	0.58	0.191	0.218
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	0.8	<0.5	1.22	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	0.012	<0.01	0.019	<0.01	0.012
Strontium (Sr)	µg/L	0.1	-	-	41.8	18.9	57.8	16.5	17.6
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					19-Mar-08	5-Oct-08	17-Mar-09	25-Jun-09	13-Sep-09
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.521	0.288	0.863	0.247	0.273
Vanadium (V)	µg/L	1	-	6	1.3	<1	1.9	<1	<1
Zinc (Zn)	µg/L	**	30	40 ^q	5.9	6	8.2	<3	2.8
Calcium (Ca)	mg/L	0.05	-	-	19.2	7.65	28.4	7	7.35
Magnesium (Mg)	mg/L	0.1	-	-	20.7	10.5	29.8	7.86	9.84
Potassium (K)	mg/L	2	-	-	2.3	<2	3.6	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	3.19	0.537	4.61	0.328	1.56
Sodium (Na)	mg/L	2	-	-	3.1	2.3	4.6	<2.0	2
Dissolved Metals									
Aluminum (Al)	µg/L	1	-	100 ^r	-	64.9	225	59.3	82.1
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	1.06	3.75	1.17	1.06
Barium (Ba)	µg/L	0.05	-	-	-	17.2	70.8	17.4	17.9
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	<10	<10	<10	<10
Cadmium (Cd)	µg/L	**	-	-	-	<0.05	<0.05	<<0.05	<0.05
Chromium (Cr)	µg/L	0.5	-	-	-	<0.5	1.32	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	0.42	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	0.48	0.71	0.35	0.36
Iron (Fe)	µg/L	30	-	350	-	232	3110	305	416
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	0.084	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	<5	9	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	-	1.46	374	3.3	13.5
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.05
Molybdenum (Mo)	µg/L	0.05	-	-	-	0.206	0.495	0.161	0.13
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	1.1	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	16.5	57.2	15	15.8
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	0.32
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	0.218	0.768	0.219	0.23
Vanadium (V)	µg/L	1	-	-	-	<1	1.2	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	5.1	4.4	1.3	2.1
Calcium (Ca)	mg/L	0.05	-	-	-	7.62	28.4	7.01	7.65
Magnesium (Mg)	mg/L	0.1	-	-	-	10.3	29.8	7.93	10.2
Potassium (K)	mg/L	2	-	-	-	<2	3.6	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	-	0.437	4.47	0.36	1.59
Sodium (Na)	mg/L	2	-	-	-	2.3	4.7	<2.0	2.1
Radionuclides									
GCDWQ MAC ^s									
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	-	<0.02	0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	-	<0.005	0.008	<0.005	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	-	<0.04	<0.02	<0.02	<0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	-	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	-	<0.01	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	-	2.00	1.33
Pheopigments	µg/L	0.01	-	-	-	-	-	-	2.72

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness ≥ 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = 10^[0.86(Log(hardness)) - 3.2]
 - Average hardness = 100 mg/L
 - Cadmium Guideline = 0.033 µg/L
- j. CCME FAL Total Copper guideline:
 - 2 µg/L when [CaCO₃] is 0 - 120 mg/L
 - 3 µg/L when [CaCO₃] is 120 - 180 mg/L
 - 4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
 - Average hardness = 100 mg/L
 - Copper Guideline = 11 µg/L
- l. CCME FAL Total Lead guideline:
 - 1 µg/L when [CaCO₃] is 0 - 60 mg/L
 - 4 µg/L when [CaCO₃] is 120 - 180 mg/L
 - 7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
 - = e(1.273 x [ln(hardness)]) - 1.460
 - Average hardness = 100 mg/L
 - Lead Guideline = 81 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
 - Average hardness = 100
 - Manganese Guideline = 1.639 mg/L
 - = 1639 µg/L
- o. CCME FAL Total Nickel guideline:
 - 25 µg/L when [CaCO₃] is 0 - 60 mg/L
 - 110 µg/L when [CaCO₃] is 120 - 180 mg/L □ 150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
 - 0.1 µg/L when [CaCO₃] is ≤ 100 mg/L
 - 3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
 - Average hardness = 100 mg/L
 - Zinc Guideline = 40 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH ≥ 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-9

South Tardiff Lake (ST-01) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					19-Mar-08	5-Oct-08	17-Mar-09	25-Jun-09	13-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	223	114	283	96.1	114
Hardness (as CaCO ₃)	mg/L	2	-	-	130	69	172	58.2	68.6
pH	pH	0.01	-	-	7.49	7.86	7.51	7.47	7.95
Total Suspended Solids	mg/L	3.0	-	-	5	3.7	14	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	225	123	317	107	127
Turbidity	NTU	0.1	-	-	5.63	1.12	4.68	1.55	1.13
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	113	57.2	149	46.8	52.2
Ammonia as N	mg/L	0.02	-	-	-	0.036	1.31	0.027	0.088
Bromide (Br)	mg/L	**f	-	-	<0.05	-	<0.05	<0.25	<0.050
Chloride (Cl)	mg/L	0.5	-	600	1.10	2.80	<2.50	<2.50	1.11
Fluoride (F)	mg/L	0.02	-	0.3 ^d	0.438	0.260	0.440	0.180	0.317
Sulfate (SO ₄)	mg/L	**	-	100	<0.5	<2.5	<2.5	<2.5	0.68
Nutrients									
Nitrate and Nitrite as N	mg/L	**	-	-	<0.005	0.146	<0.030	<0.030	0.0549
Nitrate (as N)	mg/L	**	2.9	31.3	-	0.139	<0.025	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	0.0071	<0.0050	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	3.04	1.60	3.84	1.10	1.38
Ortho Phosphate as P	mg/L	**	-	-	0.011	<0.010	<0.010	<0.0010	<0.0010
Total Phosphate as P	mg/L	**	-	-	0.029	0.022	0.044	0.0182	0.014
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	57.6	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	37.1	72.2	32.4	35.0
Total Metals									
Aluminum (Al)	µg/L	1	100 ^g	-	42.6	32.3	101	40.8	37.7
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	2.27	1.11	2.94	1.10	1.08
Barium (Ba)	µg/L	0.05	-	5000	40.8	17.3	53.1	16.5	17.5
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	13	11	17	<10	14
Cadmium (Cd)	µg/L	**	0.033 ⁱ	0.033	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	0.14	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	11 ^k	0.99	0.56	<0.7	0.49	<0.7
Iron (Fe)	µg/L	30	300	1000	1020	58	1570	133	96
Lead (Pb)	µg/L	0.05	1 - 7 ^l	81 ^m	0.078	<0.05	0.082	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	<5	<5	6.5	<5	<5
Manganese (Mn)	µg/L	0.05	-	1637 ⁿ	287	4.14	286	13.8	8.31
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	<0.05	<0.05	<0.05
Molybdenum (Mo)	µg/L	0.05	73	2000	0.438	0.422	0.561	0.373	0.365
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	51.1	26.6	63.3	22.8	23.6
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					19-Mar-08	5-Oct-08	17-Mar-09	25-Jun-09	13-Sep-09
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.71	0.559	1	0.51	0.51
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	40 ^g	7.1	2.2	5.9	<2	1.9
Calcium (Ca)	mg/L	0.05	-	-	20.5	9.02	26.4	7.91	8.68
Magnesium (Mg)	mg/L	0.1	-	-	19.1	11.6	25.6	8.9	10.5
Potassium (K)	mg/L	2	-	-	2.3	<2	3.2	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	1.88	0.688	4	0.314	1.19
Sodium (Na)	mg/L	2	-	-	2.9	2	3.6	<2.0	<2.0
Dissolved Metals									
Aluminum (Al)	µg/L	1	-	100 ^f	-	18.9	51.9	24.8	28.9
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	1.06	2.96	1.1	1.01
Barium (Ba)	µg/L	0.05	-	-	-	14.3	47.8	14.9	16.3
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	<10	17	<10	<10
Cadmium (Cd)	µg/L	**	-	-	-	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	0.5	-	-	-	<0.5	0.6	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	0.32	0.42	0.27	0.26
Iron (Fe)	µg/L	30	-	350	-	48	1150	105	85
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	<5	6.5	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	-	1.00	6.48	1.66	3.76
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.05
Molybdenum (Mo)	µg/L	0.05	-	-	-	0.304	0.520	0.326	0.279
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	22.1	62.7	19.8	21.9
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	0.427	0.949	0.428	0.450
Vanadium (V)	µg/L	1	-	-	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	1.9	4.2	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	9.06	26.6	8.21	9.14
Magnesium (Mg)	mg/L	0.1	-	-	-	11.3	25.8	9.16	11.1
Potassium (K)	mg/L	2	-	-	-	<2	3.2	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	-	0.652	3.96	0.312	1.26
Sodium (Na)	mg/L	2	-	-	-	<2	3.6	<2.0	<2.0
Radionuclides									
GCDWQ MAC ^s									
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	-	<0.02	<0.02	0.03	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	-	<0.005	0.01	<0.005	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	-	<0.2	<0.02	<0.02	<0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	-	<0.01	<0.01	0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	-	<0.01	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	-	5.73	3.33
Pheopigments	µg/L	0.01	-	-	-	-	-	-	1.71

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 100 mg/L
Cadmium Guideline = 0.033 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 100 mg/L
Copper Guideline = 11 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 100 mg/L
Lead Guideline = 81 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 100
Manganese Guideline = 1.637 mg/L
= 1637 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 100 mg/L
Zinc Guideline = 40 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-10

Thorn Lake (TL-03) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008 22-Mar-08	October 2008 4-Oct-08	March 2009 17-Mar-09	June 2009 27-Jun-09	September 2009 23-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	310	249	302	238	249
Hardness (as CaCO ₃)	mg/L	2	-	-	176	148	175	140	140
pH	pH	0.01	-	-	7.77	8.26	7.95	7.98	8.19
Total Suspended Solids	mg/L	3.0	-	-	<3.0	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	198	166	205	168	162
Turbidity	NTU	0.1	-	-	2.06	0.8	0.91	1.16	1.64
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	173	136	175	139	131
Ammonia as N	mg/L	0.02	-	-	-	0.022	0.136	0.026	0.029
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	<0.05	<0.050	<0.050
Chloride (Cl)	mg/L	0.5	-	600	0.79	0.55	0.77	<0.50	0.75
Fluoride (F)	mg/L	0.02	-	0.3 ^d	1.37	1.18	1.38	1.03	1.11
Sulfate (SO ₄)	mg/L	0.5	-	100	0.73	0.59	0.7	0.57	0.82
Nutrients									
Nitrate and Nitrite as N	mg/L	0.005	-	-	0.178	0.0119	0.183	<0.0050	0.009
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	0.0119	0.183	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	<0.0010	<0.0010	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	0.886	0.935	0.81	0.838	0.805
Ortho Phosphate as P	mg/L	0.001	-	-	0.0013	<0.0010	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.002	-	-	0.0090	0.0134	0.0078	0.0088	0.0105
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	23.6	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	22.3	22.3	20.7	20.4
Total Metals									
Aluminum (Al)	µg/L	**f	100 ^g	-	1.5	3.3	<9	<8	9
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	0.16	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	1.07	1.04	0.94	0.85	0.94
Barium (Ba)	µg/L	0.05	-	5000	73.7	53.7	62.2	46.2	60.6
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	14	13	15	15	18
Cadmium (Cd)	µg/L	**	0.048 ⁱ	0.048	<0.05	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	100	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	17 ^k	0.53	0.51	<0.7	0.64	<0.6
Iron (Fe)	µg/L	30	300	1000	72	50	82	45	121
Lead (Pb)	µg/L	0.05	1 - 7 ^l	144 ^m	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	<5	<5	<5	<5	<5
Manganese (Mn)	µg/L	0.05	-	2257 ⁿ	160	11.6	71.4	10.2	28.1
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	1.89	1.46	1.91	1.55	1.47
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	0.036
Strontium (Sr)	µg/L	0.1	-	-	42.8	34.4	41.8	33.2	35.8
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008 22-Mar-08	October 2008 4-Oct-08	March 2009 17-Mar-09	June 2009 27-Jun-09	September 2009 23-Sep-09
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.236	0.167	0.26	0.2	0.15
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	82 ^d	<1	<1	1.2	<3	<1
Calcium (Ca)	mg/L	0.05	-	-	40.4	33.6	37.7	29.7	31
Magnesium (Mg)	mg/L	0.1	-	-	18.2	16	17.8	13.6	14.8
Potassium (K)	mg/L	2	-	-	2.1	<2	<2.0	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	2.52	2.06	2.67	1.41	1.87
Sodium (Na)	mg/L	2	-	-	3.5	3	2.9	2.4	2.7
Dissolved Metals									
Aluminum (Al)	µg/L	1	-	100 ^f	-	1.4	<1	4.1	<1
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	1.01	0.97	0.97	0.9
Barium (Ba)	µg/L	0.05	-	-	-	52.1	61.7	45.6	55.9
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	13	15	13	14
Cadmium (Cd)	µg/L	**	-	-	-	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	0.57	0.45	0.54	0.34
Iron (Fe)	µg/L	30	-	350	-	<30	36	<30	<30
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	<5	<5	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	-	0.191	59.1	2	0.267
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	-	1.44	1.84	1.47	1.33
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	33.9	41.6	32.9	33.7
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	<0.1	0.1	0.23
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	0.185	0.245	0.193	0.136
Vanadium (V)	µg/L	1	-	-	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	2.2	<1	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	33	39.6	32	31.3
Magnesium (Mg)	mg/L	0.1	-	-	-	15.9	18.4	14.6	15
Potassium (K)	mg/L	2	-	-	-	2	<2	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	-	2.03	2.79	1.48	1.88
Sodium (Na)	mg/L	2	-	-	-	3.1	2.9	2.5	2.7
Radionuclides									
GCDWQ MAC^s									
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	-	0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	-	<0.005	0.006	<0.005	0.007
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	-	<0.09	<0.02	<0.02	<0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	-	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	-	<0.01	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	-	2.46	3.88
Pheopigments	µg/L	0.01	-	-	-	-	-	-	1.67

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 156 mg/L
Cadmium Guideline = 0.048 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = $0.094 \times (\text{hardness}) + 2$
Average hardness = 156 mg/L
Copper Guideline = 17 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 156 mg/L
Lead Guideline = 144 µg/L
- n. BC WQG for Total Manganese should be less than or equal to $0.01102 \times (\text{hardness}) + 0.54$
Average hardness = 156
Manganese Guideline = 2.257 mg/L
= 2257 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = $33 + 0.75 \times (\text{hardness} - 90)$
Average hardness = 156 mg/L
Zinc Guideline = 82 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008		October 2008	March 2009	June 2009	September 2009
					TL-04	Replicate	7-Oct-08	14-Mar-09	24-Jun-09	9-Sep-09
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.105	0.115	0.065	0.137	0.045	0.030
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	128 ^q	3.4	2.9	4.2	3.9	<2.0	1.5
Calcium (Ca)	mg/L	0.05	-	-	67.7	70.3	28.8	79.3	25.8	32.0
Magnesium (Mg)	mg/L	0.1	-	-	31.9	32.4	15.3	38.5	13.2	15.0
Potassium (K)	mg/L	2	-	-	5.4	6	2.5	6.5	2.2	2.6
Silicon (Si)	mg/L	0.05	-	-	1.3	1.4	0.302	1.62	0.072	0.228
Sodium (Na)	mg/L	2	-	-	5	5.6	2.7	5.3	<2.0	2.5
Dissolved Metals										
Aluminum (Al)	µg/L	1	-	100 ^f	-	-	<1	1.5	5.6	2.2
Antimony (Sb)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	-	1.64	3.68	1.45	1.31
Barium (Ba)	µg/L	0.05	-	-	-	-	29.6	104	27.6	37.6
Beryllium (Be)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	-	15	27	14	17
Cadmium (Cd)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	**	-	-	-	-	<0.5	<1	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	-	<0.1	0.19	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	-	0.26	0.31	0.27	0.29
Iron (Fe)	µg/L	30	-	350	-	-	<30	5650	35	<30
Lead (Pb)	µg/L	0.05	-	-	-	-	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	-	<5	6.5	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	-	-	0.338	1060	1.92	5.51
Mercury (Hg)	µg/L	**	-	-	-	-	-	<0.05	<0.05	<0.05
Molybdenum (Mo)	µg/L	0.05	-	-	-	-	0.536	1.37	0.42	0.445
Nickel (Ni)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	-	36.8	86.8	31.7	37.3
Thallium (Tl)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	-	<0.1	0.19	<0.1	0.58
Titanium (Ti)	µg/L	10	-	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	-	0.046	0.134	0.025	0.026
Vanadium (V)	µg/L	1	-	-	-	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	-	2.2	4.4	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	-	33.1	79.9	26.3	32.4
Magnesium (Mg)	mg/L	0.1	-	-	-	-	17.3	38.4	13.5	15.0
Potassium (K)	mg/L	2	-	-	-	-	3.5	6.5	2.3	2.7
Silicon (Si)	mg/L	0.05	-	-	-	-	0.325	1.57	0.077	0.22
Sodium (Na)	mg/L	2	-	-	-	-	3	5.2	2	2.4
Radionuclides										
GCDWQ MAC ^s										
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	-	-	<0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	-	-	<0.005	0.009	<0.005	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	-	-	<0.03	<0.02	<0.02	<0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	-	-	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	-	-	<0.01	<0.01	<0.01	<0.01
Biota										
Chlorophyll a	µg/L	0.01	-	-	-	-	-	-	2.52	2.68
Pheopigments	µg/L	0.01	-	-	-	-	-	-	-	0.65

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 300 µg/L (maximum) where water hardness ≥ 50 mg/L (as Ca)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 216 mg/L
Cadmium Guideline = 0.064 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 216 mg/L
Copper Guideline = 22 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 216 mg/L
Lead Guideline = 218 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) +
Average hardness = 216
Manganese Guideline = 2.923 mg/L
= 2923 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is ≤ 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 216 mg/L
Zinc Guideline = 128 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH ≥ 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance
- v. Replicate result where precision threshold (RPD > 25%) was exceeded
- w. Data outlier, excluded from summary statistics

Table F3-12

Megan Lake (TL-05) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008 20-Mar-08	October 2008 5-Oct-08	March 2009 14-Mar-09	June 2009 25-Jun-09	September 2009 14-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	582	449	572	419	442
Hardness (as CaCO ₃)	mg/L	2	-	-	331	260	335	252	260
pH	pH	0.01	-	-	8.09	8.46	8.11	8.47	8.62
Total Suspended Solids	mg/L	3.0	-	-	7.5	<3.0	6.5	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	355	283	317	278	274
Turbidity	NTU	0.1	-	-	7.2	1.21	7.20	1.93	1.41
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	325	262	371	256	243
Ammonia as N	mg/L	0.02	-	-	-	0.295	1.19	0.137	0.037
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	<0.05	<0.050	<0.0550
Chloride (Cl)	mg/L	0.5	-	600	2.43	2.02	2.73	1.88	2.06
Fluoride (F)	mg/L	0.02	-	0.3 ^d	3.45	3.01	3.6	2.66	2.85
Sulfate (SO ₄)	mg/L	0.5	-	100	<0.50	<0.50	<0.50	<0.50	<0.50
Nutrients									
Nitrate and Nitrite as N	mg/L	0.005	-	-	<0.0050	0.0078	<0.0050	<0.0050	<0.0050
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	0.0067	<0.0050	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	0.0011	<0.0010	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	2.58	1.96	2.73	1.610	1.52
Ortho Phosphate as P	mg/L	0.001	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.002	-	-	0.0365	0.010	0.0303	0.0073	0.0098
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	65.9	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	33.3	35.0	-	29.8
Total Metals									
Aluminum (Al)	µg/L	**f	100 ^g	-	<1	2.2	<3	7.1	<4
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	2.5	2.03	2.31	1.73	1.78
Barium (Ba)	µg/L	0.05	-	5000	187	116	168	100	130
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	56	48	58	48	52
Cadmium (Cd)	µg/L	**	0.082 ⁱ	0.082	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	29 ^k	0.34	0.39	<1	0.44	<0.5
Iron (Fe)	µg/L	30	300	1000	588	57	872	73	57
Lead (Pb)	µg/L	0.05	1 - 7 ^l	313 ^m	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	13	10.4	15.5	10.9	9.3
Manganese (Mn)	µg/L	0.05	-	3709 ⁿ	395	8.33	275	39.2	13.5
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	<0.05	<0.05	<0.05
Molybdenum (Mo)	µg/L	0.05	73	2000	0.63	0.541	0.886	0.562	0.632
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	0.243
Strontium (Sr)	µg/L	0.1	-	-	104	72.8	94	64	74.9
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008 20-Mar-08	October 2008 5-Oct-08	March 2009 14-Mar-09	June 2009 25-Jun-09	September 2009 14-Sep-09
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.087	0.053	0.086	0.064	0.06
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	30	181 ^q	<1	1.2	2.5	1.1	<1
Calcium (Ca)	mg/L	0.05	-	-	40.8	31.2	39.2	26.8	30.9
Magnesium (Mg)	mg/L	0.1	-	-	55.6	45.2	56.8	40.6	43.7
Potassium (K)	mg/L	2	-	-	6.4	6.1	6.4	4.5	5.2
Silicon (Si)	mg/L	0.05	-	-	4.69	3.68	4.97	1.94	2.32
Sodium (Na)	mg/L	2	-	-	11	9.5	9.8	7.6	8.4
Dissolved Metals									
Aluminum (Al)	µg/L	1	-	100 ^r	-	2.1	1.6	4.1	1.4
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	2.31	2.29	2.45	1.81
Barium (Ba)	µg/L	0.05	-	-	-	115	155	102	120
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	51	56	51	47
Cadmium (Cd)	µg/L	0.05	-	-	-	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	**	-	-	-	<1	<0.5	<1.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	0.36	0.58	0.33	0.27
Iron (Fe)	µg/L	30	-	350	-	<30	46	<30	<30
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	11	14.1	11.2	9.4
Manganese (Mn)	µg/L	0.05	-	-	-	0.218	262	10.7	0.277
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.05
Molybdenum (Mo)	µg/L	0.05	-	-	-	0.575	0.775	0.61	0.537
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	0.025
Strontium (Sr)	µg/L	0.1	-	-	-	74.5	88.7	66.6	69.2
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	0.34
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	0.064	0.086	0.049	0.055
Vanadium (V)	µg/L	1	-	-	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	3.9	3.4	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	30.4	40.1	30.1	31.6
Magnesium (Mg)	mg/L	0.1	-	-	-	44.8	56.9	43	44
Potassium (K)	mg/L	2	-	-	-	6.1	6.1	4.7	5.4
Silicon (Si)	mg/L	0.05	-	-	-	3.64	4.97	2.07	2.35
Sodium (Na)	mg/L	2	-	-	-	9.6	9.3	7.9	8.6
Radionuclides									
GCDWQ MAC^s									
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	<0.02	<0.02	<0.02	0.03	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	0.01	<0.005	<0.005	<0.005	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	<0.02	<0.09	<0.02	<0.02	0.03
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	0.02	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01	<0.01	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	-	0.93	3.21
Pheopigments	µg/L	0.01	-	-	-	-	-	-	0.45

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 288 mg/L
Cadmium Guideline = 0.082 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 288 mg/L
Copper Guideline = 29 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 288 mg/L
Lead Guideline = 313 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 288
Manganese Guideline = 3.709 mg/L
= 3709 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 288 mg/L
Zinc Guideline = 181 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-13

Thor Lake (TL-01, TL-02, TL-06 & TL-07) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008		October 2008				March 2009		June 2009		September 2009	
					20-Mar-08 TL-01	19-Mar-08 TL-02	TL-01	TL-02	TL-06	TL-07	TL-06	TL-07	TL-06	TL-07	TL-06	TL-07
Physicals																
Conductivity	µS/cm	0.5	-	-	357	353	292	292	293	291	356	351	278	278	291	292
Hardness (as CaCO ₃)	mg/L	2	-	-	191	185	156	158	160	158	193	190	155	154	160	160
pH	pH	0.01	-	-	8.11	8.09	8.39	8.43	8.43	8.39	8.05	8.04	7.77	8.02	8.31	8.29
Total Suspended Solids	mg/L	3.0	-	-	<3.0	3.0	<3.0	<3.0	<3.0	3.2	<3.0	<3.0	<3.0	<3.0	<3.0	3.3
Total Dissolved Solids	mg/L	10	-	-	215	212	174	171	175	180	229	219	175	176	176	177
Turbidity	NTU	0.1	-	-	0.57	0.97	0.89	0.88	0.91	1.56	1.51	1.04	1.31	1.30	1.60	1.68
Anions																
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	202	199	157	147	157	159	205	204	154	163	144	140
Ammonia as N	mg/L	0.02	-	-	-	-	<0.02	0.024	<0.02	0.022	0.059	0.039	0.020	0.020	<0.020	<0.020
Bromide (Br)	mg/L	0.05	-	-	<0.05	<0.05	-	-	-	-	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
Chloride (Cl)	mg/L	0.5	-	600	5.01	4.97	4.12	4.11	4.13	4.1	5.13	4.98	3.74	3.75	4.17	3.08
Fluoride (F)	mg/L	0.02	-	0.3 ^d	1.27	1.25	1.08	1.08	1.08	1.07	1.26	1.24	0.943	0.946	1.03	0.762
Sulfate (SO ₄)	mg/L	0.5	-	100	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50	<0.50
Nutrients																
Nitrate and Nitrite as N	mg/L	0.005	-	-	0.192	0.213	<0.0050	<0.0050	<0.0050	<0.0050	0.226	0.386	<0.0050	<0.0050	-	-
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	-	<0.0050	<0.0050	<0.0050	<0.0050	0.226	0.386	-	-	<0.0050	<0.0050
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	<0.0010	<0.0010
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	0.695	0.700	0.556	0.645	0.607	0.600	0.578	0.543	0.591	0.559	0.624	0.598
Ortho Phosphate as P	mg/L	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
Total Phosphate as P	mg/L	0.002	-	-	0.0061	0.0072	0.0071	0.0076	0.0072	0.0098	0.0062	0.0051	0.0081	0.0134	0.0054	0.0054
Organics																
Total Organic Carbon (TOC)	mg/L	0.5	-	-	15.4	15.6	-	-	-	-	-	-	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	-	13.8	13.9	13.8	13.7	14.0	13.4	14.1	12.0	14.8	14.8
Total Metals																
Aluminum (Al)	µg/L	** ^f	100 ^g	-	3.2	1.7	3.9	4.0	3.9	13.3	<3	<1	<5	<5	<5	<4
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	0.95	0.91	0.68	0.7	0.72	0.74	0.77	0.8	0.64	0.67	0.83	0.87
Barium (Ba)	µg/L	0.05	-	5000	82.9	78.2	57.6	58.7	59.4	59.3	72.6	69	47.8	47.8	73.4	73.6
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	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
Boron (B)	µg/L	10	-	1200	26	25	26	26	27	26	26	25	21	22	28	28
Cadmium (Cd)	µg/L	**	0.052 ⁱ	0.052	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	**	8.9	8.9	<0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	18 ^k	6.03	0.84	0.29	0.33	0.39	0.44	<0.4	0.11	0.35	0.35	<0.5	<0.6
Iron (Fe)	µg/L	30	300	1000	<30	47	77	58	41	232	131	94	57	53	96	106
Lead (Pb)	µg/L	0.05	1 - 7 ^l	158 ^m	0.228	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	6.0	5.9	5.8	5.7	6.4	5.8	6.8	6.7	5.1	5.0	5.2	5.4
Manganese (Mn)	µg/L	0.05	-	2395 ⁿ	17.4	47.9	24.8	25.7	26.7	37.9	130	64.5	46.8	52.8	77.0	82.6
Mercury (Hg)	µg/L	0.05	0.026	0.1	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01
Molybdenum (Mo)	µg/L	**	73	2000	2.17	2.04	2.01	2.12	2.1	2.51	2.22	2.21	1.88	1.91	2.37	2.44
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	68.3	64.7	51.6	52.2	53.2	51.9	63.7	64.1	44.5	44.5	63.1	66.2
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	0.2	<0.1	<0.1	0.98	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.378	0.367	0.309	0.315	0.312	0.309	0.429	0.477	0.417	0.413	0.320	0.328
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	92 ^q	2.6	1.7	1.1	1.9	<1	3.1	1.6	<1	<2	<2	<1	1.3
Calcium (Ca)	mg/L	0.05	-	-	40.5	39.2	32.2	33.1	32.2	32.7	40.2	41	31.4	31.4	33.7	33.1
Magnesium (Mg)	mg/L	0.1	-	-	21.9	21.2	17.3	17.5	17.7	17.4	21.5	21.4	16.9	16.8	17.9	17.3
Potassium (K)	mg/L	2	-	-	2.4	2.3	2.2	2.2	2.3	2.2	2.4	2.3	<2.0	<2.0	2.3	2.2
Silicon (Si)	mg/L	0.05	-	-	3.96	3.88	3.08	3.16	3.16	3.16	4.16	4.15	2.39	2.4	2.88	2.81
Sodium (Na)	mg/L	2	-	-	8	7.8	6.6	6.6	6.8	6.6	7	6.7	5.8	5.8	6.8	6.6
Dissolved Metals																
Aluminum (Al)	µg/L	1	-	100 ^r	-	-	<1	1.1	<1	<1	<1	<1	1.5	1.4	<1	<1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008		October 2008				March 2009		June 2009		September 2009	
					20-Mar-08	19-Mar-08	TL-01	TL-02	TL-06	TL-07	TL-06	TL-07	TL-06	TL-07	TL-06	TL-07
Antimony (Sb)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	-	0.78	0.79	0.81	0.77	0.8	0.78	0.82	0.79	0.76	0.80
Barium (Ba)	µg/L	0.05	-	-	-	-	54.6	53.6	54.9	52	68.6	67.7	46.5	45.6	67.5	67.1
Beryllium (Be)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	-	24	24	25	23	24	25	21	20	25	25
Cadmium (Cd)	µg/L	0.05	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chromium (Cr)	µg/L	**	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.7	<0.7	<0.8	<1
Cobalt (Co)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	-	0.17	0.22	0.18	0.17	0.16	0.17	0.2	0.22	0.24	0.19
Iron (Fe)	µg/L	30	-	350	-	-	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
Lead (Pb)	µg/L	0.05	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	-	<5	<5	5.2	<5	6.5	6.7	<5	<5	5.2	5.2
Manganese (Mn)	µg/L	0.05	-	-	-	-	0.141	0.143	0.121	0.149	10.7	0.466	4.85	7.89	0.3	0.383
Mercury (Hg)	µg/L	**	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	-	-	1.84	1.82	1.83	1.76	2.06	2.2	1.81	1.71	2.01	2.04
Nickel (Ni)	µg/L	0.5	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	-	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	-	47.5	47.5	48.5	46.1	64.2	64.6	42.5	42.2	56.9	56.3
Thallium (Tl)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.79	<0.1
Titanium (Ti)	µg/L	10	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	-	0.282	0.278	0.27	0.265	0.412	0.478	0.224	0.243	0.289	0.293
Vanadium (V)	µg/L	1	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	-	2	<1	<1	<1	3.1	<1	<1	<1	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	-	33.3	34.1	34.6	34	41.7	40.9	33.2	33	34.5	34.6
Magnesium (Mg)	mg/L	0.1	-	-	-	-	17.8	17.7	17.8	17.7	21.6	21.5	17.4	17.4	17.9	17.9
Potassium (K)	mg/L	2	-	-	-	-	2.4	2.2	2.1	2.1	2.4	2.3	<2.0	<2.0	2.2	2.2
Silicon (Si)	mg/L	0.05	-	-	-	-	3.21	3.21	3.24	3.23	4.23	4.14	2.52	2.5	2.91	2.91
Sodium (Na)	mg/L	2	-	-	-	-	6.8	6.5	6.4	6.4	6.7	6.6	5.9	5.9	6.6	6.6
Radionuclides																
GCDWQ MAC^s																
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	<0.02	<0.02	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.0	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	<0.005	<0.005	-	-	<0.005	<0.005	0.01	0.01	<0.005	<0.005	0.006	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	<0.02	<0.02	-	-	<0.06	<0.06	<0.03	<0.03	<0.02	<0.02	<0.03	<0.03
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	<0.01	0.02	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Biota																
Chlorophyll a	µg/L	0.01	-	-	-	-	-	-	-	-	-	-	1.76	2.01	2.23	2.04
Pheopigments	µg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	1.43	0.712

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 168 mg/L
Cadmium Guideline = 0.052 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = $0.094 \times (\text{hardness}) + 2$
Average hardness = 168 mg/L
Copper Guideline = 18 µg/L

- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e^{(1.273 \times [\text{LN}(\text{hardness})] - 1.460)}$
Average hardness = 168 mg/L
Lead Guideline = 158 µg/L
- n. BC WQG for Total Manganese should be less than or equal to $0.01102 \times (\text{hardness}) + 0.54$
Average hardness = 168
Manganese Guideline = 2.395 mg/L
= 2395 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
110 µg/L when [CaCO₃] is 120 - 180 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L

- q. BCWQG for Total Zinc (maximum) = $33 + 0.75 \times (\text{hardness} - 90)$
Average hardness = 168 mg/L
Zinc Guideline = 92 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance
- v. **Data outlier**, excluded from summary statistics

Table F3-14

Wasp Lake (UN-04) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008 20-Mar-08	October 2008 4-Oct-08	March 2009 14-Mar-09	June 2009 26-Jun-09	September 2009 23-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	632	302	638	247	282
Hardness (as CaCO ₃)	mg/L	2	-	-	348	174	378	146	162
pH	pH	0.01	-	-	7.65	8.26	7.88	8.48	8.24
Total Suspended Solids	mg/L	3.0	-	-	129	<3.0	49.5	3.3	6
Total Dissolved Solids	mg/L	10	-	-	366	208	434	186	204
Turbidity	NTU	0.1	-	-	81	0.94	44.80	1.45	2.34
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	342	172	365	144	155
Ammonia as N	mg/L	0.02	-	-	-	0.996	3.72	0.052	0.165
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	<0.05	<0.050	<0.050
Chloride (Cl)	mg/L	0.5	-	600	1.71	0.75	2.13	0.51	0.76
Fluoride (F)	mg/L	0.02	-	0.3 ^d	2.26	1.4	2.59	1.08	1.25
Sulfate (SO ₄)	mg/L	0.5	-	100	<0.50	<0.50	<0.50	<0.50	<0.50
Nutrients									
Nitrate and Nitrite as N	mg/L	0.005	-	-	<0.0050	0.016	<0.0050	0.0068	0.0079
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	0.014	<0.0050	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	0.002	<0.0010	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	5.37	2.51	6.43	1.210	1.52
Ortho Phosphate as P	mg/L	0.001	-	-	<0.0010	<0.0010	0.024	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.002	-	-	0.123	0.0139	0.031	0.0127	0.0099
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	55.8	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	32.8	45.4	25.9	25.9
Total Metals									
Aluminum (Al)	µg/L	**f	100 ^g	-	21.6	4.9	10.3	<10	3.4
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	2.39	1.2	2.64	0.97	1.11
Barium (Ba)	µg/L	0.05	-	5000	280	76.6	219	53.6	91.7
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	29	22	32	18	25
Cadmium (Cd)	µg/L	**	0.071 ⁱ	0.071	<0.05	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	0.2	<0.1	0.26	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	25 ^k	0.54	0.54	<0.6	0.45	<0.4
Iron (Fe)	µg/L	30	300	1000	11000	49	10200	45	49
Lead (Pb)	µg/L	0.05	1 - 7 ^l	251 ^m	0.06	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	8.8	5.7	10.4	<5	<5
Manganese (Mn)	µg/L	0.05	-	3202 ⁿ	581	8.93	477	7.91	17.5
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	1.1	0.913	1.81	0.521	0.695
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	0.53	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	0.044
Strontium (Sr)	µg/L	0.1	-	-	142	63.9	131	45.1	64.4
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					20-Mar-08	4-Oct-08	14-Mar-09	26-Jun-09	23-Sep-09
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.108	0.095	0.166	0.039	0.036
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	147 ^q	2.4	<1	3.2	<3	<1
Calcium (Ca)	mg/L	0.05	-	-	79.1	39.1	84.9	31.2	36.7
Magnesium (Mg)	mg/L	0.1	-	-	36.6	18.4	40.9	14.1	16.9
Potassium (K)	mg/L	2	-	-	3.3	<2	3.2	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	4.15	1.04	4.08	0.228	1
Sodium (Na)	mg/L	2	-	-	8.9	4.5	7.9	3	3.7
Dissolved Metals									
Aluminum (Al)	µg/L	1	-	100 ^f	-	2.2	1.1	5.7	1
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	1.39	2.54	1.09	1.07
Barium (Ba)	µg/L	0.05	-	-	-	69.2	174	53.9	84.8
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	20	30	15	21
Cadmium (Cd)	µg/L	**	-	-	-	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	**	-	-	-	<1	<1	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	0.21	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	0.4	0.2	0.37	0.23
Iron (Fe)	µg/L	30	-	350	-	<30	2660	<30	<30
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	<5	9.7	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	-	2.06	450	1.4	0.745
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	-	0.795	1.71	0.485	0.654
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	58.6	126	44.8	59.7
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	0.18	<0.1	0.41
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	0.072	0.157	0.037	0.032
Vanadium (V)	µg/L	1	-	-	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	2.2	4.2	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	39	84.4	33.4	36.8
Magnesium (Mg)	mg/L	0.1	-	-	-	18.7	40.6	15.2	17
Potassium (K)	mg/L	2	-	-	-	<2	3.1	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	-	1.03	3.91	0.22	1
Sodium (Na)	mg/L	2	-	-	-	4.4	7.7	3.2	3.6
Radionuclides									
GCDWQ MAC ^s									
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	-	<0.02	<0.02	<0.02	<0.08
Radium-226 (²²⁶ Ra)	Bq/L	**	0.6	-	-	<0.05	0.02	<0.005	0.006
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	-	0.39	<0.02	<0.02	<0.01
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	-	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	-	<0.01	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	-	3.05	2.29
Pheopigments	µg/L	0.01	-	-	-	-	-	-	0.851

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness ≥ 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 242 mg/L
Cadmium Guideline = 0.071 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 242 mg/L
Copper Guideline = 25 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e^{(1.273 \times [\text{Ln}(\text{hardness})] - 1.460)}$
Average hardness = 242 mg/L
Lead Guideline = 251 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 242
Manganese Guideline = 3.202 mg/L
= 3202 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is ≤ 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 242 mg/L
Zinc Guideline = 147 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH ≥ 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-15

Pistol Lake (UN-05) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008 23-Mar-08	October 2008 3-Oct-08	March 2009 15-Mar-09	June 2009 26-Jun-09	September 2009 18-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	801	288	806	215	260
Hardness (as CaCO ₃)	mg/L	2	-	-	437	171	478	123	152
pH	pH	0.01	-	-	7.64	8.26	7.85	8.56	8.28
Total Suspended Solids	mg/L	3.0	-	-	69	<3.0	73.5	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	474	194	552	154	179
Turbidity	NTU	0.1	-	-	84	0.52	99.00	1.29	1.36
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	441	160	465	123	142
Ammonia as N	mg/L	0.02	-	-	-	0.745	4.51	0.062	0.0593
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	<0.05	<0.050	<0.050
Chloride (Cl)	mg/L	0.5	-	600	2.41	0.81	2.52	<0.50	0.59
Fluoride (F)	mg/L	0.02	-	0.3 ^d	3.9	1.8	3.9	1.25	1.50
Sulfate (SO ₄)	mg/L	0.5	-	100	<0.50	<0.50	<0.50	<0.50	<0.50
Nutrients									
Nitrate and Nitrite as N	mg/L	0.005	-	-	<0.0050	0.0131	0.008	<0.0050	<0.0050
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	0.0111	0.008	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	0.002	<0.0010	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	7.98	2.24	8.02	1.200	1.29
Ortho Phosphate as P	mg/L	** ^f	-	-	<0.0010	<0.0010	<0.010	<0.0010	<0.0010
Total Phosphate as P	mg/L	**	-	-	0.0160	0.0092	0.0260	0.0086	0.0065
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	65.1	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	30.4	52.7	21.4	23.1
Total Metals									
Aluminum (Al)	µg/L	**	100 ^g	-	14.2	8.4	24.2	14.7	2.7
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.2	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	3.18	1.23	3.49	0.93	1.19
Barium (Ba)	µg/L	0.05	-	5000	281	46	227	37.9	57.5
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<1	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<1	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	21	15	23	13	16
Cadmium (Cd)	µg/L	**	0.078 ⁱ	0.078	<0.05	<0.05	<0.1	<0.05	<0.017
Chromium (Cr)	µg/L	**	8.9	8.9	<0.5	<0.5	<1	<0.5	<1
Cobalt (Co)	µg/L	0.1	-	110	0.31	<0.1	0.35	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	28 ^k	0.43	0.5	<0.5	0.37	<0.1
Iron (Fe)	µg/L	30	300	1000	16900	59	18500	34	<30
Lead (Pb)	µg/L	0.05	1 - 7 ^l	292 ^m	<0.05	<0.05	<0.1	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	9	<5	<10	<5	<5
Manganese (Mn)	µg/L	0.05	-	3540 ⁿ	1900	8.79	1680	5.76	1.72
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	2.68	0.956	2.64	0.652	0.562
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<1	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<2	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.02	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	118	42	119	32.1	41.4
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.2	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.2	<0.1	<0.1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					23-Mar-08	3-Oct-08	15-Mar-09	26-Jun-09	18-Sep-09
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.137	0.063	0.142	0.033	0.023
Vanadium (V)	µg/L	1	-	6	<1	<1	<2	<1	<1
Zinc (Zn)	µg/L	**	30	170 ^q	3.9	1.4	4.7	<3	<1
Calcium (Ca)	mg/L	0.05	-	-	93.4	34.2	102	25.2	32.8
Magnesium (Mg)	mg/L	0.1	-	-	49.6	19.9	55.6	13.6	17.6
Potassium (K)	mg/L	2	-	-	3.9	<2	4	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	1.28	0.127	1.58	0.106	0.051
Sodium (Na)	mg/L	2	-	-	7.4	3.1	6.5	<2.0	2.4
Dissolved Metals									
Aluminum (Al)	µg/L	**	-	100 ^f	-	3	4.9	12.6	2.7
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.2	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	1.48	3.28	0.98	1.04
Barium (Ba)	µg/L	0.05	-	-	-	45.3	185	36.1	55.6
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	<1	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<1	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	14	22	10	15
Cadmium (Cd)	µg/L	**	-	-	-	<0.05	<0.1	<0.05	<0.017
Chromium (Cr)	µg/L	**	-	-	-	<1	<1	<0.5	<1
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	0.32	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	0.42	<0.2	0.28	0.23
Iron (Fe)	µg/L	30	-	350	-	<30	10700	<30	<30
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	<0.1	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	<5	<10	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	-	0.874	1610	0.723	0.68
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	-	0.86	2.4	0.609	0.542
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	<1	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<2	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.02	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	40.2	115	30.7	39.2
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.2	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	<0.2	<0.1	0.63
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	0.053	0.14	0.029	0.022
Vanadium (V)	µg/L	1	-	-	-	<1	<2	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	<1	<2	<1	1.1
Calcium (Ca)	mg/L	0.05	-	-	-	36	100	26.2	32.5
Magnesium (Mg)	mg/L	0.1	-	-	-	19.6	55.3	13.9	17.3
Potassium (K)	mg/L	2	-	-	-	<2	4.1	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	-	0.117	1.52	0.099	0.074
Sodium (Na)	mg/L	2	-	-	-	2.8	6.6	<2.0	2.5
Radionuclides									
GCDWQ MAC ^s									
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	-	<0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	-	<0.005	0.01	<0.005	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	-	<0.04	<0.02	<0.02	<0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	-	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	-	<0.01	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	-	1.26	3.36
Pheopigments	µg/L	0.01	-	-	-	-	-	-	0.721

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 µg/L (maximum) where water hardness ≥ 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = 10^{(0.86[Log(hardness)] - 3.2)}
 - Average hardness = 272 mg/L
 - Cadmium Guideline = 0.078 µg/L
- j. CCME FAL Total Copper guideline:
 - 2 µg/L when [CaCO₃] is 0 - 120 mg/L
 - 3 µg/L when [CaCO₃] is 120 - 180 mg/L
 - 4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
 - Average hardness = 272 mg/L
 - Copper Guideline = 28 µg/L
- l. CCME FAL Total Lead guideline:
 - 1 µg/L when [CaCO₃] is 0 - 60 mg/L
 - 4 µg/L when [CaCO₃] is 120 - 180 mg/L
 - 7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
 - = e(1.273 x [ln(hardness)] - 1.460)
 - Average hardness = 272 mg/L
 - Lead Guideline = 292 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
 - Average hardness = 272
 - Manganese Guideline = 3.540 mg/L
 - = 3540 µg/L
- o. CCME FAL Total Nickel guideline:
 - 25 µg/L when [CaCO₃] is 0 - 60 mg/L
 - 150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
 - 0.1 µg/L when [CaCO₃] is ≤ 100 mg/L
 - 3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
 - Average hardness = 272 mg/L
 - Zinc Guideline = 170 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH ≥ 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-16

Porkchop Lake (UN-07) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008 22-Mar-08	October 2008 3-Oct-08	March 2009 15-Mar-09	June 2009 26-Jun-09	September 2009 24-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	285	251	268	239	253
Hardness (as CaCO ₃)	mg/L	2	-	-	155	143	152	133	139
pH	pH	0.01	-	-	7.93	8.19	8.06	8.08	8.28
Total Suspended Solids	mg/L	3.0	-	-	<3.0	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	164	152	176	151	153
Turbidity	NTU	0.1	-	-	0.31	1.21	0.38	1.29	0.78
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	151	139	156	135	133
Ammonia as N	mg/L	0.02	-	-	-	<0.020	0.033	<0.020	0.024
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	<0.05	<0.050	<0.050
Chloride (Cl)	mg/L	0.5	-	600	2.99	2.61	2.91	2.37	2.60
Fluoride (F)	mg/L	0.02	-	0.3 ^d	1.35	1.25	1.31	1.10	1.20
Sulfate (SO ₄)	mg/L	0.5	-	100	1.08	0.85	1.02	0.97	1.06
Nutrients									
Nitrate and Nitrite as N	mg/L	0.005	-	-	0.0526	<0.0050	0.0784	<0.0050	<0.0050
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	<0.0050	0.0784	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	0.0012	<0.0010	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	0.511	0.485	0.521	0.526	0.512
Ortho Phosphate as P	mg/L	0.001	-	-	0.0011	<0.0010	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.002	-	-	0.0065	0.0086	0.0054	0.0082	0.0048
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	13.9	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	15.5	13.0	13.9	14.5
Total Metals									
Aluminum (Al)	µg/L	**f	100 ^g	-	<1	3.3	<1	<10	9
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	0.36	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	0.8	1	0.74	0.69	0.7
Barium (Ba)	µg/L	0.05	-	5000	41.6	38.8	40.8	35.5	39.2
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	15	15	15	17	17
Cadmium (Cd)	µg/L	**	0.045 ⁱ	0.045	<0.05	<0.05	<0.05	<0.05	0.02
Chromium (Cr)	µg/L	**	8.9	8.9	<0.5	<1	<0.5	<0.5	0.77
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	16 ^k	0.5	0.54	0.38	0.67	<0.6
Iron (Fe)	µg/L	30	300	1000	<30	122	38	47	34
Lead (Pb)	µg/L	0.05	1 - 7 ^l	130 ^m	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	<5	<5	<5	<5	<5
Manganese (Mn)	µg/L	0.05	-	2131 ⁿ	8.55	89.3	9.18	12.2	25.7
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	4.26	4.46	4.42	4.07	4.42
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	<0.5	0.83
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	0.012
Strontium (Sr)	µg/L	0.1	-	-	50.3	43.5	48.7	41.1	45.3
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					22-Mar-08	3-Oct-08	15-Mar-09	26-Jun-09	24-Sep-09
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.266	0.254	0.293	0.261	0.269
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	174 ^q	<1	5.8	<1	<3	1.4
Calcium (Ca)	mg/L	0.05	-	-	33.9	32.7	33.6	27	30
Magnesium (Mg)	mg/L	0.1	-	-	17.1	15.5	16.9	14	15.1
Potassium (K)	mg/L	2	-	-	<2.0	<2	<2.0	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	2.65	2.46	2.83	2.01	2.12
Sodium (Na)	mg/L	2	-	-	5.2	4.5	4.2	3.8	4.1
Dissolved Metals									
Aluminum (Al)	µg/L	1	-	100 ^f	-	<1	<1	7.4	1.4
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	0.9	0.69	0.71	0.74
Barium (Ba)	µg/L	0.05	-	-	-	37	41.2	34.2	35.4
Beryllium (Be)	µg/L	0.5	-	-	-	2.11	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	15	16	14	15
Cadmium (Cd)	µg/L	**	-	-	-	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	0.22	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	93.2	0.54	0.45	0.43
Iron (Fe)	µg/L	30	-	350	-	35	<30	<30	<30
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	<5	<5	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	-	18.3	0.307	0.312	1.4
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	-	4.47	4.54	4	4.22
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	43.2	49.7	40	45
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	0.26	0.31	0.257	0.239
Vanadium (V)	µg/L	1	-	-	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	1.2	<1	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	31.7	33.4	29.5	30.5
Magnesium (Mg)	mg/L	0.1	-	-	-	15.6	16.7	14.5	15.3
Potassium (K)	mg/L	2	-	-	-	<2	<2	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	-	2.45	2.8	2.08	2.16
Sodium (Na)	mg/L	2	-	-	-	4.6	4.2	3.8	4
Radionuclides									
GCDWQ MAC^s									
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	-	<0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	-	<0.005	<0.005	0.009	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	-	<0.2	<0.03	<0.02	0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	-	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	-	<0.01	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	-	1.31	1.26
Pheopigments	µg/L	0.01	-	-	-	-	-	-	0.381

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{[0.86(\text{Log}(\text{hardness})) - 3.2]}$
Average hardness = 144 mg/L
Cadmium Guideline = 0.045 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 144 mg/L
Copper Guideline = 16 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})]) - 1.460$
Average hardness = 144 mg/L
Lead Guideline = 130 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 144
Manganese Guideline = 2.131 mg/L
= 2131 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 144 mg/L
Zinc Guideline = 74 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance
- v. **Data outlier**, excluded from summary statistics

Table F3-17

Kinnikinnick Lake (UN-08) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					20-Mar-08	4-Oct-08	15-Mar-09	26-Jun-09	16-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	197	176	195	177	184
Hardness (as CaCO ₃)	mg/L	2	-	-	99.3	90.3	103	88.9	94.3
pH	pH	0.01	-	-	8.01	8.17	7.97	7.82	8.10
Total Suspended Solids	mg/L	3.0	-	-	<3.0	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	113	101	117	103	99
Turbidity	NTU	0.1	-	-	0.41	0.55	0.36	0.92	1.08
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	97.2	97.1	125	103	91.9
Ammonia as N	mg/L	0.02	-	-	-	<0.020	0.02	<0.020	0.0061
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	<0.05	<0.050	<0.050
Chloride (Cl)	mg/L	0.5	-	600	2.42	2.25	2.62	2.28	2.20
Fluoride (F)	mg/L	0.02	-	0.3 ^d	0.651	0.607	0.662	0.555	0.561
Sulfate (SO ₄)	mg/L	0.5	-	100	0.93	0.77	0.96	0.93	0.69
Nutrients									
Nitrate and Nitrite as N	mg/L	0.005	-	-	0.0627	<0.0050	0.0732	<0.0050	<0.0050
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	<0.0050	0.0732	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	<0.0010	<0.0010	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	0.348	0.336	0.344	0.464	0.357
Ortho Phosphate as P	mg/L	0.001	-	-	<0.0010	0.0012	<0.0010	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.002	-	-	0.0171	0.0061	0.0069	0.0065	0.0046
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	39	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	7.72	7.18	7.2	7.75
Total Metals									
Aluminum (Al)	µg/L	**f	100 ^g	-	<1	2.1	1.2	<8	2
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	0.3	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	0.37	0.38	0.32	0.3	0.32
Barium (Ba)	µg/L	0.05	-	5000	27.5	26	28.6	27	26.1
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	15	14	16	18	15
Cadmium (Cd)	µg/L	**	0.032 ⁱ	0.032	<0.05	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	2 - 4 ^j	11 ^k	0.31	0.37	0.24	0.46	0.37
Iron (Fe)	µg/L	30	300	1000	<30	40	<30	<30	<30
Lead (Pb)	µg/L	0.05	1 - 7 ^l	77 ^m	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	<5	<5	<5	<5	<5
Manganese (Mn)	µg/L	0.05	-	1589 ⁿ	7.74	20.1	10.7	11.6	12.8
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	0.729	0.755	0.707	0.704	0.703
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	1.36	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	0.01
Strontium (Sr)	µg/L	0.1	-	-	39.8	35.3	39.5	35.8	35.3
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					20-Mar-08	4-Oct-08	15-Mar-09	26-Jun-09	16-Sep-09
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.087	0.077	0.092	0.096	0.071
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	37 ^q	<1	<1	<1	<4	<1
Calcium (Ca)	mg/L	0.05	-	-	21.1	19.8	22.3	18.3	20.2
Magnesium (Mg)	mg/L	0.1	-	-	11.3	10.4	11.3	9.21	10.7
Potassium (K)	mg/L	2	-	-	<2.0	<2	<2.0	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	2.08	1.81	2.16	1.58	1.6
Sodium (Na)	mg/L	2	-	-	4.3	4	3.6	3.4	4.2
Dissolved Metals									
Aluminum (Al)	µg/L	1	-	100 ^r	-	1.1	1	2.1	<1
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	0.34	0.33	0.33	0.32
Barium (Ba)	µg/L	0.05	-	-	-	24.8	28.6	26.1	25.7
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	14	15	15	16
Cadmium (Cd)	µg/L	**	-	-	-	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	0.29	0.24	0.37	0.37
Iron (Fe)	µg/L	30	-	350	-	<30	<30	<30	<30
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	<5	<5	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	-	0.115	1.17	0.17	1.11
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	-	0.711	0.694	0.666	0.694
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	34.7	39.7	34.6	35.5
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	1.26
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	0.081	0.097	0.097	0.084
Vanadium (V)	µg/L	1	-	-	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	2	<1	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	19.4	22.6	19.5	20.3
Magnesium (Mg)	mg/L	0.1	-	-	-	10.2	11.4	9.79	10.6
Potassium (K)	mg/L	2	-	-	-	<2	<2	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	-	1.79	2.18	1.65	1.59
Sodium (Na)	mg/L	2	-	-	-	3.9	3.6	3.6	4
Radionuclides									
GCDWQ MAC ^s									
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	<0.02	<0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	<0.005	<0.005	<0.005	<0.005	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	<0.02	<0.07	<0.02	<0.02	<0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01	<0.01	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	-	1.40	1.14
Pheopigments	µg/L	0.01	-	-	-	-	-	-	0.191

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 95 mg/L
Cadmium Guideline = 0.032 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 95 mg/L
Copper Guideline = 11 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 95 mg/L
Lead Guideline = 77 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 95
Manganese Guideline = 1.589 mg/L
= 1589 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 95 mg/L
Zinc Guideline = 37 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-18

Dinosaur Lake (UN-01 & UN-09) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					UN-01 20-Mar-08	UN-09 3-Oct-08	UN-09 14-Mar-09	UN-09 27-Jun-09	UN-09 19-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	303	187	306	164	179
Hardness (as CaCO ₃)	mg/L	2	-	-	161	102	168	89.6	94.4
pH	pH	0.01	-	-	7.6	8.08	7.71	7.80	8.03
Total Suspended Solids	mg/L	3.0	-	-	24	18.2	27.5	10.3	17.7
Total Dissolved Solids	mg/L	10	-	-	207	145	233	141	151
Turbidity	NTU	0.1	-	-	10.3	5.25	6.94	4.39	5.35
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	174	104	188	86.2	90.5
Ammonia as N	mg/L	0.02	-	-	-	0.069	1.51	0.022	0.0242
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	<0.05	<0.05	<0.05
Chloride (Cl)	mg/L	0.5	-	600	1.56	1.04	1.76	0.83	0.81
Fluoride (F)	mg/L	0.02	-	0.3 ^d	1.2	0.907	1.32	0.737	0.79
Sulfate (SO ₄)	mg/L	0.5	-	100	<0.50	<0.50	<0.50	<0.50	<0.50
Nutrients									
Nitrate and Nitrite as N	mg/L	0.005	-	-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	<0.0050	<0.0050	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	<0.0010	<0.0010	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	3.03	2.18	3.75	1.050	2.06
Ortho Phosphate as P	mg/L	** ^f	-	-	<0.01	<0.0010	<0.010	<0.0010	<0.0010
Total Phosphate as P	mg/L	**	-	-	0.0344	0.0299	0.031	0.0266	0.026
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	44	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	31.9	-	27.6	25.7
Total Metals									
Aluminum (Al)	µg/L	1	100 ^g	-	24.4	22.7	11.6	26.3	13.1
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	0.13	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	1.83	1.26	1.92	1.03	1.1
Barium (Ba)	µg/L	0.05	-	5000	72.8	38.1	67.3	26.7	36.6
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	20	16	20	16	21
Cadmium (Cd)	µg/L	**	0.040 ⁱ	0.040	<0.05	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	0.1	<0.1	0.12	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	14 ^k	0.47	1.02	<0.5	0.57	<0.6
Iron (Fe)	µg/L	30	300	1000	4510	149	6230	278	143
Lead (Pb)	µg/L	0.05	1 - 7 ^l	106 ^m	0.102	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	5.6	<5	5.8	<5	<5
Manganese (Mn)	µg/L	0.05	-	1895 ⁿ	428	28.1	358	38	39.5
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	0.733	0.637	0.841	0.508	0.507
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	0.02
Strontium (Sr)	µg/L	0.1	-	-	60.8	39.9	60.1	31.7	38.2
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					UN-01 20-Mar-08	UN-09 3-Oct-08	UN-09 14-Mar-09	UN-09 27-Jun-09	UN-09 19-Sep-09
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.079	0.069	0.093	0.047	0.044
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	58 ^q	3.2	1.8	2	<3	1.6
Calcium (Ca)	mg/L	0.05	-	-	36.7	21.9	39	18.8	20.7
Magnesium (Mg)	mg/L	0.1	-	-	16.7	11.6	17.4	9.18	10.8
Potassium (K)	mg/L	2	-	-	2.4	<2	2.5	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	0.738	0.209	0.883	0.179	0.217
Sodium (Na)	mg/L	2	-	-	4.4	3.3	4	2.2	2.8
Dissolved Metals									
Aluminum (Al)	µg/L	1	-	100 ^f	-	2.6	6.7	13.7	3
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	1.32	1.9	1.47	1.05
Barium (Ba)	µg/L	0.05	-	-	-	32.6	65.3	24.7	30.8
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	15	19	12	16
Cadmium (Cd)	µg/L	**	-	-	-	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	**	-	-	-	<0.5	<1	<0.5	<1
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	1.14	0.23	0.59	0.15
Iron (Fe)	µg/L	30	-	350	-	<30	5870	145	<30
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	<0.05	0.063	<0.05
Lithium (Li)	µg/L	5	-	-	-	<5	<5	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	-	0.308	328	16.9	0.158
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	-	0.514	0.784	0.438	0.448
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	<0.5	1	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	35.9	56.5	29.9	32.7
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	0.47	<0.1	1.73
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	0.051	0.087	0.046	0.033
Vanadium (V)	µg/L	1	-	-	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	4	3.3	1.5	<1
Calcium (Ca)	mg/L	0.05	-	-	-	21.9	38.8	20	20.2
Magnesium (Mg)	mg/L	0.1	-	-	-	11.6	17.2	9.65	10.7
Potassium (K)	mg/L	2	-	-	-	<2	2.5	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	-	0.15	0.87	0.168	0.211
Sodium (Na)	mg/L	2	-	-	-	3.3	3.9	2.4	2.7
Radionuclides									
GCDWQ MAC ^s									
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	-	<0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	-	<0.005	<0.005	<0.005	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	0.02	0.5	-	-	<0.02	<0.02	<0.02	<0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	-	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	-	<0.01	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	-	4.90	14.6
Pheopigments	µg/L	0.01	-	-	-	-	-	-	7.74

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness ≥ 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 123 mg/L
Cadmium Guideline = 0.040 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 123 mg/L
Copper Guideline = 14 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 123 mg/L
Lead Guideline = 106 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 123
Manganese Guideline = 1.895 mg/L
= 1895 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is ≤ 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 123 mg/L
Zinc Guideline = 58 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH ≥ 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-19

Murky Lake (UN-02 & UN-10) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					UN-02 20-Mar-08	UN-10 3-Oct-08	UN-10 16-Mar-09	UN-10 27-Jun-09	UN-10 17-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	439	258	495	221	253
Hardness (as CaCO ₃)	mg/L	2	-	-	220	144	267	116	140
pH	pH	0.01	-	-	7.75	8.23	7.75	8.27	8.21
Total Suspended Solids	mg/L	3.0	-	-	21	10.7	52.5	5.3	8.7
Total Dissolved Solids	mg/L	10	-	-	275	179	331	161	175
Turbidity	NTU	0.1	-	-	12.6	1.51	36.50	2.76	3.19
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	225	141	270	115	128
Ammonia as N	mg/L	0.02	-	-	-	0.099	2.65	0.029	0.0416
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	<0.05	<0.05	<0.05
Chloride (Cl)	mg/L	0.5	-	600	6.19	4.39	8.14	3.74	3.98
Fluoride (F)	mg/L	0.02	-	0.3 ^d	1.39	0.983	1.22	0.736	0.874
Sulfate (SO ₄)	mg/L	0.5	-	100	<0.50	<0.50	<0.50	<0.50	<0.50
Nutrients									
Nitrate and Nitrite as N	mg/L	0.005	-	-	<0.0050	0.0054	0.0235	<0.0050	<0.0050
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	0.0054	0.0235	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	<0.0010	<0.0010	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	3.39	1.96	4.84	1.080	1.45
Ortho Phosphate as P	mg/L	** ^f	-	-	<0.0010	<0.0010	<0.010	<0.0010	<0.0010
Total Phosphate as P	mg/L	**	-	-	0.0212	0.0225	0.022	0.0152	0.0159
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	40.4	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	25.9	36.2	22.7	21.5
Total Metals									
Aluminum (Al)	µg/L	**	100 ^g	-	10.9	10.7	14.2	<8	<6
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	1.7	1.13	2.24	0.83	0.96
Barium (Ba)	µg/L	0.05	-	5000	109	35.3	95.7	23.6	39.4
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	28	23	29	21	27
Cadmium (Cd)	µg/L	**	0.054 ⁱ	0.054	<0.05	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	0.15	<0.1	0.22	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	19 ^k	0.56	0.54	<0.7	0.38	<0.5
Iron (Fe)	µg/L	30	300	1000	4060	148	12700	93	84
Lead (Pb)	µg/L	0.05	1 - 7 ^l	169 ^m	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	7.8	6.2	8.2	<5	5.5
Manganese (Mn)	µg/L	0.05	-	2495 ⁿ	588	24.3	659	24.2	29.4
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	1.27	0.899	1.85	0.842	0.974
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01	<0.01	<0.01	0.049
Strontium (Sr)	µg/L	0.1	-	-	80.9	44.4	74.1	35.4	44.7
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					UN-02 20-Mar-08	UN-10 3-Oct-08	UN-10 16-Mar-09	UN-10 27-Jun-09	UN-10 17-Sep-09
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.106	0.104	0.134	0.059	0.046
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	99 ^d	3.6	1.7	3.7	<3	<5
Calcium (Ca)	mg/L	0.05	-	-	49.4	32.4	58.5	23.3	29.5
Magnesium (Mg)	mg/L	0.1	-	-	23.5	15.8	26.8	11.9	14.8
Potassium (K)	mg/L	2	-	-	2.9	2.1	3.3	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	2.23	1.43	4.37	0.385	1.09
Sodium (Na)	mg/L	2	-	-	9.4	7.2	10	5	6.3
Dissolved Metals									
Aluminum (Al)	µg/L	1	-	100 ^f	-	<1	3.6	5.2	<1
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	1.22	1.87	1	0.94
Barium (Ba)	µg/L	0.05	-	-	-	30.2	72.7	23.6	36.8
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	21	31	18	23
Cadmium (Cd)	µg/L	**	-	-	-	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	0.12	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	0.35	0.43	0.29	0.16
Iron (Fe)	µg/L	30	-	350	-	<30	1750	69	<30
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	5.3	9.3	<5	5
Manganese (Mn)	µg/L	0.05	-	-	-	0.553	428	17.3	0.445
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	-	0.794	1.86	0.826	0.85
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	0.55	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	0.011
Strontium (Sr)	µg/L	0.1	-	-	-	40.1	73.5	35.2	42.2
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	0.92
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	0.087	0.114	0.056	0.039
Vanadium (V)	µg/L	1	-	-	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	2.3	2.1	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	32	59.2	25.3	30.3
Magnesium (Mg)	mg/L	0.1	-	-	-	15.6	28.9	12.9	15.5
Potassium (K)	mg/L	2	-	-	-	<2	3.4	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	-	1.39	4.18	0.398	1.14
Sodium (Na)	mg/L	2	-	-	-	6.7	10.3	5.4	6.7
Radionuclides									
GCDWQ MAC^s									
Lead-210 (²¹⁰ Pb)	Bq/L ¹	0.02	0.1	-	-	<0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	-	<0.005	0.007	0.01	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	-	<0.04	<0.02	<0.02	<0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	-	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	-	<0.01	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	-	2.14	8.22
Pheopigments	µg/L	0.01	-	-	-	-	-	-	4.11

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness ≥ 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 177 mg/L
Cadmium Guideline = 0.054 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 177 mg/L
Copper Guideline = 19 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 177 mg/L
Lead Guideline = 169 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 177
Manganese Guideline = 2.495 mg/L
= 2495 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is ≤ 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 177 mg/L
Zinc Guideline = 99 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH ≥ 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-20

Egg Lake (UN-03 & UN-11) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					UN-03 20-Mar-08	UN-11 3-Oct-08	UN-11 15-Mar-09	UN-11 27-Jun-09	UN-11 23-Sep-09
Physicals									
Conductivity	µS/cm	0.5	-	-	253	183	267	169	182
Hardness (as CaCO ₃)	mg/L	2	-	-	132	98.5	144	91.2	93.5
pH	pH	0.01	-	-	7.75	8.12	7.80	8.04	8.16
Total Suspended Solids	mg/L	3.0	-	-	<3.0	3.7	8.5	<3.0	5.0
Total Dissolved Solids	mg/L	10	-	-	169	127	193	129	125
Turbidity	NTU	0.1	-	-	2.74	1.62	12.90	1.78	1.72
Anions									
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	148	97.7	170	91	95.1
Ammonia as N	mg/L	0.02	-	-	-	0.146	1.08	0.042	0.036
Bromide (Br)	mg/L	0.05	-	-	<0.05	-	<0.05	<0.050	<0.05
Chloride (Cl)	mg/L	0.5	-	600	0.8	0.63	1.08	<0.50	0.83
Fluoride (F)	mg/L	0.02	-	0.3 ^d	1.14	0.954	1.26	0.797	0.865
Sulfate (SO ₄)	mg/L	0.5	-	100	<0.50	<0.50	<0.50	<0.50	<0.50
Nutrients									
Nitrate and Nitrite as N	mg/L	0.005	-	-	<0.0050	0.0065	0.0129	<0.0050	0.0058
Nitrate (as N)	mg/L	0.005	2.9	31.3	-	0.0065	0.0129	-	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-	<0.0010	<0.0010	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	1.68	1.34	2.67	0.847	1.21
Ortho Phosphate as P	mg/L	0.001	-	-	<0.0010	<0.0010	0.011	<0.0010	<0.0010
Total Phosphate as P	mg/L	0.002	-	-	0.0095	0.0115	0.0214	0.0096	0.0101
Organics									
Total Organic Carbon (TOC)	mg/L	0.5	-	-	26.6	-	-	-	-
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	-	24	25.4	19.7	22.1
Total Metals									
Aluminum (Al)	µg/L	**f	100 ^g	-	<1	4.6	1.6	<8	3.7
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	0.85	0.72	0.92	0.83	0.67
Barium (Ba)	µg/L	0.05	-	5000	53.8	34.5	60.5	30.6	34.5
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	13	13	14	12	16
Cadmium (Cd)	µg/L	**	0.036 ⁱ	0.036	<0.05	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1	<0.1	0.1	<0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	13 ^k	0.25	0.5	0.35	0.48	<0.4
Iron (Fe)	µg/L	30	300	1000	213	80	1480	249	139
Lead (Pb)	µg/L	0.05	1 - 7 ^l	94 ^m	<0.05	<0.05	<0.05	0.118	<0.05
Lithium (Li)	µg/L	5	-	870	<5	<5	<5	<5	<5
Manganese (Mn)	µg/L	0.05	-	1772 ⁿ	81.8	17.4	649	25.7	28.9
Mercury (Hg)	µg/L	**	0.026	0.1	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	0.256	0.264	0.341	0.23	0.24
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5	<0.5	<0.5	1.14	<0.5
Phosphorus (P)	µg/L	300	-	-	<300	<300	<300	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	0.011	<0.01	<0.01	0.023
Strontium (Sr)	µg/L	0.1	-	-	32.4	26.3	34	23.2	24.6
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1	<0.1	<0.1	<0.1

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	March 2008	October 2008	March 2009	June 2009	September 2009
					UN-03 20-Mar-08	UN-11 3-Oct-08	UN-11 15-Mar-09	UN-11 27-Jun-09	UN-11 23-Sep-09
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	300	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium (V)	µg/L	1	-	6	<1	<1	<1	<1	<1
Zinc (Zn)	µg/L	**	30	49 ^d	<1	1.3	<1	<4	<1
Calcium (Ca)	mg/L	0.05	-	-	31.2	22.4	35.2	20.1	21.7
Magnesium (Mg)	mg/L	0.1	-	-	13.3	10.7	14.4	8.83	9.71
Potassium (K)	mg/L	2	-	-	<2.0	<2	<2.0	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	0.847	0.556	1.34	0.249	0.501
Sodium (Na)	mg/L	2	-	-	3.5	3.1	3.3	2.3	2.5
Dissolved Metals									
Aluminum (Al)	µg/L	1	-	100 ^f	-	<1	1.3	2.4	<1
Antimony (Sb)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	-	0.76	0.85	0.66	0.6
Barium (Ba)	µg/L	0.05	-	-	-	30.2	53.4	27.7	29.8
Beryllium (Be)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Boron (B)	µg/L	10	-	-	-	12	14	<10	12
Cadmium (Cd)	µg/L	**	-	-	-	<0.05	<0.05	<0.05	<0.017
Chromium (Cr)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	-	0.72	0.18	0.28	0.17
Iron (Fe)	µg/L	30	-	350	-	<30	83	73	<30
Lead (Pb)	µg/L	0.05	-	-	-	<0.05	<0.05	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	-	<5	<5	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	-	0.447	2.25	2.28	0.266
Mercury (Hg)	µg/L	**	-	-	-	-	<0.05	<0.05	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	-	0.209	0.265	0.205	0.195
Nickel (Ni)	µg/L	0.5	-	-	-	<0.5	<0.5	<0.5	<0.5
Phosphorus (P)	µg/L	300	-	-	-	<300	<300	<300	<300
Selenium (Se)	µg/L	1	-	-	-	<1	<1	<1	<1
Silver (Ag)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	-	23.6	34.5	20.8	21.4
Thallium (Tl)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	-	<0.1	<0.1	<0.1	0.19
Titanium (Ti)	µg/L	10	-	-	-	<10	<10	<10	<10
Uranium (U)	µg/L	0.01	-	-	-	<0.01	<0.01	<0.01	<0.01
Vanadium (V)	µg/L	1	-	-	-	<1	<1	<1	<1
Zinc (Zn)	µg/L	1	-	-	-	2	<1	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	-	22.2	34.2	21.2	21.6
Magnesium (Mg)	mg/L	0.1	-	-	-	10.5	14.3	9.3	9.61
Potassium (K)	mg/L	2	-	-	-	<2	<2	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	-	0.535	1.3	0.235	0.495
Sodium (Na)	mg/L	2	-	-	-	2.9	3.3	2.4	2.4
Radionuclides									
GCDWQ MAC^s									
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	<0.02	<0.02	<0.02	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	<0.005	<0.005	<0.005	<0.005	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	**	0.5	-	<0.02	<0.04	<0.03	<0.02	<0.01
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01	<0.01	<0.01	<0.01	<0.01
Biota									
Chlorophyll a	µg/L	0.01	-	-	-	-	-	-	2.69
Pheopigments	µg/L	0.01	-	-	-	-	-	-	0.40

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness ≥ 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite is 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 112 mg/L
Cadmium Guideline = 0.036 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 112 mg/L
Copper Guideline = 13 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 112 mg/L
Lead Guideline = 94 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 112
Manganese Guideline = 1.772 mg/L
= 1772 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is ≤ 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 112 mg/L
Zinc Guideline = 49 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH ≥ 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-21

Buck Lake (UN-12) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	September 2009
					10-Sep-09
Physicals					
Conductivity	µS/cm	0.5	-	-	231
Hardness (as CaCO ₃)	mg/L	2	-	-	134
pH	pH	0.01	-	-	8.28
Total Suspended Solids	mg/L	3.0	-	-	6.80
Total Dissolved Solids	mg/L	10	-	-	174
Turbidity	NTU	0.1	-	-	3.75
Anions					
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	121
Ammonia as N	mg/L	0.02	-	-	0.072
Bromide (Br)	mg/L	0.05	-	-	<0.050
Chloride (Cl)	mg/L	0.5	-	600	0.92
Fluoride (F)	mg/L	0.02	-	0.3 ^d	0.978
Sulfate (SO ₄)	mg/L	0.5	-	100	<0.50
Nutrients					
Nitrate and Nitrite as N	mg/L	0.005	-	-	<0.005
Nitrate (as N)	mg/L	-	2.9	31.3	-
Nitrite (as N)	mg/L	-	0.06	0.12 ^e	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	1.82
Ortho Phosphate as P	mg/L	0.001	-	-	<0.001
Total Phosphate as P	mg/L	0.002	-	-	0.0179
Organics					
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	27.4
Total Metals					
Aluminum (Al)	µg/L	7	100 ^g	-	<7
Antimony (Sb)	µg/L	0.1	-	20	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	0.99
Barium (Ba)	µg/L	0.05	-	5000	26.4
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5
Boron (B)	µg/L	10	-	1200	24
Cadmium (Cd)	µg/L	0.05	0.043 ⁱ	0.043	<0.05
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1
Copper (Cu)	µg/L	0.5	2 - 4 ^j	15 ^k	<0.5
Iron (Fe)	µg/L	30	300	1000	87
Lead (Pb)	µg/L	0.05	1 - 7 ^l	119 ^m	<0.05
Lithium (Li)	µg/L	5	-	870	<5
Manganese (Mn)	µg/L	0.05	-	2017 ⁿ	24.2
Mercury (Hg)	µg/L	0.05	0.026	0.1	<0.05
Molybdenum (Mo)	µg/L	0.05	73	2000	0.127
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5
Phosphorus (P)	µg/L	300	-	-	<300
Selenium (Se)	µg/L	1	1	2	<1
Silver (Ag)	µg/L	0.017	0.1	0.1 - 3 ^p	0.017
Strontium (Sr)	µg/L	0.1	-	-	38.1
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	September 2009 10-Sep-09
Uranium (U)	µg/L	0.01	-	300	<0.01
Vanadium (V)	µg/L	1	-	6	<1
Zinc (Zn)	µg/L	1	30	66 ^q	1.5
Calcium (Ca)	mg/L	0.05	-	-	29.9
Magnesium (Mg)	mg/L	0.1	-	-	13.5
Potassium (K)	mg/L	2	-	-	2.3
Silicon (Si)	mg/L	0.05	-	-	1.31
Sodium (Na)	mg/L	2	-	-	3.1
Dissolved Metals					
Aluminum (Al)	µg/L	1	-	100 ^f	1
Antimony (Sb)	µg/L	0.1	-	-	<0.1
Arsenic (As)	µg/L	0.1	-	-	0.93
Barium (Ba)	µg/L	0.05	-	-	23.2
Beryllium (Be)	µg/L	0.5	-	-	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5
Boron (B)	µg/L	10	-	-	18
Cadmium (Cd)	µg/L	0.05	-	-	<0.05
Chromium (Cr)	µg/L	0.5	-	-	<0.5
Cobalt (Co)	µg/L	0.1	-	-	<0.1
Copper (Cu)	µg/L	0.1	-	-	0.21
Iron (Fe)	µg/L	30	-	350	<30
Lead (Pb)	µg/L	0.05	-	-	<0.05
Lithium (Li)	µg/L	5	-	-	<5
Manganese (Mn)	µg/L	0.05	-	-	0.538
Mercury (Hg)	µg/L	0.05	-	-	<0.05
Molybdenum (Mo)	µg/L	0.05	-	-	0.1
Nickel (Ni)	µg/L	0.5	-	-	<0.5
Phosphorus (P)	µg/L	300	-	-	<300
Selenium (Se)	µg/L	1	-	-	<1
Silver (Ag)	µg/L	0.01	-	-	<0.01
Strontium (Sr)	µg/L	0.1	-	-	34.6
Thallium (Tl)	µg/L	0.1	-	-	<0.1
Tin (Sn)	µg/L	0.1	-	-	1.43
Titanium (Ti)	µg/L	10	-	-	<10
Uranium (U)	µg/L	0.01	-	-	<0.01
Vanadium (V)	µg/L	1	-	-	<1
Zinc (Zn)	µg/L	1	-	-	<1
Calcium (Ca)	mg/L	0.05	-	-	30.9
Magnesium (Mg)	mg/L	0.1	-	-	13.8
Potassium (K)	mg/L	2	-	-	2.4
Silicon (Si)	mg/L	0.05	-	-	1.35
Sodium (Na)	mg/L	2	-	-	3.2
Radionuclides					
GCDWQ MAC^s					
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	0.02	0.5	-	<0.03
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01
Biota					
Chlorophyll a	µg/L	0.01	-	-	
Pheopigments	µg/L	0.01	-	-	

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{[0.86(\text{Log}(\text{hardness})) - 3.2]}$
Average hardness = 134 mg/L
Cadmium Guideline = 0.043 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = $0.094 \times (\text{hardness}) + 2$
Average hardness = 134 mg/L
Copper Guideline = 15 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 134 mg/L
Lead Guideline = 119 µg/L
- n. BC WQG for Total Manganese should be less than or equal to $0.01102 \times (\text{hardness}) + 0.54$
Average hardness = 134
Manganese Guideline = 2.017 mg/L
= 2017 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = $33 + 0.75 \times (\text{hardness} - 90)$
Average hardness = 134 mg/L
Zinc Guideline = 66 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-22

Drizzle Lake (UN-13) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	September 2009 19-Sep-09
Physicals					
Conductivity	µS/cm	0.5	-	-	252
Hardness (as CaCO ₃)	mg/L	2	-	-	134
pH	pH	0.01	-	-	8.10
Total Suspended Solids	mg/L	3.0	-	-	7.20
Total Dissolved Solids	mg/L	10	-	-	169
Turbidity	NTU	0.1	-	-	2.32
Anions					
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	129
Ammonia as N	mg/L	0.02	-	-	0.705
Bromide (Br)	mg/L	0.05	-	-	<0.05
Chloride (Cl)	mg/L	0.5	-	600	3.60
Fluoride (F)	mg/L	0.02	-	0.3 ^d	0.893
Sulfate (SO ₄)	mg/L	0.5	-	100	<0.5
Nutrients					
Nitrate and Nitrite as N	mg/L	0.005	-	-	<0.005
Nitrate (as N)	mg/L	0.005	2.9	31.3	-
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	2.26
Ortho Phosphate as P	mg/L	0.001	-	-	<0.0010
Total Phosphate as P	mg/L	0.002	-	-	0.0155
Organics					
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	21.5
Total Metals					
Aluminum (Al)	µg/L	5	100 ^g	-	<5
Antimony (Sb)	µg/L	0.1	-	20	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	0.84
Barium (Ba)	µg/L	0.05	-	5000	55.4
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5
Boron (B)	µg/L	10	-	1200	29
Cadmium (Cd)	µg/L	0.017	0.043 ⁱ	0.043	<0.017
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5
Cobalt (Co)	µg/L	0.1	-	110	<0.1
Copper (Cu)	µg/L	0.3	2 - 4 ^j	15 ^k	<0.3
Iron (Fe)	µg/L	30	300	1000	58
Lead (Pb)	µg/L	0.05	1 - 7 ^l	119 ^m	<0.05
Lithium (Li)	µg/L	5	-	870	5.1
Manganese (Mn)	µg/L	0.05	-	2017 ⁿ	32.7
Mercury (Hg)	µg/L	0.05	0.026	0.1	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	1.2
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	<0.5
Phosphorus (P)	µg/L	300	-	-	<300
Selenium (Se)	µg/L	1	1	2	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	0.023
Strontium (Sr)	µg/L	0.1	-	-	47.6
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	September 2009 19-Sep-09
Uranium (U)	µg/L	0.01	-	300	0.056
Vanadium (V)	µg/L	1	-	6	<1
Zinc (Zn)	µg/L	1	30	66 ^q	1.6
Calcium (Ca)	mg/L	0.05	-	-	26.1
Magnesium (Mg)	mg/L	0.1	-	-	13.8
Potassium (K)	mg/L	2	-	-	<2.0
Silicon (Si)	mg/L	0.05	-	-	1.72
Sodium (Na)	mg/L	2	-	-	5.8
Dissolved Metals					
Aluminum (Al)	µg/L	1	-	100 ^f	<1
Antimony (Sb)	µg/L	0.1	-	-	<0.1
Arsenic (As)	µg/L	0.1	-	-	0.81
Barium (Ba)	µg/L	0.05	-	-	50.8
Beryllium (Be)	µg/L	0.5	-	-	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5
Boron (B)	µg/L	10	-	-	25
Cadmium (Cd)	µg/L	0.017	-	-	<0.017
Chromium (Cr)	µg/L	1.0	-	-	<1
Cobalt (Co)	µg/L	0.1	-	-	<0.1
Copper (Cu)	µg/L	0.1	-	-	0.13
Iron (Fe)	µg/L	30	-	350	<30
Lead (Pb)	µg/L	0.05	-	-	<0.05
Lithium (Li)	µg/L	5	-	-	5
Manganese (Mn)	µg/L	0.05	-	-	0.693
Mercury (Hg)	µg/L	0.01	-	-	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	1.04
Nickel (Ni)	µg/L	0.5	-	-	<0.5
Phosphorus (P)	µg/L	300	-	-	<300
Selenium (Se)	µg/L	1	-	-	<1
Silver (Ag)	µg/L	0.01	-	-	<0.01
Strontium (Sr)	µg/L	0.1	-	-	44.4
Thallium (Tl)	µg/L	0.1	-	-	<0.1
Tin (Sn)	µg/L	0.1	-	-	0.53
Titanium (Ti)	µg/L	10	-	-	<10
Uranium (U)	µg/L	0.01	-	-	0.045
Vanadium (V)	µg/L	1	-	-	<1
Zinc (Zn)	µg/L	1	-	-	<1
Calcium (Ca)	mg/L	0.05	-	-	29.6
Magnesium (Mg)	mg/L	0.1	-	-	14.5
Potassium (K)	mg/L	2	-	-	<2.0
Silicon (Si)	mg/L	0.05	-	-	1.8
Sodium (Na)	mg/L	2	-	-	6.2
Radionuclides					
GCDWQ MAC^s					
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	<0.005
Radium-228 (²²⁸ Ra)	Bq/L	0.02	0.5	-	<0.01
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01
Biota					
Chlorophyll a	µg/L	0.01	-	-	
Pheopigments	µg/L	0.01	-	-	

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86[\text{Log}(\text{hardness})] - 3.2)}$
Average hardness = 134 mg/L
Cadmium Guideline = 0.043 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 134 mg/L
Copper Guideline = 15 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 134 mg/L
Lead Guideline = 119 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 134
Manganese Guideline = 2.017 mg/L
= 2017 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 134 mg/L
Zinc Guideline = 66 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance

Table F3-23

Redemption Lake (UN-14) Baseline Water Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	September 2009	
					UN-14	28-Sep-09 Replicate
Physicals						
Conductivity	µS/cm	0.5	-	-	171	171
Hardness (as CaCO ₃)	mg/L	2	-	-	89.2	87.7
pH	pH	0.01	-	-	8.06	7.95
Total Suspended Solids	mg/L	3.0	-	-	<3.0	<3.0
Total Dissolved Solids	mg/L	10	-	-	106	112
Turbidity	NTU	0.1	-	-	1.92	1.74
Anions						
Alkalinity, Total (as CaCO ₃)	mg/L	2	-	-	86.7	77.2
Ammonia as N	mg/L	0.02	-	-	<0.02	<0.02
Bromide (Br)	mg/L	0.05	-	-	<0.05	<0.05
Chloride (Cl)	mg/L	0.5	-	600	1.41	1.41
Fluoride (F)	mg/L	0.02	-	0.3 ^d	0.054	0.053
Sulfate (SO ₄)	mg/L	0.5	-	100	6.69	6.66
Nutrients						
Nitrate and Nitrite as N	mg/L	-	-	-	-	-
Nitrate (as N)	mg/L	0.005	2.9	31.3	<0.005	<0.005
Nitrite (as N)	mg/L	0.001	0.06	0.12 ^e	<0.001	<0.001
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	0.656	0.603
Ortho Phosphate as P	mg/L	0.001	-	-	0.0021	0.0019
Total Phosphate as P	mg/L	0.002	-	-	0.0209	0.0206
Organics						
Dissolved Organic Carbon (DOC)	mg/L	0.5	-	-	14.3	14.4
Total Metals						
Aluminum (Al)	µg/L	** ^f	100 ^g	-	<9	<8
Antimony (Sb)	µg/L	0.1	-	20	<0.1	<0.1
Arsenic (As)	µg/L	0.1	5.0	5.0	0.67	0.68
Barium (Ba)	µg/L	0.05	-	5000	12	12.3
Beryllium (Be)	µg/L	0.5	-	5.3 ^h	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5
Boron (B)	µg/L	10	-	1200	42	41
Cadmium (Cd)	µg/L	**	0.030 ⁱ	0.030	<0.017	<0.017
Chromium (Cr)	µg/L	0.5	8.9	8.9	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	110	0.1	<0.1
Copper (Cu)	µg/L	**	2 - 4 ^j	10 ^k	0.40	0.45
Iron (Fe)	µg/L	30	300	1000	53	51
Lead (Pb)	µg/L	0.05	1 - 7 ^l	70 ^m	<0.05	<0.05
Lithium (Li)	µg/L	5	-	870	<5	<5
Manganese (Mn)	µg/L	0.05	-	1515 ⁿ	90.8	93.1
Mercury (Hg)	µg/L	0.05	0.026	0.1	<0.01	<0.01
Molybdenum (Mo)	µg/L	0.05	73	2000	0.14	0.131
Nickel (Ni)	µg/L	0.5	25 - 150 ^o	25 - 150	0.84	0.85
Phosphorus (P)	µg/L	300	-	-	<300	<300
Selenium (Se)	µg/L	1	1	2	<1	<1
Silver (Ag)	µg/L	0.01	0.1	0.1 - 3 ^p	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	37.6	38.6
Thallium (Tl)	µg/L	0.1	0.8	-	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	2000	<10	<10
Uranium (U)	µg/L	0.01	-	300	0.041	0.039

Parameter	Units	D.L. ^a	CCME FAL ^b	BC WQG ^c	September 2009 28-Sep-09	
					UN-14	Replicate
Vanadium (V)	µg/L	1	-	6	<1	<1
Zinc (Zn)	µg/L	1	30	32 ^q	1.2	<1
Calcium (Ca)	mg/L	0.05	-	-	17.6	17.7
Magnesium (Mg)	mg/L	0.1	-	-	10.1	10.1
Potassium (K)	mg/L	2	-	-	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	1.41	1.41
Sodium (Na)	mg/L	2	-	-	3.2	3.2
Dissolved Metals						
Aluminum (Al)	µg/L	1	-	100 ^r	1	<1
Antimony (Sb)	µg/L	0.1	-	-	<0.1	<0.1
Arsenic (As)	µg/L	0.1	-	-	0.63	0.65
Barium (Ba)	µg/L	0.05	-	-	10.5	10.5
Beryllium (Be)	µg/L	0.5	-	-	<0.5	<0.5
Bismuth (Bi)	µg/L	0.5	-	-	<0.5	<0.5
Boron (B)	µg/L	10	-	-	34	35
Cadmium (Cd)	µg/L	**	-	-	<0.017	<0.017
Chromium (Cr)	µg/L	**	-	-	<0.5	<0.5
Cobalt (Co)	µg/L	0.1	-	-	<0.1	<0.1
Copper (Cu)	µg/L	0.1	-	-	0.31	0.28
Iron (Fe)	µg/L	30	-	350	<30	<30
Lead (Pb)	µg/L	0.05	-	-	<0.05	<0.05
Lithium (Li)	µg/L	5	-	-	<5	<5
Manganese (Mn)	µg/L	0.05	-	-	0.666	1.08
Mercury (Hg)	µg/L	**	-	-	<0.01	<0.01
Molybdenum (Mo)	µg/L	0.05	-	-	0.103	0.121
Nickel (Ni)	µg/L	0.5	-	-	0.72	0.65
Phosphorus (P)	µg/L	300	-	-	<300	<300
Selenium (Se)	µg/L	1	-	-	<1	<1
Silver (Ag)	µg/L	0.01	-	-	<0.01	<0.01
Strontium (Sr)	µg/L	0.1	-	-	35.2	35.6
Thallium (Tl)	µg/L	0.1	-	-	<0.1	<0.1
Tin (Sn)	µg/L	0.1	-	-	<0.1	<0.1
Titanium (Ti)	µg/L	10	-	-	<10	<10
Uranium (U)	µg/L	0.01	-	-	0.032	0.033
Vanadium (V)	µg/L	1	-	-	<1	<1
Zinc (Zn)	µg/L	1	-	-	<1	<1
Calcium (Ca)	mg/L	0.05	-	-	18.3	18
Magnesium (Mg)	mg/L	0.1	-	-	10.5	10.4
Potassium (K)	mg/L	2	-	-	<2.0	<2.0
Silicon (Si)	mg/L	0.05	-	-	1.46	1.45
Sodium (Na)	mg/L	2	-	-	3.3	3.3
Radionuclides						
GCDWQ MAC^s						
Lead-210 (²¹⁰ Pb)	Bq/L ^t	0.02	0.1	-	<0.02	<0.02
Radium-226 (²²⁶ Ra)	Bq/L	0.005	0.6	-	<0.005	0.008
Radium-228 (²²⁸ Ra)	Bq/L	0.02	0.5	-	<0.02	<0.02
Thorium-230 (²³⁰ Th)	Bq/L	0.01	0.4	-	<0.01	<0.01
Thorium-232 (²³² Th)	Bq/L	0.01	0.1	-	<0.01	<0.01
Biota						
Chlorophyll a	µg/L	0.01	-	-	-	-
Pheopigments	µg/L	0.01	-	-	-	-

NOTES:

- a. D.L. = laboratory detection limit
- b. CCME FAL - Canadian Council of Ministers of the Environment Freshwater Aquatic Life
- c. BC WQG - British Columbia Water Quality Guidelines (Approved and Working) for maximum concentrations
- d. BC WQG for Fluoride is 0.3 mg/L (maximum) where water hardness \geq 50 mg/L (as CaCO₃)
- e. BC WQG for Nitrite 0.12 mg/L when chloride is 2 - 4 mg/L
- f. ** implies detection limit varied by season - '<' (less than) value implies detection limit
- g. CCME FAL Total Aluminum guideline is 100 µg/L when pH > 6.5
- h. BC WQG for Total Beryllium is Working chronic criterion
- i. CCME FAL Total Cadmium guideline = $10^{(0.86(\text{Log}(\text{hardness}) - 3.2))}$
Average hardness = 88 mg/L
Cadmium Guideline = 0.030 µg/L
- j. CCME FAL Total Copper guideline:
2 µg/L when [CaCO₃] is 0 - 120 mg/L
3 µg/L when [CaCO₃] is 120 - 180 mg/L
4 µg/L when [CaCO₃] is > 180 mg/L
- k. BC WQG for Total Copper = 0.094 x (hardness) + 2
Average hardness = 88 mg/L
Copper Guideline = 10 µg/L
- l. CCME FAL Total Lead guideline:
1 µg/L when [CaCO₃] is 0 - 60 mg/L
4 µg/L when [CaCO₃] is 120 - 180 mg/L
7 µg/L when [CaCO₃] is > 180 mg/L
- m. BC WQG for Total Lead (when water hardness (as CaCO₃) > 8 mg/L)
= $e(1.273 \times [\ln(\text{hardness})] - 1.460)$
Average hardness = 88 mg/L
Lead Guideline = 70 µg/L
- n. BC WQG for Total Manganese should be less than or equal to 0.01102 x (hardness) + 0.54
Average hardness = 88
Manganese Guideline = 1.515 mg/L
= 1515 µg/L
- o. CCME FAL Total Nickel guideline:
25 µg/L when [CaCO₃] is 0 - 60 mg/L
150 µg/L when [CaCO₃] is > 180 mg/L
- p. BC WQG for Total Silver:
0.1 µg/L when [CaCO₃] is \leq 100 mg/L
3 µg/L when [CaCO₃] is > 100 mg/L
- q. BCWQG for Total Zinc (maximum) = 33 + 0.75 x (hardness - 90)
Average hardness = 88 mg/L
Zinc Guideline = 32 µg/L
- r. BC WQG for Dissolved Aluminum guideline 100 µg/L for pH \geq 6.5
- s. GCDWQ MAC - Health Canada's Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentration for Radionuclides; based on adults consuming 2 L of water per day or 730 L of water per year (May 2008)
- t. Bq/L = Becquerel per litre; the becquerel (Bq) measures the quantity of radioactivity present without consideration for what kind of radiation is emitted.
- u. **Bolded** result implies a guideline exceedance
- v. **Replicate** result where precision threshold (RPD > 25%) was exceeded



APPENDIX G

Sediment Chemistry Data



Table G1-1

Replicate Sediment Chemistry & Coefficient of Variation (CV)
 Avalon Rare Metals Thor Lake Property
 Thor Lake, NT
 Project # 123510050

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		Elbow North				Elbow South				Thorn			
			ISQG ^c	PEL ^d	Replicate 1	Replicate 2	Replicate 3	CV ^e	Replicate 1	Replicate 2	Replicate 3	CV ^e	Replicate 1	Replicate 2	Replicate 3 ^f	CV ^e
					30-Sep-09				29-Sep-09				23-Sep-09			
Organics & Nutrients																
Inorganic Carbon	mg/kg	0.1	-	-	0.44	0.36	0.34	14	0.29	0.33	0.31	6	0.17	0.14	0.12	18
Total Organic Carbon	mg/kg	0.1	-	-	6.33	16.90	13.30	44	26.2	21.5	25.9	11	30.2	30.6	31.2	2
CaCO3 Equivalent	mg/kg	0.7	-	-	4.09	3.53	3.24	12	2.98	3.24	3.1	4	1.69	1.56	1.32	12
Total Carbon (by combustion)	mg/kg	0.1	-	-	6.8	17.3	13.7	42	26.5	21.8	26.2	11	30.4	30.8	31.3	1
Total Kjeldahl Nitrogen	mg/kg	0.02	-	-	0.694	1.81	1.33	44	2.80	2.29	2.77	11	2.58	2.71	2.73	3
Total Phosphorus	mg/kg	90	-	-	1180	1290	1110	8	2070	1650	1860	11	1160	937	1200	13
Total Metals																
Mercury (Hg)	mg/kg	0.05	0.17	0.486	<0.050	<0.050	<0.050	0	0.056	0.057	0.051	6	0.071	0.078	0.081	7
Silver (Ag)	mg/kg	1	0.5 ^g	-	<1.0	<1.0	<1.0	0	<1.0	<1.0	<1.0	0	<1.0	<1.0	<2.0	43
Arsenic (As)	mg/kg	0.2	5.9	17.0	15.60	3.20	3.77	93	4.37	6.81	4.74	25	9.91	8.93	9.13	6
Barium (Ba)	mg/kg	5	-	-	163	168	181	5	109	134	103	14	149	152	137	5
Beryllium (Be)	mg/kg	1	-	-	<1.0	<1.0	<1.0	0	<1.0	<1.0	<1.0	0	<1.0	<1.0	<2.0	43
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50	<0.50	<0.50	0	<0.50	<0.50	<0.50	0	<0.50	<0.50	<1.0	43
Cobalt (Co)	mg/kg	1	-	-	7.7	7.1	7.3	4	5.1	5.4	5.3	3	7.0	6.8	6.6	3
Chromium (Cr)	mg/kg	0.5	37.3	90.0	16.0	17.9	19.0	9	10.9	12.4	11.7	6	15.3	14.3	13.4	7
Copper (Cu)	mg/kg	2	35.7	197.0	12.9	24.6	25.7	34	29.1	24.0	28.3	10	33.0	34.8	31.6	5
Molybdenum (Mo)	mg/kg	1	-	-	2.6	2.8	2.2	12	4.6	1.5	5.1	52	10.5	9.7	11.8	10
Nickel (Ni)	mg/kg	2	16.0 ^h	75.0 ⁱ	13.5	16.9	17.5	14	13.4	13.7	13.6	1	17.3	16.1	16.6	4
Lead (Pb)	mg/kg	5	35.0	91.3	<5.0	5.4	5.6	39	<5.0	<5.0	<5.0	0	6.2	6.8	<10	15
Antimony (Sb)	mg/kg	0.2	-	-	0.21	0.30	0.30	19	0.34	0.30	0.35	8	0.55	0.70	0.63	12
Selenium (Se)	mg/kg	0.2	5.0 ^g	-	0.31	0.68	0.74	40	0.83	0.81	0.83	1	1.05	1.13	1.01	6
Tin (Sn)	mg/kg	5	-	-	<5.0	<5.0	<5.0	0	<5.0	<5.0	<5.0	0	<5.0	<5.0	<10	43
Thallium (Tl)	mg/kg	1	-	-	<1.0	<1.0	<1.0	0	<1.0	<1.0	<1.0	0	<1.0	<1.0	<2.0	43
Uranium (U)	mg/kg	2	-	-	<2.0	2.9	2.8	48	4.6	<2.0	5.0	62	3.8	3.9	<4.0	33
Vanadium (V)	mg/kg	1	-	-	44.1	30.8	32.8	20	18.8	23.6	20.9	11	28.5	28.1	26.5	4
Zinc (Zn)	mg/kg	10	123	315	38	47	50	14	33	35	35	3	63	67	65	3
Particle Size																
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	55.0	5.0	16.0	104	3.0	15.0	5.0	84	4.0	12.0	2.0	88
% Silt (0.05 mm - 2 um)	%	1	-	-	35.0	79.0	69.0	38	76.0	66.0	74.0	7	53.0	31.0	49.0	26
% Clay (< 2 um)	%	1	-	-	9.0	16.0	15.0	28	21.0	19.0	21.0	6	43.0	58.0	49.0	15
Texture	-	-	-	-	Sandy loam	Silt loam	Silt loam	-	Silt loam	Silt loam	Silt loam	-	Silty clay	Clay	Silty clay	-

Notes:

- ^a D.L. = Detection Limit
- ^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines
- ^c ISQG = Interim Sediment Quality Guidelines
- ^d PEL = Probable Effects Level
- ^e C.V. = Coefficient of Variation between replicate samples when all results > 5 times the detection limit
- ^f Detection limit for silver (Ag) to zinc (Zn) adjusted due to insufficient sample
- ^g BCWSQ guidelines
- ^h BCWSQ Lowest Effects Level (LEL)
- ⁱ BCWSQ Severe Effects Level (SEL)
- ^j **Bolded** result implies ISQG exceedance
- ^k **Bolded & shaded** result implies PEL exceedance
- ^l Replicate result where precision threshold (CV > 20%) was exceeded (when all results > 5 times detection limit)

Table G1-1

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		Wasp				Porkchop				Egg			
			ISQG ^c	PEL ^d	Replicate 1 ^f	Replicate 2	Replicate 3	CV ^e	Replicate 1	Replicate 2	Replicate 3	CV ^e	Replicate 1 ^f	Replicate 2	Replicate 3 ^f	CV ^e
					23-Sep-09				24-Sep-09				22-Sep-09			
Organics & Nutrients																
Inorganic Carbon	mg/kg	0.1	-	-	0.13	0.12	<0.10	6	0.11	0.11	<0.10	38	0.12	0.13	<0.10	44
Total Organic Carbon	mg/kg	0.1	-	-	33.5	33.3	32.3	2	17.4	17.7	15.6	7	32.9	33.5	33.8	1
CaCO3 Equivalent	mg/kg	0.7	-	-	1.40	1.36	0.84	26	1.21	1.23	0.97	13	1.48	1.61	1.28	11
Total Carbon (by combustion)	mg/kg	0.1	-	-	33.6	33.5	32.3	2	17.5	17.8	15.6	7	33.0	33.6	33.8	1
Total Kjeldahl Nitrogen	mg/kg	0.02	-	-	2.89	2.89	2.82	1	1.50	1.63	1.40	8	2.40	3.01	2.55	12
Total Phosphorus	mg/kg	90	-	-	791	759	656	10	1610	1220	969	26	1260	1200	1300	4
Total Metals																
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.064	0.052	0.052	12	0.117	0.083	0.088	19	0.109	0.088	0.113	13
Silver (Ag)	mg/kg	1	0.5 ^g	-	<2.0	<1.0	<1.0	43	<1.0	<1.0	<1.0	0	<2.0	<1.0	<2.0	35
Arsenic (As)	mg/kg	0.2	5.9	17.0	7.43	5.70	5.96	15	18.70	12.80	10.70	29	11.00	13.10	11.80	9
Barium (Ba)	mg/kg	5	-	-	147	158	143	5	253	221	160	22	106	128	105	12
Beryllium (Be)	mg/kg	1	-	-	<2.0	<1.0	<1.0	43	1.2	1.2	<1.0	42	<2.0	<1.0	<2.0	35
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<1.0	<0.50	<0.50	43	<0.50	<0.50	<0.50	0	<1.0	<0.50	<1.0	35
Cobalt (Co)	mg/kg	1	-	-	4.7	5.5	5.8	11	8.6	9.9	9.7	7	2.7	2.7	2.5	4
Chromium (Cr)	mg/kg	0.5	37.3	90.0	9.2	10.5	10.9	9	22.1	24.0	24.9	6	6.60	6.98	6.20	6
Copper (Cu)	mg/kg	2	35.7	197.0	28.4	29.1	32.3	7	47.0	48.9	51.0	4	19.3	21.2	18.6	7
Molybdenum (Mo)	mg/kg	1	-	-	9.4	12.1	13.6	18	10.6	13.6	20.4	34	4.3	4.5	4.0	6
Nickel (Ni)	mg/kg	2	16.0 ^h	75.0 ⁱ	11.8	12.3	12.8	4	20.9	22.2	22.5	4	9.0	9.2	8.8	2
Lead (Pb)	mg/kg	5	35.0	91.3	<10	<5.0	<5.0	43	10.2	9.9	8.0	13	<10	6.1	<10	12
Antimony (Sb)	mg/kg	0.2	-	-	<0.40	0.35	0.37	30	0.62	0.49	0.37	20	<0.40	0.38	<0.40	44
Selenium (Se)	mg/kg	0.2	5.0 ^g	-	0.87	0.93	1.05	10	1.12	1.09	1.03	4	0.90	1.11	0.84	15
Tin (Sn)	mg/kg	5	-	-	<10	<5.0	<5.0	43	<5.0	<5.0	<5.0	0	<10	<5.0	<10	35
Thallium (Tl)	mg/kg	1	-	-	<2.0	<1.0	<1.0	43	<1.0	<1.0	<1.0	0	<2.0	<1.0	<2.0	35
Uranium (U)	mg/kg	2	-	-	<4.0	<2.0	<2.0	43	2.2	2.3	3.9	34	<4.0	<2.0	<4.0	35
Vanadium (V)	mg/kg	1	-	-	21.2	22.1	22.3	3	40.1	41.8	36.7	7	14.2	14.4	13.3	4
Zinc (Zn)	mg/kg	10	123	315	62	60	68	7	72	80	72	6	61	59	61	2
Particle Size																
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	5.0	5.0	7.0	20	3.0	2.0	2.0	25	2.0	3.0	3.0	22
% Silt (0.05 mm - 2 um)	%	1	-	-	69.0	66.0	60.0	7	73.0	57.0	63.0	13	37.0	27.0	36.0	17
% Clay (< 2 um)	%	1	-	-	26.0	29.0	33.0	12	24.0	40.0	35.0	25	61.0	70.0	61.0	8
Texture	-	-	-	-	Silt loam	Silty clay loam	Silty clay loam	-	Silt loam	Silt clay loam/ Silty clay	Silty clay loam	-	Clay	Clay	Clay	-

Table G1-1

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		Replicate 1	Redemption		CV ^e
			ISQG ^c	PEL ^d		Replicate 2	Replicate 3	
Organics & Nutrients								
Inorganic Carbon	mg/kg	0.1	-	-	<0.10	<0.10	<0.10	0
Total Organic Carbon	mg/kg	0.1	-	-	13.2	11.9	13.3	6
CaCO3 Equivalent	mg/kg	0.7	-	-	1.04	0.88	1.06	10
Total Carbon (by combustion)	mg/kg	0.1	-	-	13.2	11.9	13.3	6
Total Kjeldahl Nitrogen	mg/kg	0.02	-	-	1.47	1.32	1.56	8
Total Phosphorus	mg/kg	90	-	-	918	937	1090	10
Total Metals								
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.060	0.059	0.066	6
Silver (Ag)	mg/kg	1	0.5 ^g	-	<1.0	<1.0	<1.0	0
Arsenic (As)	mg/kg	0.2	5.9	17.0	17.90	13.00	19.90	21
Barium (Ba)	mg/kg	5	-	-	185	160	234	20
Beryllium (Be)	mg/kg	1	-	-	<1.0	<1.0	<1.0	0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50	<0.50	<0.50	0
Cobalt (Co)	mg/kg	1	-	-	11.7	12.4	10.5	8
Chromium (Cr)	mg/kg	0.5	37.3	90.0	30.0	30.9	26.6	8
Copper (Cu)	mg/kg	2	35.7	197.0	41.6	39.2	41.1	3
Molybdenum (Mo)	mg/kg	1	-	-	2.2	2.2	1.9	8
Nickel (Ni)	mg/kg	2	16.0 ^h	75.0 ⁱ	39.8	39.9	38.4	2
Lead (Pb)	mg/kg	5	35.0	91.3	11.7	10.7	11.1	5
Antimony (Sb)	mg/kg	0.2	-	-	0.43	0.38	0.38	7
Selenium (Se)	mg/kg	0.2	5.0 ^g	-	0.77	0.88	0.84	7
Tin (Sn)	mg/kg	5	-	-	<5.0	<5.0	<5.0	0
Thallium (Tl)	mg/kg	1	-	-	<1.0	<1.0	<1.0	0
Uranium (U)	mg/kg	2	-	-	2.3	2.4	2.1	7
Vanadium (V)	mg/kg	1	-	-	43.2	42.1	39.2	5
Zinc (Zn)	mg/kg	10	123	315	88	87	84	2
Particle Size								
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	<1.0	1.0	1.0	35
% Silt (0.05 mm - 2 um)	%	1	-	-	71.0	70.0	67.0	3
% Clay (< 2 um)	%	1	-	-	29.0	29.0	32.0	5.8
Texture	-	-	-	-	Silty clay loam	Silty clay loam	Silty clay loam	-



Table G2-1

**Blachford Lake (BL-02) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		BL-02
			ISQG ^c	PEL ^d	21-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	<0.10
Total Organic Carbon	mg/kg	0.1	-	-	2.50
CaCO ₃ Equivalent	mg/kg	0.7	-	-	<0.70
Total Carbon (by combustion)	mg/kg	0.1	-	-	2.5
Total Kjeldahl Nitrogen	mg/kg	0.02	-	-	0.196
Total Phosphorus	mg/kg	90	-	-	400
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	<0.050
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	4.42
Barium (Ba)	mg/kg	5	-	-	82.6
Beryllium (Be)	mg/kg	1	-	-	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50
Cobalt (Co)	mg/kg	1	-	-	6.8
Chromium (Cr)	mg/kg	0.5	37.3	90.0	22.9
Copper (Cu)	mg/kg	2	35.7	197.0	13.0
Molybdenum (Mo)	mg/kg	1	-	-	<1.0
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	15.6
Lead (Pb)	mg/kg	5	35.0	91.3	6.7
Antimony (Sb)	mg/kg	0.2	-	-	0.21
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	0.21
Tin (Sn)	mg/kg	5	-	-	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0
Uranium (U)	mg/kg	2	-	-	<2.0
Vanadium (V)	mg/kg	1	-	-	35.7
Zinc (Zn)	mg/kg	10	123	315	38
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	62.0
% Silt (0.05 mm - 2 um)	%	1	-	-	37.0
% Clay (< 2 um)	%	1	-	-	1.0
Texture	-	-	-	-	Sandy loam

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e BCWSQ guidelines^f BCWSQ Lowest Effects Level (LEL)^g BCWSQ Severe Effects Level (SEL)^h **Bolded** result implies ISQG exceedanceⁱ **Bolded & shaded** result implies PEL exceedance

Table G2-2

Elbow Lake (EL-01 & EL-02) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		EL-01			EL-02		
			ISQG ^c	PEL ^d	Replicate 1	Replicate 2 30-Sep-09	Replicate 3	Replicate 1	Replicate 2 29-Sep-09	Replicate 3
Organics & Nutrients										
Inorganic Carbon	mg/kg	0.1	-	-	0.44	0.36	0.34	0.29	0.33	0.31
Total Organic Carbon	mg/kg	0.1	-	-	6.33	16.90	13.30	26.2	21.5	25.9
CaCO ₃ Equivalent	mg/kg	0.7	-	-	4.09	3.53	3.24	2.98	3.24	3.1
Total Carbon (by combustion)	mg/kg	0.1	-	-	6.8	17.3	13.7	26.5	21.8	26.2
Total Kjeldahl Nitrogen	%	0.02	-	-	0.694	1.81	1.33	2.80	2.29	2.77
Total Phosphorus	mg/kg	90	-	-	1180	1290	1110	2070	1650	1860
Total Metals										
Mercury (Hg)	mg/kg	0.05	0.17	0.486	<0.050	<0.050	<0.050	0.056	0.057	0.051
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	15.60	3.20	3.77	4.37	6.81	4.74
Barium (Ba)	mg/kg	5	-	-	163	168	181	109	134	103
Beryllium (Be)	mg/kg	1	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cobalt (Co)	mg/kg	1	-	-	7.7	7.1	7.3	5.1	5.4	5.3
Chromium (Cr)	mg/kg	0.5	37.3	90.0	16.0	17.9	19.0	10.9	12.4	11.7
Copper (Cu)	mg/kg	2	35.7	197.0	12.9	24.6	25.7	29.1	24.0	28.3
Molybdenum (Mo)	mg/kg	1	-	-	2.6	2.8	2.2	4.6	1.5	5.1
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	13.5	16.9	17.5	13.4	13.7	13.6
Lead (Pb)	mg/kg	5	35.0	91.3	<5.0	5.4	5.6	<5.0	<5.0	<5.0
Antimony (Sb)	mg/kg	0.2	-	-	0.21	0.30	0.30	0.34	0.30	0.35
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	0.31	0.68	0.74	0.83	0.81	0.83
Tin (Sn)	mg/kg	5	-	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium (U)	mg/kg	2	-	-	<2.0	2.9	2.8	4.6	<2.0	5.0
Vanadium (V)	mg/kg	1	-	-	44.1	30.8	32.8	18.8	23.6	20.9
Zinc (Zn)	mg/kg	10	123	315	38	47	50	33	35	35
Particle Size										
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	55.0	5.0	16.0	3.0	15.0	5.0
% Silt (0.05 mm - 2 um)	%	1	-	-	35.0	79.0	69.0	76.0	66.0	74.0
% Clay (< 2 um)	%	1	-	-	9.0	16.0	15.0	21.0	19.0	21.0
Texture	-	-	-	-	Sandy loam	Silt loam	Silt loam	Silt loam	Silt loam	Silt loam

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e BCWSQ guidelines^f BCWSQ Lowest Effects Level (LEL)^g BCWSQ Severe Effects Level (SEL)^h **Bolded** result implies ISQG exceedanceⁱ **Bolded & shaded** result implies PEL exceedance

Table G2-3

**Fred Lake (FL-01) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		FL-01
			ISQG ^c	PEL ^d	5-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	0.15
Total Organic Carbon	mg/kg	0.1	-	-	30.6
CaCO ₃ Equivalent	mg/kg	0.7	-	-	2.25
Total Carbon (by combustion)	mg/kg	0.1	-	-	30.7
Total Kjeldahl Nitrogen	mg/kg	0.02	-	-	2.75
Total Phosphorus	mg/kg	90	-	-	920
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	<0.050
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	4.66
Barium (Ba)	mg/kg	5	-	-	163
Beryllium (Be)	mg/kg	1	-	-	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50
Cobalt (Co)	mg/kg	1	-	-	2.4
Chromium (Cr)	mg/kg	0.5	37.3	90.0	9.35
Copper (Cu)	mg/kg	2	35.7	197.0	12.8
Molybdenum (Mo)	mg/kg	1	-	-	9.6
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	9.1
Lead (Pb)	mg/kg	5	35.0	91.3	<5.0
Antimony (Sb)	mg/kg	0.2	-	-	0.21
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	0.56
Tin (Sn)	mg/kg	5	-	-	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0
Uranium (U)	mg/kg	2	-	-	4.9
Vanadium (V)	mg/kg	1	-	-	12.2
Zinc (Zn)	mg/kg	10	123	315	34
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	16.0
% Silt (0.05 mm - 2 um)	%	1	-	-	52.0
% Clay (< 2 um)	%	1	-	-	32.0
Texture	-	-	-	-	Silty clay loam

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e BCWSQ guidelines^f BCWSQ Lowest Effects Level (LEL)^g BCWSQ Severe Effects Level (SEL)^h **Bolded** result implies ISQG exceedanceⁱ **Bolded & shaded** result implies PEL exceedance

Table G2-4

**Cressy Lake (FL-02) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		FL-02
			ISQG ^c	PEL ^d	8-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	0.11
Total Organic Carbon	mg/kg	0.1	-	-	32.5
CaCO ₃ Equivalent	mg/kg	0.7	-	-	1.79
Total Carbon (by combustion)	mg/kg	0.1	-	-	32.6
Total Kjeldahl Nitrogen	%	0.02	-	-	2.99
Total Phosphorus	mg/kg	90	-	-	1210
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.111
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	33.90
Barium (Ba)	mg/kg	5	-	-	109
Beryllium (Be)	mg/kg	1	-	-	2.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50
Cobalt (Co)	mg/kg	1	-	-	4.2
Chromium (Cr)	mg/kg	0.5	37.3	90.0	13.0
Copper (Cu)	mg/kg	2	35.7	197.0	34.3
Molybdenum (Mo)	mg/kg	1	-	-	13.1
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	12.0
Lead (Pb)	mg/kg	5	35.0	91.3	7.2
Antimony (Sb)	mg/kg	0.2	-	-	0.47
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	1.70
Tin (Sn)	mg/kg	5	-	-	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0
Uranium (U)	mg/kg	2	-	-	23.6
Vanadium (V)	mg/kg	1	-	-	25.2
Zinc (Zn)	mg/kg	10	123	315	374
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	3.0
% Silt (0.05 mm - 2 um)	%	1	-	-	42.0
% Clay (< 2 um)	%	1	-	-	54.0
Texture	-	-	-	-	Silty clay

Notes:

^a D.L. = Detection Limit

^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines

^c ISQG = Interim Sediment Quality Guidelines

^d PEL = Probable Effects Level

^e BCWSQ guidelines

^f BCWSQ Lowest Effects Level (LEL)

^g BCWSQ Severe Effects Level (SEL)

^h **Bolded** result implies ISQG exceedance

ⁱ **Bolded & shaded** result implies PEL exceedance

Table G2-5

**Lake A (FL-03) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^{a,b}	CCME / BC SQG ^c		FL-03
			ISQG ^d	PEL ^e	20-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	<0.10
Total Organic Carbon	mg/kg	0.1	-	-	7.89
CaCO ₃ Equivalent	mg/kg	0.7	-	-	0.91
Total Carbon (by combustion)	mg/kg	0.1	-	-	7.9
Total Kjeldahl Nitrogen	%	0.02	-	-	0.62
Total Phosphorus	mg/kg	90	-	-	779
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.087
Silver (Ag)	mg/kg	2	0.5 ^f	-	<2.0
Arsenic (As)	mg/kg	0.4	5.9	17.0	5.38
Barium (Ba)	mg/kg	10	-	-	225
Beryllium (Be)	mg/kg	2	-	-	<2.0
Cadmium (Cd)	mg/kg	1	0.6	3.5	<1.0
Cobalt (Co)	mg/kg	2	-	-	10.1
Chromium (Cr)	mg/kg	1	37.3	90.0	33.4
Copper (Cu)	mg/kg	4	35.7	197.0	30.7
Molybdenum (Mo)	mg/kg	2	-	-	<2.0
Nickel (Ni)	mg/kg	4	16.0 ^g	75.0 ^h	22.5
Lead (Pb)	mg/kg	10	35.0	91.3	10
Antimony (Sb)	mg/kg	0.4	-	-	<0.40
Selenium (Se)	mg/kg	0.4	5.0 ^f	-	0.43
Tin (Sn)	mg/kg	10	-	-	<10
Thallium (Tl)	mg/kg	2	-	-	<2.0
Uranium (U)	mg/kg	4	-	-	<4.0
Vanadium (V)	mg/kg	2	-	-	43.2
Zinc (Zn)	mg/kg	20	123	315	83
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	1.0
% Silt (0.05 mm - 2 um)	%	1	-	-	73.0
% Clay (< 2 um)	%	1	-	-	26.0
Texture	-	-	-	-	Silt loam

Parameter	Units	D.L. ^{a,b}	CCME / BC SQG ^c		FL-03
			ISQG ^d	PEL ^e	20-Sep-09
Polycyclic Aromatic Hydrocarbons (PAHs)					Composite
% Moisture	%	0.1	-	-	81.1
Acenaphthene	µg/g	0.3	0.00671	0.0889	<0.30
Acenaphthylene	µg/g	0.3	0.00587	0.128	<0.30
Anthracene	µg/g	0.3	0.0469	0.245	<0.30
Benz(a)anthracene	µg/g	0.3	0.0317	0.385	<0.30
Benzo(a)pyrene	µg/g	0.3	0.0319	0.782	<0.30
Benzo(b&j)fluoranthene	µg/g	0.3	-	-	<0.30
Benzo(g,h,i)perylene	µg/g	0.3	0.17 ^g	3.2 ^h	<0.30
Benzo(k)fluoranthene	µg/g	0.3	0.24 ^g	13.4 ⁱ	<0.30
Chrysene	µg/g	0.3	0.0571	0.862	<0.30
Dibenz(a,h)anthracene	µg/g	0.3	0.00622	0.135	<0.30
Fluoranthene	µg/g	0.3	0.111	2.355	<0.30
Fluorene	µg/g	0.3	0.0212	0.144	<0.30
Indeno(1,2,3-c,d)pyrene	µg/g	0.3	0.2 ^g	3.2 ⁱ	<0.30
2-Methylnaphthalene	µg/g	0.3	0.0202	0.201	<0.30
Naphthalene	µg/g	0.3	0.0346	0.391	<0.30
Phenanthrene	µg/g	0.3	0.0419	0.515	<0.30
Pyrene	µg/g	0.3	0.053	0.875	<0.30
Surrogate: Nitrobenzene d5	%	1	-	-	47
Surrogate: 2-Fluorobiphenyl	%	1	-	-	57
Surrogate: p-Terphenyl d14	%	1	-	-	62

Notes:

^a D.L. = Detection Limit

^b Detection limit for silver (Ag) to zinc (Zn) adjusted due to insufficient sample

^c Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines

^d ISQG = Interim Sediment Quality Guidelines

^e PEL = Probable Effects Level

^f BCWSQ guidelines

^g BCWSQ Lowest Effects Level (LEL)

^h BCWSQ Severe Effects Level (SEL)

ⁱ BCWSQ SEL when sediment contains 1% organic carbon

^j **Bolded** result implies ISQG exceedance

^k **Bolded & shaded** result implies PEL exceedance

Table G2-6

**Great Slave Lake (GL-01) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		GL-01
			ISQG ^c	PEL ^d	30-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	0.11
Total Organic Carbon	mg/kg	0.1	-	-	2.24
CaCO ₃ Equivalent	mg/kg	0.7	-	-	1.43
Total Carbon (by combustion)	mg/kg	0.1	-	-	2.4
Total Kjeldahl Nitrogen	%	0.02	-	-	0.31
Total Phosphorus	mg/kg	90	-	-	553
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	<0.050
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	4.65
Barium (Ba)	mg/kg	5	-	-	135
Beryllium (Be)	mg/kg	1	-	-	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50
Cobalt (Co)	mg/kg	1	-	-	7.4
Chromium (Cr)	mg/kg	0.5	37.3	90.0	18.3
Copper (Cu)	mg/kg	2	35.7	197.0	26.9
Molybdenum (Mo)	mg/kg	1	-	-	<1.0
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	22.6
Lead (Pb)	mg/kg	5	35.0	91.3	6.1
Antimony (Sb)	mg/kg	0.2	-	-	0.53
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	1.34
Tin (Sn)	mg/kg	5	-	-	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0
Uranium (U)	mg/kg	2	-	-	3.3
Vanadium (V)	mg/kg	1	-	-	42.2
Zinc (Zn)	mg/kg	10	123	315	46
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	57.0
% Silt (0.05 mm - 2 um)	%	1	-	-	31.0
% Clay (< 2 um)	%	1	-	-	12.0
Texture	-	-	-	-	Sandy loam

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e BCWSQ guidelines^f BCWSQ Lowest Effects Level (LEL)^g BCWSQ Severe Effects Level (SEL)^h **Bolded** result implies ISQG exceedanceⁱ **Bolded & shaded** result implies PEL exceedance

Table G2-7

**Long Lake (LL-02) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		LL-02
			ISQG ^c	PEL ^d	11-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	0.2
Total Organic Carbon	mg/kg	0.1	-	-	19.9
CaCO ₃ Equivalent	mg/kg	0.7	-	-	2.11
Total Carbon (by combustion)	mg/kg	0.1	-	-	20
Total Kjeldahl Nitrogen	%	0.02	-	-	2
Total Phosphorus	mg/kg	90	-	-	1390
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.097
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	9.07
Barium (Ba)	mg/kg	5	-	-	171
Beryllium (Be)	mg/kg	1	-	-	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50
Cobalt (Co)	mg/kg	1	-	-	10.3
Chromium (Cr)	mg/kg	0.5	37.3	90.0	21.5
Copper (Cu)	mg/kg	2	35.7	197.0	53.1
Molybdenum (Mo)	mg/kg	1	-	-	44.8
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	25.8
Lead (Pb)	mg/kg	5	35.0	91.3	8.8
Antimony (Sb)	mg/kg	0.2	-	-	0.51
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	1.28
Tin (Sn)	mg/kg	5	-	-	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0
Uranium (U)	mg/kg	2	-	-	19.3
Vanadium (V)	mg/kg	1	-	-	35.7
Zinc (Zn)	mg/kg	10	123	315	69
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	7.0
% Silt (0.05 mm - 2 um)	%	1	-	-	53.0
% Clay (< 2 um)	%	1	-	-	40.0
Texture	-	-	-	-	Silty clay loam

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		LL-02
			ISQG ^c	PEL ^d	11-Sep-09
Polycyclic Aromatic Hydrocarbons (PAHs)			Composite		
% Moisture	%	0.1	-		95.1
Acenaphthene	µg/g	1	0.00671	0.0889	<1.0
Acenaphthylene	µg/g	1	0.00587	0.128	<1.0
Anthracene	µg/g	1	0.0469	0.245	<1.0
Benz(a)anthracene	µg/g	1	0.0317	0.385	<1.0
Benzo(a)pyrene	µg/g	1	0.0319	0.782	<1.0
Benzo(b&j)fluoranthene	µg/g	1	-	-	<1.0
Benzo(g,h,i)perylene	µg/g	1	0.17 ^f	3.2 ^g	<1.0
Benzo(k)fluoranthene	µg/g	1	0.24 ^f	13.4 ^h	<1.0
Chrysene	µg/g	1	0.0571	0.862	<1.0
Dibenz(a,h)anthracene	µg/g	1	0.00622	0.135	<1.0
Fluoranthene	µg/g	1	0.111	2.355	<1.0
Fluorene	µg/g	1	0.0212	0.144	<1.0
Indeno(1,2,3-c,d)pyrene	µg/g	1	0.2 ^f	3.2 ^h	<1.0
2-Methylnaphthalene	µg/g	1	0.0202	0.201	<1.0
Naphthalene	µg/g	1	0.0346	0.391	<1.0
Phenanthrene	µg/g	1	0.0419	0.515	<1.0
Pyrene	µg/g	1	0.053	0.875	<1.0
Surrogate: Nitrobenzene d5	%	1	-	-	50
Surrogate: 2-Fluorobiphenyl	%	1	-	-	58
Surrogate: p-Terphenyl d14	%	1	-	-	78

Notes:

^a D.L. = Detection Limit

^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines

^c ISQG = Interim Sediment Quality Guidelines

^d PEL = Probable Effects Level

^e BCWSQ guidelines

^f BCWSQ Lowest Effects Level (LEL)

^g BCWSQ Severe Effects Level (SEL)

^h BCWSQ SEL when sediment contains 1% organic carbon

ⁱ **Bolded** result implies ISQG exceedance

^j **Bolded & shaded** result implies PEL exceedance

Table G2-8

**North Tardiff Lake (NT-01) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^{a,b}	CCME / BC SQG ^c		NT-01
			ISQG ^d	PEL ^e	13-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	<0.10
Total Organic Carbon	mg/kg	0.1	-	-	38.4
CaCO ₃ Equivalent	mg/kg	0.7	-	-	0.99
Total Carbon (by combustion)	mg/kg	0.1	-	-	38.4
Total Kjeldahl Nitrogen	mg/kg	0.02	-	-	3.11
Total Phosphorus	mg/kg	90	-	-	755
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.057
Silver (Ag)	mg/kg	2	0.5 ^f	-	<2.0
Arsenic (As)	mg/kg	0.4	5.9	17.0	3.07
Barium (Ba)	mg/kg	10	-	-	114
Beryllium (Be)	mg/kg	2	-	-	<2.0
Cadmium (Cd)	mg/kg	1	0.6	3.5	<1.0
Cobalt (Co)	mg/kg	2	-	-	3.6
Chromium (Cr)	mg/kg	1	37.3	90.0	9.8
Copper (Cu)	mg/kg	4	35.7	197.0	16.2
Molybdenum (Mo)	mg/kg	2	-	-	2.1
Nickel (Ni)	mg/kg	4	16.0 ^g	75.0 ^h	11.0
Lead (Pb)	mg/kg	10	35.0	91.3	<10
Antimony (Sb)	mg/kg	0.4	-	-	<0.40
Selenium (Se)	mg/kg	0.4	5.0 ^f	-	0.99
Tin (Sn)	mg/kg	10	-	-	<10
Thallium (Tl)	mg/kg	2	-	-	<2.0
Uranium (U)	mg/kg	4	-	-	7.0
Vanadium (V)	mg/kg	2	-	-	15.3
Zinc (Zn)	mg/kg	20	123	315	88
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	7.0
% Silt (0.05 mm - 2 um)	%	1	-	-	49.0
% Clay (< 2 um)	%	1	-	-	44.0
Texture	-	-	-	-	Silty clay

Notes:

^a D.L. = Detection Limit

^b Detection limit for silver (Ag) to zinc (Zn) adjusted due to insufficient sample

^c Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines

^d ISQG = Interim Sediment Quality Guidelines

^e PEL = Probable Effects Level

^f BCWSQ guidelines

^g BCWSQ Lowest Effects Level (LEL)

^h BCWSQ Severe Effects Level (SEL)

ⁱ **Bolded** result implies ISQG exceedance

^j **Bolded & shaded** result implies PEL exceedance

Table G2-9

**South Tardiff Lake (ST-01) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		ST-01
			ISQG ^c	PEL ^d	13-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	<0.10
Total Organic Carbon	mg/kg	0.1	-	-	41.2
CaCO ₃ Equivalent	mg/kg	0.7	-	-	1.02
Total Carbon (by combustion)	mg/kg	0.1	-	-	41.2
Total Kjeldahl Nitrogen	mg/kg	0.02	-	-	3.41
Total Phosphorus	mg/kg	90	-	-	796
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.078
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	4.17
Barium (Ba)	mg/kg	5	-	-	104
Beryllium (Be)	mg/kg	1	-	-	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50
Cobalt (Co)	mg/kg	1	-	-	2.5
Chromium (Cr)	mg/kg	0.5	37.3	90.0	6.96
Copper (Cu)	mg/kg	2	35.7	197.0	14.2
Molybdenum (Mo)	mg/kg	1	-	-	2.9
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	9.7
Lead (Pb)	mg/kg	5	35.0	91.3	<5.0
Antimony (Sb)	mg/kg	0.2	-	-	0.25
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	1.12
Tin (Sn)	mg/kg	5	-	-	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0
Uranium (U)	mg/kg	2	-	-	21.9
Vanadium (V)	mg/kg	1	-	-	9.2
Zinc (Zn)	mg/kg	10	123	315	65
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	9.0
% Silt (0.05 mm - 2 um)	%	1	-	-	39.0
% Clay (< 2 um)	%	1	-	-	51.0
Texture	-	-	-	-	Silty clay / Clay

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e BCWSQ guidelines^f BCWSQ Lowest Effects Level (LEL)^g BCWSQ Severe Effects Level (SEL)^h **Bolded** result implies ISQG exceedanceⁱ **Bolded & shaded** result implies PEL exceedance

Table G2-10

Thorn Lake (TL-03) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		Replicate 1	TL-03	
			ISQG ^c	PEL ^d		Replicate 2 23-Sep-09	Replicate 3 ^e
Organics & Nutrients							
Inorganic Carbon	mg/kg	0.1	-	-	0.17	0.14	0.12
Total Organic Carbon	mg/kg	0.1	-	-	30.2	30.6	31.2
CaCO ₃ Equivalent	mg/kg	0.7	-	-	1.69	1.56	1.32
Total Carbon (by combustion)	mg/kg	0.1	-	-	30.4	30.8	31.3
Total Kjeldahl Nitrogen	%	0.02	-	-	2.58	2.71	2.73
Total Phosphorus	mg/kg	90	-	-	1160	937	1200
Total Metals							
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.071	0.078	0.081
Silver (Ag)	mg/kg	1	0.5 ^f	-	<1.0	<1.0	<2.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	9.91	8.93	9.13
Barium (Ba)	mg/kg	5	-	-	149	152	137
Beryllium (Be)	mg/kg	1	-	-	<1.0	<1.0	<2.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50	<0.50	<1.0
Cobalt (Co)	mg/kg	1	-	-	7.0	6.8	6.6
Chromium (Cr)	mg/kg	0.5	37.3	90.0	15.3	14.3	13.4
Copper (Cu)	mg/kg	2	35.7	197.0	33.0	34.8	31.6
Molybdenum (Mo)	mg/kg	1	-	-	10.5	9.7	11.8
Nickel (Ni)	mg/kg	2	16.0 ^g	75.0 ^h	17.3	16.1	16.6
Lead (Pb)	mg/kg	5	35.0	91.3	6.2	6.8	<10
Antimony (Sb)	mg/kg	0.2	-	-	0.55	0.70	0.63
Selenium (Se)	mg/kg	0.2	5.0 ^f	-	1.05	1.13	1.01
Tin (Sn)	mg/kg	5	-	-	<5.0	<5.0	<10
Thallium (Tl)	mg/kg	1	-	-	<1.0	<1.0	<2.0
Uranium (U)	mg/kg	2	-	-	3.8	3.9	<4.0
Vanadium (V)	mg/kg	1	-	-	28.5	28.1	26.5
Zinc (Zn)	mg/kg	10	123	315	63	67	65
Particle Size							
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	4.0	12.0	2.0
% Silt (0.05 mm - 2 um)	%	1	-	-	53.0	31.0	49.0
% Clay (< 2 um)	%	1	-	-	43.0	58.0	49.0
Texture	-	-	-	-	Silty clay	Clay	Silty clay

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e Detection limit for silver (Ag) to zinc (Zn) adjusted due to insufficient sample^f BCWSQ guidelines^g BCWSQ Lowest Effects Level (LEL)^h BCWSQ Severe Effects Level (SEL)ⁱ **Bolded** result implies ISQG exceedance^j **Bolded & shaded** result implies PEL exceedance

Table G2-11

**Ring Lake (TL-04) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^{a,b}	CCME / BC SQG ^c		TL-04
			ISQG ^d	PEL ^e	9-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	<0.10
Total Organic Carbon	mg/kg	0.1	-	-	33.4
CaCO ₃ Equivalent	mg/kg	0.7	-	-	1.11
Total Carbon (by combustion)	mg/kg	0.1	-	-	33.4
Total Kjeldahl Nitrogen	%	0.02	-	-	2.92
Total Phosphorus	mg/kg	90	-	-	950
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.054
Silver (Ag)	mg/kg	2	0.5 ^f	-	<2.0
Arsenic (As)	mg/kg	0.4	5.9	17.0	10.80
Barium (Ba)	mg/kg	10	-	-	87
Beryllium (Be)	mg/kg	2	-	-	<2.0
Cadmium (Cd)	mg/kg	1	0.6	3.5	<1.0
Cobalt (Co)	mg/kg	2	-	-	3.2
Chromium (Cr)	mg/kg	1	37.3	90.0	6.9
Copper (Cu)	mg/kg	4	35.7	197.0	25.7
Molybdenum (Mo)	mg/kg	2	-	-	14.3
Nickel (Ni)	mg/kg	4	16.0 ^g	75.0 ^h	10.1
Lead (Pb)	mg/kg	10	35.0	91.3	<10
Antimony (Sb)	mg/kg	0.4	-	-	0.68
Selenium (Se)	mg/kg	0.4	5.0 ^f	-	0.95
Tin (Sn)	mg/kg	10	-	-	<10
Thallium (Tl)	mg/kg	2	-	-	<2.0
Uranium (U)	mg/kg	4	-	-	<4.0
Vanadium (V)	mg/kg	2	-	-	14.6
Zinc (Zn)	mg/kg	20	123	315	91
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	1.0
% Silt (0.05 mm - 2 um)	%	1	-	-	37.0
% Clay (< 2 um)	%	1	-	-	62.0
Texture	-	-	-	-	Clay

Notes:^a D.L. = Detection Limit^b Detection limit for silver (Ag) to zinc (Zn) adjusted due to insufficient sample^c Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^d ISQG = Interim Sediment Quality Guidelines^e PEL = Probable Effects Level^f BCWSQ guidelines^g BCWSQ Lowest Effects Level (LEL)^h BCWSQ Severe Effects Level (SEL)ⁱ **Bolded** result implies ISQG exceedance^j **Bolded & shaded** result implies PEL exceedance

Table G2-12

**Megan Lake (TL-05) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		TL-05
			ISQG ^c	PEL ^d	14-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	4.03
Total Organic Carbon	mg/kg	0.1	-	-	24.7
CaCO ₃ Equivalent	mg/kg	0.7	-	-	33.9
Total Carbon (by combustion)	mg/kg	0.1	-	-	28.7
Total Kjeldahl Nitrogen	%	0.02	-	-	2.08
Total Phosphorus	mg/kg	90	-	-	819
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.061
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	13.80
Barium (Ba)	mg/kg	5	-	-	665
Beryllium (Be)	mg/kg	1	-	-	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50
Cobalt (Co)	mg/kg	1	-	-	2.7
Chromium (Cr)	mg/kg	0.5	37.3	90.0	6.50
Copper (Cu)	mg/kg	2	35.7	197.0	15.2
Molybdenum (Mo)	mg/kg	1	-	-	4.3
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	8.6
Lead (Pb)	mg/kg	5	35.0	91.3	6.1
Antimony (Sb)	mg/kg	0.2	-	-	0.44
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	0.82
Tin (Sn)	mg/kg	5	-	-	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0
Uranium (U)	mg/kg	2	-	-	<2.0
Vanadium (V)	mg/kg	1	-	-	11.9
Zinc (Zn)	mg/kg	10	123	315	32
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	11.0
% Silt (0.05 mm - 2 um)	%	1	-	-	62.0
% Clay (< 2 um)	%	1	-	-	27.0
Texture	-	-	-	-	Silt loam / Silty clay

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e BCWSQ guidelines^f BCWSQ Lowest Effects Level (LEL)^g BCWSQ Severe Effects Level (SEL)^h **Bolded** result implies ISQG exceedanceⁱ **Bolded & shaded** result implies PEL exceedance

Table G2-13

**Thor Lake (TL-06 & TL-07) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		TL-06	TL-07
			ISQG ^c	PEL ^d	5-Sep-09	5-Sep-09
Organics & Nutrients						
Inorganic Carbon	mg/kg	0.1	-	-	0.33	0.14
Total Organic Carbon	mg/kg	0.1	-	-	21.3	25.2
CaCO ₃ Equivalent	mg/kg	0.7	-	-	3.25	2.02
Total Carbon (by combustion)	mg/kg	0.1	-	-	21.6	25.3
Total Kjeldahl Nitrogen	%	0.02	-	-	2.36	2.92
Total Phosphorus	mg/kg	90	-	-	1610	1890
Total Metals						
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.053	<0.050
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	8.51	13.20
Barium (Ba)	mg/kg	5	-	-	126	123
Beryllium (Be)	mg/kg	1	-	-	<1.0	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50	<0.50
Cobalt (Co)	mg/kg	1	-	-	5.9	4.5
Chromium (Cr)	mg/kg	0.5	37.3	90.0	15.0	13.4
Copper (Cu)	mg/kg	2	35.7	197.0	21.7	16.8
Molybdenum (Mo)	mg/kg	1	-	-	5.0	2.4
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	12.9	10.5
Lead (Pb)	mg/kg	5	35.0	91.3	6.5	5.2
Antimony (Sb)	mg/kg	0.2	-	-	0.49	0.36
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	0.80	0.65
Tin (Sn)	mg/kg	5	-	-	<5.0	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0	<1.0
Uranium (U)	mg/kg	2	-	-	3.4	2.2
Vanadium (V)	mg/kg	1	-	-	25.5	19.1
Zinc (Zn)	mg/kg	10	123	315	45	60
Particle Size						
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	9	9
% Silt (0.05 mm - 2 um)	%	1	-	-	48	43
% Clay (< 2 um)	%	1	-	-	43	48
Texture	-	-	-	-	Silty clay	Silty clay

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e BCWSQ guidelines^f BCWSQ Lowest Effects Level (LEL)^g BCWSQ Severe Effects Level (SEL)^h **Bolded** result implies ISQG exceedanceⁱ **Bolded & shaded** result implies PEL exceedance

Table G2-14

**Wasp Lake (UN-04) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		Replicate 1 ^e	UN-04	
			ISQG ^c	PEL ^d		Replicate 2 23-Sep-09	Replicate 3
Organics & Nutrients							
Inorganic Carbon	mg/kg	0.1	-	-	0.13	0.12	<0.10
Total Organic Carbon	mg/kg	0.1	-	-	33.5	33.3	32.3
CaCO3 Equivalent	mg/kg	0.7	-	-	1.40	1.36	0.84
Total Carbon (by combustion)	mg/kg	0.1	-	-	33.6	33.5	32.3
Total Kjeldahl Nitrogen	%	0.02	-	-	2.89	2.89	2.82
Total Phosphorus	mg/kg	90	-	-	791	759	656
Total Metals							
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.064	0.052	0.052
Silver (Ag)	mg/kg	1	0.5 ^f	-	<2.0	<1.0	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	7.43	5.70	5.96
Barium (Ba)	mg/kg	5	-	-	147	158	143
Beryllium (Be)	mg/kg	1	-	-	<2.0	<1.0	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<1.0	<0.50	<0.50
Cobalt (Co)	mg/kg	1	-	-	4.7	5.5	5.8
Chromium (Cr)	mg/kg	0.5	37.3	90.0	9.2	10.5	10.9
Copper (Cu)	mg/kg	2	35.7	197.0	28.4	29.1	32.3
Molybdenum (Mo)	mg/kg	1	-	-	9.4	12.1	13.6
Nickel (Ni)	mg/kg	2	16.0 ^g	75.0 ^h	11.8	12.3	12.8
Lead (Pb)	mg/kg	5	35.0	91.3	<10	<5.0	<5.0
Antimony (Sb)	mg/kg	0.2	-	-	<0.40	0.35	0.37
Selenium (Se)	mg/kg	0.2	5.0 ^f	-	0.87	0.93	1.05
Tin (Sn)	mg/kg	5	-	-	<10	<5.0	<5.0
Thallium (Tl)	mg/kg	1	-	-	<2.0	<1.0	<1.0
Uranium (U)	mg/kg	2	-	-	<4.0	<2.0	<2.0
Vanadium (V)	mg/kg	1	-	-	21.2	22.1	22.3
Zinc (Zn)	mg/kg	10	123	315	62	60	68
Particle Size							
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	5.0	5.0	7.0
% Silt (0.05 mm - 2 um)	%	1	-	-	69.0	66.0	60.0
% Clay (< 2 um)	%	1	-	-	26.0	29.0	33.0
Texture	-	-	-	-	Silt loam	Silty clay loam	Silty clay loam

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e Detection limit for silver (Ag) to zinc (Zn) adjusted due to insufficient sample^f BCWSQ guidelines^g BCWSQ Lowest Effects Level (LEL)^h BCWSQ Severe Effects Level (SEL)ⁱ **Bolded** result implies ISQG exceedance^j **Bolded & shaded** result implies PEL exceedance

Table G2-15

**Pistol Lake (UN-05) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^{a,b}	CCME / BC SQG ^c		UN-05 18-Sep-09
			ISQG ^d	PEL ^e	
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	0.13
Total Organic Carbon	mg/kg	0.1	-	-	4.34
CaCO ₃ Equivalent	mg/kg	0.7	-	-	1.50
Total Carbon (by combustion)	mg/kg	0.1	-	-	4.5
Total Kjeldahl Nitrogen	%	0.02	-	-	0.286
Total Phosphorus	mg/kg	90	-	-	306
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	<0.050
Silver (Ag)	mg/kg	2	0.5 ^f	-	<2.0
Arsenic (As)	mg/kg	0.4	5.9	17.0	2.92
Barium (Ba)	mg/kg	10	-	-	266
Beryllium (Be)	mg/kg	2	-	-	<2.0
Cadmium (Cd)	mg/kg	1	0.6	3.5	<1.0
Cobalt (Co)	mg/kg	2	-	-	<2.0
Chromium (Cr)	mg/kg	1	37.3	90.0	2.5
Copper (Cu)	mg/kg	4	35.7	197.0	8.4
Molybdenum (Mo)	mg/kg	2	-	-	2.4
Nickel (Ni)	mg/kg	4	16.0 ^g	75.0 ^h	4.3
Lead (Pb)	mg/kg	10	35.0	91.3	<10
Antimony (Sb)	mg/kg	0.4	-	-	<0.40
Selenium (Se)	mg/kg	0.4	5.0 ^f	-	<0.40
Tin (Sn)	mg/kg	10	-	-	<10
Thallium (Tl)	mg/kg	2	-	-	<2.0
Uranium (U)	mg/kg	4	-	-	<4.0
Vanadium (V)	mg/kg	2	-	-	4.6
Zinc (Zn)	mg/kg	20	123	315	23
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	5.0
% Silt (0.05 mm - 2 um)	%	1	-	-	4.0
% Clay (< 2 um)	%	1	-	-	91.0
Texture	-	-	-	-	Clay

Notes:^a D.L. = Detection Limit^b Detection limit for silver (Ag) to zinc (Zn) adjusted due to insufficient sample^c Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^d ISQG = Interim Sediment Quality Guidelines^e PEL = Probable Effects Level^f BCWSQ guidelines^g BCWSQ Lowest Effects Level (LEL)^h BCWSQ Severe Effects Level (SEL)ⁱ **Bolded** result implies ISQG exceedance^j **Bolded & shaded** result implies PEL exceedance

Table G2-16

Porkchop Lake (UN-07) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		Replicate 1	UN-07	Replicate 3
			ISQG ^c	PEL ^d		Replicate 2 24-Sep-09	
Organics & Nutrients							
Inorganic Carbon	mg/kg	0.1	-	-	0.11	0.11	<0.10
Total Organic Carbon	mg/kg	0.1	-	-	17.4	17.7	15.6
CaCO ₃ Equivalent	mg/kg	0.7	-	-	1.21	1.23	0.97
Total Carbon (by combustion)	mg/kg	0.1	-	-	17.5	17.8	15.6
Total Kjeldahl Nitrogen	%	0.02	-	-	1.50	1.63	1.40
Total Phosphorus	mg/kg	90	-	-	1610	1220	969
Total Metals							
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.117	0.083	0.088
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0	<1.0	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	18.70	12.80	10.70
Barium (Ba)	mg/kg	5	-	-	253	221	160
Beryllium (Be)	mg/kg	1	-	-	1.2	1.2	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50	<0.50	<0.50
Cobalt (Co)	mg/kg	1	-	-	8.6	9.9	9.7
Chromium (Cr)	mg/kg	0.5	37.3	90.0	22.1	24.0	24.9
Copper (Cu)	mg/kg	2	35.7	197.0	47.0	48.9	51.0
Molybdenum (Mo)	mg/kg	1	-	-	10.6	13.6	20.4
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	20.9	22.2	22.5
Lead (Pb)	mg/kg	5	35.0	91.3	10.2	9.9	8.0
Antimony (Sb)	mg/kg	0.2	-	-	0.62	0.49	0.37
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	1.12	1.09	1.03
Tin (Sn)	mg/kg	5	-	-	<5.0	<5.0	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0	<1.0	<1.0
Uranium (U)	mg/kg	2	-	-	2.2	2.3	3.9
Vanadium (V)	mg/kg	1	-	-	40.1	41.8	36.7
Zinc (Zn)	mg/kg	10	123	315	72	80	72
Particle Size							
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	3.0	2.0	2.0
% Silt (0.05 mm - 2 um)	%	1	-	-	73.0	57.0	63.0
% Clay (< 2 um)	%	1	-	-	24.0	40.0	35.0
Texture	-	-	-	-	Silt loam	Silt clay loam/ Silty clay	Silty clay loam

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		Replicate 1	UN-07	Replicate 3
			ISQG ^c	PEL ^d		Replicate 2 24-Sep-09	
Polycyclic Aromatic Hydrocarbons (PAHs)							
% Moisture	%	0.1	-			94.4	
Acenaphthene	µg/g	0.8	0.00671	0.0889		<0.80	
Acenaphthylene	µg/g	0.8	0.00587	0.128		<0.80	
Anthracene	µg/g	0.8	0.0469	0.245		<0.80	
Benz(a)anthracene	µg/g	0.8	0.0317	0.385		<0.80	
Benzo(a)pyrene	µg/g	0.8	0.0319	0.782		<0.80	
Benzo(b&j)fluoranthene	µg/g	0.8	-	-		<0.80	
Benzo(g,h,i)perylene	µg/g	0.8	0.17 ^f	3.2 ^g		<0.80	
Benzo(k)fluoranthene	µg/g	0.8	0.24 ^f	13.4 ^h		<0.80	
Chrysene	µg/g	0.8	0.0571	0.862		<0.80	
Dibenz(a,h)anthracene	µg/g	0.8	0.00622	0.135		<0.80	
Fluoranthene	µg/g	0.8	0.111	2.355		<0.80	
Fluorene	µg/g	0.8	0.0212	0.144		<0.80	
Indeno(1,2,3-c,d)pyrene	µg/g	0.8	0.2 ^f	3.2 ^h		<0.80	
2-Methylnaphthalene	µg/g	0.8	0.0202	0.201		<0.80	
Naphthalene	µg/g	0.8	0.0346	0.391		<0.80	
Phenanthrene	µg/g	0.8	0.0419	0.515		<0.80	
Pyrene	µg/g	0.8	0.053	0.875		<0.80	
Surrogate: Nitrobenzene d5	%	1	-	-		58	
Surrogate: 2-Fluorobiphenyl	%	1	-	-		61	
Surrogate: p-Terphenyl d14	%	1	-	-		84	

Notes:

^a D.L. = Detection Limit

^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines

^c ISQG = Interim Sediment Quality Guidelines

^d PEL = Probable Effects Level

^e BCWSQ guidelines

^f BCWSQ Lowest Effects Level (LEL)

^g BCWSQ Severe Effects Level (SEL)

^h BCWSQ SEL when sediment contains 1% organic carbon

ⁱ **Bolded** result implies ISQG exceedance

^j **Bolded & shaded** result implies PEL exceedance

Table G2-17

**Kinnikinnick Lake (UN-08) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		UN-08
			ISQG ^c	PEL ^d	16-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	<0.10
Total Organic Carbon	mg/kg	0.1	-	-	23.4
CaCO ₃ Equivalent	mg/kg	0.7	-	-	0.89
Total Carbon (by combustion)	mg/kg	0.1	-	-	23.4
Total Kjeldahl Nitrogen	%	0.02	-	-	2.38
Total Phosphorus	mg/kg	90	-	-	1740
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.095
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	3.65
Barium (Ba)	mg/kg	5	-	-	127
Beryllium (Be)	mg/kg	1	-	-	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	0.58
Cobalt (Co)	mg/kg	1	-	-	5.9
Chromium (Cr)	mg/kg	0.5	37.3	90.0	15.3
Copper (Cu)	mg/kg	2	35.7	197.0	39.3
Molybdenum (Mo)	mg/kg	1	-	-	3.6
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	19.4
Lead (Pb)	mg/kg	5	35.0	91.3	9.0
Antimony (Sb)	mg/kg	0.2	-	-	0.52
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	1.62
Tin (Sn)	mg/kg	5	-	-	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0
Uranium (U)	mg/kg	2	-	-	3.7
Vanadium (V)	mg/kg	1	-	-	23.7
Zinc (Zn)	mg/kg	10	123	315	66
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	8.0
% Silt (0.05 mm - 2 um)	%	1	-	-	45.0
% Clay (< 2 um)	%	1	-	-	46.0
Texture	-	-	-	-	Silty clay

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e BCWSQ guidelines^f BCWSQ Lowest Effects Level (LEL)^g BCWSQ Severe Effects Level (SEL)^h **Bolded** result implies ISQG exceedanceⁱ **Bolded & shaded** result implies PEL exceedance

Table G2-18

**Dinosaur Lake (UN-09) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		UN-09
			ISQG ^c	PEL ^d	19-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	<0.10
Total Organic Carbon	mg/kg	0.1	-	-	29.5
CaCO ₃ Equivalent	mg/kg	0.7	-	-	1.28
Total Carbon (by combustion)	mg/kg	0.1	-	-	29.5
Total Kjeldahl Nitrogen	%	0.02	-	-	2.65
Total Phosphorus	mg/kg	90	-	-	1120
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.084
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	13.2
Barium (Ba)	mg/kg	5	-	-	83.4
Beryllium (Be)	mg/kg	1	-	-	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50
Cobalt (Co)	mg/kg	1	-	-	4.4
Chromium (Cr)	mg/kg	0.5	37.3	90.0	11.7
Copper (Cu)	mg/kg	2	35.7	197.0	19.5
Molybdenum (Mo)	mg/kg	1	-	-	3.7
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	13.2
Lead (Pb)	mg/kg	5	35.0	91.3	7.7
Antimony (Sb)	mg/kg	0.2	-	-	0.72
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	0.94
Tin (Sn)	mg/kg	5	-	-	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0
Uranium (U)	mg/kg	2	-	-	<2.0
Vanadium (V)	mg/kg	1	-	-	18.7
Zinc (Zn)	mg/kg	10	123	315	81
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	1.0
% Silt (0.05 mm - 2 um)	%	1	-	-	41.0
% Clay (< 2 um)	%	1	-	-	58.0
Texture	-	-	-	-	Silty clay

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e BCWSQ guidelines^f BCWSQ Lowest Effects Level (LEL)^g BCWSQ Severe Effects Level (SEL)^h **Bolded** result implies ISQG exceedanceⁱ **Bolded & shaded** result implies PEL exceedance

Table G2-19

**Murky Lake (UN-10) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		UN-10
			ISQG ^c	PEL ^d	17-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	0.20
Total Organic Carbon	mg/kg	0.1	-	-	35.8
CaCO ₃ Equivalent	mg/kg	0.7	-	-	2.43
Total Carbon (by combustion)	mg/kg	0.1	-	-	36
Total Kjeldahl Nitrogen	%	0.02	-	-	0.324
Total Phosphorus	mg/kg	90	-	-	650
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	<0.050
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	7.85
Barium (Ba)	mg/kg	5	-	-	246
Beryllium (Be)	mg/kg	1	-	-	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50
Cobalt (Co)	mg/kg	1	-	-	2.8
Chromium (Cr)	mg/kg	0.5	37.3	90.0	8.29
Copper (Cu)	mg/kg	2	35.7	197.0	10.8
Molybdenum (Mo)	mg/kg	1	-	-	3.9
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	7.5
Lead (Pb)	mg/kg	5	35.0	91.3	<5.0
Antimony (Sb)	mg/kg	0.2	-	-	<0.20
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	0.51
Tin (Sn)	mg/kg	5	-	-	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0
Uranium (U)	mg/kg	2	-	-	<2.0
Vanadium (V)	mg/kg	1	-	-	17.9
Zinc (Zn)	mg/kg	10	123	315	43
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	79.0
% Silt (0.05 mm - 2 um)	%	1	-	-	16.0
% Clay (< 2 um)	%	1	-	-	5.0
Texture	-	-	-	-	Loamy sand

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e BCWSQ guidelines^f BCWSQ Lowest Effects Level (LEL)^g BCWSQ Severe Effects Level (SEL)^h **Bolded** result implies ISQG exceedanceⁱ **Bolded & shaded** result implies PEL exceedance

Table G2-20

**Egg Lake (UN-11) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		Replicate 1 ^e	UN-11	
			ISQG ^c	PEL ^d		Replicate 2 22-Sep-09	Replicate 3 ^e
Organics & Nutrients							
Inorganic Carbon	mg/kg	0.1	-	-	0.12	0.13	<0.10
Total Organic Carbon	mg/kg	0.1	-	-	32.9	33.5	33.8
CaCO ₃ Equivalent	mg/kg	0.7	-	-	1.48	1.61	1.28
Total Carbon (by combustion)	mg/kg	0.1	-	-	33.0	33.6	33.8
Total Kjeldahl Nitrogen	%	0.02	-	-	2.40	3.01	2.55
Total Phosphorus	mg/kg	90	-	-	1260	1200	1300
Total Metals							
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.109	0.088	0.113
Silver (Ag)	mg/kg	1	0.5 ^f	-	<2.0	<1.0	<2.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	11.00	13.10	11.80
Barium (Ba)	mg/kg	5	-	-	106	128	105
Beryllium (Be)	mg/kg	1	-	-	<2.0	<1.0	<2.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<1.0	<0.50	<1.0
Cobalt (Co)	mg/kg	1	-	-	2.7	2.7	2.5
Chromium (Cr)	mg/kg	0.5	37.3	90.0	6.60	6.98	6.20
Copper (Cu)	mg/kg	2	35.7	197.0	19.3	21.2	18.6
Molybdenum (Mo)	mg/kg	1	-	-	4.3	4.5	4.0
Nickel (Ni)	mg/kg	2	16.0 ^g	75.0 ^h	9.0	9.2	8.8
Lead (Pb)	mg/kg	5	35.0	91.3	<10	6.1	<10
Antimony (Sb)	mg/kg	0.2	-	-	<0.40	0.38	<0.40
Selenium (Se)	mg/kg	0.2	5.0 ^f	-	0.90	1.11	0.84
Tin (Sn)	mg/kg	5	-	-	<10	<5.0	<10
Thallium (Tl)	mg/kg	1	-	-	<2.0	<1.0	<2.0
Uranium (U)	mg/kg	2	-	-	<4.0	<2.0	<4.0
Vanadium (V)	mg/kg	1	-	-	14.2	14.4	13.3
Zinc (Zn)	mg/kg	10	123	315	61	59	61
Particle Size							
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	2.0	3.0	3.0
% Silt (0.05 mm - 2 um)	%	1	-	-	37.0	27.0	36.0
% Clay (< 2 um)	%	1	-	-	61.0	70.0	61.0
Texture	-	-	-	-	Clay	Clay	Clay

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e Detection limit for silver (Ag) to zinc (Zn) adjusted due to insufficient sample^f BCWSQ guidelines^g BCWSQ Lowest Effects Level (LEL)^h BCWSQ Severe Effects Level (SEL)ⁱ **Bolded** result implies ISQG exceedance^j **Bolded & shaded** result implies PEL exceedance

Table G2-21

**Buck Lake (UN-12) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		UN-12 10-Sep-09
			ISQG ^c	PEL ^d	
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	0.12
Total Organic Carbon	mg/kg	0.1	-	-	36.3
CaCO ₃ Equivalent	mg/kg	0.7	-	-	1.37
Total Carbon (by combustion)	mg/kg	0.1	-	-	36.4
Total Kjeldahl Nitrogen	%	0.02	-	-	2.78
Total Phosphorus	mg/kg	90	-	-	673
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	<0.050
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	4.24
Barium (Ba)	mg/kg	5	-	-	213
Beryllium (Be)	mg/kg	1	-	-	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50
Cobalt (Co)	mg/kg	1	-	-	1.5
Chromium (Cr)	mg/kg	0.5	37.3	90.0	3.95
Copper (Cu)	mg/kg	2	35.7	197.0	9.6
Molybdenum (Mo)	mg/kg	1	-	-	1.8
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	5.2
Lead (Pb)	mg/kg	5	35.0	91.3	<5.0
Antimony (Sb)	mg/kg	0.2	-	-	<0.20
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	0.66
Tin (Sn)	mg/kg	5	-	-	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0
Uranium (U)	mg/kg	2	-	-	<2.0
Vanadium (V)	mg/kg	1	-	-	6
Zinc (Zn)	mg/kg	10	123	315	61
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	15.0
% Silt (0.05 mm - 2 um)	%	1	-	-	51.0
% Clay (< 2 um)	%	1	-	-	35.0
Texture	-	-	-	-	Silty clay loam

Notes:^a D.L. = Detection Limit^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^c ISQG = Interim Sediment Quality Guidelines^d PEL = Probable Effects Level^e BCWSQ guidelines^f BCWSQ Lowest Effects Level (LEL)^g BCWSQ Severe Effects Level (SEL)^h **Bolded** result implies ISQG exceedanceⁱ **Bolded & shaded** result implies PEL exceedance

Table G2-22

**Drizzle Lake (UN-13) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050**

Parameter	Units	D.L. ^{a,b}	CCME / BC SQG ^c		UN-13
			ISQG ^d	PEL ^e	19-Sep-09
Organics & Nutrients					
Inorganic Carbon	mg/kg	0.1	-	-	0.18
Total Organic Carbon	mg/kg	0.1	-	-	32.5
CaCO ₃ Equivalent	mg/kg	0.7	-	-	2.03
Total Carbon (by combustion)	mg/kg	0.1	-	-	32.7
Total Kjeldahl Nitrogen	%	0.02	-	-	2.75
Total Phosphorus	mg/kg	90	-	-	1030
Total Metals					
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.057
Silver (Ag)	mg/kg	2	0.5 ^f	-	<2.0
Arsenic (As)	mg/kg	0.4	5.9	17.0	8.85
Barium (Ba)	mg/kg	10	-	-	132
Beryllium (Be)	mg/kg	2	-	-	<2.0
Cadmium (Cd)	mg/kg	1	0.6	3.5	<1.0
Cobalt (Co)	mg/kg	2	-	-	3.4
Chromium (Cr)	mg/kg	1	37.3	90.0	9.3
Copper (Cu)	mg/kg	4	35.7	197.0	18.4
Molybdenum (Mo)	mg/kg	2	-	-	6.9
Nickel (Ni)	mg/kg	4	16.0 ^g	75.0 ^h	11.4
Lead (Pb)	mg/kg	10	35.0	91.3	<10
Antimony (Sb)	mg/kg	0.4	-	-	<0.40
Selenium (Se)	mg/kg	0.4	5.0 ^f	-	0.73
Tin (Sn)	mg/kg	10	-	-	<10
Thallium (Tl)	mg/kg	2	-	-	<2.0
Uranium (U)	mg/kg	4	-	-	<4.0
Vanadium (V)	mg/kg	2	-	-	16.0
Zinc (Zn)	mg/kg	20	123	315	48
Particle Size					
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	3.0
% Silt (0.05 mm - 2 um)	%	1	-	-	43.0
% Clay (< 2 um)	%	1	-	-	54.0
Texture	-	-	-	-	Silty clay

Notes:^a D.L. = Detection Limit^b Detection limit for silver (Ag) to zinc (Zn) adjusted due to insufficient sample^c Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines^d ISQG = Interim Sediment Quality Guidelines^e PEL = Probable Effects Level^f BCWSQ guidelines^g BCWSQ Lowest Effects Level (LEL)^h BCWSQ Severe Effects Level (SEL)ⁱ **Bolded** result implies ISQG exceedance^j **Bolded & shaded** result implies PEL exceedance

Table G2-23

Redemption Lake (UN-14) Baseline Sediment Chemistry
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		Replicate 1	UN-14	
			ISQG ^c	PEL ^d		Replicate 2	Replicate 3
Organics & Nutrients							
Inorganic Carbon	mg/kg	0.1	-	-	<0.10	<0.10	<0.10
Total Organic Carbon	mg/kg	0.1	-	-	13.2	11.9	13.3
CaCO ₃ Equivalent	mg/kg	0.7	-	-	1.04	0.88	1.06
Total Carbon (by combustion)	mg/kg	0.1	-	-	13.2	11.9	13.3
Total Kjeldahl Nitrogen	%	0.02	-	-	1.47	1.32	1.56
Total Phosphorus	mg/kg	90	-	-	918	937	1090
Total Metals							
Mercury (Hg)	mg/kg	0.05	0.17	0.486	0.060	0.059	0.066
Silver (Ag)	mg/kg	1	0.5 ^e	-	<1.0	<1.0	<1.0
Arsenic (As)	mg/kg	0.2	5.9	17.0	17.90	13.00	19.90
Barium (Ba)	mg/kg	5	-	-	185	160	234
Beryllium (Be)	mg/kg	1	-	-	<1.0	<1.0	<1.0
Cadmium (Cd)	mg/kg	0.5	0.6	3.5	<0.50	<0.50	<0.50
Cobalt (Co)	mg/kg	1	-	-	11.7	12.4	10.5
Chromium (Cr)	mg/kg	0.5	37.3	90.0	30.0	30.9	26.6
Copper (Cu)	mg/kg	2	35.7	197.0	41.6	39.2	41.1
Molybdenum (Mo)	mg/kg	1	-	-	2.2	2.2	1.9
Nickel (Ni)	mg/kg	2	16.0 ^f	75.0 ^g	39.8	39.9	38.4
Lead (Pb)	mg/kg	5	35.0	91.3	11.7	10.7	11.1
Antimony (Sb)	mg/kg	0.2	-	-	0.43	0.38	0.38
Selenium (Se)	mg/kg	0.2	5.0 ^e	-	0.77	0.88	0.84
Tin (Sn)	mg/kg	5	-	-	<5.0	<5.0	<5.0
Thallium (Tl)	mg/kg	1	-	-	<1.0	<1.0	<1.0
Uranium (U)	mg/kg	2	-	-	2.3	2.4	2.1
Vanadium (V)	mg/kg	1	-	-	43.2	42.1	39.2
Zinc (Zn)	mg/kg	10	123	315	88	87	84
Particle Size							
% Sand (2.0 mm - 0.05 mm)	%	1	-	-	<1.0	1.0	1.0
% Silt (0.05 mm - 2 um)	%	1	-	-	71.0	70.0	67.0
% Clay (< 2 um)	%	1	-	-	29.0	29.0	32.0
Texture	-	-	-	-	Silty clay loam	Silty clay loam	Silty clay loam

Parameter	Units	D.L. ^a	CCME / BC SQG ^b		Replicate 1	UN-14 Replicate 2 28-Sep-09	Replicate 3
			ISQG ^c	PEL ^d			
Polycyclic Aromatic Hydrocarbons (PAHs)			Composite Sample				
% Moisture	%	0.1	-			93.4	
Acenaphthene	µg/g	0.71	0.00671	0.0889		<0.71	
Acenaphthylene	µg/g	0.71	0.00587	0.128		<0.71	
Anthracene	µg/g	0.71	0.0469	0.245		<0.71	
Benz(a)anthracene	µg/g	0.71	0.0317	0.385		<0.71	
Benzo(a)pyrene	µg/g	0.71	0.0319	0.782		<0.71	
Benzo(b&j)fluoranthene	µg/g	0.71	-	-		<0.71	
Benzo(g,h,i)perylene	µg/g	0.71	0.17 ^f	3.2 ^g		<0.71	
Benzo(k)fluoranthene	µg/g	0.71	0.24 ^f	13.4 ^h		<0.71	
Chrysene	µg/g	0.71	0.0571	0.862		<0.71	
Dibenz(a,h)anthracene	µg/g	0.71	0.00622	0.135		<0.71	
Fluoranthene	µg/g	0.71	0.111	2.355		<0.71	
Fluorene	µg/g	0.71	0.0212	0.144		<0.71	
Indeno(1,2,3-c,d)pyrene	µg/g	0.71	0.2 ^f	3.2 ^h		<0.71	
2-Methylnaphthalene	µg/g	0.71	0.0202	0.201		<0.71	
Naphthalene	µg/g	0.71	0.0346	0.391		<0.71	
Phenanthrene	µg/g	0.71	0.0419	0.515		<0.71	
Pyrene	µg/g	0.71	0.053	0.875		<0.71	
Surrogate: Nitrobenzene d5	%	1	-	-		67	
Surrogate: 2-Fluorobiphenyl	%	1	-	-		78	
Surrogate: p-Terphenyl d14	%	1	-	-		109	

Notes:

^a D.L. = Detection Limit

^b Guidelines are derived from CCME guidelines, except for nickel, selenium and silver, based on the British Columbia Working Sediment Quality (BCWSQ) guidelines

^c ISQG = Interim Sediment Quality Guidelines

^d PEL = Probable Effects Level

^e BCWSQ guidelines

^f BCWSQ Lowest Effects Level (LEL)

^g BCWSQ Severe Effects Level (SEL)

^h BCWSQ SEL when sediment contains 1% organic carbon

ⁱ **Bolded** result implies ISQG exceedance

^j **Bolded & shaded** result implies PEL exceedance



APPENDIX H

Phytoplankton Data

Phyto Report Table

Table H1
Phytoplankton Taxonomy & Species Abundance
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Phytoplankton (cells/mL)	No. of Stations Taxa Identified	Sample Station																								
		Blachford 27-Jun-09 2:45 PM	Elbow North 28-Jun-09 9:30 AM	Elbow South 28-Jun-09 11:00 AM	Fred 24-Jun-09 9:00 AM	Cressy 24-Jun-09 4:30 PM	A 27-Jun-09 4:00 PM	Great Slave 28-Jun-09 12:30 PM	Replicate 1:30PM	Long 25-Jun-09 7:30 PM	North Tardiff 25-Jun-09 5:00 PM	South Tardiff 25-Jun-09 3:00 PM	Thorn 27-Jun-09 9:30 AM	Ring 24-Jun-09 2:30 PM	Megan 24-Jun-09 12:00 PM	Thor West 24-Jun-09 10:00 AM	Thor East 24-Jun-09 11:00 AM	Wasp 26-Jun-09 5:30 PM	Pistol 26-Jun-09 4:00 PM	Porkchop 26-Jun-09 7:00 PM	Kinnikinnick 26-Jun-09 1:30 PM	Dinosaur 27-Jun-09 1:15 PM	Murky 27-Jun-09 12:00 PM	Egg 27-Jun-09 10:30 AM		
Phylum: Bacillariophyceae (Diatoms)																										
Order: Centrales																										
<i>Cyclotella bodanica</i>	9	<1.4		16.8		2.8		<1.4									5.6	2.8			35.0		<17.8		<2.8	
<i>Cyclotella glomerata</i>	14		<2.8						2.8		<2.8	<1.4	142.8	<2.8	<2.8	5.6	71.2	<2.8	11.2	28.0			131.6	137.2	2.8	
<i>Cyclotella spp.</i>	18	4.2	28.0	39.2	4.2		<1.4	<1.4	<2.8			1.4	<2.8	109.2	42.0	19.6	53.4	8.4	33.6		5.6		284.8		2.8	
<i>Melosira sp.</i>	7	<1.4	<2.8	<2.8			<1.4		<2.8							<2.8										
<i>Rhizosolenia sp.</i>	0																									
<i>Stephanodiscus sp.</i>	4	<1.4	<2.8	<2.8			<1.4																			
<i>Achnanthes flexella</i>	6			<2.8	<1.4											<2.8	<2.8			<1.4					<2.8	
<i>Achnanthes lanceolata</i>	1								<1.4																	
<i>Achnanthes minutissima</i>	23	1.4	5.6	11.2	9.8	16.8	3.8	1.4	4.2	2.8	8.4	2.8	4.2	11.2	<2.8	11.2	22.4	17.8	25.2	8.4	<2.8	71.2	<2.8	8.4	<2.8	
<i>Achnanthes sp.</i>	7	1.4		<2.8						<2.8						<2.8	5.6			<1.4					<2.8	
<i>Amphileura pellucida</i>	6						<2.8	<1.9					<1.4			<2.8	<2.8					2.8				
<i>Amphiprora (= Entomoneis)</i>	2						<2.8						<2.8													
<i>Amphora ovalis</i>	13			<2.8	<1.4	<2.8	<1.9	<1.4	<2.8	<2.8					<2.8	<2.8	<17.8			<1.4	<2.8				<2.8	
<i>Amphora sp.</i>	5	<1.4	<2.8												<2.8	<2.8									<2.8	
<i>Asterionella formosa</i>	12	1.4	84.0	22.4	<1.4	61.6	1.9	<1.4	<1.4	2.8					<2.8	<2.8							<2.8			
<i>Caloneis sp.</i>	2		<2.8	<2.8																						
<i>Ceratoneis arcus</i>	3				<1.4		<1.9	<1.4																		
<i>Ceratoneis sp.</i>	9	<1.4			<1.4				<1.4				<2.8	<2.8		<2.8							<2.8		<2.8	
<i>Cocconeis sp.</i>	4	<1.4						<1.4	<1.4	<2.8				<2.8	<2.8								<2.8		<2.8	
<i>Cocconeis placentula</i>	5	<1.4						<1.4													<1.4	<2.8		<2.8		
<i>Cymatopleura solea</i>	2	<1.4																				2.8				
<i>Cymatopleura sp.</i>	14	<1.4	<2.8	<2.8	<1.4				<2.8		<2.8		<2.8	<2.8	<2.8	<2.8	<17.8			<1.4				<2.8	<2.8	
<i>Cymbella cf. minuta</i>	16				<1.4			<1.4	<1.4	<2.8	<2.8		<2.8	2.8	2.8	2.8	<17.8	<2.8	<1.4	2.8	<17.8		<2.8	<2.8	<2.8	
<i>Cymbella sp.</i>	21	2.8	<2.8	2.8		<2.8	<1.9	<1.4	<1.4	<2.8		<2.8	<1.4	<2.8	2.8	5.6	2.8	35.6	<2.8	<1.4	<2.8	<17.8	<2.8	<2.8	<2.8	
<i>Denticula sp.</i>	0																									
<i>Diatoma elongatum</i>	14	1.4		<2.8	5.6		<1.9	<1.4	1.4	<2.8		<2.8	<1.4			2.8	<2.8				2.8		<2.8	<2.8		
<i>Diatoma sp.</i>	15	<1.4	2.8	<2.8	1.4	<2.8			1.4	<2.8		2.8	<2.8	<2.8		<2.8	<2.8	<17.8		<1.4	<2.8		<2.8	<2.8		
<i>Diploneis sp.</i>	4	<1.4								<2.8											<1.4					
<i>Epihemia sorex</i>	2	<1.4																								
<i>Epihemia sp.</i>	3	<1.4																								
<i>Epihemia turgida</i>	4	<1.4	<2.8		<1.4											<2.8										
<i>Eunotia sp.</i>	12						<1.9		<1.4	<2.8	<2.8	<2.8		<2.8	<2.8	<2.8	<17.8						<17.8	<2.8	<2.8	
<i>Fragilaria crotonensis</i>	23	4.2	22.4	16.8	11.2	25.2	32.3	4.2	9.8	5.6	5.6	75.6	4.2	2.8	123.2	100.8	114.8	<17.8	<2.8	180.6	14.0	854.4	8.4	44.8		
<i>Fragilaria sp.</i>	23	7.0	14.0	8.4	4.2	<2.8	3.8	2.8	1.4	<2.8	<2.8	<2.8	<1.4	11.2	19.6	5.6	11.2	<17.8	<2.8	1.4	<2.8	<17.8	8.4	<2.8	<2.8	
<i>Frustulia sp.</i>	7	<1.4			<1.4										<2.8	<2.8							<17.8	<2.8		
<i>Frustulia sp. ?</i>	1					<2.8																				
<i>Gomphonema acuminatum</i>	8	<1.4		<2.8	<1.4	<2.8		<1.4									<2.8								<2.8	
<i>Gomphonema cf. acuminatum</i>	1						<1.9															<2.8			<2.8	
<i>Gomphonema constrictum</i>	3				1.4							<2.8													<2.8	
<i>Gomphonema olivaceum</i>	9				<1.4		<1.9	<1.4	<1.4			<1.4	<2.8				<17.8					<17.8	<2.8		<2.8	
<i>Gomphonema spp.</i>	22	<1.4	2.8	<2.8	<1.4	8.4	1.9	<1.4	<1.4	2.8	<2.8	<2.8	<1.4	5.6	<2.8	5.6	2.8	<17.8		<1.4	<2.8	<17.8	<2.8	<2.8	<2.8	
<i>Licmorpha sp. ?</i>	1																									
<i>Navicula sp.</i>	23	9.8	22.4	5.6	8.4	2.8	5.7	<1.4	2.8	<2.8	<2.8	<2.8	<1.4	16.8	25.2	11.2	16.8	35.6	11.2	5.6	<2.8	124.6	67.2	19.6		
<i>Nitzschia sp.</i>	22	1.4	<2.8		<1.4	5.6	3.8	<1.4	1.4	2.8	<2.8	2.8	<1.4	2.8	<2.8	2.8	5.6	17.8	<2.8	<1.4	<2.8	<17.8	2.8	<2.8		
<i>Pinnularia sp.</i>	13	<1.4		<2.8	<1.4	<2.8	<1.9	<1.4	<1.4	<2.8	<2.8	<2.8	<1.4		<2.8	<2.8				<1.4	<2.8		<2.8	<2.8		
<i>Pleurosigma / Gyrosigma</i>	21	1.4	<2.8	<2.8	1.4	<2.8	<1.9		<2.8	2.8	<2.8	<1.4	5.6	8.4	<2.8	5.6	71.2	<2.8	<1.4	<2.8	<17.8	<2.8	<2.8	2.8		
<i>Rhoicosphenia curvata</i>	1							<1.4																		
<i>Rhopalodia gibba</i>	8	<1.4	<2.8	<2.8	<1.4												<2.8				<1.4			<2.8	<2.8	
<i>Stauroneis sp.</i>	11	<1.4		<2.8	<1.4	<2.8							<2.8			<2.8	<2.8	<17.8		<1.4				<2.8		
<i>Surirella sp.</i>	4	<1.4	<2.8	<2.8										<2.8												
<i>Synedra acus</i>	9	4.2	92.4	75.6	<1.4					16.8						11.2	25.2				1.4	<2.8				
<i>Synedra ulna</i>	18	<1.4	28.0	16.8	<1.4	<2.8	<1.9	<1.4	<1.4	5.6		<2.8	<2.8	<1.4	<2.8	<2.8	<2.8	<17.8		<1.4	<2.8				<2.8	
<i>Synedra sp.</i>	16	<1.4			<1.4	<2.8	<1.9	<1.4	<1.4			<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<17.8		<1.4	<2.8		<2.8	2.8	<2.8	
<i>Tabellaria fenestrata</i>	16	4.2	<2.8	<2.8	<1.4	<2.8	<1.9	<1.4	16.8	58.8	<2.8	<2.8	<2.8	<2.8	<2.8	50.4	<17.8			8.4	16.8		<2.8	<2.8	<2.8	
<i>Tabellaria flocculosa</i>	5			<2.8						<2.8	<2.8	<2.8										<17.8		<2.8	<2.8	
UID*	23	12.6	2.8	11.2	2.8	<2.8	1.9	<1.4	1.4	<2.8	<2.8	2.8	<1.4	2.8	<2.8	2.8	14.0	17.8	<2.8	2.8	<2.8	17.8	11.2	2.8		

Phyto Report Table

Phytoplankton (cells/mL)	No. of Stations Taxa Identified	Sample Station																							
		Blachford 27-Jun-09 2:45 PM	Elbow North 28-Jun-09 9:30 AM	Elbow South 28-Jun-09 11:00 AM	Fred 24-Jun-09 9:00 AM	Cressy 24-Jun-09 4:30 PM	A 27-Jun-09 4:00 PM	Great Slave 28-Jun-09 12:30 PM	Replicate 1:30PM	Long 25-Jun-09 7:30 PM	North Tardiff 25-Jun-09 5:00 PM	South Tardiff 25-Jun-09 3:00 PM	Thorn 27-Jun-09 9:30 AM	Ring 24-Jun-09 2:30 PM	Megan 24-Jun-09 12:00 PM	Thor West 24-Jun-09 10:00 AM	Thor East 24-Jun-09 11:00 AM	Wasp 26-Jun-09 5:30 PM	Pistel 26-Jun-09 4:00 PM	Portchop 26-Jun-09 7:00 PM	Kinnikinnick 26-Jun-09 1:30 PM	Dinosaur 27-Jun-09 1:15 PM	Murky 27-Jun-09 12:00 PM	Egg 27-Jun-09 10:30 AM	
Phylum: Cryptophyta (Cryptophyte Algae)																									
Order: Cryptomonadales																									
<i>Chroomonas acuta</i>	22	1.4	19.8	14.0	119.0	134.4	76.0	190.4	229.6	36.4	103.6	16.8	124.6		5.6	39.2	92.4	<17.8	2.8	112.0	<2.8	17.8	5.6	25.2	
<i>Cryptomonas ovata / erosa</i>	21		2.8	5.6	5.6	11.2	<1.9	5.6	12.6	5.6	19.6	30.8	14.0		72.8	36.4	100.8	17.8	53.2	14.0	<2.8	35.6	5.6	30.8	
<i>Cryptomonas sp.</i>	22		<2.8	14.0	1.4	2.8	11.4	16.8	4.2	5.6	8.4	5.6	1.4	2.8	<2.8	8.4	14.0	35.6	19.6	1.4	2.8	17.8	5.6	8.4	
Phylum: Cyanophyta																									
Order: Chroococcales																									
<i>Agmenellum tenuissimum</i>	14		22.4	<2.8	<1.4		<1.9							604.8	<2.8	<2.8	<2.8	1922.4	963.2	<1.4		712.0	257.6	<2.8	
<i>Agmenellum sp.</i>	7													<2.8	<2.8		<2.8	<17.8	<2.8			<17.8	<2.8		
<i>Anacystis cf. aeruginosa</i>	5									392.0	<2.8								<17.8	<2.8			<17.8		
<i>Anacystis cf. elachista</i>	17		<2.8	<2.8	<1.4					<2.8	<2.8	<1.4	672.0	403.2	196.0	<2.8	2794.6	571.2	<1.4	<2.8	1139.2	994.0	924.0		
<i>Anacystis cf. limneticus</i>	16	<1.4	<2.8	11.2	11.2					<2.8	<2.8		123.2	33.6	78.4	11.2	284.8	106.4	11.2	<2.8	213.6	89.6	<2.8		
<i>Anacystis spp.</i>	17	<1.4	<2.8	<2.8	8.4					<2.8	<2.8	<1.4	<2.8	<2.8	<2.8	11.2	<17.8	<2.8		<2.8	427.2	<2.8	<2.8		
<i>Gomphosphaeria aponina</i>	4				<1.4								<2.8								<2.8		<2.8		
<i>Gomphosphaeria Naegelianum</i>	2																	<17.8					<2.8		
<i>Gomphosphaeria sp.</i>	6												<2.8				<2.8	<17.8				<17.8	11.2	<2.8	
<i>Gomphosphaeria sp. ?</i>	1			<2.8														<17.8				<17.8	11.2	<2.8	
Order: Nostocales																									
<i>Anabaena flos-aquae</i>	6									11.2	336.0		<2.8		<2.8	196.0								28.0	
<i>Anabaena sp. ?</i>	5	<1.4					<1.9			<2.8										<1.4				<2.8	
<i>Anabaena spp.</i>	12						<2.8				25.2	<1.4	<2.8			16.8	<2.8	<17.8	128.8		<2.8	<17.8	<2.8	<2.8	
<i>Aphanizomenon ? *</i>	1															<2.8									
<i>Aphanizomenon flos-aquae *</i>	4	42.0	1027.6	1332.8													<2.8								
<i>Nostoc sp. ?</i>	2						<2.8																		
Order: Oscillatoriales																									
<i>Arthrospira sp.</i>	1					<2.8																			
<i>Lyngbya Birgei</i>	1					126.0																			
<i>Lyngbya contorta</i>	3																					4966.2	98.0	<2.8	
<i>Lyngbya cf. limnetica</i>	14		2394.0	1626.8	22.4	<2.8	<1.4	16.8		<2.8	<2.8	<1.4			212.8	126.0					327.6	3542.2	448.0		
<i>Lyngbya limnetica</i>	8	226.8							938.0				142.8	<2.8			267.0	114.8	197.4					28.0	
<i>Lyngbya sp.</i>	9						21.0	<1.4	<2.8			<1.4	<2.8				<17.8					<17.8	84.0	<2.8	
<i>Lyngbya sp. ?</i>	2				<1.4							<2.8													
<i>Phormidium</i>	1										<2.8														
<i>Pseudanabaena ?</i>	4								476.0				<2.8		<2.8						420.0				
<i>Oscillatoria sp.</i>	14	<1.4			<1.4	<2.8	<1.9	<1.4	<1.4	<2.8	<2.8	<2.8	16.8		<2.8	<2.8	<17.8	<2.8	<2.8	<1.4	<2.8	<17.8	<2.8	36.4	
<i>Oscillatoria tenuis</i>	19		42.0	56.0	<1.4	<2.8		<1.4	<1.4	560.0	<2.8	<2.8	<2.8	<2.8	182.0	47.6		<2.8	<2.8	<1.4	<2.8	<17.8	<2.8	<2.8	
<i>Spirulina sp.</i>	5										<2.8	<2.8										<17.8	<2.8	<2.8	
Order: Euglenales																									
<i>Euglena spp.</i>	15	<1.4	<2.8	<2.8		<2.8	<1.9				<2.8	<2.8	<2.8			<2.8	<17.8	<2.8	<1.4	<2.8	<17.8			<2.8	
<i>Phacus sp. ?</i>	1											<2.8													
<i>Trachelomonas sp.</i>	16	<1.4	<2.8	<2.8	<1.4	<2.8	<1.9			2.8	2.8		<1.4		<2.8	<2.8	<17.8		<1.4	<2.8	<17.8	<2.8			
Phylum: Pyrrophyta (Dinoflagellates)																									
Order: Dinokontae																									
<i>Ceratium hirundinella</i>	16			<2.8	<1.4	<2.8	<1.9			<2.8			<1.4	<2.8	<2.8	<2.8	<2.8	<17.8		<1.4	<2.8	<17.8	<2.8	<2.8	
<i>Ceratium sp.</i>	3																				<17.8				<2.8
<i>Gymnodinium sp. ?</i>	21	<1.4	2.8	2.8	<1.4	<2.8	<1.9	<1.4	<1.4	<2.8	<2.8	<2.8	2.8	2.8	<2.8	<2.8	17.8	<2.8	1.4		<17.8	<2.8	<2.8		
<i>Peridinium cf. inconspicuum</i>	19	1.4	8.4	19.6	<1.4	<2.8	<1.9	<1.4	<1.4	<2.8	2.8		<2.8	16.8	2.8	5.6	<17.8	2.8	<1.4	2.8	17.8	<2.8	8.4		
<i>Peridinium / Glenodinium</i>	18	1.4	2.8	2.8	1.4	<2.8		<1.4	<1.4	<2.8	<2.8		<2.8	5.6	5.6	2.8	<17.8	2.8	5.6	<2.8	17.8	<2.8	<2.8		
UID	10						<1.9	<1.4	<1.4							2.8	2.8	<2.8	2.8	<2.8	<17.8	<2.8			
Unidentified (UID)																									
UID branched filamentous algae	2															<2.8					<1.4				
UID colonial algae	4		<2.8											<2.8										<2.8	<2.8
UID filamentous algae	13			<2.8	<1.4		<1.9			<2.8		<2.8			<2.8	<2.8	<17.8		<1.4	<2.8	<17.8	<2.8	<2.8	<2.8	
UID unicellular algae	1					<2.8																			
UID flagellates observed, but not counted	2								<1.4																
TOTAL (cells/mL)	-	511	4417	3730	379	1620	587	265	327	2300	890	923	467	2796	1739	1712	1680	7672	2838	925	1060	14578	2968	2010	

NOTES:
 * UID = unidentified due to lack of size and / or missing morphological characters.
 * No gonidia observed therefor id. tentative.



APPENDIX I

Zooplankton Data

Table I1

Zooplankton Taxonomy & Species Abundance
Avalon Rare Metals Thor Lake Property
Thor Lake, NT
Project # 123510050

Zooplankton	Stage	Sample Station																		
		Blachford 27-Jun-09 2:45 PM	Elbow North 28-Jun-09 9:30 AM	Elbow South 28-Jun-09 11:00 AM	A 27-Jun-09 4:00 PM	Great Slave 28-Jun-09 12:30 PM	Replicate 1:30 PM	North Tardiff 25-Jun-09 5:00 PM	South Tardiff 25-Jun-09 3:00 PM	Thorn 27-Jun-09 9:30 AM	Thor West 26-Jun-09 6:00 PM	Thor East 26-Jun-09 6:30 PM	Wasp 26-Jun-09 5:30 PM	Pistol 26-Jun-09 4:00 PM	Porkchop 26-Jun-09 7:00 PM	Kinnikinnick 26-Jun-09 1:30 PM	Dinosaur 27-Jun-09 1:15 PM	Murky 27-Jun-09 12:00 PM	Egg 27-Jun-09 10:30 AM	
Phylum: Rotifera																				
<i>Kellicottia longispina</i>		2400.0	7000.0	5800.0	2000.0	180.0	90.0	2300.0	14100.0	5400.0	9800.0	6200.0	1600.0	600.0	5900.0	700.0	4500.0	9500.0	8300.0	
<i>Keratella cochlearis</i>		6000.0	8500.0	8100.0	7600.0	180.0	200.0	110.0	2300.0		13000.0	20800.0	900.0	900.0	4800.0	5500.0	6900.0	500.0	9200.0	
<i>Keratella quadrata</i>		400.0	2600.0	350.0	40.0	7.0	3.0	5.0	10.0					20.0						
<i>Filinia</i>		40.0			30.0						100.0	3200.0			10.0					
<i>Conochilus</i>	colony			10.0					10.0	10.0	10.0		130.0	50.0			210.0			
<i>Lecane</i>											100.0			10.0						
<i>Asplanchna</i>		320.0	120.0	80.0	200.0				20.0		2600.0	10.0			150.0					
<i>Polyarthra</i>	colony	1400.0	1900.0	1400.0	120.0				600.0	1100.0	2100.0	4100.0	300.0		4400.0	1400.0			300.0	
<i>Testudinella</i>		10.0		5.0						100.0	70.0				10.0	10.0	10.0			
<i>Trichocera</i>														10.0				10.0		
UID ^a		2300.0			100.0				400.0	100.0	900.0	1700.0			5100.0					
Order: Cladocera																				
<i>Diaphanosoma birgei</i>																				
<i>Ceriodaphnia acanthina</i>				1.0				2.0												
<i>Ceriodaphnia sp.</i>																	2.0			
<i>Daphnia ambigua</i>					1.0										1.0					
<i>Daphnia longiremis</i>	F																		1.0	
<i>Daphnia middendorffiana</i>								5.0	5.0											
<i>Daphnia sp.</i>	juvenile	4.0	11.0	3.0	5.0	5.0		62.0	90.0	195.0	3.0	3.0	41.0	40.0	76.0	1.0	56.0	43.0	112.0	
<i>Daphnia pulicaria (schodleri)</i>	F									32.0			8.0	18.0	14.0		8.0	10.0	14.0	
<i>Bosmina longirostris</i>		70.0	80.0	240.0	11.0	4.0	2.0	20.0		40.0	1400.0	210.0	1.0	90.0	24.0			1.0	6.0	
Family: Chydoridae (benthic)																				
<i>Chydorus sphaericus</i>								6.0	10.0		80.0			1.0		1.0	1.0		1.0	
<i>Leptodora kindtii</i>		2.0							1.0											
<i>Holopedium gibberum</i>					4.0						16.0	11.0			2.0	1.0				
<i>Simocephalus vetulus</i>								1.0	12.0											
Subclass: Copepoda																				
UID Calanoida/Cyclopoida	nauplius	1900.0	4400.0	2700.0	290.0	1200.0	1200.0	250.0	1100.0	3900.0	4700.0	4000.0	8800.0	4800.0	5400.0	2300.0	1600.0	5100.0	1200.0	
Order: Calanoida																				
<i>Aglaodiaptomus leptopus</i>	M									1.0	1.0			2.0				1.0		
<i>Aglaodiaptomus leptopus</i>	F				1.0					4.0			1.0					3.0		
Family: Diaptomidae																				
<i>Epischura nevadensis</i>		11.0	7.0	59.0	1012.0	23.0	27.0	13.0	70.0	1260.0	540.0	180.0	420.0	448.0	176.0	230.0	391.0	1416.0	360.0	
<i>Heterocope septentrionalis</i>		6.0	41.0	187.0	5.0	3.0	3.0	2.0	7.0	881.0	271.0	1.0	2.0	22.0	78.0		6.0	6.0	1.0	
<i>Leptodiaptomus ashlandi</i>					1.0			33.0	19.0	1.0			4.0	20.0		9.0	7.0	7.0		
<i>Leptodiaptomus ashlandi</i>						50.0	42.0													
<i>Leptodiaptomus pribilofensis</i>		2.0	1.0					29.0	113.0	3.0		1.0	96.0	104.0	4.0		139.0	5.0	117.0	
<i>Leptodiaptomus sicilis</i>					7.0	6.0	19.0	1.0			2.0									
<i>Limnocalanus macrurus</i>					13.0	299.0	242.0	20.0												
Order: Cyclopoida																				
<i>Cyclops bicuspidatus thomasi</i>		82.0	119.0	22.0	22.0	7.0	4.0	1.0	5.0		370.0	380.0		3.0		3.0			6.0	
<i>Cyclops scutifer</i>		1.0			1.0		1.0	3.0	2.0	73.0	9.0	17.0	1.0	4.0	310.0	1.0	6.0	13.0	12.0	
<i>Eucyclops (benthic)</i>													1.0			2.0				
<i>Macrocyclops (benthic)</i>								1.0									2.0	1.0		
UID Cyclopoida	copepodid	310.0	1200.0	1000.0	120.0	700.0	380.0	70.0	1100.0	140.0	5700.0	3500.0	200.0	8.0	3200.0	130.0	420.0	120.0	430.0	
Order: Harpacticoida																				
UID Harpacticoida	nauplius																10.0			
Order: Amphipoda																				
Family: Gammaridae																				
<i>Gammarus lacustris</i>										8.0				1.0				1.0		
Family: Talitridae																				
<i>Hyalella azteca</i>								3.0												
Order: Diptera																				
Family: Chaoboridae																				
<i>Chaoborus sp.</i>	larvae							2.0	2.0				9.0	3.0		6.0	5.0	3.0		

NOTES:^a UID = unidentified



APPENDIX J

Fish Length, Weight, and Age Data

**Table J1 Fish Species, Weight, Length, Age and Sex Caught at Each Study Lake
Avalon Rare Metals
Thor Lake, NT
Project # 123510051**

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
A	2008	LC	275	320	-						
A	2008	LC	243	190	-						
A	2008	LC	305	460	-						
A	2008	LC	310	420	-						
A	2008	LC	312	435	-						
A	2008	LC	297	410	-						
A	2008	LWF	525	2100	-	LWF AL01	C/A	36.7	F		n
A	2008	LWF	436	1900	-	LWF AL02	9	37.9	F		n
A	2008	LWF	522	2210	-	LWF AL03	9	32.3	F		n
A	2008	LWF	402	1350	-	LWF AL04	6	13.8	F		n
A	2008	LWF	461	1390	-	LWF AL05	7	19.1	M		n
A	2008	LWF	519	1900	-	LWF AL06	10	26.5	F		n
A	2008	LWF	487	1480	-	LWF AL07	9	14.6	M		y
A	2008	LWF	448	1320	-	LWF AL08	7	15.7	M		n
A	2008	LWF	446	1220	-	LWF AL09	7	13.9	M		n
A	2008	LWF	485	1630	-	LWF AL10	8	15.8	U		n
A	2008	LWF	486	1700	-	LWF AL11	6	22.1	U		n
A	2008	LWF	495	1320	-	LWF AL12	6	12.8	U		n
A	2008	LWF	467	1370	-	-					
A	2008	LWF	263	245	-	-					
A	2008	LWF	474	1590	-	-					
A	2008	LWF	480	1410	-	-					
A	2008	LWF	474	1520	-	-					
A	2008	LWF	475	1685	-	-					
A	2008	LWF	484	1590	-	-					
A	2008	LWF	484	1580	-	-					
A	2008	LWF	512	1870	-	-					
A	2008	LWF	496	1590	-	-					
A	2008	LWF	490	1730	-	-					
A	2008	LWF	487	1620	-	-					
A	2008	LWF	500	980	-	-					
A	2008	LWF	474	1610	-	-					
A	2008	LWF	-	-	-	-					
A	2008	LWF	-	-	-	-					
A	2008	NP	437	630	-	NP AL01	3	8.6	F		n

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
A	2008	NP	437	560	-	NP AL02	5	9.5	F		n
A	2008	NP	320	200	-	NP AL03	4	2.6	M		n
A	2008	NP	421	480	-	NP AL04	4	8.4	F		n
A	2008	NP	342	290	-	NP AL05	4	5.7	F		n
A	2008	NP	283	130	-	NP AL06	2	2.7	M		n
A	2008	NP	337	250	-	NP AL07	3	3.8	F		n
A	2008	NP	438	560	-	NP AL08	5	12.7	F		n
A	2009	LC	296	410.4	n	ALLC01		7.67	F	29.33	n
A	2009	LC	303	468.5	y	ALLC02		3.96	M	13.55	y
A	2009	LC	283	342	n	ALLC03		5.76	F	27.3	n
A	2009	LC	252	213.3	n	ALLC04		2.45	M	3.81	n
A	2009	LC	281	354.8	n	ALLC05		3.94	M	10.45	n
A	2009	LC	237	144.2	n	ALLC06		0.84	M	1.86	n
A	2009	LC	230	161.8	n	ALLC07		1.7	M	9.52	n
A	2009	LC	224	134.6	n	ALLC08		1.59	M	8.01	n
A	2009	LC	221	138.7	n	ALLC09		0.78	M	3.61	y
A	2009	LC	149	35.5	n	ALLC10		0.25	F		n
A	2009	LC	116	17.1	n	ALLC11		0.25	M		n
A	2009	LC	147	33.6	n	ALLC11		0.13	F		n
A	2009	LC	125	21.6	n	ALLC13		0.18			n
A	2009	LC	117	17.5	n	ALLC14		0.12			n
A	2009	LC	112	15.2	n	ALLC15		0.12			n
A	2009	LC	120	18.2	n	ALLC16		0.13			n
A	2009	LC	121	19	n	ALLC17		0.13			n
A	2009	LC	116	18.5	n	ALLC18		0.14			n
A	2009	LC	120	19.3	n	ALLC19		0.14			n
A	2009	LC	114	16.7	n	ALLC20		0.08			n
A	2009	LC	119	18.6	n	ALLC21		0.16			n
A	2009	LC	116	15.9	n	ALLC22		0.11			n
A	2009	LC	-	-	n						
A	2009	LC	140	32.6	n						
A	2009	LC	268	293.8	n						
A	2009	LC	290	328	n						
A	2009	LWF	499	1771.6	n	ALLWF01		21.21	M	43.29	y
A	2009	LWF	480	1527.1	n	ALLWF02		18.1	F	26.87	y
A	2009	LWF	413	1298.4	n	ALLWF03		21.07	F	122.51	n
A	2009	LWF	413	1192.1	n	ALLWF04		16.37	F	100.61	n
A	2009	LWF	409	1067.7	n	ALLWF05		14.01	F	91.48	n
A	2009	NP	25	-	n						
A	2009	NP	200	-	n						
A	2009	NP	358	305.1	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
A	2009	NP	509	998	n						
A	2009	SSC	-	-	n						
A	2009	SSC	-	-	n						
A	2009	SSC	-	-	n						
A	2009	SSC	-	-	n						
A	2009	SSC	-	-	n						
A	2009	SSC	-	-	n						
A	2009	SSC	-	-	n						
A	2009	SSC	-	-	n						
A	2009	STB	25	-	n						
A	2009	STB	-	-	n						
Elbow	2008	LC	174	53	-						
Elbow	2008	LC	128	21	-						
Elbow	2008	LC	123	19	-						
Elbow	2008	LC	144	22	-						
Elbow	2008	LC	131	20.8	-						
Elbow	2008	LC	120	17.7	-						
Elbow	2008	LC	121	20.7	-						
Elbow	2008	LC	117	16	-						
Elbow	2008	LC	125	20.2	-						
Elbow	2008	LC	120	16.8	-						
Elbow	2008	LC	124	19.3	-						
Elbow	2008	LC	137	24.5	-						
Elbow	2008	LC	134	26	-						
Elbow	2008	LC	140	22.7	-						
Elbow	2008	LC	120	15.2	-						
Elbow	2008	LC	127	18.7	-						
Elbow	2008	LC	131	22.7	-						
Elbow	2008	LC	131	20.7	-						
Elbow	2008	LC	131	22.4	-						
Elbow	2008	LC	129	20.1	-						
Elbow	2008	LC	132	19	-						
Elbow	2008	LWF	409	860	-	LWF EL01	C/A	12.3	F		y
Elbow	2008	LWF	444	1000	-	LWF EL02	8	10.9	M		y
Elbow	2008	LWF	423	900	-	LWF EL03	6	15.2	M		y
Elbow	2008	LWF	430	1040	-	LWF EL04	7	18.1	F		y
Elbow	2008	LWF	422	1260	-	LWF EL05	9	32.6	F		y
Elbow	2008	LWF	434	1340	-	LWF EL06	8	26.6	F		y
Elbow	2008	LWF	352	570	-	LWF EL07	4	7.9	F		y
Elbow	2008	LWF	416	1240	-	LWF EL08	C/A	27.4	F		y
Elbow	2008	LWF	366	690	-	LWF EL09	5	11.6	F		y

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Elbow	2008	LWF	395	900	-	LWF EL10	8	10.1	F		y
Elbow	2008	LWF	272	240	-	LWF EL11	C/A	2.8	F		y
Elbow	2008	LWF	408	905	-	LWF EL12	6	11.6	F		y
Elbow	2008	LWF	424	1060	-						
Elbow	2008	LWF	445	1060	-						
Elbow	2008	LWF	447	1140	-						
Elbow	2008	LWF	385	1010	-						
Elbow	2008	LWF	394	920	-						
Elbow	2008	LWF	360	640	-						
Elbow	2008	LWF	408	870	-						
Elbow	2008	LWF	444	1080	-						
Elbow	2008	LWF	435	1080	-						
Elbow	2008	LWF	425	1060	-						
Elbow	2008	LWF	395	960	-						
Elbow	2008	LWF	434	950	-						
Elbow	2008	LWF	370	560	-						
Elbow	2008	LWF	405	860	-						
Elbow	2008	LWF	445	1090	-						
Elbow	2008	LWF	432	1100	-						
Elbow	2008	LWF	427	970	-						
Elbow	2008	LWF	427	960	-						
Elbow	2008	LWF	465	1100	-						
Elbow	2008	LWF	434	1300	-						
Elbow	2008	LWF	416	1080	-						
Elbow	2008	LWF	392	820	-						
Elbow	2008	LWF	418	1020	-						
Elbow	2008	LWF	-	-	-						
Elbow	2008	LWF	-	-	-						
Elbow	2008	LWF	440	1330	-						
Elbow	2008	LWF	410	880	-						
Elbow	2008	LWF	405	900	-						
Elbow	2008	LWF	425	1120	-						
Elbow	2008	LWF	438	1180	-						
Elbow	2008	LWF	414	965	-						
Elbow	2008	LWF	408	940	-						
Elbow	2008	LWF	440	1250	-						
Elbow	2008	LWF	416	990	-						
Elbow	2008	LWF	420	1020	-						
Elbow	2008	LWF	420	925	-						
Elbow	2008	LWF	418	950	-						
Elbow	2008	LWF	414	850	-						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Elbow	2008	LWF	424	1070	-						
Elbow	2008	LWF	409	1050	-						
Elbow	2008	LWF	400	810	-						
Elbow	2008	LWF	402	820	-						
Elbow	2008	LWF	407	1280	-						
Elbow	2008	LWF	393	880	-						
Elbow	2008	LWF	398	850	-						
Elbow	2008	LWF	465	1190	-						
Elbow	2008	LWF	439	1110	-						
Elbow	2008	LWF	412	950	-						
Elbow	2008	LWF	402	740	-						
Elbow	2008	LWF	420	1070	-						
Elbow	2008	LWF	460	1310	-						
Elbow	2008	LWF	440	1100	-						
Elbow	2008	LWF	398	910	-						
Elbow	2008	LWF	415	1080	-						
Elbow	2008	LWF	407	1140	-						
Elbow	2008	LWF	433	1060	-						
Elbow	2008	LWF	-	-	-						
Elbow	2008	LWF	-	-	-						
Elbow	2008	LWF	-	-	-						
Elbow	2008	NP	773	4410	-	NP EL01	7	152.4	F		n
Elbow	2008	NP	574	1200	-	NP EL02	7	22.6	F		n
Elbow	2008	NP	548	760	-	NP EL03	C/A	14.6	F		n
Elbow	2008	NP	568	1030	-	NP EL04	C/A	16.3	F		n
Elbow	2008	NP	480	760	-	NP EL05	5	16	M		n
Elbow	2008	NP	634	1680	-	NP EL06	7	29.1	F		n
Elbow	2008	NP	543	980	-	NP EL07	5	16.4	F		n
Elbow	2008	NP	538	1010	-	NP EL08	7	14.5	M		n
Elbow	2008	NP	565	1090	-	NP EL09	7	15.6	F		n
Elbow	2008	NP	410	440	-	NP EL10	5	9	F		n
Elbow	2008	NP	523	1050	-	NP EL11	6	16.2	M		n
Elbow	2008	NP	384	400	-						
Elbow	2008	NP	443	550	-						
Elbow	2008	NP	515	920	-						
Elbow	2008	NP	556	1120	-						
Elbow	2008	NP	408	460	-						
Elbow	2009	LC	122	18.7	n						
Elbow	2009	LC	127	19.9	n						
Elbow	2009	LC	128	18.6	n						
Elbow	2009	LC	132	25.4	y						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Elbow	2009	LC	203	103.5	n						
Elbow	2009	LC	-	-	n						
Elbow	2009	LWF	397	944.8	y	ELLWF01		7.91	M	13.05	y
Elbow	2009	LWF	441	1166	n	ELLWF02		14.26	M	27.1	y
Elbow	2009	LWF	434	1351.1	n	ELLWF03		20.58	F	214.24	y
Elbow	2009	LWF	460	1379.2	n	ELLWF04		15.27	M	31.84	y
Elbow	2009	LWF	429	1239.4	n	ELLWF05		14.94	M	35.76	y
Elbow	2009	LWF	454	1348.7	y	ELLWF06		17.18	M	27.62	y
Elbow	2009	LWF	433	1074.8	n	ELLWF07		13.17	M	13.9	y
Elbow	2009	LWF	470	1640.5	n	ELLWF08		21.19	F	348.4	y
Elbow	2009	LWF	427	1055.3	n	ELLWF09		7.47	M	15.19	y
Elbow	2009	LWF	420	1134.3	n	ELLWF10		13.38	M	10.89	y
Elbow	2009	LWF	400	796.5	n	ELLWF11		7.34	M	14.99	y
Elbow	2009	LWF	410	988.7	y	ELLWF12		8.83	M	19.9	y
Elbow	2009	LWF	219	113	y						
Elbow	2009	LWF	385	879.1	n						
Elbow	2009	LWF	388	808.9	y						
Elbow	2009	LWF	389	842.5	y						
Elbow	2009	LWF	390	733.6	n						
Elbow	2009	LWF	398	913.8	y						
Elbow	2009	LWF	404	1144.8	y						
Elbow	2009	LWF	407	979.2	y						
Elbow	2009	LWF	409	979	y						
Elbow	2009	LWF	409	1040.3	n						
Elbow	2009	LWF	410	960.5	n						
Elbow	2009	LWF	411	1204.1	n						
Elbow	2009	LWF	412	910.8	y						
Elbow	2009	LWF	413	1160.2	n						
Elbow	2009	LWF	414	1010.5	n						
Elbow	2009	LWF	415	1001.7	n						
Elbow	2009	LWF	415	1044.8	n						
Elbow	2009	LWF	416	1087.7	n						
Elbow	2009	LWF	416	958	y						
Elbow	2009	LWF	416	1019.5	y						
Elbow	2009	LWF	418	968.8	y						
Elbow	2009	LWF	420	1086.7	y						
Elbow	2009	LWF	420	1129.1	n						
Elbow	2009	LWF	421	1229.8	y						
Elbow	2009	LWF	421	1024.6	n						
Elbow	2009	LWF	422	1152.6	y						
Elbow	2009	LWF	422	926.9	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Elbow	2009	LWF	422	1233.1	n						
Elbow	2009	LWF	424	1118.6	n						
Elbow	2009	LWF	426	1175.6	n						
Elbow	2009	LWF	426	1139.8	n						
Elbow	2009	LWF	427	1142.3	y						
Elbow	2009	LWF	427	1010.4	n						
Elbow	2009	LWF	428	1115.7	n						
Elbow	2009	LWF	430	1133.7	n						
Elbow	2009	LWF	430	1084.5	y						
Elbow	2009	LWF	432	1155.9	y						
Elbow	2009	LWF	434	1139.4	y						
Elbow	2009	LWF	434	1203.2	y						
Elbow	2009	LWF	435	1092	n						
Elbow	2009	LWF	435	1371.6	y						
Elbow	2009	LWF	438	1155.1	n						
Elbow	2009	LWF	439	1224.3	n						
Elbow	2009	LWF	440	1322.5	y						
Elbow	2009	LWF	441	1171.9	n						
Elbow	2009	LWF	441	1019.2	y						
Elbow	2009	LWF	441	1282.6	y						
Elbow	2009	LWF	442	1222.5	y						
Elbow	2009	LWF	445	1250	n						
Elbow	2009	LWF	446	1304.9	n						
Elbow	2009	LWF	447	1011.7	n						
Elbow	2009	LWF	455	1312.3	n						
Elbow	2009	LWF	474	1201.6	n						
Elbow	2009	LWF	-	-	n						
Elbow	2009	LWF	-	-	n						
Elbow	2009	LWF	-	-	n						
Elbow	2009	LWF	-	-	n						
Elbow	2009	LWF	-	-	n						
Elbow	2009	LWF	-	-	n						
Elbow	2009	LWF	-	-	n						
Elbow	2009	NP	565	897.4	n	ELNP01	10	12.56	F	21.76	n
Elbow	2009	NP	397	439.1	y	ELNP02	4	5.67	M	4.06	n
Elbow	2009	NP	531	835.5	n	ELNP03	7	15.53	F	12.81	n
Elbow	2009	NP	510	876.9	y	ELNP04	5	14.73	F	18.62	n
Elbow	2009	NP	494	759.3	n	ELNP05	6	13.17	F	24.42	n
Elbow	2009	NP	542	911	y	ELNP06	8	13.26	F	22.62	n
Elbow	2009	NP	558	991.4	n	ELNP07	10	7.17	M	9.88	n
Elbow	2009	NP	469	652.1	n	ELNP08	4	6.44	M	8.42	n

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Elbow	2009	NP	450	573.8	n	ELNP09	6	9.78	F	13.3	n
Elbow	2009	NP	550	1010.6	n	ELNP10	8	8.95	M	14.37	n
Elbow	2009	NP	462	678.6	n	ELNP11	5	9	M	9.64	n
Elbow	2009	NP	570	913.9	n	ELNP12	9	14.25	F	24.47	n
Elbow	2009	NP	475	695.7	n						
Elbow	2009	NP	512	896.6	n						
Elbow	2009	NP	566	1143.8	n						
Elbow	2009	NP	571	954.9	n						
Elbow	2009	SSC	-	-	n						
Elbow	2009	SSC	-	-	n						
Elbow	2009	SSC	-	-	n						
Elbow	2009	SSC	-	-	n						
Elbow	2009	STB	-	-	n						
Elbow	2009	STB	-	-	n						
Fred	2008	LC	205	120	-						
Fred	2008	LWF	407	1300	-	LWF FL01	5	24	F		
Fred	2008	LWF	429	1320	-	LWF FL02	4	26.4	F		
Fred	2008	LWF	330	620	-	LWF FL03	3	14.7	M		
Fred	2008	LWF	270	300	-	LWF FL04	2	3.5	M		
Fred	2008	LWF	259	260	-	LWF FL05	2	4.3	M		
Fred	2008	LWF	405	1390	-	LWF FL06	3	35.5	F		
Fred	2008	LWF	146	40	-	LWF FL07	1	0.7	?		
Fred	2008	LWF	374	820	-	LWF FL08	3	7.6	M		
Fred	2008	LWF	251	250	-	LWF FL09	2	2.6	M		
Fred	2008	LWF	381	1020	-	LWF FL10	4	19.6	F		
Fred	2008	LWF	353	1060	-	LWF FL11	4	19.7	F		
Fred	2008	LWF	207	130	-	LWF FL12	2	1.8	F		
Fred	2008	LWF	362	680	-						
Fred	2008	LWF	361	780	-						
Fred	2008	LWF	420	1120	-						
Fred	2008	LWF	371	760	-						
Fred	2008	LWF	251	240	-						
Fred	2008	LWF	405	930	-						
Fred	2008	LWF	410	1020	-						
Fred	2008	LWF	148	40	-						
Fred	2008	LWF	135	20	-						
Fred	2008	LWF	253	210	-						
Fred	2008	LWF	255	210	-						
Fred	2008	LWF	238	190	-						
Fred	2008	LWF	255	230	-						
Fred	2008	LWF	253	255	-						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Fred	2008	LWF	304	700	-						
Fred	2008	LWF	350	700	-						
Fred	2008	LWF	355	755	-						
Fred	2008	LWF	404	1040	-						
Fred	2008	LWF	263	260	-						
Fred	2008	NP	305	205	-	NP FL01	3	5.2	F		
Fred	2008	NP	348	300	-	NP FL02	3	6.2	?		
Fred	2008	NP	367	350	-	NP FL03	3	7	M		
Fred	2008	NP	313	20	-	NP FL04	3	4.7	M		
Fred	2008	NP	220	80	-	NP FL05	1	1.3	F		
Fred	2008	NP	355	300	-	NP FL06	3	5.7	M		
Fred	2008	NP	320	240	-	NP FL07	2	3.9	F		
Fred	2009	LC	114	15.7	n						
Fred	2009	LC	190	107.1	n						
Fred	2009	LWF	316	429.2	n	FLLWF01		1.69	M	1.07	n
Fred	2009	LWF	231	184.6	n	FLLWF02		2.28	M		n
Fred	2009	LWF	446	1541	n	FLLWF03		27.55	F	221.9	n
Fred	2009	LWF	405	1176.7	n	FLLWF04		9.23	M	23.39	n
Fred	2009	LWF	387	886.4	n	FLLWF05		18.48	F	107.65	n
Fred	2009	LWF	335	550.1	n	FLLWF06		6.5	M	3.14	n
Fred	2009	LWF	331	644.1	n	FLLWF07		6.93	M	1.44	n
Fred	2009	LWF	230	153.5	n	FLLWF08		2.17	U		n
Fred	2009	LWF	246	205.2	n	FLLWF09		1.76	U		n
Fred	2009	LWF	229	159.5	n	FLLWF10		1.37	U		n
Fred	2009	LWF	244	192.4	n	FLLWF11		2.03	U		n
Fred	2009	LWF	244	196.2	n	FLLWF12		3.06	U		n
Fred	2009	LWF	233	165	n						
Fred	2009	LWF	233	186.1	n						
Fred	2009	LWF	238	182.5	n						
Fred	2009	LWF	387	927.6	n						
Fred	2009	LWF	391	955.8	n						
Fred	2009	LWF	395	1040.8	n						
Fred	2009	NP	442	511.4	n	FLNP01	4	10.3	M	6.55	n
Fred	2009	NP	434	615.1	n	FLNP02	4	9.85	F		n
Fred	2009	NP	354	355.2	n	FLNP03	3	6.38	M	4.6	n
Fred	2009	NP	324	220.7	n	FLNP04	3	5.06	F	3.19	n
Fred	2009	NP	290	180.4	n	FLNP05	3	4.44	M	1.62	n
Fred	2009	NP	256	127.3	n	FLNP06	3	3.69	M	1.28	n
Fred	2009	NP	272	146.9	n	FLNP07	2	3.03	M	2.61	n
Fred	2009	NP	255	118.3	n	FLNP08	2	2.76	M	1.03	n
Great Slave	2008	AC	371	610	-						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Great Slave	2008	AC	401	670	-						
Great Slave	2008	AC	397	720	-						
Great Slave	2008	AC	406	800	-						
Great Slave	2008	AC	385	670	-						
Great Slave	2008	AC	399	660	-						
Great Slave	2008	AC	395	730	-						
Great Slave	2008	AC	341	410	-						
Great Slave	2008	AG	394	790	-	AG GSL01	5	6.3	M		n
Great Slave	2008	AG	458	1020	-	AG GSL02	6	8.2	M		y
Great Slave	2008	AG	413	1070	-	AG GSL03	5	19.6	F		n
Great Slave	2008	AG	421	1010	-	AG GSL04	6	14.7	F		n
Great Slave	2008	AG	400	870	-	AG GSL05	6	14.2	F		n
Great Slave	2008	AG	464	1160	-	AG GSL06	7	8.9	M		n
Great Slave	2008	BB	281	138.6	-						
Great Slave	2008	BB	161	22.1	-						
Great Slave	2008	LC	185	-	-						
Great Slave	2008	LC	253	122	-						
Great Slave	2008	LC	24	-	-						
Great Slave	2008	LC	194	73.5	-						
Great Slave	2008	LC	147	29.5	-						
Great Slave	2008	LC	215	94.5	-						
Great Slave	2008	LC	185	57.6	-						
Great Slave	2008	LC	255	162.5	-						
Great Slave	2008	LC	180	53	-						
Great Slave	2008	LC	183	61.1	-						
Great Slave	2008	LC	147	27.2	-						
Great Slave	2008	LC	170	49.7	-						
Great Slave	2008	LC	126	16.9	-						
Great Slave	2008	LC	167	44.9	-						
Great Slave	2008	LC	176	49.9	-						
Great Slave	2008	LC	183	58.7	-						
Great Slave	2008	LC	191	63.2	-						
Great Slave	2008	LC	204	66.4	-						
Great Slave	2008	LC	180	49.1	-						
Great Slave	2008	LC	212	89.4	-						
Great Slave	2008	LC	177	60.4	-						
Great Slave	2008	LC	123	0	-						
Great Slave	2008	LC	152	30.8	-						
Great Slave	2008	LC	181	57.4	-						
Great Slave	2008	LC	212	91.7	-						
Great Slave	2008	LC	143	0	-						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Great Slave	2008	LC	200	72.4	-						
Great Slave	2008	LC	173	50.3	-						
Great Slave	2008	LC	149	25.5	-						
Great Slave	2008	LC	155	38	-						
Great Slave	2008	LC	247	139.7	-						
Great Slave	2008	LC	301	290	-						
Great Slave	2008	LC	210	93.7	-						
Great Slave	2008	LC	255	177.1	-						
Great Slave	2008	LC	248	165.6	-						
Great Slave	2008	LC	209	89	-						
Great Slave	2008	LC	215	95	-						
Great Slave	2008	LC	190	64.6	-						
Great Slave	2008	LC	216	100.8	-						
Great Slave	2008	LC	218	100.9	-						
Great Slave	2008	LC	191	59.6	-						
Great Slave	2008	LC	200	90.2	-						
Great Slave	2008	LC	247	154.9	-						
Great Slave	2008	LC	167	47.7	-						
Great Slave	2008	LC	185	58	-						
Great Slave	2008	LC	171	53.9	-						
Great Slave	2008	LC	202	67.5	-						
Great Slave	2008	LC	108	15.1	-						
Great Slave	2008	LC	-	-	-						
Great Slave	2008	LC	-	-	-						
Great Slave	2008	LC	-	-	-						
Great Slave	2008	LC	143	24.4	-						
Great Slave	2008	LC	132	22	-						
Great Slave	2008	LC	136	29.9	-						
Great Slave	2008	LC	150	31.8	-						
Great Slave	2008	LC	144	27.3	-						
Great Slave	2008	LC	140	21.6	-						
Great Slave	2008	LC	146	27.8	-						
Great Slave	2008	LC	188	63.4	-						
Great Slave	2008	LC	135	21.5	-						
Great Slave	2008	LC	133	19.5	-						
Great Slave	2008	LC	133	21.9	-						
Great Slave	2008	LC	145	29.3	-						
Great Slave	2008	LC	141	24.1	-						
Great Slave	2008	LC	143	24.4	-						
Great Slave	2008	LC	139	23.8	-						
Great Slave	2008	LC	147	29.5	-						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Great Slave	2008	LC	-	-	-						
Great Slave	2008	LNS	124	20.6	-						
Great Slave	2008	LNS	119	19.5	-						
Great Slave	2008	LNS	114	16.5	-						
Great Slave	2008	LT	711	4080	-						
Great Slave	2008	LT	687	3850	-						
Great Slave	2008	LT	-	-	-						
Great Slave	2008	LT	-	-	-						
Great Slave	2008	LT	-	-	-						
Great Slave	2008	LT	-	-	-						
Great Slave	2008	LT	703	4900	-						
Great Slave	2008	LT	612	2550	-						
Great Slave	2008	LT	620	2585	-						
Great Slave	2008	LWF	435	1210	-	LWF GSL01	9	16.8	F		y
Great Slave	2008	LWF	485	1380	-	LWF GSL02	12	20	F		n
Great Slave	2008	LWF	373	640	-	LWF GSL03	7	6.2	F		n
Great Slave	2008	LWF	481	1540	-	LWF GSL04	11	20	F		n
Great Slave	2008	LWF	395	920	-	LWF GSL05	12	9.5	M		n
Great Slave	2008	LWF	345	500	-	LWF GSL06	6	3.6	M		y
Great Slave	2008	LWF	465	1280	-	LWF GSL07	11	21.5	F		n
Great Slave	2008	LWF	364	580	-	LWF GSL08	10	4.7	F		n
Great Slave	2008	LWF	478	1480	-	LWF GSL09	13	18.4	F		y
Great Slave	2008	LWF	375	660	-	LWF GSL10		9.8	M		n
Great Slave	2008	LWF	435	1110	-	LWF GSL11	12	14.4	M		n
Great Slave	2008	LWF	491	1590	-	LWF GSL12	13	20.3	f		n
Great Slave	2008	LWF	356	550	-						
Great Slave	2008	LWF	391	740	-						
Great Slave	2008	LWF	402	890	-						
Great Slave	2008	LWF	403	805	-						
Great Slave	2008	LWF	360	560	-						
Great Slave	2008	RWF	440	945	-						
Great Slave	2008	RWF	343	530	-						
Great Slave	2008	RWF	412	910	-						
Great Slave	2008	RWF	435	1055	-						
Great Slave	2008	RWF	396	765	-						
Great Slave	2008	RWF	361	575	-						
Great Slave	2008	RWF	270	178.1	-						
Great Slave	2008	NP	793	4500	-						
Great Slave	2008	NP	729	3000	-						
Great Slave	2008	NP	746	3400	-						
Great Slave	2009	BB	370	309.2	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Great Slave	2009	LC	374	630.6	n	GSLLC01		9.56	F	65.6	
Great Slave	2009	LC	224	121.2	n	GSLLC02		1.61	F	9.48	
Great Slave	2009	LC	212	104.9	n	GSLLC03		1.94	F	12.75	
Great Slave	2009	LC	221	101.7	n	GSLLC04		0.75	F		
Great Slave	2009	LC	235	126	n	GSLLC05		1.62	F	9.03	
Great Slave	2009	LC	192	63.5	n	GSLLC06		0.5	F	2.24	
Great Slave	2009	LC	200	82.2	n	GSLLC07		0.76	M	1.86	
Great Slave	2009	LC	175	47.6	n	GSLLC08		0.56	F	1.18	
Great Slave	2009	LC	180	50.9	n	GSLLC09		0.49	F	0.4	
Great Slave	2009	LC	175	46.4	n	GSLLC10		0.39	F	0.31	
Great Slave	2009	LC	159	36.1	n	GSLLC11		0.27	F	0.25	
Great Slave	2009	LC	160	38.2	n	GSLLC12		0.3	F		
Great Slave	2009	LC	151	27.6	n	GSLLC13		0.21	F	0.23	
Great Slave	2009	LC	145	29.3	n	GSLLC14		0.19	F	0.3	
Great Slave	2009	LC	142	23.6	n	GSLLC15		0.16	M	0.38	
Great Slave	2009	LC	145	23.4	n	GSLLC16		0.17	F	0.26	
Great Slave	2009	LC	140	22.2	n	GSLLC17		0.15	U		
Great Slave	2009	LC	128	18.7	n	GSLLC18		0.09	U		
Great Slave	2009	LC	131	16.4	n	GSLLC19			U		
Great Slave	2009	LC	124	15.4	n	GSLLC20		0.1	U		
Great Slave	2009	LC	123	14.6	n						
Great Slave	2009	LC	124	17.5	n						
Great Slave	2009	LC	127	18.1	n						
Great Slave	2009	LC	128	24.9	n						
Great Slave	2009	LC	128	18.6	n						
Great Slave	2009	LC	129	25.3	n						
Great Slave	2009	LC	129	17.7	n						
Great Slave	2009	LC	130	21.8	n						
Great Slave	2009	LC	130	20.9	n						
Great Slave	2009	LC	130	17.7	n						
Great Slave	2009	LC	131	-	n						
Great Slave	2009	LC	131	19.3	n						
Great Slave	2009	LC	131	23.8	n						
Great Slave	2009	LC	132	20.9	n						
Great Slave	2009	LC	132	26	n						
Great Slave	2009	LC	132	29.5	n						
Great Slave	2009	LC	132	18.2	n						
Great Slave	2009	LC	132	21	n						
Great Slave	2009	LC	132	19.3	n						
Great Slave	2009	LC	133	25.8	n						
Great Slave	2009	LC	133	34	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Great Slave	2009	LC	133	21.3	n						
Great Slave	2009	LC	134	23.9	n						
Great Slave	2009	LC	134	23.4	n						
Great Slave	2009	LC	134	31.3	n						
Great Slave	2009	LC	134	23	n						
Great Slave	2009	LC	135	-	n						
Great Slave	2009	LC	135	25.5	n						
Great Slave	2009	LC	135	28.2	n						
Great Slave	2009	LC	135	28.8	n						
Great Slave	2009	LC	135	21.5	n						
Great Slave	2009	LC	135	20.2	n						
Great Slave	2009	LC	135	20.9	n						
Great Slave	2009	LC	136	24.5	n						
Great Slave	2009	LC	136	29.5	n						
Great Slave	2009	LC	136	27.8	n						
Great Slave	2009	LC	136	20.4	n						
Great Slave	2009	LC	136	20	n						
Great Slave	2009	LC	137	25.4	n						
Great Slave	2009	LC	137	20.2	n						
Great Slave	2009	LC	137	20.4	n						
Great Slave	2009	LC	138	-	n						
Great Slave	2009	LC	138	23.7	n						
Great Slave	2009	LC	138	28.1	n						
Great Slave	2009	LC	138	22.2	n						
Great Slave	2009	LC	139	32.1	n						
Great Slave	2009	LC	139	30.9	n						
Great Slave	2009	LC	139	20.4	n						
Great Slave	2009	LC	139	23.8	n						
Great Slave	2009	LC	139	22.2	n						
Great Slave	2009	LC	140	28.3	n						
Great Slave	2009	LC	140	32.8	n						
Great Slave	2009	LC	140	23	n						
Great Slave	2009	LC	140	23.3	n						
Great Slave	2009	LC	140	22	n						
Great Slave	2009	LC	140	27.3	n						
Great Slave	2009	LC	140	26	n						
Great Slave	2009	LC	140	21.3	n						
Great Slave	2009	LC	140	31.3	n						
Great Slave	2009	LC	140	21.4	n						
Great Slave	2009	LC	140	25.3	n						
Great Slave	2009	LC	140	18.1	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Great Slave	2009	LC	141	30.1	n						
Great Slave	2009	LC	141	25.1	n						
Great Slave	2009	LC	141	28.1	n						
Great Slave	2009	LC	141	23.3	n						
Great Slave	2009	LC	142	25.2	n						
Great Slave	2009	LC	142	25.9	n						
Great Slave	2009	LC	142	29.5	n						
Great Slave	2009	LC	142	23.7	n						
Great Slave	2009	LC	142	28.7	n						
Great Slave	2009	LC	143	30.4	n						
Great Slave	2009	LC	143	25.3	n						
Great Slave	2009	LC	144	32.9	n						
Great Slave	2009	LC	144	30	n						
Great Slave	2009	LC	144	26.8	n						
Great Slave	2009	LC	144	19.2	n						
Great Slave	2009	LC	145	29.3	n						
Great Slave	2009	LC	145	24.8	n						
Great Slave	2009	LC	145	28.5	n						
Great Slave	2009	LC	145	30.5	n						
Great Slave	2009	LC	145	23.9	n						
Great Slave	2009	LC	145	24.5	n						
Great Slave	2009	LC	145	22.4	n						
Great Slave	2009	LC	145	23	n						
Great Slave	2009	LC	146	36.3	n						
Great Slave	2009	LC	147	-	n						
Great Slave	2009	LC	147	-	n						
Great Slave	2009	LC	147	31.7	n						
Great Slave	2009	LC	147	37.8	n						
Great Slave	2009	LC	147	35.7	n						
Great Slave	2009	LC	147	38.1	n						
Great Slave	2009	LC	147	35.5	n						
Great Slave	2009	LC	147	40.5	n						
Great Slave	2009	LC	147	34.4	n						
Great Slave	2009	LC	147	24.1	n						
Great Slave	2009	LC	148	29.9	n						
Great Slave	2009	LC	148	38.2	n						
Great Slave	2009	LC	148	30.8	n						
Great Slave	2009	LC	148	33.6	n						
Great Slave	2009	LC	148	31.6	n						
Great Slave	2009	LC	148	33.4	n						
Great Slave	2009	LC	148	29.6	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Great Slave	2009	LC	148	29.6	n						
Great Slave	2009	LC	148	27	n						
Great Slave	2009	LC	148	22.4	n						
Great Slave	2009	LC	148	22.6	n						
Great Slave	2009	LC	149	30.6	n						
Great Slave	2009	LC	149	38.6	n						
Great Slave	2009	LC	149	36.2	n						
Great Slave	2009	LC	149	36.9	n						
Great Slave	2009	LC	149	35.5	n						
Great Slave	2009	LC	149	28.4	n						
Great Slave	2009	LC	149	52.4	n						
Great Slave	2009	LC	150	25.8	n						
Great Slave	2009	LC	150	34.7	n						
Great Slave	2009	LC	150	36.8	n						
Great Slave	2009	LC	150	38.4	n						
Great Slave	2009	LC	150	39.3	n						
Great Slave	2009	LC	150	43.1	n						
Great Slave	2009	LC	150	29.7	n						
Great Slave	2009	LC	150	31.6	n						
Great Slave	2009	LC	150	22.8	n						
Great Slave	2009	LC	151	-	n						
Great Slave	2009	LC	151	31	n						
Great Slave	2009	LC	152	39.1	n						
Great Slave	2009	LC	152	42.8	n						
Great Slave	2009	LC	152	40.9	n						
Great Slave	2009	LC	152	-	n						
Great Slave	2009	LC	152	32	n						
Great Slave	2009	LC	152	34	n						
Great Slave	2009	LC	153	-	n						
Great Slave	2009	LC	153	30.6	n						
Great Slave	2009	LC	153	32.9	n						
Great Slave	2009	LC	153	34.5	n						
Great Slave	2009	LC	154	31.3	n						
Great Slave	2009	LC	154	42.9	n						
Great Slave	2009	LC	154	40.7	n						
Great Slave	2009	LC	154	33.2	n						
Great Slave	2009	LC	154	29.5	n						
Great Slave	2009	LC	154	30.3	n						
Great Slave	2009	LC	155	42.7	n						
Great Slave	2009	LC	155	37.8	n						
Great Slave	2009	LC	155	41.7	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Great Slave	2009	LC	155	45.2	n						
Great Slave	2009	LC	155	41.3	n						
Great Slave	2009	LC	155	32.5	n						
Great Slave	2009	LC	155	32.5	n						
Great Slave	2009	LC	156	33.5	n						
Great Slave	2009	LC	156	40.7	n						
Great Slave	2009	LC	156	40.5	n						
Great Slave	2009	LC	156	38.5	n						
Great Slave	2009	LC	157	33.5	n						
Great Slave	2009	LC	157	35.3	n						
Great Slave	2009	LC	157	33	n						
Great Slave	2009	LC	157	32.2	n						
Great Slave	2009	LC	158	44.8	n						
Great Slave	2009	LC	159	43.4	n						
Great Slave	2009	LC	159	36.7	n						
Great Slave	2009	LC	159	30.8	n						
Great Slave	2009	LC	160	36	n						
Great Slave	2009	LC	160	32.5	n						
Great Slave	2009	LC	160	38.3	n						
Great Slave	2009	LC	160	33.6	n						
Great Slave	2009	LC	160	31.1	n						
Great Slave	2009	LC	161	37.6	n						
Great Slave	2009	LC	162	43.4	n						
Great Slave	2009	LC	162	41.2	n						
Great Slave	2009	LC	162	36	n						
Great Slave	2009	LC	164	-	n						
Great Slave	2009	LC	164	42.7	n						
Great Slave	2009	LC	164	45	n						
Great Slave	2009	LC	165	16.9	n						
Great Slave	2009	LC	167	42.3	n						
Great Slave	2009	LC	168	40.8	n						
Great Slave	2009	LC	169	42.1	n						
Great Slave	2009	LC	169	39.2	n						
Great Slave	2009	LC	170	47	n						
Great Slave	2009	LC	170	54.4	n						
Great Slave	2009	LC	170	35.6	n						
Great Slave	2009	LC	171	51.2	n						
Great Slave	2009	LC	172	45.2	n						
Great Slave	2009	LC	174	58.2	n						
Great Slave	2009	LC	174	47.6	n						
Great Slave	2009	LC	175	55.2	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Great Slave	2009	LC	175	66.3	n						
Great Slave	2009	LC	178	59.9	n						
Great Slave	2009	LC	179	64.3	n						
Great Slave	2009	LC	179	53.7	n						
Great Slave	2009	LC	180	66.2	n						
Great Slave	2009	LC	181	56.5	n						
Great Slave	2009	LC	181	49.6	n						
Great Slave	2009	LC	182	63.9	n						
Great Slave	2009	LC	183	65.9	n						
Great Slave	2009	LC	183	59.3	n						
Great Slave	2009	LC	184	56	n						
Great Slave	2009	LC	184	60.4	n						
Great Slave	2009	LC	185	57.2	n						
Great Slave	2009	LC	185	63.1	n						
Great Slave	2009	LC	186	63.4	n						
Great Slave	2009	LC	187	65.3	n						
Great Slave	2009	LC	187	56.1	n						
Great Slave	2009	LC	188	62.6	n						
Great Slave	2009	LC	190	72.8	n						
Great Slave	2009	LC	190	63.6	n						
Great Slave	2009	LC	190	68	n						
Great Slave	2009	LC	190	57.4	n						
Great Slave	2009	LC	193	69.5	n						
Great Slave	2009	LC	193	-	n						
Great Slave	2009	LC	193	58.8	n						
Great Slave	2009	LC	194	-	n						
Great Slave	2009	LC	196	72.9	n						
Great Slave	2009	LC	197	89.5	n						
Great Slave	2009	LC	198	82.4	n						
Great Slave	2009	LC	198	74.4	n						
Great Slave	2009	LC	205	80.6	n						
Great Slave	2009	LC	206	81.3	n						
Great Slave	2009	LC	212	90.2	n						
Great Slave	2009	LC	235	143.5	n						
Great Slave	2009	LC	275	234.5	n						
Great Slave	2009	LC	277	232.7	n						
Great Slave	2009	LC	295	259.2	n						
Great Slave	2009	LC	305	-	n						
Great Slave	2009	LC	404	715.3	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	-	-	n						
Great Slave	2009	LC	380	648.1	n						
Great Slave	2009	LC	405	805.7	n						
Great Slave	2009	LNS	112	17.9	n						
Great Slave	2009	LT	206	78.7	n						
Great Slave	2009	LT	217	94.3	n						
Great Slave	2009	LT	340	386.6	n						
Great Slave	2009	LT	525	1540.1	n						
Great Slave	2009	LT	529	-	n						
Great Slave	2009	LT	540	-	n						
Great Slave	2009	LT	550	2053.1	n						
Great Slave	2009	LT	570	-	n						
Great Slave	2009	LT	592	-	n						
Great Slave	2009	LT	620	-	n						
Great Slave	2009	LT	639	2995.2	n						
Great Slave	2009	LT	650	-	n						
Great Slave	2009	LT	650	-	n						
Great Slave	2009	LT	650	-	n						
Great Slave	2009	LT	655	3130.8	n						
Great Slave	2009	LT	660	-	n						
Great Slave	2009	LT	680	-	n						
Great Slave	2009	LT	685	3350.6	n						
Great Slave	2009	LT	700	-	n						
Great Slave	2009	LT	717	-	n						
Great Slave	2009	LT	750	-	n						
Great Slave	2009	LT	750	-	n						
Great Slave	2009	LT	770	-	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Great Slave	2009	LT	975	~15909	n						
Great Slave	2009	LWF	420	965.7	n	GSLLWF01		17.15	F	20.66	
Great Slave	2009	LWF	417	781.1	n	GSLLWF02		6.57	F	4.8	
Great Slave	2009	LWF	495	1997.9	n	GSLLWF03		31.68	M	25.47	
Great Slave	2009	LWF	478	1520.7	n	GSLLWF04		20.93	F	18.27	
Great Slave	2009	LWF	362	602.9	n	GSLLWF05		6.61	F	3.53	
Great Slave	2009	LWF	446	1402.7	n	GSLLWF06		23.12	M	3.52	
Great Slave	2009	LWF	445	1155.3	n	GSLLWF07		14.11	F	12.81	
Great Slave	2009	LWF	390	772.7	n	GSLLWF08		7.74	F	7.65	
Great Slave	2009	LWF	396	865.1	n	GSLLWF09		11.6	F	6.45	
Great Slave	2009	LWF	394	592	n	GSLLWF10		3.53	M	0.4	
Great Slave	2009	LWF	370	709.8	n	GSLLWF11		8.06	M		
Great Slave	2009	LWF	542	2461	n	GSLLWF12		67.64	F	258.2	
Great Slave	2009	LWF	338	449.2	n						
Great Slave	2009	LWF	370	604.2	n						
Great Slave	2009	LWF	371	610.6	n						
Great Slave	2009	LWF	372	641.9	n						
Great Slave	2009	LWF	375	663.8	n						
Great Slave	2009	LWF	375	789.6	n						
Great Slave	2009	LWF	382	752.7	n						
Great Slave	2009	LWF	385	707.8	n						
Great Slave	2009	LWF	398	876.8	n						
Great Slave	2009	LWF	402	859.6	n						
Great Slave	2009	LWF	406	744.2	n						
Great Slave	2009	LWF	413	892	n						
Great Slave	2009	LWF	420	1018.3	n						
Great Slave	2009	LWF	430	1084.1	n						
Great Slave	2009	LWF	435	1132.1	n						
Great Slave	2009	RWF	219	88.3	n						
Great Slave	2009	RWF	266	-	n						
Great Slave	2009	RWF	295	275.3	n						
Great Slave	2009	RWF	351	525.3	n						
Great Slave	2009	RWF	355	534.8	n						
Great Slave	2009	RWF	360	-	n						
Great Slave	2009	RWF	363	570.4	n						
Great Slave	2009	RWF	380	599.3	n						
Great Slave	2009	RWF	420	881	n						
Great Slave	2009	RWF	424	839.2	n						
Kinnikinnick	2009	LC	133	25.6	n						
Kinnikinnick	2009	LC	168	55.1	n						
Kinnikinnick	2009	LC	206	101.1	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Kinnikinnick	2009	LC	241	183.9	n						
Kinnikinnick	2009	NP	335	1083.2 X	n	KLNP01	3	4.4	M		n
Kinnikinnick	2009	NP	694	2749 X	n	KLNP02	9	29.44	F	23.08	n
Kinnikinnick	2009	NP	353	1103.9 X	n	KLNP03	4	5.24	M		n
Kinnikinnick	2009	NP	501	1765.1 X	n	KLNP04	5	14.71	M		n
Kinnikinnick	2009	NP	306	972.2 X	n	KLNP05	2	3.28	U		n
Kinnikinnick	2009	NP	270	924.9 X	n	KLNP06	2	2.45	U		n
Kinnikinnick	2009	NP	270	916.1 X	n	KLNP07	2	2.21	U		n
Kinnikinnick	2009	NP	247	882.2 X	n	KLNP08	3	1.93	U		n
Kinnikinnick	2009	NP	259	903.7 X	n	KLNP09	2	1.86	U		n
Kinnikinnick	2009	NP	601	2504.8 X	n	KLNP10	10	33.31	F	51.69	n
Kinnikinnick	2009	NP	609	2090.9 X	n	KLNP11	9	26.17	F	27.35	n
Kinnikinnick	2009	NP	630	2644 X	n	KLNP12	8	41.34	F	46.49	n
Kinnikinnick	2009	NP	152	21.9	n						
Kinnikinnick	2009	NP	464	1547.3 X	n						
Kinnikinnick	2009	NP	488	1671 X	n						
Kinnikinnick	2009	NP	553	2139.5 X	n						
Kinnikinnick	2009	NP	618	2366.5 X	n						
Kinnikinnick	2009	NP	627	2655.2 X	n						
Kinnikinnick	2009	CH	28	-	n						
Kinnikinnick	2009	CH	28	-	n						
Kinnikinnick	2009	CH	100	-	n						
Kinnikinnick	2009	SSC	30	-	n						
Long	2008	LC	156	37.1	-						
Long	2008	LC	127	16	-						
Long	2008	LC	111	13.1	-						
Long	2008	LC	105	10.8	-						
Long	2008	LC	114	13.2	-						
Long	2008	LC	166	49.8	-						
Long	2008	LC	147	36.3	-						
Long	2008	LC	149	37.1	-						
Long	2008	LC	163	39.5	-						
Long	2008	LC	131	22	-						
Long	2008	LWF	240	150	-	LWF LL01	3	1.4	M		n
Long	2008	LWF	380	720	-	LWF LL02	4	6.7	M		n
Long	2008	LWF	425	950	-	LWF LL03	5	13.3	F		y
Long	2008	LWF	413	860	-	LWF LL04	5	11.6	M		y
Long	2008	LWF	363	630	-	LWF LL05	6	8.4	F		n
Long	2008	LWF	404	980	-	LWF LL06	7	16.4	F		n
Long	2008	LWF	290	360	-	LWF LL07	8	5	F		n
Long	2008	LWF	388	840	-	LWF LL08	6	16.5	F		n

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Long	2008	LWF	235	160	-	LWF LL09	4	2.2	F		n
Long	2008	LWF	402	580	-	LWF LL10	6	15.1	F		n
Long	2008	LWF	408	900	-	LWF LL11	7	13	F		n
Long	2008	LWF	368	680	-	LWF LL12	5	9.4	M		n
Long	2008	LWF	400	880	-						
Long	2008	LWF	390	760	-						
Long	2008	LWF	400	920	-						
Long	2008	LWF	390	900	-						
Long	2008	LWF	410	1120	-						
Long	2008	LWF	420	1100	-						
Long	2008	LWF	410	920	-						
Long	2008	LWF	410	920	-						
Long	2008	LWF	385	760	-						
Long	2008	LWF	405	920	-						
Long	2008	LWF	395	700	-						
Long	2008	LWF	400	800	-						
Long	2008	LWF	350	540	-						
Long	2008	LWF	420	1140	-						
Long	2008	LWF	405	845	-						
Long	2008	LWF	390	830	-						
Long	2008	LWF	380	600	-						
Long	2008	LWF	265	220	-						
Long	2008	LWF	245	150	-						
Long	2008	LWF	400	920	-						
Long	2008	LWF	410	980	-						
Long	2008	LWF	380	720	-						
Long	2008	LWF	400	980	-						
Long	2008	LWF	380	760	-						
Long	2008	LWF	11	13	-						
Long	2008	LWF	390	800	-						
Long	2008	LWF	389	750	-						
Long	2008	LWF	376	820	-						
Long	2008	LWF	400	800	-						
Long	2008	LWF	420	1040	-						
Long	2008	LWF	423	1040	-						
Long	2008	LWF	251	160	-						
Long	2008	LWF	394	800	-						
Long	2008	LWF	410	850	-						
Long	2008	LWF	390	830	-						
Long	2008	LWF	420	960	-						
Long	2008	LWF	394	900	-						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Long	2008	LWF	420	1000	-						
Long	2008	LWF	394	490	-						
Long	2008	LWF	385	590	-						
Long	2008	LWF	421	580	-						
Long	2008	LWF	305	490	-						
Long	2008	LWF	405	580	-						
Long	2008	LWF	395	800	-						
Long	2008	LWF	317	480	-						
Long	2008	LWF	303	400	-						
Long	2008	LWF	301	220	-						
Long	2008	LWF	332	640	-						
Long	2008	LWF	174	64.4	-						
Long	2008	LWF	183	76.1	-						
Long	2008	LWF	176	58.5	-						
Long	2008	LWF	152	37.5	-						
Long	2008	LWF	140	28.7	-						
Long	2008	LWF	170	53.5	-						
Long	2008	LWF	146	38.9	-						
Long	2008	LWF	166	51.7	-						
Long	2008	LWF	155	41.9	-						
Long	2008	LWF	155	41.1	-						
Long	2008	LWF	158	41.4	-						
Long	2008	LWF	166	46.4	-						
Long	2008	NP	444	620	-	NP LL01	4	10.5	M		n
Long	2008	NP	275	120	-	NP LL02	2	1.4	F		n
Long	2008	NP	555	1080	-	NP LL03	4	12.2	M		n
Long	2008	NP	455	640	-	NP LL04	6	18.5	F		n
Long	2008	NP	465	710	-	NP LL05	5	12.1	F		n
Long	2008	NP	507	1000	-	NP LL06	5	18.3	F		n
Long	2008	NP	378	360	-	NP LL07	3	5.8	F		n
Long	2008	NP	577	1545	-	NP LL08	6	22.3	M		n
Long	2008	NP	608	1500	-	NP LL09	7		F		n
Long	2008	NP	537	825	-	NP LL10	4	13.8	F		n
Long	2008	NP	406	450	-	NP LL11	4	7	M		n
Long	2008	NP	308	220	-	NP LL12	3	4.3	M		n
Long	2008	NP	325	200	-						
Long	2008	NP	400	440	-						
Long	2008	NP	500	920	-						
Long	2008	NP	412	500	-						
Long	2008	NP	509	900	-						
Long	2008	NP	407	420	-						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Long	2008	NP	512	970	-						
Long	2008	NP	428	490	-						
Long	2008	NP	397	450	-						
Long	2008	NP	496	820	-						
Long	2008	NP	458	369	-						
Long	2008	NP	626	1580	-						
Long	2009	LC	106	14	n						
Long	2009	LC	112	14.8	n						
Long	2009	LC	113	-	n						
Long	2009	LC	113	16.2	n						
Long	2009	LC	113	17.2	n						
Long	2009	LC	116	17.7	n						
Long	2009	LC	118	15.5	n						
Long	2009	LC	118	14	n						
Long	2009	LC	119	17.5	n						
Long	2009	LC	128	22.5	n						
Long	2009	LC	132	26.9	n						
Long	2009	LC	132	25.2	n						
Long	2009	LC	133	27.3	n						
Long	2009	LC	137	26.3	n						
Long	2009	LC	147	38.8	n						
Long	2009	LC	157	44.7	y						
Long	2009	LC	158	51.6	n						
Long	2009	LC	162	50.6	n						
Long	2009	LC	162	47.9	n						
Long	2009	LC	165	45.1	n						
Long	2009	LC	165	52.3	n						
Long	2009	LC	168	55	n						
Long	2009	LC	168	52.3	n						
Long	2009	LC	169	57	n						
Long	2009	LC	169	53.3	n						
Long	2009	LC	174	60.3	n						
Long	2009	LC	175	67.9	n						
Long	2009	LC	176	74.9	n						
Long	2009	LC	177	44	n						
Long	2009	LC	215	124	n						
Long	2009	LC	-	-	n						
Long	2009	LWF	417	968.7	n	LLLWF01		6.72	M	27.38	n
Long	2009	LWF	419	986.2	n	LLLWF02		16.13	F	103.02	n
Long	2009	LWF	441	987.3	n	LLLWF03		11.8	F	34.67	y
Long	2009	LWF	368	626.1	n	LLLWF04		9.49	F	59.87	n

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Long	2009	LWF	410	993.3	n	LLLWF05		17.27	M	21.52	n
Long	2009	LWF	403	914.8	n	LLLWF06		17.7	F	80.28	y
Long	2009	LWF	393	854.8	n	LLLWF07		10.82	F		n
Long	2009	LWF	374	733.8	n	LLLWF08		5.45	M	16.88	n
Long	2009	LWF	206	95.9	y	LLLWF09		0.56	U		n
Long	2009	LWF	395	821.8	y	LLLWF10		16.1	F	84.28	n
Long	2009	LWF	304	329	n	LLLWF11		2.77	U		n
Long	2009	LWF	374	658.2	n	LLLWF12		7.14	M	13.95	y
Long	2009	LWF	270	220	n						
Long	2009	LWF	296	300.2	n						
Long	2009	LWF	298	329.7	y						
Long	2009	LWF	312	380.3	y						
Long	2009	LWF	325	420.3	n						
Long	2009	LWF	336	462.9	n						
Long	2009	LWF	361	540	n						
Long	2009	LWF	369	216.9	y						
Long	2009	LWF	369	652	y						
Long	2009	LWF	371	710.6	y						
Long	2009	LWF	373	345	n						
Long	2009	LWF	382	961.8	n						
Long	2009	LWF	385	800	n						
Long	2009	LWF	387	826	n						
Long	2009	LWF	390	731.8	n						
Long	2009	LWF	397	859.1	n						
Long	2009	LWF	398	730	n						
Long	2009	LWF	400	933.7	n						
Long	2009	LWF	402	870	n						
Long	2009	LWF	404	847.9	n						
Long	2009	LWF	406	655	y						
Long	2009	LWF	410	969.1	n						
Long	2009	LWF	413	809.9	n						
Long	2009	LWF	422	1061.6	n						
Long	2009	LWF	425	943.6	n						
Long	2009	NP	257	115.3	n	LLNP01	3	1.55	M	0.43	n
Long	2009	NP	526	938.3	n	LLNP02	6	51.3	F	26.59	n
Long	2009	NP	406	437.1	n	LLNP03	5	5.04	F	8.9	n
Long	2009	NP	486	824	n	LLNP04	4	9.53	F	12.49	n
Long	2009	NP	110	-	n						
Long	2009	NP	150	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	20	-	n						
Long	2009	SSC	50	-	n						
Long	2009	SSC	82	5.5	n						
Long	2009	SSC	100	-	n						
Long	2009	STB	40	-	n						
Long	2009	STB	50	-	n						
Murky	2009	NP	177	38.1	n	MLNP01		0.7			n
Redemption	2009	LC	196	325.6	n	RLLC01		2.61	F	15.38	n
Redemption	2009	LC	287	335.9	n	RLLC02		1.86	F	13.35	n
Redemption	2009	LC	289	309.7	n	RLLC03		1.99	M	5.96	n
Redemption	2009	LC	264	261.5	n	RLLC04		1.52	M	5.77	y
Redemption	2009	LC	267	263.6	n	RLLC05		1.56	F	13.09	n
Redemption	2009	LC	233	170.6	n	RLLC06		1.05	M	2.33	n
Redemption	2009	LC	265	233.4	n	RLLC07		2.12	F	5.64	y
Redemption	2009	LC	251	229.3	n	RLLC08		2.04	F	10.72	n
Redemption	2009	LC	231	164	y	RLLC09		1.07	M	2.48	n
Redemption	2009	LC	212	135.3	n	RLLC10		1.15	F	3.71	n
Redemption	2009	LC	215	153.8	n	RLLC11		0.86	M	2.88	n
Redemption	2009	LC	222	148.5	n	RLLC12		1	M	2.65	n
Redemption	2009	LC	128	32.8	n	RLLC13		0.2	U		n
Redemption	2009	LC	122	29.3	n	RLLC14		0.19	U		n
Redemption	2009	LC	118	18.8	n	RLLC15		0.22	U		n
Redemption	2009	LC	125	20.3	n	RLLC16		0.17	U		n
Redemption	2009	LC	120	30.1	n	RLLC17		0.19	U		n
Redemption	2009	LC	120	31.6	n	RLLC18		0.18	U		n
Redemption	2009	LC	116	22.7	n	RLLC19		0.15	U		n
Redemption	2009	LC	121	20.2	n	RLLC20		0.2	U		n
Redemption	2009	LC	122	21.7	n	RLLC21		0.17	U		n

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Redemption	2009	LC	117	18	n	RLLC22		0.14	U		n
Redemption	2009	LC	106	16.8	n	RLLC23		0.12	U		n
Redemption	2009	LC	125	22.4	n	RLLC24		0.18	U		n
Redemption	2009	LC	292	365	n						
Redemption	2009	LWF	168	68.6	n	RLLWF01		0.34	U		n
Redemption	2009	LWF	207	120.1	n	RLLWF02		1.05	U		n
Redemption	2009	LWF	480	1805.6	n	RLLWF03		15.64	M		y
Redemption	2009	LWF	520	2345.7	n	RLLWF04		18.51	M	38.87	y
Redemption	2009	LWF	250	224.9	n	RLLWF05		1.95	U		n
Redemption	2009	LWF	468	1608.8	n	RLLWF06		28.91	F	183.4	n
Redemption	2009	LWF	456	1531.6	n	RLLWF07		10.5	M	22.07	n
Redemption	2009	LWF	172	66.3	n	RLLWF08		0.56	U		n
Redemption	2009	LWF	487	2130.1	n	RLLWF09		18.59	M	32.91	n
Redemption	2009	LWF	528	2345.8	y	RLLWF10		33.84	F	296.8	y
Redemption	2009	LWF	474	1714.5	n	RLLWF11		23.09	F	240	y
Redemption	2009	LWF	457	1451.1	y	RLLWF12		9.35	M	10.21	n
Redemption	2009	LWF	110	10.8	n						
Redemption	2009	LWF	117	21.8	n						
Redemption	2009	LWF	165	60.8	n						
Redemption	2009	LWF	425	1201.3	n						
Redemption	2009	LWF	464	1756.1	n						
Redemption	2009	LWF	470	1840.3	n						
Redemption	2009	NP	280	164.5	n	RLNP01	3	1.53	U		n
Redemption	2009	NP	459	702.2	n	RLNP02	5	8.89	F	11.77	n
Redemption	2009	NP	481	864.1	n	RLNP03	5	10.59	M	10.53	n
Redemption	2009	NP	549	1204.8	n	RLNP04	6	13.27	M	13.86	n
Redemption	2009	NP	422	570.1	n	RLNP05	5	7.08	F	10.6	n
Redemption	2009	NP	313	241.5	n	RLNP06	4	2.35	U		n
Redemption	2009	NP	513	971.2	n	RLNP07	8	14.85	M	11.47	n
Redemption	2009	NP	825	>4000	n	RLNP08	18	67.67	F	110.55	n
Redemption	2009	SSC	30	-	n						
Redemption	2009	SSC	30	-	n						
Redemption	2009	SSC	70	-	n						
Redemption	2009	STB	40	-	n						
Thor	2008	LC	215	130	-						
Thor	2008	LC	215	140	-						
Thor	2008	LC	210	100	-						
Thor	2008	LWF	363	645	-	LWF TL01	C/A	11.6	F		n
Thor	2008	LWF	260	210	-	LWF TL02	3	3.7	F		n
Thor	2008	LWF	410	830	-	LWF TL03	C/A	13.1	F		n
Thor	2008	LWF	421	1160	-	LWF TL04	5	22.4	F		n

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Thor	2008	LWF	432	1030	-	LWF TL05	5	14.7	M		y
Thor	2008	LWF	398	1000	-	LWF TL06	7	20.7	F		y
Thor	2008	LWF	360	700	-	LWF TL07	8	9.3	M		y
Thor	2008	LWF	370	670	-	LWF TL08	6	11.7	F		y
Thor	2008	LWF	275	240	-	LWF TL09	3	2	M		y
Thor	2008	LWF	427	1060	-	LWF TL10	6	21.2	F		y
Thor	2008	LWF	351	660	-	LWF TL11	9	6.1	M		n
Thor	2008	LWF	392	820	-	LWF TL12	6	10.9	M		n
Thor	2008	LWF	360	590	-						
Thor	2008	LWF	364	770	-						
Thor	2008	LWF	408	900	-						
Thor	2008	LWF	363	660	-						
Thor	2008	LWF	372	820	-						
Thor	2008	LWF	353	780	-						
Thor	2008	LWF	316	400	-						
Thor	2008	LWF	360	740	-						
Thor	2008	LWF	406	830	-						
Thor	2008	LWF	350	600	-						
Thor	2008	LWF	371	760	-						
Thor	2008	LWF	403	840	-						
Thor	2008	LWF	373	880	-						
Thor	2008	LWF	379	700	-						
Thor	2008	LWF	360	700	-						
Thor	2008	LWF	362	600	-						
Thor	2008	LWF	380	760	-						
Thor	2008	LWF	340	560	-						
Thor	2008	LWF	381	760	-						
Thor	2008	LWF	420	1000	-						
Thor	2008	LWF	373	740	-						
Thor	2008	LWF	383	780	-						
Thor	2008	LWF	334	450	-						
Thor	2008	LWF	369	740	-						
Thor	2008	LWF	370	650	-						
Thor	2008	LWF	407	950	-						
Thor	2008	LWF	427	810	-						
Thor	2008	LWF	261	220	-						
Thor	2008	LWF	193	80	-						
Thor	2008	LWF	202	80	-						
Thor	2008	LWF	200	80	-						
Thor	2008	LWF	193	78	-						
Thor	2008	LWF	195	75	-						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Thor	2008	LWF	188	61	-						
Thor	2008	LWF	71	15	-						
Thor	2008	LWF	176	71	-						
Thor	2008	LWF	115	11	-						
Thor	2008	LWF	190	73	-						
Thor	2008	LWF	406	1000	-						
Thor	2008	LWF	373	870	-						
Thor	2008	LWF	391	880	-						
Thor	2008	LWF	370	690	-						
Thor	2008	LWF	392	790	-						
Thor	2008	LWF	354	560	-						
Thor	2008	LWF	350	600	-						
Thor	2008	LWF	360	520	-						
Thor	2008	LWF	373	800	-						
Thor	2008	LWF	366	660	-						
Thor	2008	LWF	372	840	-						
Thor	2008	LWF	373	720	-						
Thor	2008	LWF	385	720	-						
Thor	2008	LWF	369	720	-						
Thor	2008	LWF	393	920	-						
Thor	2008	LWF	350	640	-						
Thor	2008	LWF	368	740	-						
Thor	2008	LWF	380	780	-						
Thor	2008	LWF	340	520	-						
Thor	2008	LWF	405	820	-						
Thor	2008	LWF	383	720	-						
Thor	2008	LWF	407	1000	-						
Thor	2008	LWF	370	700	-						
Thor	2008	LWF	440	780	-						
Thor	2008	LWF	370	840	-						
Thor	2008	LWF	370	760	-						
Thor	2008	LWF	381	760	-						
Thor	2008	LWF	375	790	-						
Thor	2008	LWF	279	240	-						
Thor	2008	LWF	365	670	-						
Thor	2008	LWF	305	340	-						
Thor	2008	LWF	360	590	-						
Thor	2008	LWF	264	240	-						
Thor	2008	LWF	183	70	-						
Thor	2008	NP	564	1260	-	NP TL01	7	22.7	F		n
Thor	2008	NP	496	1000	-	NP TL02	5	21.7	F		n

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Thor	2008	NP	385	360	-	NP TL03	3	4.4	F		n
Thor	2008	NP	420	500	-	NP TL04	3	7.4	F		n
Thor	2008	NP	320	210	-	NP TL05	3	1.3	M		n
Thor	2008	NP	459	790	-	NP TL06	4	13.6	M		y
Thor	2008	NP	406	460	-	NP TL07	3	5.6	M		n
Thor	2008	NP	612	1500	-	NP TL08	6	26.3	F		n
Thor	2008	NP	608	1420	-	NP TL09	7	31.8	F		n
Thor	2008	NP	520	820	-	NP TL10	5	13.6	F		n
Thor	2008	NP	565	1280	-	NP TL11	5	24.8	F		n
Thor	2008	NP	325	200	-	NP TL12	3	1.9	M		n
Thor	2008	NP	564	1180	-						
Thor	2008	NP	438	530	-						
Thor	2008	NP	394	410	-						
Thor	2008	NP	414	530	-						
Thor	2008	NP	383	400	-						
Thor	2008	NP	371	370	-						
Thor	2009	LC	116	17.2	n						
Thor	2009	LC	117	17.7	n						
Thor	2009	LC	117	20.2	n						
Thor	2009	LC	117	16.8	n						
Thor	2009	LC	117	19.1	n						
Thor	2009	LC	118	18.3	n						
Thor	2009	LC	118	16.5	n						
Thor	2009	LC	119	18.2	n						
Thor	2009	LC	120	19.3	n						
Thor	2009	LC	121	-	n						
Thor	2009	LC	127	25.3	n						
Thor	2009	LC	127	23.1	n						
Thor	2009	LC	127	23.4	n						
Thor	2009	LC	130	25.6	n						
Thor	2009	LC	152	48.6	n						
Thor	2009	LC	156	38	n						
Thor	2009	LC	164	51.6	n						
Thor	2009	LC	164	64.3	n						
Thor	2009	LC	191	91.9	y						
Thor	2009	LC	198	-	n						
Thor	2009	LC	210	115.8	n						
Thor	2009	LC	211	108.4	n						
Thor	2009	LC	212	113.7	n						
Thor	2009	LC	219	142.2	n						
Thor	2009	LC	-	-	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Thor	2009	LC	-	-	n						
Thor	2009	LC	-	-	n						
Thor	2009	LC	-	-	n						
Thor	2009	LC	-	-	n						
Thor	2009	LWF	177	56.9	n	TLLWF01		0.55	U		n
Thor	2009	LWF	228	140.6	n	TLLWF02		1.3	U		y
Thor	2009	LWF	278	238.2	n	TLLWF03		2.31	U		y
Thor	2009	LWF	299	278.1	y	TLLWF04		2.88	U		n
Thor	2009	LWF	365	633.1	n	TLLWF05		7.14	F	4.94	y
Thor	2009	LWF	387	793.8	n	TLLWF06		12.7	M	17.11	y
Thor	2009	LWF	294	292.8	n	TLLWF07		3.16	U		y
Thor	2009	LWF	392	894.1	n	TLLWF08		14.88	F	72.37	y
Thor	2009	LWF	381	773	n	TLLWF09		15.38	F	62.7	y
Thor	2009	LWF	411	952.8	n	TLLWF10		17.53	F	93.79	y
Thor	2009	LWF	439	1046.9	n	TLLWF11		10.4	F	135.6	y
Thor	2009	LWF	397	952.8	n	TLLWF12		14.61	25.09	143.56	y
Thor	2009	LWF	145	31.8	n						
Thor	2009	LWF	149	28.7	n						
Thor	2009	LWF	202	90.5	n						
Thor	2009	LWF	243	174.7	n						
Thor	2009	LWF	250		n						
Thor	2009	LWF	282	273.6	n						
Thor	2009	LWF	314	386	n						
Thor	2009	LWF	320	406.9	n						
Thor	2009	LWF	331	403.6	n						
Thor	2009	LWF	337	604.9	n						
Thor	2009	LWF	345	568.2	n						
Thor	2009	LWF	346	495	n						
Thor	2009	LWF	356	590.6	n						
Thor	2009	LWF	359	557.2	n						
Thor	2009	LWF	362	723.2	n						
Thor	2009	LWF	365	620.3	n						
Thor	2009	LWF	365	633.2	n						
Thor	2009	LWF	367	609.2	n						
Thor	2009	LWF	372	657.8	n						
Thor	2009	LWF	374	564.8	n						
Thor	2009	LWF	375	909.9	n						
Thor	2009	LWF	377	673.1	n						
Thor	2009	LWF	379	738.1	n						
Thor	2009	LWF	380	742.2	n						
Thor	2009	LWF	380	691.2	n						

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
Thor	2009	LWF	380	791	n						
Thor	2009	LWF	384	683	n						
Thor	2009	LWF	386	769.4	n						
Thor	2009	LWF	386	754.9	n						
Thor	2009	LWF	386	784.2	n						
Thor	2009	LWF	386	722.9	n						
Thor	2009	LWF	387	774.2	n						
Thor	2009	LWF	389	745.9	n						
Thor	2009	LWF	390	716.7	n						
Thor	2009	LWF	390	778.8	n						
Thor	2009	LWF	391	749.7	n						
Thor	2009	LWF	394	768.2	n						
Thor	2009	LWF	396	845.4	n						
Thor	2009	LWF	397	841.2	n						
Thor	2009	LWF	398	826.1	n						
Thor	2009	LWF	398	892.4	n						
Thor	2009	LWF	399	791.2	n						
Thor	2009	LWF	399	851.9	n						
Thor	2009	LWF	405	845.1	n						
Thor	2009	LWF	406	805.1	n						
Thor	2009	LWF	410	795.8	n						
Thor	2009	LWF	415	804.3	n						
Thor	2009	LWF	-	-	n						
Thor	2009	LWF	-	-	n						
Thor	2009	LWF	-	-	n						
Thor	2009	LWF	-	-	n						
Thor	2009	LWF	-	-	n						
Thor	2009	NP	272	130.5	n	TLNP01	2	1.57	M	1.43	n
Thor	2009	NP	631	1589.2	n	TLNP02	7	26.56	F	22.86	n
Thor	2009	NP	567	1169.6	n	TLNP03	7	26.67	F	41.63	n
Thor	2009	NP	565	1364.5	n	TLNP04	5	18.17	F	26.7	n
Thor	2009	NP	367	296.1	n	TLNP05	3	4.36	M	1.53	n
Thor	2009	NP	434	601.4	n	TLNP06	3	10.74	F	13.76	n
Thor	2009	NP	434	590.4	n	TLNP07	4	8.01	M	7.64	n
Thor	2009	NP	422	575.8	n	TLNP08	4	9.7	M	8.45	n
Thor	2009	NP	490	784.1	n	TLNP09	4	9.87	F	13.99	n
Thor	2009	NP	477	880.5	n	TLNP10	6	12.41	M	17.09	n
Thor	2009	NP	477	709.2	n	TLNP11	5	9.61	F	11.45	n
Thor	2009	NP	-	-	n						
U	2008	NP	250	120	-	NP UL01	2	1.5	M		
U	2008	NP	260	130	-	NP UL02	3	1.8	F		

Lake	Year	Species ^a	Length (mm)	Weight (g)	External Parasites ^b	Fish I.D.	Age ^c (years)	Liver Weight (g)	Sex ^c	Gonad Weight	Internal Parasites ^b
U	2008	NP	250	100	-	NP UL03	2	1	F		
U	2008	NP	260	130	-	NP UL04	2	2	F		
U	2008	NP	284	250	-	NP UL05	2	2.4	F		
U	2008	NP	250	160	-	NP UL06	2	2	M		
U	2008	NP	259	120	-	NP UL07	2	1.9	M		

Notes:

^a AC = arctic cisco, AG = arctic grayling, BB = burbot, CH = lake chub, LC = lake cisco, LNS = longnose sucker, LT = lake trout, LWF = lake whitefish, NP = northern pike, RWF = round whitefish, SSC = slimy sculpin, STB = ninespine stickleback

^b External/Internal parasites = yes (y), no (n) and data not collected (-)

^c C/A = cannot age fish

^d Sex = male (M), female (F) and unidentified (U)