Interim Water Management Plan Wolfden Resources Inc., Ulu Exploration Project

Prepared for:
Wolfden Resources Inc.

Prepared by:
Gartner Lee Limited

Reference:
GLL 51013

Date:
March, 2006

Distribution:

4 Wolfden Resources Inc.
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March 13, 2006

Wolfden Resources Inc.
309 South Court Street
Thunder Bay, Ontario
P7B 2Y1

Attention: Dave Stevenson

Dear Dave:

Re: Interim Water Management Plan - Wolfden Resources Inc., Ulu Exploration Project

Please find attached the Interim Water Management Plan for the Ulu Exploration Project. This plan forms part of Wolfden Resources Inc.'s (WRI) request for an amendment to the Ulu Water Licence NWB1ULU0008, in which WRI is requesting deferment of the requirement for all mine water and run-off to be directed to the Retention and Settling/ Neutralization Ponds as outlined in Part D, Item 1 and 7.

If there are any questions regarding this report, or if you require any additional assistance, please contact the undersigned.

Sincerely,
GARTNER LEE LIMITED

Leslie Gomm, P.Eng., Ph.D.
Senior Environmental Engineer

LSG:lg

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1. Introduction

Gartner Lee Limited was retained by Wolfden Resources Inc. (WRI) to develop an Interim Water Management Plan to monitor and manage the mine water and run-off from the existing Waste Rock and Ore Storage Pads at the Ulu Property. This plan forms part of WRI's request for an amendment to the Ulu Water Licence NWB1ULU0008, in which WRI is requesting deferment of the requirement for all mine water and run-off to be directed to the Retention and Settling/ Neutralization Ponds as outlined in Part D, Item 1 and 7 (see the accompanying amendment application and covering letter).

The Interim Water Management Plan provided herein addresses the management and monitoring of minewater and runoff over the term (i.e., present to June 30, 2008) of the existing Water Licence. The Interim Water Management Plan includes:

- Monitoring of runoff during peak flow and rainfall events for key water quality parameters and compliance of the Water Licence discharge criteria;
- Monitoring of minewater and ice excavated during re-opening of the portal for key water quality parameters and compliance with Water Licence discharge criteria;
- Assessment of any trends in the concentration of these parameters;
- Establishment of water quality triggers;
- Outline of response plan development and contingency implementation should collection and treatment be required; and
- Assessment of the environmental impact of the potential loadings from ice excavation on the receiving environment.

2. Existing Site Drainage and Water Quality

Figure 1 presents an overall plan of the existing facilities at the Ulu Mine site and shows the location of the waste rock and ore storage pads. The entire site lies within the drainage basin of Ulu Lake with the majority of the surface run-off from the Ore Storage Pad and Waste Rock Pad draining in an east/southeast direction towards East Lake. Runoff from the pads is typically only observed during spring freshet and rainfall events. Sewage from the camp is also discharged into East Lake, and fisheries studies performed by Gartner Lee Limited in 2005 indicate that East Lake is a non-fish bearing lake. The outflow of East Lake flows northeast into Ulu Lake, and is thought to be primarily via subsurface flow. Surface flow through the boulders at the lake outlet is evident during peak flow conditions.

2.1 Water Quality Monitoring

Water quality monitoring at the Ulu Mine site is facilitated through two programs: the Surveillance Network Program (SNP) as required by Water Licence NWB1ULU0008, and the Water and Sediment Quality Program carried out in 2004 and 2005 as part of the broader environmental baseline studies for the High Lake Project. Sample locations for both programs are identified on Figure 2. Selected sampling locations from both programs will be utilized for the Interim Water Management Plan, as well as a new sampling location/area down-slope of the Waste Rock Pad. The following is a brief summary of the existing water quality conditions at the site.

2.1.1 Ore Pad Run-off

In June and August of 2005, Ore Storage Pad seepage was monitored as part of the broader environmental baseline studies for the project at Station WR1, located southeast of the pad in an area where visible sedimentation from previous surface flow is present. A summary of the water quality at this location is provided in Table 1. All parameters met the Water Licence effluent quality criteria with the exception of total dissolved solids (TSS) during the August sampling event. Higher concentrations of metals were also detected in the August sample event associated with the elevated amount of particulate matter in this sample. The chemistry of the drainage from the Ore Storage Pad is typical of water that has been in contact with highly mineralized rock with significantly higher concentrations of sulphate compared to other surface waters in the Ulu area. Iron, cadmium and copper levels exceeded CCME guidelines.

Table 1 Summary of Ore Storage Pad Run-off Water Quality (2005)

	Maximum Grab Licence Discharge Limits (mg/L)	Parameter Concentration (mg/L)	Parameter Concentration (mg/L)
		June 18, 2005	Aug. 4, 2005
Routine Parameters			
pH	6.0 – 9.5	7.36	7.68
Nitrate + Nitrate (as N)		0.193	2.42
Ammonia (as N)		0.046	
Total Suspended Solids	50	12	134
Sulphate		416	436
Metals (Total)			
Total Aluminum		0.035	0.041
Total Arsenic	1.00	0.00145	0.00177
Total Cadmium		0.000065	0.00018
Total Chromium		<0.0005	<0.001
Total Copper	0.60	0.00159	0.00214
Total Iron		0.532	1.01
Total Lead	0.40	0.00021	0.00012
Total Nickel	1.00	0.00282	0.0046
Total Zinc	1.00	0.0077	0.0165

2.1.2 Waste Rock Pad Run-off

Water quality data for Waste Rock Pad run-off is not available, as no observable flow was present during previous sampling events. As outlined in the WROSP (BGC 2005) metal leaching is not anticipated to be a concern for the waste rock during the period of advanced exploration and therefore it is anticipated that the water quality in the Waste Rock Pad run-off will be better than that from the Ore Storage Pad. Attempts will be made to sample Waste Rock Pad run-off, provided sufficient flow for sample collection is present.

2.1.3 Mine Sump

In June 2005, water from the portal area, including melt water from runoff and excavated ice, was pumped to the surface sump located outside the portal area. The sump water quality results are presented in Table 2. The results indicate that the sump water is within the Licence criteria with the exception of total suspended solids (TSS). This sample was collected following active pumping to the sump and the elevated TSS is thought to be due to turbulent conditions created from the pumping.

Table 2 Summary of Sump Water Quality (June 2005)

	Maximum Grab Licence Discharge Limits (mg/L)	Parameter Concentration (mg/L)
Routine Parameters		
pH	6.0 – 9.5	7.91
Nitrate + Nitrate (as N)		5.88
Ammonia (as N)		2.97
Total Suspended Solids	50	66
Metals (Total)		
Total Aluminum		2.820
Total Arsenic	1.00	0.0102
Total Cadmium		0.0001
Total Chromium		0.0066
Total Copper	0.60	0.0216
Total Lead	0.40	0.0046
Total Nickel	1.00	0.0073
Total Zinc	1.00	0.039

2.1.4 East Lake and East Lake Outflow

East Lake is currently monitored as per the Water Licence at the point of outflow (Station 200-4) during periods of open water. Additional water quality sampling within East Lake (Station L525) was conducted in 2004 and 2005 and at the outlet of East Lake (Station S525B) in 2005. A summary of the water quality data for East Lake and East Lake outflow is presented in Appendix A.

East Lake exhibits low hardness and alkalinity and near neutral pH. The metal levels are low and within the recommended CCME guidelines. Aluminum and zinc concentrations are typically within the range of other lakes in the area while arsenic, copper, iron and nickel concentrations are higher. Sulphate concentrations in East Lake are also higher than other lakes in the area.

The water in the outflow of East Lake is relatively neutral, moderately soft and mesotrophic. The pH ranged between 6.66 and 7.11, hardness was 22.4 and 50.6 mg/L $CaCO_3$. The alkalinity is low, ranging from 1.9 – 9.2 mg/L $CaCO_3$. Total phosphorous levels are 0.012 and 0.055 mg/L, which indicates mesotrophic to eutrophic conditions. Metal levels in the outflow of East Lake are typically low with the exception of total copper, present at concentrations above the CCME guideline in all samples taken in 2005. Abnormally high total metal concentrations were measured in August 2005 by GLL in association

with an extremely high concentration of totals suspended solids (419 mg/L). Total arsenic, barium, cadmium, chromium, copper, iron, lead, nickel, selenium, silver and zinc in this sample were all above CCME guidelines. The corresponding concentrations of dissolved metals in this sample were significantly lower, well below the CCME guidelines. This confirms that the elevated total metal concentrations in this sample were due to entrainment of particulate matter during sample collection and the dissolved metal concentrations are more representative of the actual water quality for this sampling event.

2.1.5 Ulu Lake and Ulu Lake Outflow

As per the Water Licence SNP, the inflow from East Lake and outflow of Ulu Lake is monitored at Stations 200-5A and 200-5. Water quality monitoring was also conducted at Ulu Lake (Station L504), and at Station S504b, the outlet of Ulu Lake, during the summer of 2004 and 2005 for baseline studies. Water quality parameters for all sampling events are summarized in Appendix B.

Ulu Lake has a near neutral pH and exhibits very soft water and low alkalinity, the latter indicating a high sensitivity to acidic inputs. Typical of the other lakes in the area, Ulu Lake is oligotrophic. Levels of sulphate in Ulu Lake are low ranging from 6.2 – 22.9 mg/L. Alkalinity is extremely low, ranging from <1 – 7.3 mg/L. All metals in Ulu Lake surface water samples are below CCME guidelines with the exception of copper.

The outflow of Ulu Lake is very soft and highly sensitive to acid inputs. The phosphorous concentrations indicate an oligotrophic environment. Similar to Ulu Lake, all metals are below the CCME guidelines in the Ulu Lake Outflow with the exception of copper.

3. Interim Water Management Plan

The objective of the Interim Water Management Plan is to monitor run-off from the Ore Storage and Waste Rock Pad areas, assess water quality trends in run-off waters and the receiving environment, and develop a framework for implementation of water management contingency measures. The Water Management Plan is intended to be representative of the Precautionary Approach in that it intends to identify potential environmental risks as they emerge, and provide response before environmental impact occurs.

A fundamental component of the Interim Water Management Plan is a monitoring program that is designed to provide an indication of when environmental management is necessary. In this way, confidence is provided that the information necessary for the assessment of environmental conditions is gathered and evaluated against pre-determined "triggers" or "thresholds".

The plan consists of the following components, each discussed in detail in the following sections:

- Monitoring requirements – The frequency and means for monitoring water quality.
- Specific Indicators – Selected water quality parameters chosen for assessment and analysis which are indicative of water quality degradation.
- Specific Thresholds – Defines the conditions, in terms of the specific indicators, when management actions should be taken.
- Evaluation of monitoring results – The means of evaluating whether specific thresholds have been crossed.
- Approach to responses – Describes the approach to responses to be implemented if any specific thresholds have been crossed.

3.1 Monitoring Requirements

Ore Storage Pad seepage, Waste Rock Pad seepage, outflow of East Lake and Ulu Lake inflow and outflow will be monitored weekly when flow is present at the toe of the pads, particularly during spring freshet and rainfall events. This monitoring frequency is consistent with the sampling requirements at these locations during periods of discharge outlined in Schedule 1 of the Water Licence. Monitoring requirements are summarized in Table 3. Water quality data generated from this monitoring program, as well as the routine monthly SNP data provide the core data to be used in the Plan. Data generated from the baseline water quality program will be used comparison purposes as required.

A specific sampling location for Waste Rock Pad seepage has not yet been defined, as it is anticipated that seepage flow locations may vary from one sampling event to the next. Consequently, WRI proposes that seepage samples be collected at the south/southwest toe of the Waste Rock Pad (Figure 2) in an area

with sufficient flow. Sampling location coordinates will be recorded at the time of sampling using a hand-held GPS unit.

Table 3 Interim Water Management Plan Sampling Schedule

Station	Frequency	Parameters	Comments
WR1- Ore pad seepage	When flow present at toe of pads (i.e. during spring freshet and rainfall events)	TSS, pH, Conductivity, Hardness, Alkalinity, Sulphate, Ammonia, Nitrate, Nitrite, Total and Dissolved Metals	
Waste rock pad seepage	When flow present at toe of pads (i.e. during spring freshet and rainfall events)	TSS, pH, Conductivity, Hardness, Alkalinity, Sulphate, Ammonia, Nitrate, Nitrite, Total and Dissolved Metals	Sample to be collected where there is sufficient flow. Coordinates of sampling location will be recorded at time of sampling.
200-4 -Outflow East Lake	When flow present at toe of pads (i.e. during spring freshet and rainfall events) and monthly as part of routine SNP	TSS, pH, Conductivity, Hardness, Alkalinity, Sulphate, Ammonia, Nitrate, Nitrite, Total and Dissolved Metals	
200-5 -Outflow Ulu Lake	When flow present at toe of pads (i.e. during spring freshet and rainfall events) and monthly as part of routine SNP	TSS, pH, Conductivity, Hardness, Alkalinity, Sulphate, Ammonia, Nitrate, Nitrite, Total and Dissolved Metals	

3.2 Specific Indicators

All water quality results generated from the monitoring program will be compared to Water Licence discharge limits and historical data to assess potential water quality degradation. Water quality data for selected parameters, know as Specific Indicators, will be used to establish "triggers" and determine significant changes in water quality. The following Specific Indicators have been selected for the Ulu Water Management Plan:

- Sulphate;
- Total Arsenic;

- Total Copper;
- Total Lead;
- Total Nickel; and
- Total Zinc.

Selection of these indicators is primarily based on the licenced discharge parameters, as well as the need for precautionary monitoring of acid rock drainage and metals leaching from the waste rock/ore storage pads.

3.3 Specific Thresholds

Two types of thresholds or triggers that would initiate an action plan, for any one of the specific indicators, will be established: numerical threshold and trend analysis threshold. For all potential point source discharge locations the thresholds for each indicator, except sulphate, are outlined in Table 4. These thresholds were determined based on the existing conditions at the various effluent sources and the need to establish a threshold that will provide sufficient action time to implement contingency measures well before the discharge limits are reached.

Table 4 Summary of Thresholds

Indicator	Threshold (mg/L)	Maximum Grab Sample Licence Limit (mg/L)
Total Arsenic	0.10	1.00
Total Copper	0.06	0.60
Total Lead	0.04	0.40
Total Nickel	0.10	1.00
Total Zinc	0.10	1.00

The assessment of sulphate in the point source discharges trend analysis will be used to determine if there are any changes in sulphate concentrations in run-off from the ore storage and Waste Rock Pads. This will be defined as a statistically significant trend in the water quality results. This trend analysis will be carried out using the LINEST function in Excel. The F-statistic for this regression is calculated from the ratio of the variances. The F-statistic is used to test the null hypothesis that the data is a random scatter of points with a zero slope. The calculated F-statistic is compared to critical values of F-statistic found in standard statistics texts. If the F-statistic is greater than the critical value, the null hypothesis fails and the linear model is significant. Using a significance level of 0.05, if the calculated statistic is greater than the critical value, we can be 95% confident that the data is not a random scatter and the linear regression model is justified. A minimum of four (4) data points is required for the trend analysis. Water quality results from stations with less than four data points will be directly compared to previous results until the minimum data requirement for trend analysis is obtained.

For all monitoring locations in the receiving environment (Stations 200-4 and 200-5), the trend analysis method outlined will also be used to determine if there are any changes in the receiving water quality for each indicator.

3.4 Evaluation of Monitoring Results

The management review of the relevant water quality data will be performed after each sampling event and assessed against the appropriate triggers, upon receiving water quality data from the laboratory. The laboratory turn around time from the time of sampling is approximately two weeks.

3.5 Approach to Responses

In the event that a trigger or threshold is met, a staged response will be activated. The initial response to the trigger will be the verifications of the monitoring information. This will involve a comprehensive analysis of laboratory results. The water quality at the trigger locations will require re-sampling if warranted (ie. QA/QC data or field notes indicates sampling issues/errors). This re-sampling could be done within approximately two weeks of the previous sampling time with the results available approximately four weeks from the initial trigger, provided sufficient sample is present (in the case of seepage sampling). Upon confirmation of the water quality results, a comprehensive analysis of other related monitoring results from other data collection programs at the mine site will be carried out. This will include water quality data generated as part of the ongoing baseline monitoring program as well as the Waste Rock / Ore Monitoring Program outlined in the WROSP (BGC 2005). The goal of this analysis is provide for a preliminary identification of the dominant source of the increased concentrations and trigger activation. As well, it may be warranted to increase the monitoring intensity at key sample locations to verify the initial trigger.

If the cause of the trigger is identified to be runoff from the site, specifically the Ore Storage Pad and the Waste Rock Storage Pad, then a response plan will be developed which, where appropriate, may include mitigation at source. The ultimate goal of the response plan is to outline the steps that will be taken to ensure that there will not be an uncontrolled discharge of water from the pads at concentrations over the licenced discharge limits. The mitigation plan might include berming, ditching, and collection of the runoff water at the toe of the pads or whatever other means are possible to ensure that water is not discharged at levels above the allowable limits.

The response plan will be developed in consultation with technical experts and regulatory agencies and submitted to the Nunavut Water Board according to the procedures laid out in Part G, Item 1 of Water Licence NWB1ULU0008. This plan may include:

1. Collection of Ore Storage/Waste Rock Pad seepage through construction of ditches and the installation of geomembrane lined berm at seepage discharge points;
2. Pumping of collected seepage into the sump or other containment structure;
3. Water quality monitoring of sump water; and
4. Discharge of sump water upon meeting Water Licence discharge requirements and providing notification to the INAC Inspector

Other response plan options will be considered dependent on current climatic conditions and availability of materials.

3.6 Annual Review and Reporting

An annual review will be completed that assess the adequacy and appropriateness of the element of the Interim Water Management Plan such as trigger locations, specific indicators and thresholds and monitoring requirements. Updates, amendments or other changes to the Plan will be recommended to the Nunavut Water Board based on this annual review. The Plan also includes management review of the relevant data as the sampling results are generated. The results of these reviews will be reported to the NWB as part of the Monthly Reports required under Schedule I, Part D, Item 1 of the Water Licence. The results of these reviews will also be summarized in the Annual Report submitted to the NWB no later than March 31 of the year following the calendar year reported.

4. Mine Ice Management Plan

In 2005, approximately 3,500 m^3 of ice was excavated from the mine portal before underground work was postponed and the portal was sealed off. The excavated ice was placed at the edge of the Waste Rock Pad, such that melt water drained towards East Lake. In addition, minewater including ice melt water was pumped from the underground mine into the existing surface sump located outside of the portal area. Water from the sump was sampled in June 2005 and met all Water Licence discharge criteria with the exception of total suspended solids suspended solids (Table 2).

In the spring of 2006, Wolfden Resources is planning to resume underground exploration activities and intends to excavate the 15,000 m^3 of ice remaining in the underground portal. In support of this activity, a Mine Ice Management Plan has been developed to deal with water being generated as part of this one-time-only ice excavation.

The objective of the Mine Ice Management Plan is to monitoring mine ice, associated surface run-off, and receiving water quality during of mine excavation activities and outline contingency measures in the event degraded water quality is encountered. Where appropriate, this plan will be carried out in conjunction with the Interim Water Management Plan.

4.1 Ice Management and Contingency Planning

During ice excavation operations, random ice samples will be collected from the ice face weekly and sent for analysis to ensure Water Licence discharge criteria are met. Additional parameters including ammonia, nitrate and nitrite will be monitored to assess potential impacts of blasting activities on water quality. Turnaround time for lab results will be approximately two weeks.

Upon removal from the underground portal, ice will be placed on the southwest corner of the Waste Rock Pad as close to the perimeter as possible to facilitate drainage of melt water towards East Lake, and minimize filtration through the Waste Rock Pad. In the event that water quality results from samples taken from the ice face are above Water Licence discharge criteria, excavation activities will be discontinued, and all ice will be removed from the Waste Rock Pad to the portal ramp to allow melt water to drain back into the mine. Minewater will be pumped into the existing mine sump or may remain in the mine for future removal. Sump water will be released if Water Licence discharge criteria are met, once notification is given to the INAC Inspector.

Before ice excavation activities resume, an approved containment facility will be constructed following Board approval of the design drawing as outline in Part G, Item 1 of the Water Licence. Excavation activities will resume following completion of the containment facility. Excavated ice will be placed in

the containment facility and melt water will be stored until Licence discharge requirements are met. Compliant water will be release to East Lake following prior notification to the INAC Inspector.

4.2 Monitoring Requirements

The following water quality monitoring schedule will be implemented at the onset of ice excavation activities:

Table 5 Ice Management Plan Sampling Schedule

Station	Frequency	Parameters	Comments
Mine Ice Face (Random locations)	Weekly during ice excavation activities.	TSS, pH, Conductivity, Hardness, Alkalinity, Sulphate, Ammonia, Nitrate, Nitrite, Total and Dissolved Metals	
Waste Rock Pad Seepage (location to be determined)	Weekly during ice excavation activities, including 3 weeks after ice is no longer present at placement site.	TSS, pH, Conductivity, Hardness, Alkalinity, Sulphate, Ammonia, Nitrate, Nitrite, Total and Dissolved Metals	Sample collection will be coordinated with those required for the Interim Water Management Plan
Sump Water	Prior to discharge	TSS, pH, Conductivity, Hardness, Alkalinity, Sulphate, Ammonia, Nitrate, Nitrite, Total and Dissolved Metals	
200-4 -Outflow East Lake	Weekly during ice excavation activities, including 3 weeks after ice is no longer present at placement site.	TSS, pH, Conductivity, Hardness, Alkalinity, Sulphate, Ammonia, Nitrate, Nitrite, Total and Dissolved Metals	Sample collection will be coordinated with those required for the Interim Water Management Plan
200-5 -Outflow Ulu Lake	Weekly during ice excavation activities, including 3 weeks after ice is no longer present at placement site.	TSS, pH, Conductivity, Hardness, Alkalinity, Sulphate, Ammonia, Nitrate, Nitrite, Total and Dissolved Metals	Sample collection will be coordinated with those required for the Interim Water Management Plan

4.3 Impact Assessment of Ice Excavation Activities

Based on water quality results from sump water sampled in June 2005 and presented in Table 6, contaminant loads can be estimated for 15,000 m^3 of mine ice (total amount of ice to be excavated), assuming relatively similar concentrations throughout the ice body.

Table 6 Predicted Total Contaminant Loads from Excavated Ice

	Parameter Concentration (mg/L)	Total Load from Excavated Ice (kg)
Ice volume = 15,000 m^3		
Water Volume = 13650 m^3 = 1.3650 x 10^7 L (Volume decreases by 9% from ice to water)		
Routine Parameters		
pH	7.91	N/A
Nitrate + Nitrate (as N)	5.88	80.26
Ammonia (as N)	2.97	40.54
Total Suspended Solids	66	900.9
Metals (Total)		
Total Aluminum	2.820	38.49
Total Arsenic	0.0102	0.14
Total Cadmium	0.0001	0.0014
Total Chromium	0.0066	0.09
Total Copper	0.0216	0.29
Total Lead	0.0046	0.063
Total Nickel	0.0073	0.100
Total Zinc	0.039	0.53

A conservative (protective) estimate of the impact of this loading to the receiving environment was carried out assuming two bounding scenarios:

- Scenario 1 – All contaminants from mine ice go directly (without removal) to East Lake and
- Scenario 2 – All contaminants from mine ice go directly (without dilution in East lake) to Ulu Lake.

The later scenario was assessed to provide confidence that the loading of contaminants due to the mine ice will have minimal impact on the fish bearing waters of Ulu Lake.

Scenario 1 – Directly to East Lake

The total volume of East Lake, determined from bathymetry data collected in August 2005, is 29,925 cubic meters. Assuming that the entire volume of water generated from the ice excavation instantaneously mixes in East Lake, predicted concentrations of the various water quality parameters can be calculated. As outlined in Table 7, the predicted concentrations of aluminum, cadmium, chromium and copper exceed the CCME Guidelines for the Protection of Aquatic Life. The actual concentrations in East Lake resulting from the loading from ice excavation would be significantly lower than those predicted due to the following:

- The contaminant loading from the ice excavation will not be directly discharged to East Lake and will flow overland prior to discharge which may result in the reduction in loading of the various contaminants;
- Some of the elevated contaminants in the ice melt water are associated with particulate matter and may be deposited out of solution as the discharge flows overland to East Lake;
- The contaminant loading to East Lake will not occur instantaneously, but will take place over a period of a few weeks during spring melt; and
- The contaminant loading from the ice will occur during spring melt when the available dilution in East Lake is much higher due to natural runoff contributions to the lake from snow melt.

Table 7 Predicted Water Quality for East Lake

	CCME Guideline for Protection of Aquatic Life	Existing East Lake Water Quality[a] (mg/L)	Total Load from Excavated Ice (kg)	Predicted East Lake Water Quality (mg/L)
East Lake Volume = 29,925 m^3				
Routine Parameters				
Nitrate + Nitrate (as N)		0.987	80.26	2.52
Ammonia (as N)		0.042	40.54	0.96
Total Suspended Solids		<4	900.9	23.4
Metals (Total)				
Total Aluminum	0.005 – 0.01	0.0104	38.49	***0.89***
Total Arsenic	0.005	0.00036	0.14	0.0034
Total Cadmium	0.000017	<0.00005	0.0014	***0.000066***
Total Chromium	0.001	<0.0005	0.09	***0.0025***
Total Copper	0.002 – 0.004	0.00185	0.29	***0.0079***
Total Lead	0.001 – 0.007	<0.00005	0.063	0.0015
Total Nickel	0.025 – 0.15	0.00217	0.100	0.0033
Total Zinc	0.03	0.0056	0.53	0.015

Notes: a) Median concentration from 2004 – 2005 Baseline Program
***Italics** – Exceeds CCME Guideline*

Scenario 2 – Directly to Ulu Lake

The total volume of Ulu Lake, determined from bathymetry data collected in August 2005, is 1,138,494 cubic meters. Assuming that the entire volume of water generated from the ice excavation instantaneously mixes in Ulu Lake, predicted concentrations of the various water quality parameters can be calculated. As outlined in Table 8 the predicted concentrations of cadmium and copper exceed the CCME Guidelines for the Protection of Aquatic Life. The predicted concentration for cadmium is dominated by the natural load from Ulu Lake which was calculated using the detection limit value. Predicted copper concentrations are only marginally higher than the natural levels in Ulu Lake.

Table 8 Predicted Water Quality for Ulu Lake

	CCME Guideline for Protection of Aquatic Life	Existing Ulu Lake Water Quality[a] (mg/L)	Total Load from Excavated Ice (kg)	Predicted Ulu Lake Water Quality (mg/L)
East Lake Volume = 29,925 m^3				
Routine Parameters				
Nitrate + Nitrate (as N)		0.006	80.26	0.076
Ammonia (as N)		0.0199	40.54	0.055
Total Suspended Solids		<4	900.9	4.73
Metals (Total)				
Total Aluminum	0.005 – 0.01	0.0184	38.49	0.052
Total Arsenic	0.005	<0.0001	0.14	0.0002
Total Cadmium	0.000017	<0.00005	0.0014	***0.000051***
Total Chromium	0.001	<0.0005	0.09	0.00057
Total Copper	0.002 – 0.004	0.00209	0.29	***0.0023***
Total Lead	0.001 – 0.007	<0.00005	0.063	0.0001
Total Nickel	0.025 – 0.15	0.00217	0.100	0.0022
Total Zinc	0.03	0.0056	0.53	0.0059

Notes: a) Median concentration from 2004 – 2005 Baseline Program
***Italics** – Exceeds CCME Guideline*

The actual concentrations in Ulu Lake resulting from the loading from ice excavation would be significantly lower than those predicted due to those outline for East Lake and the following:

- The contaminant loading from the ice excavation will not be directly discharged to Ulu Lake and will be initially diluted in East Lake.
- The contaminant loading to Ulu Lake from East Lake will be substantially lower and will not occur instantaneously but will take place over a period of a few weeks during spring melt; and
- The contaminant loading from the ice will occur during spring melt when the available dilution in East Lake and Ulu Lake is much higher due to natural runoff contributions to the lake from snow melt.

5. Conclusions

The Interim Water Management Plan outlines the steps that will be taken monitor and manage the mine water and run-off from the existing Waste Rock and Ore Storage Pads at the Ulu Property. This plan forms part of WRI's request for an amendment to the Ulu Water Licence NWB1ULU0008, in which WRI is requesting deferment of the requirement for all mine water and run-off to be directed to the Retention and Settling/ Neutralization Ponds as outlined in Part D, Item 1 and 7. The objective of the Interim Water Management Plan is to monitor run-off from the Ore Storage and Waste Rock Pad areas, assess water quality trends in run-off waters and the receiving environment, and develop a framework for implementation of water management contingency measures. The Water Management Plan is intended to be representative of the Precautionary Approach in that it intends to identify potential environmental risks as they emerge, and provide response before environmental impact occurs.

A fundamental component of the Interim Water Management Plan is a monitoring program that is designed to provide an indication of when environmental management is necessary. In this way, confidence is provided that the information necessary for the assessment of environmental conditions is gathered and evaluated against pre-determined "triggers" or "thresholds".

The plan consists of the following key components:

- Establishment of monitoring requirements including the location and frequency of sample collection;
- Establishment of specific indicators indicative of water quality degradation.
- Establishment of specific thresholds which define the conditions, in terms of the specific indicators, when management actions should be taken;
- Methods for the evaluation of monitoring results;
- Establishment of the approach to responses to be implemented if any specific thresholds have been crossed;
- Establishment of review and reporting requirements.

In addition, the plan also includes a Mine Ice Management Plan to deal with water being generated as part of ice excavation during the re-opening of the portal. The objective of the Mine Ice Management Plan is to monitoring mine ice, associated surface run-off, and receiving water quality during of mine excavation activities and outline contingency measures in the event degraded water quality is encountered.

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Figures

Figure 1 Ulu Mine Site – Existing Facilities

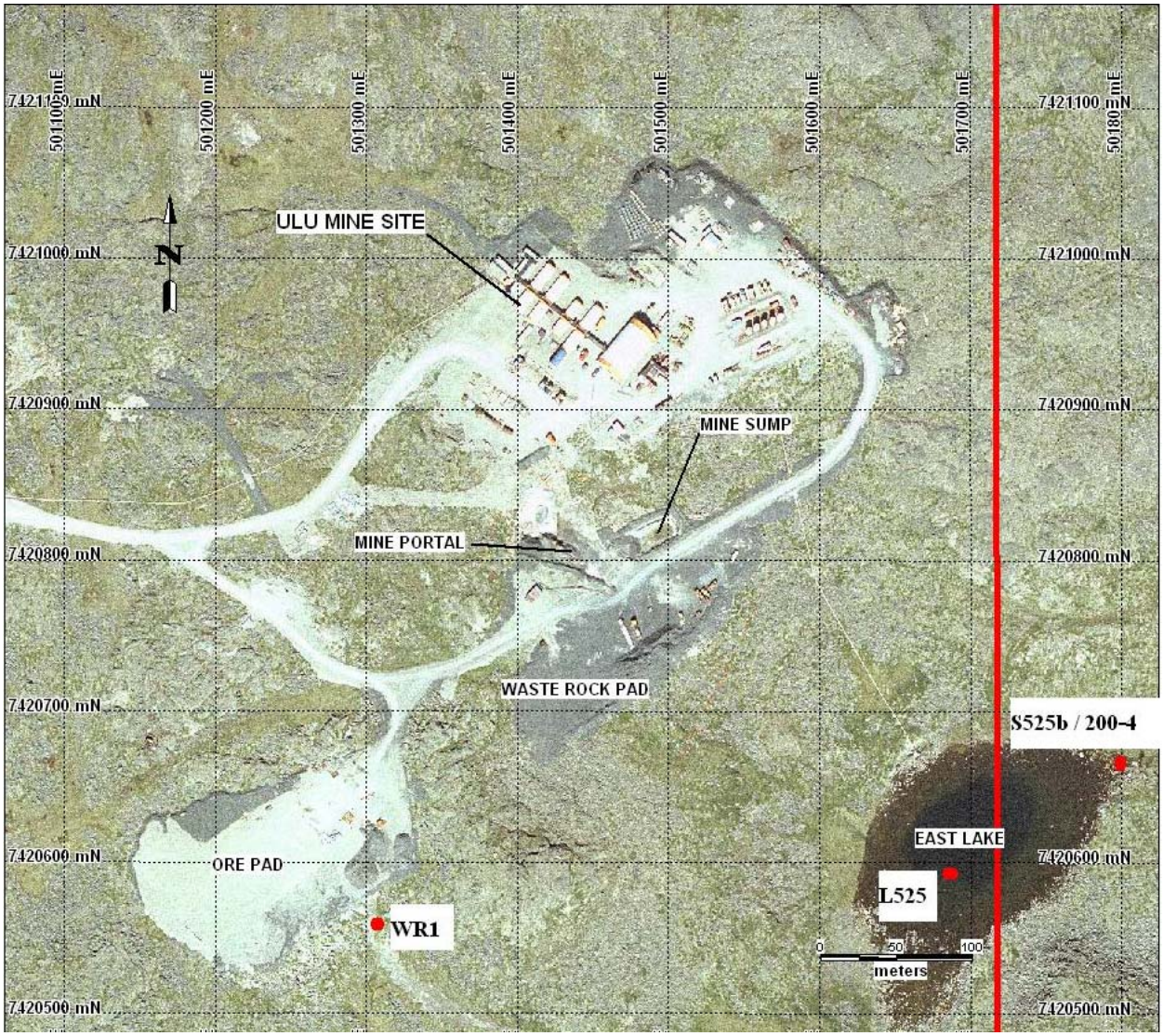

Figure 2 Ulu Mine Site – Water Quality Sample Locations

Appendices

Appendix A. East Lake and East Lake Outflow Water Quality Data

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Table A1. Summary of East Lake Water Quality Data (2004 - 2005)
East Lake (L525-T)

				East Lake	
				L525-T	L525-T
Parameter	**Units**	**WL Discharge Requirement[1]**	**CCME Aquatic Life**	**22-Aug-04**	**6-Aug-05**
Physical Tests					
pH (lab)	pH unit		6.5-9.0	6.86	7.21
Conductivity	uS/cm			103	270
Total Dissolved Solids	mg/L			49.8	137
Hardness CaCO3	mg/L			23.9	47.8
Total Suspended Solids	mg/L	50		<4.0	<4.0
Turbidity	NTU			3.1	0.4
Major Ions					
Alkalinity-Gran Total CaCO3	mg/L			9.9	1.7
Chloride	mg/L			8.89	54.9
Sulphate SO4	mg/L			20.4	24.3
Nutrients					
Ammonia Nitrogen	mg/L			0.12	0.042
Total Kjeldahl Nitrogen	mg/L			0.4	0.327
Nitrate Nitrogen	mg/L		13	0.011	0.979
Nitrite Nitrogen	mg/L		0.06	<0.0050	0.0077
Nitrate/Nitrite Nitrogen	mg/L			0.01	0.987
Dissolved ortho-phosphate	mg/L			0.004	<0.0010
Total Phosphorous	mg/L			0.0184	0.0086
Organics					
Total Organic Carbon	mg/L			2.62	3.24
Dissolved Organic Carbon	mg/L			2.9	2.73
Total Metals					
Aluminum	mg/L		0.005-0.1[b]	0.0063	0.0145
Antimony	mg/L			<0.00010	<0.00010
Arsenic	mg/L	1.00	0.005	0.00042	<0.00030
Barium	mg/L			0.00537	0.0133
Boron	mg/L			<0.010	0.016
Cadmium	mg/L		0.000017[c]	<0.000050	<0.000050
Calcium	mg/L			6.02	13.7
Chromium	mg/L		0.001	<0.00050	<0.00050
Copper	mg/L	0.60	0.002-0.004[d]	0.00182	0.00188
Iron	mg/L		0.3	0.08	0.053
Lead	mg/L	0.40	0.001-0.007[e]	<0.000050	0.00005
Manganese	mg/L			0.0153	0.00488
Mercury	mg/L		0.000026	<0.000050	<0.000050
Molybdenum	mg/L		0.073	<0.000050	0.000078
Nickel	mg/L	1.00	0.025-0.15[f]	0.00159	0.00138
Selenium	mg/L		0.001	<0.0010	<0.0010
Silver	mg/L		0.0001	<0.000010	<0.000010
Sodium	mg/L			8.07	33.1
Zinc	mg/L	1.00	0.03	0.0028	0.005
Dissolved Metals					
Aluminum	mg/L			0.0036	0.0125
Antimony	mg/L			<0.00010	<0.00010
Arsenic	mg/L			0.00037	<0.00030
Barium	mg/L			0.00521	0.013
Boron	mg/L			<0.010	0.015
Cadmium	mg/L			<0.000050	<0.000050
Calcium	mg/L			6	13.5
Chromium	mg/L			<0.00050	<0.00050
Copper	mg/L			0.0017	0.00173
Iron	mg/L			<0.030	0.043
Lead	mg/L			<0.000050	<0.000050
Manganese	mg/L			0.0123	0.00457
Mercury	mg/L			<0.000050	<0.000050
Molybdenum	mg/L			<0.000050	0.000066
Nickel	mg/L			0.00157	0.0014
Selenium	mg/L			<0.0010	<0.0010
Silver	mg/L			<0.000010	<0.000010
Sodium	mg/L			8.2	32.9
Zinc	mg/L			0.0048	0.0078

All units mg/l unless otherwise noted

a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2003

b) 0.005mg/L at pH < 6.5, [Ca2+] < 4 mg/L, DOC < 2 mg/L: 0.1 mg/L at pH $\geq$ 6.5, [Ca2+] $\geq$ 4 mg/L, DOC $\geq$ 2 mg/L

c) Hardness based guideline = $10^{\{0.86[\log(\text{hardness})]-3.2\}}$

d) 0.002 mg/L at [CaCO3] = 0 - 120 mg/L; 0.003 mg/L at [CaCO3] =120 - 180 mg/L; 0.004 mg/L at [CaCO3] >180mg/L

e) 0.001 mg/L at [CaCO3] = 0 - 60 mg/L; 0.002 mg/L at [CaCO3] =60 - 120 mg/L; 0.004 mg/L at [CaCO3] =120 -180mg/L; 0.007 mg/L at [CaCO3] > 180mg/L

f) 0.025 mg/L at [CaCO3] = 0 - 60 mg/L; 0.065 mg/L at [CaCO3] =60 - 120 mg/L; 0.110 mg/L at [CaCO3] =120 -180mg/L; 0.150 mg/L at [CaCO3] > 180mg/L

Note 1: Water Licence Discharge Requirements are maximum grab sample concentration for discharges from waste rock/ore storage areas. Provided for information only.

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Table A2. Summary of East Lake Outflow Water Quality Data (2005)
East Lake Outlet (S525b and 200-4)

				East Lake Outflow			
				S525b	200-4	S525b	200-4
Parameter	**Units**	**WL Discharge Requirement[1]**	**CCME Aquatic Life**	**18-Jun-05**	**13-Jul-05**	**6-Aug-05**	**17-Aug-05**
Physical Tests							
pH (lab)	pH unit		6.5-9.0	6.66	6.65	7.11	6.8
Conductivity	uS/cm			84.3		272	
Total Dissolved Solids	mg/L			41.4		135	
Hardness CaCO3	mg/L			22.4		50.6	
Total Suspended Solids	mg/L	50		<4.0	<3	419	<3
Turbidity	NTU			2.56		114	
Major Ions							
Alkalinity-Gran Total CaCO3	mg/L			9.2		1.9	
Chloride	mg/L			6.19		57.4	
Sulphate SO4	mg/L			16.8		20.8	
Nutrients							
Ammonia Nitrogen	mg/L			0.07		0.086	
Total Kjeldahl Nitrogen	mg/L			0.331		1.81	
Nitrate Nitrogen	mg/L		13	0.189		0.181	
Nitrite Nitrogen	mg/L		0.06	<0.0050		<0.0050	
Nitrate/Nitrite Nitrogen	mg/L			0.189		0.181	
Dissolved ortho-phosphate	mg/L			0.0013		0.0013	
Total Phosphorous	mg/L			0.012		0.055	
Organics							
Total Organic Carbon	mg/L			3.86		6.3	
Dissolved Organic Carbon	mg/L			3.5		3.02	
Total Metals							
Aluminum	mg/L		0.005-0.1[b]	0.0796		11.6	
Antimony	mg/L			<0.00010		0.00028	
Arsenic	mg/L	1.00	0.005	0.00051	0.0006	0.036	0.0005
Barium	mg/L			0.00714		0.169	
Boron	mg/L			<0.010		0.015	
Cadmium	mg/L		0.000017[c]	<0.000050	<0.0001	0.00403	<0.00005
Calcium	mg/L			6.33		18	
Chromium	mg/L		0.001	<0.00050		0.0181	
Copper	mg/L	0.60	0.002-0.004[d]	0.0025	0.0034	0.0748	0.0037
Iron	mg/L		0.3	0.354		36.2	
Lead	mg/L	0.40	0.001-0.007[e]	0.000091	<0.0001	0.0171	<0.0001
Manganese	mg/L			0.043		10.1	
Mercury	mg/L		0.000026			<0.000050	
Molybdenum	mg/L		0.073	<0.000050		0.00201	
Nickel	mg/L	1.00	0.025-0.15[f]	0.00228	0.0025	0.106	0.0017
Selenium	mg/L		0.001	<0.0010		0.0022	
Silver	mg/L		0.0001	<0.000010		0.000314	
Sodium	mg/L			4.37		31.6	
Zinc	mg/L	1.00	0.03	0.0054	0.01	0.268	0.0059
Dissolved Metals							
Aluminum	mg/L					0.0258	
Antimony	mg/L					<0.0001	
Arsenic	mg/L					0.0004	
Barium	mg/L					0.0202	
Boron	mg/L					0.011	
Cadmium	mg/L					0.000364	
Calcium	mg/L					13.9	
Chromium	mg/L					<0.0005	
Copper	mg/L					0.00199	
Iron	mg/L					0.054	
Lead	mg/L					<0.00005	
Manganese	mg/L					0.515	
Mercury	mg/L					<0.00005	
Molybdenum	mg/L					<0.00005	
Nickel	mg/L					0.0074	
Selenium	mg/L					<0.001	
Silver	mg/L					<0.00001	
Sodium	mg/L					31	
Zinc	mg/L					0.0242	

All units mg/l unless otherwise noted

a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2003

b) 0.005mg/L at pH < 6.5, [Ca2+] < 4 mg/L, DOC < 2 mg/L: 0.1 mg/L at pH ≥ 6.5, [Ca2+] ≥ 4 mg/L, DOC ≥ 2 mg/L

c) Hardness based guideline = $10^{\{0.86[\log(\text{hardness})]-3.2\}}$

d) 0.002 mg/L at [CaCO3] = 0 - 120 mg/L; 0.003 mg/L at [CaCO3] =120 - 180 mg/L; 0.004 mg/L at [CaCO3] >180mg/L

e) 0.001 mg/L at [CaCO3] = 0 - 60 mg/L; 0.002 mg/L at [CaCO3] =60 - 120 mg/L; 0.004 mg/L at [CaCO3] =120 -180mg/L; 0.007 mg/L at [CaCO3] > 180mg/L

f) 0.025 mg/L at [CaCO3] = 0 - 60 mg/L; 0.065 mg/L at [CaCO3] =60 - 120 mg/L; 0.110 mg/L at [CaCO3] =120 -180mg/L; 0.150 mg/L at [CaCO3] > 180mg/L

Note 1: Water Licence Discharge Requirements are maximum grab sample concentration for discharges from waste rock/ore storage areas. Provided for information only.

Appendix B. Ulu Lake and Ulu Lake Outflow Water Quality Data

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Table B1. Summary of Ulu Lake Water Quality Data (2004 - 2005)
Ulu Lake (L504-T)

				Ulu Lake				
				L504-T	L504-T	L504-T	L504-T	L504-T
Parameter	Units	WL Discharge Requirement[1]	CCME Aquatic Life	19-May-04	19-Jul-04	21-Aug-04	25-May-05	4-Aug-05
Physical Tests								
pH (lab)	pH unit		6.5-9.0	7.14	6.5	6.54	6.61	7.21
Conductivity	uS/cm			82.6	39.9	42.1	59.6	34
Total Dissolved Solids	mg/L			38	20	19.2	28	14.9
Hardness CaCO3	mg/L			26.1	13.6	14.1	18.8	12.6
Total Suspended Solids	mg/L	50		<4.0	<4.0	<4.0	<4.0	<4.0
Turbidity	NTU			0.24	0.26	1.46	0.21	0.34
Major Ions								
Alkalinity-Gran Total CaCO3	mg/L			7	5.2	3.5	7.2	<1.0
Chloride	mg/L			3.03	1.7	1.86	2.57	2.14
Sulphate SO4	mg/L			22.8	9.5	9.2	13.7	6.2
Nutrients								
Ammonia Nitrogen	mg/L			0.0199	<0.020	0.0079	0.014	<0.020
Total Kjeldahl Nitrogen	mg/L			0.132	0.089	0.096	0.133	0.089
Nitrate Nitrogen	mg/L		13	0.089	<0.0050	<0.0050	0.015	<0.0050
Nitrite Nitrogen	mg/L		0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrate/Nitrite Nitrogen	mg/L			0.09	<0.0050	<0.0050	0.02	<0.0071
Dissolved ortho-phosphate	mg/L			<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Total Phosphorous	mg/L			<0.0020	0.0028	0.0024	0.0073	0.0093
Organics								
Total Organic Carbon	mg/L				2.33	2.15	2.49	2.37
Dissolved Organic Carbon	mg/L			2.08	2.11	2.19	2.28	2
Chlorophyll a	ug/L			0.879	0.731	0.606	1.228	0.184
Total Metals								
Aluminum	mg/L		0.005-0.1[b]	0.0118	0.0219	0.0118	0.0189	0.0241
Antimony	mg/L			<0.00020	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	1.00	0.005	<0.00020	<0.00010	<0.00010	0.0001	<0.00010
Barium	mg/L			0.00734	0.00366	0.00322	0.00568	0.00324
Boron	mg/L			<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L		0.000017[c]	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Calcium	mg/L			5.59	2.68	2.74	4.39	2.71
Chromium	mg/L		0.001	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Copper	mg/L	0.60	0.002-0.004[d]	0.00238	0.00207	0.00161	0.00276	0.00252
Iron	mg/L		0.3	<0.030	<0.030	<0.030	<0.030	<0.030
Lead	mg/L	0.40	0.001-0.007[e]	0.000094	<0.000050	<0.000050	<0.000050	0.000086
Manganese	mg/L			0.00388	0.00471	0.00402	0.00466	0.00307
Mercury	mg/L		0.000026	<0.000010	<0.000050	<0.000050	<0.000050	<0.000050
Molybdenum	mg/L		0.073	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Nickel	mg/L	1.00	0.025-0.15[f]	0.0038	0.00222	0.00136	0.00339	0.00168
Selenium	mg/L		0.001	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010
Silver	mg/L		0.0001	<0.000010	<0.000010	<0.000010	<0.000010	0.000047
Sodium	mg/L			2.4	1.18	1.24	1.75	<2.0
Zinc	mg/L	1.00	0.03	0.012	0.0061	0.003	0.0095	0.0054
Dissolved Metals								
Aluminum	mg/L			0.01	0.0119	0.0062	0.0166	0.0127
Antimony	mg/L			<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L			0.00012	<0.00010	0.00012	<0.00010	<0.00010
Barium	mg/L			0.00725	0.0035	0.0033	0.00536	0.00285
Boron	mg/L			<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	mg/L			<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Calcium	mg/L			5.41	2.68	2.82	4.04	2.68
Chromium	mg/L			<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Copper	mg/L			0.00224	0.00197	0.00157	0.00247	0.00218
Iron	mg/L				<0.030	<0.030	<0.030	<0.030
Lead	mg/L			<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Manganese	mg/L			0.00301	0.00346	0.00305	0.00366	0.00209
Mercury	mg/L				<0.000050	<0.000050	<0.000050	<0.000050
Molybdenum	mg/L			<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Nickel	mg/L			0.00363	0.00215	0.00136	0.00314	0.00153
Selenium	mg/L			<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silver	mg/L			<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L				1.18	1.3	1.91	<2.0
Zinc	mg/L			0.0131	0.0102	0.0064	0.0133	0.007

All units mg/l unless otherwise noted

a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2003

b) 0.005mg/L at pH < 6.5, [Ca2+] < 4 mg/L, DOC < 2 mg/L: 0.1 mg/L at pH $\geq$ 6.5, [Ca2+] $\geq$ 4 mg/L, DOC $\geq$ 2 mg/L

c) Hardness based guideline = $10^{\{0.86[\log(\text{hardness})]-3.2\}}$

d) 0.002 mg/L at [CaCO3] = 0 - 120 mg/L; 0.003 mg/L at [CaCO3] =120 - 180 mg/L; 0.004 mg/L at [CaCO3] >180mg/L

e) 0.001 mg/L at [CaCO3] = 0 - 60 mg/L; 0.002 mg/L at [CaCO3] =60 - 120 mg/L; 0.004 mg/L at [CaCO3] =120 -180mg/L; 0.007 mg/L at [CaCO3] > 180mg/L

f) 0.025 mg/L at [CaCO3] = 0 - 60 mg/L; 0.065 mg/L at [CaCO3] =60 - 120 mg/L; 0.110 mg/L at [CaCO3] =120 -180mg/L; 0.150 mg/L at [CaCO3] > 180mg/L

Note 1: Water Licence Discharge Requirements are maximum grab sample concentration for discharges from waste rock/ore storage areas. Provided for information only.

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Table B2. Summary of Ulu Lake Outflow Water Quality Data (2004 - 2005)
Ulu Lake Outlet (S504b and 200-5)

				Ulu Lake Outflow				
				S504b	S504b	200-5	S504b	200-5
Parameter	**Units**	**WL Discharge Requirement[1]**	**CCME Aquatic Life**	**19-Jul-04**	**18-Jun-05**	**13-Jul-05**	**5-Aug-05**	**17-Aug-05**
Physical Tests								
pH (lab)	pH unit		6.5-9.0	6.51	6.43	6.63	6.95	6.74
Conductivity	uS/cm			40.7	27		32.9	
Total Dissolved Solids	mg/L			24	12.9		15.8	
Hardness CaCO3	mg/L			13.7	8.51		12.3	
Total Suspended Solids	mg/L	50		<4.0	<4.0	<3.0	<4.0	<3
Turbidity	NTU			0.76	0.64		0.41	
Major Ions								
Alkalinity-Gran Total CaCO3	mg/L			3.6	4.2		1.1	
Chloride	mg/L			1.74	1.22		2.14	
Sulphate SO4	mg/L			9.6	4.8		6.3	
Nutrients								
Ammonia Nitrogen	mg/L			<0.020	<0.020		<0.020	
Total Kjeldahl Nitrogen	mg/L			0.096	0.163		0.087	
Nitrate Nitrogen	mg/L		13	<0.0050	0.012		<0.0050	
Nitrite Nitrogen	mg/L		0.06	<0.0050	<0.0050		<0.0050	
Nitrate/Nitrite Nitrogen	mg/L			<0.0050	0.012		<0.0071	
Dissolved ortho-phosphate	mg/L			<0.0010	<0.0010		<0.0010	
Total Phosphorous	mg/L			0.0029	0.0107		0.01	
Organics								
Total Organic Carbon	mg/L			7	2.72		3.4	
Dissolved Organic Carbon	mg/L			2.17	2.49		2.1	
Total Metals								
Aluminum	mg/L		0.005-0.1[b]	0.0167	0.0535		0.0147	
Antimony	mg/L			<0.00010	<0.00010		<0.00010	
Arsenic	mg/L	1.00	0.005	<0.00010	<0.00010	<0.0002	<0.00010	<0.0002
Barium	mg/L			0.00326	0.00333		0.00311	
Boron	mg/L			<0.010	<0.010		<0.010	
Cadmium	mg/L		0.000017[c]	<0.000050	<0.000050	<0.0001	<0.000050	<0.00005
Calcium	mg/L			2.63	1.93		2.68	
Chromium	mg/L		0.001	<0.00050	<0.00050		<0.00050	
Copper	mg/L	0.60	0.002-0.004[d]	0.00181	0.00236	0.0033	0.00183	0.002
Iron	mg/L		0.3	<0.030	<0.030		<0.030	
Lead	mg/L	0.40	0.001-0.007[e]	<0.000050	<0.000050	0.0001	<0.000050	<0.0001
Manganese	mg/L			0.00462	0.00452		0.002	
Mercury	mg/L		0.000026	<0.000050		0.00002	<0.000050	<0.00002
Molybdenum	mg/L		0.073	<0.000050	<0.000050		<0.000050	
Nickel	mg/L	1.00	0.025-0.15[f]	0.00154	0.00211	0.0019	0.00131	0.0014
Selenium	mg/L		0.001	<0.0010	<0.0010		<0.0010	
Silver	mg/L		0.0001	<0.000010	<0.000010		<0.000010	
Sodium	mg/L			1.17	0.847		<2.0	
Zinc	mg/L	1.00	0.03	0.0036	0.0063	<0.01	0.0034	0.0065
Dissolved Metals								
Aluminum	mg/L			0.0089			0.0102	
Antimony	mg/L			<0.00010			<0.00010	
Arsenic	mg/L			<0.00010			<0.00010	
Barium	mg/L			0.00318			0.00304	
Boron	mg/L			<0.010			<0.010	
Cadmium	mg/L			<0.000050			<0.000050	
Calcium	mg/L			2.67			2.62	
Chromium	mg/L			<0.00050			<0.00050	
Copper	mg/L			0.0016			0.00184	
Iron	mg/L			<0.030			<0.030	
Lead	mg/L			<0.000050			<0.000050	
Manganese	mg/L			0.00364			0.00046	
Mercury	mg/L			<0.000050			<0.000050	
Molybdenum	mg/L			0.000058			<0.000050	
Nickel	mg/L			0.0016			0.00128	
Selenium	mg/L			<0.0010			<0.0010	
Silver	mg/L			<0.000010			<0.000010	
Sodium	mg/L			1.21			<2.0	
Zinc	mg/L			0.0071			0.0067	

All units mg/l unless otherwise noted

a) Canadian water quality guidelines for the protection of aquatic life, Council of Ministers of the Environment, 2003

b) 0.005mg/L at pH < 6.5, [Ca2+] < 4 mg/L, DOC < 2 mg/L: 0.1 mg/L at pH ≥ 6.5, [Ca2+] ≥ 4 mg/L, DOC ≥ 2 mg/L

c) Hardness based guideline = $10^{\{0.86[\log(\text{hardness})]-3.2\}}$

d) 0.002 mg/L at [CaCO3] = 0 - 120 mg/L; 0.003 mg/L at [CaCO3] =120 - 180 mg/L; 0.004 mg/L at [CaCO3] >180mg/L

e) 0.001 mg/L at [CaCO3] = 0 - 60 mg/L; 0.002 mg/L at [CaCO3] =60 - 120 mg/L; 0.004 mg/L at [CaCO3] =120 -180mg/L; 0.007 mg/L at [CaCO3] > 180mg/L

f) 0.025 mg/L at [CaCO3] = 0 - 60 mg/L; 0.065 mg/L at [CaCO3] =60 - 120 mg/L; 0.110 mg/L at [CaCO3] =120 -180mg/L; 0.150 mg/L at [CaCO3] > 180mg/L

Note 1: Water Licence Discharge Requirements are maximum grab sample concentration for discharges from waste rock/ore storage areas. Provided for information only.