



August 11, 2005

Nunavut Water Board  
Box 119  
Gjoa Haven, NU  
X0B 0J0

**Attention: Phyllis Beaulieu, Manager of Licensing**

Indian and Northern Affairs Canada  
P.O. Box 100  
Iqaluit, Nunavut  
X0A 0H0

**Attention: Carl McLean, Manager, Lands Administration**

Dear Phyllis and Carl;

**Re: Polaris Mine Water Licence NWB1POL0311 – 2005 1<sup>st</sup> and 2<sup>nd</sup> Quarter Water Licence Report**

Please find attached the Polaris Mine 1<sup>st</sup> and 2<sup>nd</sup> Quarter 2005 Water Licence Report and Decommissioning and Reclamation Plan (DRP) Report. I will forward two paper copies of this report to your offices.

**1<sup>st</sup> Quarter, 2005**

During the 1<sup>st</sup> Quarter of 2005, the Polaris Mine remained un-occupied by personnel. No monitoring events occurred during the quarter.

The Water Licence requires a mid-winter sampling of Garrow Lake stratigraphy for water quality parameters. At mid-winter the site was not safely accessible. Charter aircraft will not fly to the site due to the dark conditions without the site having runway lighting and visual confirmation from the ground of landing conditions.

There was no monitoring of temperature conditions in the Little Red Dog Landfill or the Operational Landfill as the thermistors required to monitor the temperatures had not yet been installed. Work on capping the Little Red Dog Landfill continued right up until the reclamation activities were completed in September 2004 and the crews demobilized from site. It is planned to install these in the summer of 2005 once a crew is on site to conduct site clean-up and monitoring activities. Once the thermistors have been installed, temperature monitoring will be initiated.

As planned, the dam at Garrow Lake was decommissioned in 2004 so that there is no further need to monitor the integrity of the dam. As part of the dam decommissioning the thermistors were removed as part of the dam excavation.

With the site reclamation complete, the fresh water system and pump station have been removed so that reporting of freshwater use from Frustration Lake has been discontinued.

Due to winter conditions at the site throughout the 1<sup>st</sup> Quarter reporting period, there was no discharge from Garrow Lake and thus there is no effluent monitoring data to report.

## **2<sup>nd</sup> Quarter, 2005**

The majority of the 2<sup>nd</sup> Quarter the Polaris Mine site remained un-occupied by personnel. However, monitoring of the Garrow Lake stratigraphy for water quality was completed in early May to capture the Maximum Ice Thickness conditions as required by the Water Licence. Starting in mid-June, a crew of three people occupied the temporary camp for the following purposes:

- To undertake maintenance of the equipment and facilities remaining at site after completion of the main reclamation activities last year. Contractors had been in responsible for maintaining the facilities until they demobilized in September 2004 and as a result maintenance of the equipment and facilities were minimal. The temporary camp facilities and associated equipment require assessment and catch-up maintenance to ensure that we have an on-going viable base of operations to support the post-reclamation monitoring phase of the project.
- To initiate additional clean-up of litter and debris remaining at the site after demobilization of the reclamation contractor as identified in the INAC inspection in September of 2004. At the end of this summer season, we will have a better idea of how much of the final clean-up has been accomplished in 2005 and what will remain to complete in the coming summer seasons.
- To conduct monitoring activities as required under the approvals of the Decommissioning and Reclamation Plan (DRP) and the Water Licence.

The Decommissioning and Reclamation Plan approvals have a number of parameters that must be monitored that are separate from the Water Licence. However during the 2<sup>nd</sup> Quarter due to the summer season just starting, the only items available for monitoring are itemized below. The majority of the detailed monitoring parameters required will be undertaking during the 3<sup>rd</sup> Quarter.

### **1. Garrow Lake Water Quality and Stratigraphy Monitoring**

Please find attached to this report, the results of the May 9th, 2005 sampling event of Garrow Lake. This represents the Maximum Ice Thickness monitoring event required by the Water Licence. As light conditions at this time of the year are excellent we were able access the site by charter plane despite the landing site being abandoned through the winter.

The attached results confirm that the stability of the stratigraphy and the water quality of Garrow Lake continue to be satisfactory as predicted. While not required by the Water Licence, a number of dissolved samples were collected to give a more comprehensive look at the water chemistry and have been included in this submission.

There was a problem with the TSS analysis conducted by the laboratory. Due to the brine content of the lake, processing of the TSS analysis required rinsing of the filters with fresh water prior to weighing. The laboratory did not do this and as a result the TSS results are inflated and reflect the water salinity rather than measuring particulates in the water column. We will remind the laboratory of this issue before the samples from the next sampling event are processed. Looking at previous

Garrow Lake data, it is apparent that this same problem has occurred before without being detected. The environmental scientist collecting the samples in May noted the clarity of the samples in the field so that when the laboratory results were received, he identified a concern with the TSS numbers. Discussions with the laboratory confirmed problem with the analysis methodology.

Equipment problems with the Hydrolab resulted in not obtaining field pH and dissolved oxygen data. The Hydrolab has since been repaired and calibrated in preparation for the Minimum Ice Thickness monitoring event scheduled for August.

## **2. Water Quality and Environmental Effects Monitoring Program**

Please find attached the Garrow Creek effluent monitoring report (As per Part H of the Water Licence) for the Polaris Mine for the 2nd Quarter of 2005. Flow initiated at the end of June (approximately June 25th, 2005), thus only one sample was collected during the 2nd quarter. This first routine monitoring sample was collected on Wednesday June 29, 2005. All routine parameters, plus additional EEM water quality parameters were analyzed on this sample. However, only the final discharge point (i.e., Garrow Creek station) was accessible at this time due to ice conditions in Garrow Bay precluding sample collection from the receiving and reference stations. An oversight by the ALS lab resulted in mercury, nitrate, and alkalinity analysis being conducted slightly after the holding times. A written explanation of this oversight is attached as APPENDIX E of the monitoring report (note the pdf file from ALS is protected so it can not be inserted electronically into this document and so is being submitted as a separate electronic document). Concentrations of all deleterious substances were well within Water Licence limits.

While a toxicity program (acute and sublethal) was considered for this event, EVS and Stantec laboratories were not able to accommodate sample receiving or testing at this time, due to the statutory holiday (i.e., Friday July 1, 2005). Toxicity sample shipment to meet holding times would also have been problematic due to the holiday. Thus, toxicity testing was attempted at the earliest possible timing, which was in July, and will be discussed in the 3rd quarter report.

Yours truly,



Bruce J. Donald  
Reclamation Manager  
Environment and Corporate Affairs  
Teck Cominco Limited

Enclosures (2):

- 2<sup>nd</sup> Quarter 2005 Garrow Lake May 2005 Monitoring Data Report, and
- 2<sup>nd</sup> Quarter 2005 Water Quality Monitoring and Environmental Effects Monitoring Report

**POLARIS MINE**

**GARROW LAKE MAXIMUM ICE THICKNESS**

**WATER QUALITY AND STRATIGRAPHY MONITORING EVENT**

**2<sup>ND</sup> QUARTER, 2005**

**Project** TC-05-02 Garrow Analysis  
**Report to** Azimuth Consulting Group Inc.  
**ALS File No.** V8130  
**Date Received** 13/05/2005  
**Date:** 06/06/2005

Conventions:  
GLC Represents Water Licence Monitoring Station # 262 - 3 (Garrow Lake Centre)  
GLS Represents Water Licence Monitoring Station # 262 - 3A (Garrow Lake South - Near Outlet)

**DETECTION LIMITS**

Sample ID	GLS- 2m	GLS- 3m	GLS- 4m	GLS- 5m	GLS- 6m	GLS- 7m	GLS- 8m	GLS- 9m	GLS- 10m	GLS- 11m	GLS- 12m	GLS- 13m	GLS- 14m	GLS- 15m	GLS- 16m	GLS- 17m	GLS- 18m	GLS- 19m	GLS- 20m	GLC- 2m	GLC- 3m	GLC- 4m	GLC- 5m	GLC- 6m
Date Sampled	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005
Time Sampled																								
ALS Sample ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
<b>Physical Tests</b>																								
Conductivity (uS/cm)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Hardness CaCO3	-	5.4	-	5.4	-	5.4	-	5.4	-	-	-	-	-	-	-	-	-	27	-	5.4	-	5.4	-	-
pH	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Salinity o/oo	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total Suspended Solids	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
<b>Dissolved Anions</b>																								
Alkalinity-Total CaCO3	-	2.0	-	2.0	-	2.0	-	2.0	-	-	-	-	-	-	-	-	-	-	2.0	-	2.0	-	2.0	-
<b>Total Metals</b>																								
Aluminum T-Al	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.020	0.020	0.020	0.020	0.020
Arsenic T-As	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020
Cadmium T-Cd	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020
Calcium T-Ca	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.50	0.50	0.50	0.50	0.50
Copper T-Cu	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Iron T-Fe	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
Lead T-Pb	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Magnesium T-Mg	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	1.0	1.0	1.0	1.0	1.0
Mercury T-Hg	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010
Molybdenum T-Mo	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0010	0.0010	0.0010	0.0010	0.0010
Nickel T-Ni	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Zinc T-Zn	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
<b>Dissolved Metals</b>																								
Aluminum D-Al	-	0.020	-	0.020	-	0.020	-	0.10	-	-	-	-	-	-	-	-	-	-	0.10	-	0.020	-	0.020	-
Arsenic D-As	-	0.00020	-	0.00020	-	0.00020	-	0.00020	-	-	-	-	-	-	-	-	-	-	0.00020	-	0.00020	-	0.00020	-
Cadmium D-Cd	-	0.000020	-	0.000020	-	0.000020	-	0.000020	-	-	-	-	-	-	-	-	-	-	0.000020	-	0.000020	-	0.000020	-
Calcium D-Ca	-	0.50	-	0.50	-	0.50	-	0.50	-	-	-	-	-	-	-	-	-	-	2.5	-	0.50	-	0.50	-
Copper D-Cu	-	0.000050	-	0.000050	-	0.000050	-	0.000050	-	-	-	-	-	-	-	-	-	-	0.000050	-	0.000050	-	0.000050	-
Iron D-Fe	-	0.010	-	0.010	-	0.010	-	0.010	-	-	-	-	-	-	-	-	-	-	0.010	-	0.010	-	0.010	-
Lead D-Pb	-	0.000050	-	0.000050	-	0.000050	-	0.000050	-	-	-	-	-	-	-	-	-	-	0.000050	-	0.000050	-	0.000050	-
Magnesium D-Mg	-	1.0	-	1.0	-	1.0	-	1.0	-	-	-	-	-	-	-	-	-	-	5.0	-	1.0	-	1.0	-
Mercury D-Hg	-	0.000010	-	0.000010	-	0.000010	-	0.000010	-	-	-	-	-	-	-	-	-	-	0.000010	-	0.000010	-	0.000010	-
Molybdenum D-Mo	-	0.0010	-	0.0010	-	0.0010	-	0.0050	-	-	-	-	-	-	-	-	-	-	0.0050	-	0.0010	-	0.0010	-
Nickel D-Ni	-	0.000050	-	0.000050	-	0.000050	-	0.000050	-	-	-	-	-	-	-	-	-	-	0.000050	-	0.000050	-	0.000050	-
Zinc D-Zn	-	0.00050	-	0.00050	-	0.00050	-	0.00050	-	-	-	-	-	-	-	-	-	-	0.00050	-	0.00050	-	0.00050	-
<b>Inorganic Parameters</b>																								
Sulphide S	-	0.020	-	0.020	-	0.020	-	0.020	-	-	-	-	-	-	-	-	-	-	0.020	-	0.020	-	0.020	-

Project TC-05-02 Garrow Analysis  
Report to Azimuth Consulting Group Inc.  
ALS File No. V8130  
Date Received 13/05/2005  
Date: 06/06/2005

DETECTION LIMITS

Sample ID	GLC- 7m	GLC- 8m	GLC- 9m	GLC- 10m	GLC- 11m	GLC- 12m	GLC- 13m	GLC- 14m	GLC- 15m	GLC- 16m	GLC- 17m	GLC- 18m	GLC- 19m	GLC- 20m	GLC- 22m	GLC- 30m	GLC- 40m
Date Sampled	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005
Time Sampled																	
ALS Sample ID	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests																	
Conductivity (uS/cm)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Hardness CaCO3	5.4	-	5.4	-	-	-	-	-	-	-	-	-	-	27	-	27	27
pH	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Salinity o/oo	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total Suspended Solids	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Dissolved Anions																	
Alkalinity-Total CaCO3	2.0	-	2.0	-	-	-	-	-	-	-	-	-	-	2.0	-	2.0	2.0
Total Metals																	
Aluminum T-Al	0.020	0.020	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Arsenic T-As	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020
Cadmium T-Cd	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020
Calcium T-Ca	0.50	0.50	0.50	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Copper T-Cu	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Iron T-Fe	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
Lead T-Pb	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Magnesium T-Mg	1.0	1.0	1.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Mercury T-Hg	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010
Molybdenum T-Mo	0.0010	0.0010	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
Nickel T-Ni	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Zinc T-Zn	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
Dissolved Metals																	
Aluminum D-Al	0.020	-	0.10	-	-	-	-	-	-	-	-	-	-	0.10	-	0.10	0.10
Arsenic D-As	0.00020	-	0.00020	-	-	-	-	-	-	-	-	-	-	0.00020	-	0.00020	0.00020
Cadmium D-Cd	0.000020	-	0.000020	-	-	-	-	-	-	-	-	-	-	0.000020	-	0.000020	0.000020
Calcium D-Ca	0.50	-	0.50	-	-	-	-	-	-	-	-	-	-	2.5	-	2.5	2.5
Copper D-Cu	0.000050	-	0.000050	-	-	-	-	-	-	-	-	-	-	0.000050	-	0.000050	0.000050
Iron D-Fe	0.010	-	0.010	-	-	-	-	-	-	-	-	-	-	0.010	-	0.010	0.010
Lead D-Pb	0.000050	-	0.000050	-	-	-	-	-	-	-	-	-	-	0.000050	-	0.000050	0.000050
Magnesium D-Mg	1.0	-	1.0	-	-	-	-	-	-	-	-	-	-	5.0	-	5.0	5.0
Mercury D-Hg	0.000010	-	0.000010	-	-	-	-	-	-	-	-	-	-	0.000010	-	0.000010	0.000010
Molybdenum D-Mo	0.0010	-	0.0050	-	-	-	-	-	-	-	-	-	-	0.0050	-	0.0050	0.0050
Nickel D-Ni	0.000050	-	0.000050	-	-	-	-	-	-	-	-	-	-	0.000050	-	0.000050	0.000050
Zinc D-Zn	0.00050	-	0.00050	-	-	-	-	-	-	-	-	-	-	0.00050	-	0.00050	0.00050
Inorganic Parameters																	
Sulphide S	0.020	-	0.020	-	-	-	-	-	-	-	-	-	-	0.020	-	0.10	0.40

**Project** TC-05-02 Garrow Analysis  
**Report to** Azimuth Consulting Group Inc.  
**ALS File No.** V8130  
**Date Received** 13/05/2005  
**Date:** 06/06/2005

Conventions:

GLC Represents Water Licence Monitoring Station # 262 - 3 (Garrow Lake Centre)  
 GLS Represents Water Licence Monitoring Station # 262 - 3A (Garrow Lake South - Near Outlet)

Duplicate Results

Sample ID	GLS- 6m	GLS- 6m	RPD %	GLS- 20m	GLS- 20m	RPD %	GLC- 9m	GLC- 9m	RPD %	GLC- 20m	GLC- 20m	RPD %
Date Sampled	09/05/2005	QC# 441213		09/05/2005	QC# 441214		09/05/2005	QC# 441215		09/05/2005	QC# 441216	
Time Sampled												
ALS Sample ID	5			19			27			38		
Nature	Water			Water			Water			Water		

Physical Tests

Conductivity (uS/cm)	13700	13700	0	78600	78700	0.127	42400	42500	0.236	78400	78500	0.127
Hardness CaCO3	-	-	-	12500	12500	0	5990	5940	0.838	12500	12000	4.08
pH	8.04	8.04	0	7.63	7.65	0.262	7.65	7.65	0	7.67	7.68	0.13
Salinity o/oo	8.6	8.6	0	59.6	59.7	0.168	29.6	29.6	0	59.4	59.5	0.168

Dissolved Anions

Alkalinity-Total CaCO3	-	-	-	400	406	1.49	178	183	2.77	402	405	0.743
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Total Metals

Aluminum T-Al	<0.020	<0.020	0	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
Arsenic T-As	0.00025	<0.00020	22.2	0.00038	0.00038	0	0.00022	<0.00020	9.52	0.00045	0.00046	2.2
Cadmium T-Cd	0.000585	0.000626	6.77	0.000034	0.000034	0	0.00285	0.00282	1.06	0.000037	0.000032	14.5
Calcium T-Ca	145	146	0.687	812	834	2.67	432	438	1.38	807	811	0.494
Copper T-Cu	0.0010	0.0011	9.52	<0.0010	<0.0010	0	0.0043	0.0040	7.23	<0.0010	<0.0010	0
Iron T-Fe	<0.030	<0.030	0	0.221	0.218	1.37	<0.030	<0.030	0	0.231	0.230	0.434
Lead T-Pb	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0	0.0010	0.0010	0
Magnesium T-Mg	307	306	0.326	2510	2580	2.75	1380	1410	2.15	2470	2460	0.406
Mercury T-Hg	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Molybdenum T-Mo	0.0037	0.0030	20.9	0.0052	<0.0050	3.92	<0.0050	<0.0050	0	0.0057	<0.0050	13.1
Nickel T-Ni	0.0037	0.0039	5.26	0.0079	0.0080	1.26	0.0084	0.0080	4.88	0.0080	0.0083	3.68
Zinc T-Zn	0.219	0.228	4.03	0.0415	0.0418	0.72	1.12	1.09	2.71	0.0425	0.0438	3.01

Dissolved Metals

Aluminum D-Al	-	-	-	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
Arsenic D-As	-	-	-	0.00040	<0.00020	66.7	<0.00020	0.00024	18.2	0.00027	<0.00020	29.8
Cadmium D-Cd	-	-	-	<0.000020	<0.000020	0	0.00252	0.00252	0	<0.000020	<0.000020	0
Calcium D-Ca	-	-	-	815	824	1.1	385	382	0.782	826	789	4.58
Copper D-Cu	-	-	-	0.000248	0.000222	11.1	0.00364	0.00353	3.07	0.000218	0.000215	1.39
Iron D-Fe	-	-	-	0.215	0.218	1.39	<0.010	<0.010	0	0.204	0.204	0
Lead D-Pb	-	-	-	<0.000050	<0.000050	0	0.000263	0.000251	4.67	<0.000050	<0.000050	0
Magnesium D-Mg	-	-	-	2530	2540	0.394	1220	1210	0.823	2520	2430	3.64
Mercury D-Hg	-	-	-	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Molybdenum D-Mo	-	-	-	<0.0050	0.0052	3.92	<0.0050	<0.0050	0	<0.0050	<0.0050	0
Nickel D-Ni	-	-	-	0.00802	0.00795	0.877	0.00746	0.00745	0.134	0.00750	0.00772	2.89
Zinc D-Zn	-	-	-	0.00581	0.00552	5.12	0.876	0.884	0.909	0.00307	0.00284	7.78

Inorganic Parameters

Sulphide S	-	-	-	0.030	0.032	6.45	<0.020	<0.020	0	0.049	0.070	35.3
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**Project** TC-05-02 Garrow Analysis  
**Report to** Azimuth Consulting Group Inc.  
**ALS File No.** V8130  
**Date Received** 13/05/2005  
**Date:** 06/06/2005

Conventions:  
GLC Represents Water Licence Monitoring Station # 262 - 3 (Garrow Lake Centre)  
GLS Represents Water Licence Monitoring Station # 262 - 3A (Garrow Lake South - Near Outlet)

**DETECTION LIMITS**

Sample ID	GLS- 2m	GLS- 3m	GLS- 4m	GLS- 5m	GLS- 6m	GLS- 7m	GLS- 8m	GLS- 9m	GLS- 10m	GLS- 11m	GLS- 12m	GLS- 13m	GLS- 14m	GLS- 15m	GLS- 16m	GLS- 17m	GLS- 18m	GLS- 19m	GLS- 20m	GLC- 2m	GLC- 3m	GLC- 4m	GLC- 5m	GLC- 6m
Date Sampled	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005
Time Sampled																								
ALS Sample ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
<b>Physical Tests</b>																								
Conductivity (uS/cm)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Hardness CaCO3	-	5.4	-	5.4	-	5.4	-	5.4	-	-	-	-	-	-	-	-	-	27	-	5.4	-	5.4	-	-
pH	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Salinity o/oo	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total Suspended Solids	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
<b>Dissolved Anions</b>																								
Alkalinity-Total CaCO3	-	2.0	-	2.0	-	2.0	-	2.0	-	-	-	-	-	-	-	-	-	-	2.0	-	2.0	-	2.0	-
<b>Total Metals</b>																								
Aluminum T-Al	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.020	0.020	0.020	0.020	0.020
Arsenic T-As	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020
Cadmium T-Cd	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020
Calcium T-Ca	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.50	0.50	0.50	0.50	0.50
Copper T-Cu	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Iron T-Fe	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
Lead T-Pb	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Magnesium T-Mg	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	1.0	1.0	1.0	1.0	1.0
Mercury T-Hg	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010
Molybdenum T-Mo	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0010	0.0010	0.0010	0.0010	0.0010
Nickel T-Ni	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Zinc T-Zn	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
<b>Dissolved Metals</b>																								
Aluminum D-Al	-	0.020	-	0.020	-	0.020	-	0.10	-	-	-	-	-	-	-	-	-	-	0.10	-	0.020	-	0.020	-
Arsenic D-As	-	0.00020	-	0.00020	-	0.00020	-	0.00020	-	-	-	-	-	-	-	-	-	-	0.00020	-	0.00020	-	0.00020	-
Cadmium D-Cd	-	0.000020	-	0.000020	-	0.000020	-	0.000020	-	-	-	-	-	-	-	-	-	-	0.000020	-	0.000020	-	0.000020	-
Calcium D-Ca	-	0.50	-	0.50	-	0.50	-	0.50	-	-	-	-	-	-	-	-	-	-	2.5	-	0.50	-	0.50	-
Copper D-Cu	-	0.000050	-	0.000050	-	0.000050	-	0.000050	-	-	-	-	-	-	-	-	-	-	0.000050	-	0.000050	-	0.000050	-
Iron D-Fe	-	0.010	-	0.010	-	0.010	-	0.010	-	-	-	-	-	-	-	-	-	-	0.010	-	0.010	-	0.010	-
Lead D-Pb	-	0.000050	-	0.000050	-	0.000050	-	0.000050	-	-	-	-	-	-	-	-	-	-	0.000050	-	0.000050	-	0.000050	-
Magnesium D-Mg	-	1.0	-	1.0	-	1.0	-	1.0	-	-	-	-	-	-	-	-	-	-	5.0	-	1.0	-	1.0	-
Mercury D-Hg	-	0.000010	-	0.000010	-	0.000010	-	0.000010	-	-	-	-	-	-	-	-	-	-	0.000010	-	0.000010	-	0.000010	-
Molybdenum D-Mo	-	0.0010	-	0.0010	-	0.0010	-	0.0050	-	-	-	-	-	-	-	-	-	-	0.0050	-	0.0010	-	0.0010	-
Nickel D-Ni	-	0.000050	-	0.000050	-	0.000050	-	0.000050	-	-	-	-	-	-	-	-	-	-	0.000050	-	0.000050	-	0.000050	-
Zinc D-Zn	-	0.00050	-	0.00050	-	0.00050	-	0.00050	-	-	-	-	-	-	-	-	-	-	0.00050	-	0.00050	-	0.00050	-
<b>Inorganic Parameters</b>																								
Sulphide S	-	0.020	-	0.020	-	0.020	-	0.020	-	-	-	-	-	-	-	-	-	-	0.020	-	0.020	-	0.020	-



Project TC-05-02 Garrow Analysis  
Report to Azimuth Consulting Group Inc.  
ALS File No. V8130  
Date Received 13/05/2005  
Date: 06/06/2005

DETECTION LIMITS

Sample ID	GLC- 7m	GLC- 8m	GLC- 9m	GLC- 10m	GLC- 11m	GLC- 12m	GLC- 13m	GLC- 14m	GLC- 15m	GLC- 16m	GLC- 17m	GLC- 18m	GLC- 19m	GLC- 20m	GLC- 22m	GLC- 30m	GLC- 40m
Date Sampled	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005	09/05/2005
Time Sampled																	
ALS Sample ID	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Nature	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests																	
Conductivity (uS/cm)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Hardness CaCO3	5.4	-	5.4	-	-	-	-	-	-	-	-	-	-	27	-	27	27
pH	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Salinity o/oo	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total Suspended Solids	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Dissolved Anions																	
Alkalinity-Total CaCO3	2.0	-	2.0	-	-	-	-	-	-	-	-	-	-	2.0	-	2.0	2.0
Total Metals																	
Aluminum T-Al	0.020	0.020	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Arsenic T-As	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020
Cadmium T-Cd	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020	0.000020
Calcium T-Ca	0.50	0.50	0.50	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Copper T-Cu	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Iron T-Fe	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
Lead T-Pb	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Magnesium T-Mg	1.0	1.0	1.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Mercury T-Hg	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010	0.000010
Molybdenum T-Mo	0.0010	0.0010	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
Nickel T-Ni	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Zinc T-Zn	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050
Dissolved Metals																	
Aluminum D-Al	0.020	-	0.10	-	-	-	-	-	-	-	-	-	-	0.10	-	0.10	0.10
Arsenic D-As	0.00020	-	0.00020	-	-	-	-	-	-	-	-	-	-	0.00020	-	0.00020	0.00020
Cadmium D-Cd	0.000020	-	0.000020	-	-	-	-	-	-	-	-	-	-	0.000020	-	0.000020	0.000020
Calcium D-Ca	0.50	-	0.50	-	-	-	-	-	-	-	-	-	-	2.5	-	2.5	2.5
Copper D-Cu	0.000050	-	0.000050	-	-	-	-	-	-	-	-	-	-	0.000050	-	0.000050	0.000050
Iron D-Fe	0.010	-	0.010	-	-	-	-	-	-	-	-	-	-	0.010	-	0.010	0.010
Lead D-Pb	0.000050	-	0.000050	-	-	-	-	-	-	-	-	-	-	0.000050	-	0.000050	0.000050
Magnesium D-Mg	1.0	-	1.0	-	-	-	-	-	-	-	-	-	-	5.0	-	5.0	5.0
Mercury D-Hg	0.000010	-	0.000010	-	-	-	-	-	-	-	-	-	-	0.000010	-	0.000010	0.000010
Molybdenum D-Mo	0.0010	-	0.0050	-	-	-	-	-	-	-	-	-	-	0.0050	-	0.0050	0.0050
Nickel D-Ni	0.000050	-	0.000050	-	-	-	-	-	-	-	-	-	-	0.000050	-	0.000050	0.000050
Zinc D-Zn	0.00050	-	0.00050	-	-	-	-	-	-	-	-	-	-	0.00050	-	0.00050	0.00050
Inorganic Parameters																	
Sulphide S	0.020	-	0.020	-	-	-	-	-	-	-	-	-	-	0.020	-	0.10	0.40

**Project** TC-05-02 Garrow Analysis  
**Report to** Azimuth Consulting Group Inc.  
**ALS File No.** V8130  
**Date Received** 13/05/2005  
**Date:** 06/06/2005

Conventions:

GLC Represents Water Licence Monitoring Station # 262 - 3 (Garrow Lake Centre)  
 GLS Represents Water Licence Monitoring Station # 262 - 3A (Garrow Lake South - Near Outlet)

Duplicate Results

Sample ID	GLS- 6m	GLS- 6m	RPD %	GLS- 20m	GLS- 20m	RPD %	GLC- 9m	GLC- 9m	RPD %	GLC- 20m	GLC- 20m	RPD %
Date Sampled	09/05/2005	QC# 441213		09/05/2005	QC# 441214		09/05/2005	QC# 441215		09/05/2005	QC# 441216	
Time Sampled												
ALS Sample ID	5			19			27			38		
Nature	Water			Water			Water			Water		

Physical Tests

Conductivity (uS/cm)	13700	13700	0	78600	78700	0.127	42400	42500	0.236	78400	78500	0.127
Hardness CaCO3	-	-	-	12500	12500	0	5990	5940	0.838	12500	12000	4.08
pH	8.04	8.04	0	7.63	7.65	0.262	7.65	7.65	0	7.67	7.68	0.13
Salinity o/oo	8.6	8.6	0	59.6	59.7	0.168	29.6	29.6	0	59.4	59.5	0.168

Dissolved Anions

Alkalinity-Total CaCO3	-	-	-	400	406	1.49	178	183	2.77	402	405	0.743
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Total Metals

Aluminum T-Al	<0.020	<0.020	0	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
Arsenic T-As	0.00025	<0.00020	22.2	0.00038	0.00038	0	0.00022	<0.00020	9.52	0.00045	0.00046	2.2
Cadmium T-Cd	0.000585	0.000626	6.77	0.000034	0.000034	0	0.00285	0.00282	1.06	0.000037	0.000032	14.5
Calcium T-Ca	145	146	0.687	812	834	2.67	432	438	1.38	807	811	0.494
Copper T-Cu	0.0010	0.0011	9.52	<0.0010	<0.0010	0	0.0043	0.0040	7.23	<0.0010	<0.0010	0
Iron T-Fe	<0.030	<0.030	0	0.221	0.218	1.37	<0.030	<0.030	0	0.231	0.230	0.434
Lead T-Pb	<0.0010	<0.0010	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0	0.0010	0.0010	0
Magnesium T-Mg	307	306	0.326	2510	2580	2.75	1380	1410	2.15	2470	2460	0.406
Mercury T-Hg	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Molybdenum T-Mo	0.0037	0.0030	20.9	0.0052	<0.0050	3.92	<0.0050	<0.0050	0	0.0057	<0.0050	13.1
Nickel T-Ni	0.0037	0.0039	5.26	0.0079	0.0080	1.26	0.0084	0.0080	4.88	0.0080	0.0083	3.68
Zinc T-Zn	0.219	0.228	4.03	0.0415	0.0418	0.72	1.12	1.09	2.71	0.0425	0.0438	3.01

Dissolved Metals

Aluminum D-Al	-	-	-	<0.10	<0.10	0	<0.10	<0.10	0	<0.10	<0.10	0
Arsenic D-As	-	-	-	0.00040	<0.00020	66.7	<0.00020	0.00024	18.2	0.00027	<0.00020	29.8
Cadmium D-Cd	-	-	-	<0.000020	<0.000020	0	0.00252	0.00252	0	<0.000020	<0.000020	0
Calcium D-Ca	-	-	-	815	824	1.1	385	382	0.782	826	789	4.58
Copper D-Cu	-	-	-	0.000248	0.000222	11.1	0.00364	0.00353	3.07	0.000218	0.000215	1.39
Iron D-Fe	-	-	-	0.215	0.218	1.39	<0.010	<0.010	0	0.204	0.204	0
Lead D-Pb	-	-	-	<0.000050	<0.000050	0	0.000263	0.000251	4.67	<0.000050	<0.000050	0
Magnesium D-Mg	-	-	-	2530	2540	0.394	1220	1210	0.823	2520	2430	3.64
Mercury D-Hg	-	-	-	<0.000010	<0.000010	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Molybdenum D-Mo	-	-	-	<0.0050	0.0052	3.92	<0.0050	<0.0050	0	<0.0050	<0.0050	0
Nickel D-Ni	-	-	-	0.00802	0.00795	0.877	0.00746	0.00745	0.134	0.00750	0.00772	2.89
Zinc D-Zn	-	-	-	0.00581	0.00552	5.12	0.876	0.884	0.909	0.00307	0.00284	7.78

Inorganic Parameters

Sulphide S	-	-	-	0.030	0.032	6.45	<0.020	<0.020	0	0.049	0.070	35.3
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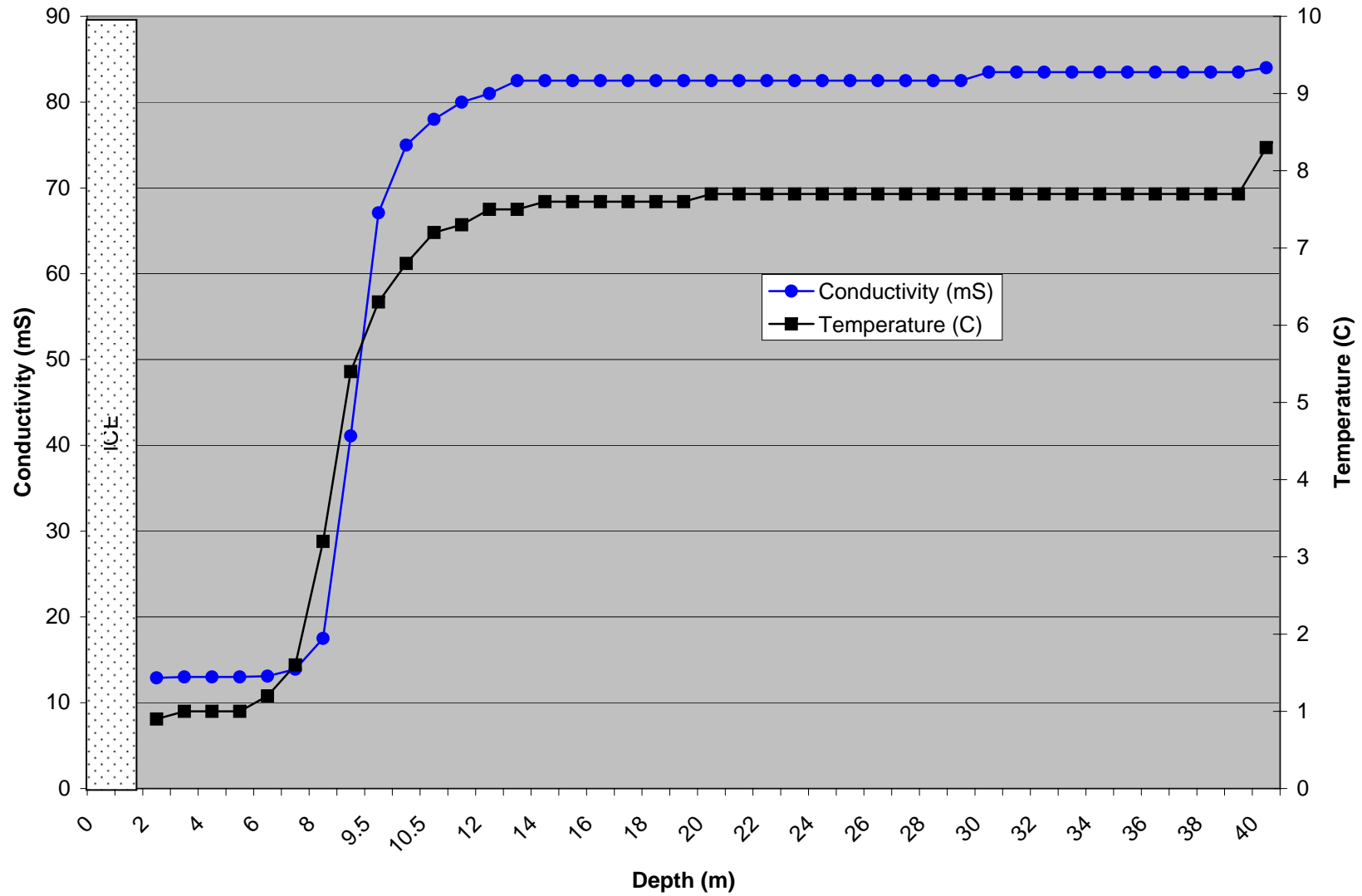
# **Garrow Lake Mid-Winter Water Sampling Data Sheet**

Station: 262-3

Date: 05-May-05

Depth (M)	Temp (°C)	Conductivity	pH	Dissolved Oxygen	Observations
0					Ice
1					Ice (2 M thick)
2	0.9	12.9			
3	1.0	13.0			
4	1.0	13.0			
5	1.0	13.0			
6	1.2	13.1			
7	1.6	13.9			
8	3.2	17.5			
9	5.4	41.1			
9.5	6.3	67.1			
10	6.8	75.0			
10.5	7.2	78.0			
11	7.3	80.0			
12	7.5	81.0			
13	7.5	82.5			
14	7.6	82.5			
15	7.6	82.5			
16	7.6	82.5			
17	7.6	82.5			
18	7.6	82.5			
19	7.6	82.5			
20	7.7	82.5			
21	7.7	82.5			
22	7.7	82.5			
23	7.7	82.5			
24	7.7	82.5			
25	7.7	82.5			
26	7.7	82.5			
27	7.7	82.5			
28	7.7	82.5			
29	7.7	82.5			
30	7.7	83.5			
31	7.7	83.5			
32	7.7	83.5			
33	7.7	83.5			
34	7.7	83.5			
35	7.7	83.5			
36	7.7	83.5			
37	7.7	83.5			
38	7.7	83.5			
39	7.7	83.5			
40	8.3	84			

# Garrow Lake 2005 Maximum Ice Thickness Limnology



# **POLARIS MINE – WATER QUALITY AND ENVIRONMENTAL EFFECTS**

## **MONITORING REPORT**

### **2nd QUARTER 2005**

*Note: Identification of Regulation numbers in this report relate to the Metal Mining Effluent Regulations.*

#### **APPENDIX A (96-hour Rainbow Trout Toxicity Test)**

- i. Information specified by Section 8.1 of Reference Method EPS 1/Rm/13: 96 hr acute rainbow trout test

#### **APPENDIX B (72-hour Daphnia Magna Toxicity Test)**

- i. Information specified by Section 8.1 of Reference Method EPS 1/Rm/14: 72 hr acute *Daphnia magna* test

#### **APPENDIX C (Mass Loadings)**

- i. Concentration & monthly mean concentrations of each deleterious substance of Schedule 4
- ii. pH of the effluents samples as required by subsection 12(1)
- iii. Description of sample collection method
- iv. Total volume of effluent deposited during each month of the quarter as per section 19
- v. Mass loading of the deleterious substances set out in Schedule 4 and as per section 20

#### **APPENDIX D (Effluent Characterization Results)**

- i. Results of the effluent characterization as per paragraph 4(1) of Schedule 5

#### **APPENDIX E (Letter regarding monthly parameter holding times)**

- i. Letter from ALS Environmental

## **APPENDIX A**

### **96-h Acute Rainbow Trout Toxicity Test**

## **Reporting Requirements for Reference Method EPS 1/RM/13**

### **Section 8.1.1 Effluent**

- i. Name & location of operation generating the effluent
  - Polaris Mine, Little Cornwallis Island, Nunavut
  - Final Discharge Point for Garrow Lake is geo referenced as 75° 22' 32" N, 97° 48' 37" W.
- ii. Date & time of sampling
  - No sampling conducted as effluent discharge began in the final days of June, and the EVS laboratory could not accommodate testing due to the July 1 statutory holiday. The statutory holiday also precluded sample shipment within toxicity testing holding times. Testing was conducted at the next possible time, which was July and will be discussed in the 3<sup>rd</sup> quarter report.
- iii. Type of sample
  - No toxicity sampling conducted, see ii.
- iv. Brief description of sampling point
  - Discharge point of siphon at Garrow Lake dam
- v. Sampling method
  - No toxicity sampling conducted, see ii.
- vi. Name of person submitting samples
  - No toxicity sampling conducted, see ii.

### **Section 8.1.2 Test Facilities and Conditions**

- i. Test type & method
  - No testing conducted during the quarter
- ii. Indications of deviations from requirements in Sections 2 to 7 of Method EPS 1/RM/13
  - No deviations to report as there was no testing conducted during the quarter
- iii. Name and city of testing laboratory
  - No laboratory used during the quarter
- iv. Percent mortality of fish in stock tank(s)
  - None to report. There were no tests conducted during the period
- v. Species of test organism
  - None to report as there were no tests conducted during the period
- vi. Date and time for start of definitive test
  - None to report as there were no tests conducted during the period
- vii. Person(s) performing the test and verifying the results
  - No tests performed during the quarter
- viii. pH, temperature, dissolved oxygen, and conductivity of unadjusted, undiluted effluent
  - No data to report as there were no tests conducted during the period
- ix. Confirmation that no adjustment of sample or solution pH occurred
  - No adjustment to report as there were no tests conducted during the period
- x. Indication of aeration of test solutions before introduction of fish
  - None to report as there were no tests conducted during the period
- xi. Concentrations and volumes tested
  - No data to report as there were no tests conducted during the period
- xii. Measurements of dissolved oxygen, pH and temperature
  - No data to report as there were no tests conducted during the period
- xiii. Number of fish added to each test vessel
  - No fish added as there were no tests conducted during the period
- xiv. Mean and range of fork length of control fish at end of test
  - No data to report as there were no tests conducted during the period
- xv. Mean wet weight of individual control fish at end of the test
  - No data to report as there were no tests conducted during the period

## **Reporting Requirements for Reference Method EPS 1/RM/13**

xvi. Estimated loading density of fish in test solutions

- No data to report as there were no tests conducted during the period

### **Section 8.1.3 Results**

- i. Number of mortalities of fish in each test solution
  - None to report. No tests conducted during the period
- ii. Number of control fish showing atypical/stressed behaviour
  - None to report. No tests conducted.
- iii. Mean mortality rate in solutions of effluent and control water
  - None to report. No tests conducted
- iv. Estimate of 96-h LC50 in multi-concentration tests
  - No data to report. No tests conducted
- v. Most recent 96-h LC50 for reference toxicity test(s)
  - No data to report. No tests conducted



## **APPENDIX B**

### **72-h Acute *Daphnia magna* Toxicity Test**

## **Reporting Requirements for Reference Method EPA/600/4-91/003 Method 1009.0**

### **Section 8.1.1 Effluent**

- i. Name & location of operation generating the effluent
  - Polaris Mine, Little Cornwallis Island, Nunavut
  - Final Discharge Point for Garrow Lake is geo referenced as 75° 22' 32" N, 97° 48' 37" W.
- ii. Date & time of sampling
  - No sampling conducted as effluent discharge began in the final days of June, and the EVS laboratory could not accommodate testing due to the July 1 statutory holiday. The statutory holiday also precluded sample shipment within toxicity testing holding times. Testing was conducted at the next possible time, which was July and will be discussed in the 3<sup>rd</sup> quarter report.
- iii. Type of sample
  - No toxicity sampling conducted, see ii.
- iv. Brief description of sampling point
  - Discharge point of siphon at Garrow Lake dam
- v. Sampling method
  - No toxicity sampling conducted, see ii.
- vi. Name of person submitting samples
  - No toxicity sampling conducted, see ii.

### **Section 8.1.2 Test Facilities and Conditions**

- i. Test type & method
  - No testing conducted during the quarter
- ii. Indications of deviations from requirements in Sections 2 to 7 of Method EPS 1/RM/13
  - No deviations to report as there was no testing conducted during the quarter
- iii. Name and city of testing laboratory
  - No laboratory used during the quarter
- iv. Species of test organism
  - None to report as there were no tests conducted during the period
- v. Date and time for start of definitive test
  - None to report as there were no tests conducted during the period
- vi. Person(s) performing the test and verifying the results
  - No tests performed during the quarter
- vii. pH, temperature, dissolved oxygen, and conductivity of unadjusted, undiluted effluent
  - No data to report as there were no tests conducted during the period
- viii. Confirmation that no adjustment of sample or solution pH occurred
  - No adjustment to report as there were no tests conducted during the period
- ix. Indication of any adjustment of hardness of effluent sample
  - No adjustment to report as there were no tests conducted during the period
- x. Indication of any aeration of sample
  - No indication to report as there were no tests conducted during the period
- xi. Concentrations and volumes tested
  - No data to report as there were no tests conducted during the period
- xii. Measurements of dissolved oxygen, pH and temperature
  - No data to report as there were no tests conducted during the period
- xiii. Estimates of time to first brood, average number of neonates per brood, and percent mortality during the seven-day period prior to the test
  - No data to report as there were no tests conducted during the period
- xiv. Number of neonates per test vessel and milliliters of solution per daphnid
  - No data to report as there were no tests conducted during the period

## **Reporting Requirements for Reference Method EPA/600/4-91/003 Method 1009.0**

### **Section 8.1.3 Results**

- i. Number of dead and/or immobile daphnids in each test solution including controls
  - No data to report. No tests conducted during the period.
- ii. For single-concentration test the number of daphnids dead in each of three replicate effluent solutions and in each of three replicate control solutions at end of test. Also report the mean value.
  - No data to report. No tests conducted during the period.
- iii. Estimate of 48-h LC50 and 95% confidence limits in multi-concentration tests, 48-h EC50 for immobilization and 95% confidence limits, indication of statistical method on which results are based.
  - No data to report. No tests conducted during the period
- iv. Most recent 48-h LC50 for reference toxicant test(s), reference chemical(s), date test initiated, historic geometric mean LC50 and warning limits.
  - No data to report. No tests conducted during the period.

## **APPENDIX C**

### **Effluent Metals Concentrations and Loadings**

## 2005 2nd QUARTER MMER REPORT

LOCATION - FINAL DISCHARGE POINT FROM GARROW LAKE (GARROW LAKE DAM SIPHONS)

### CONCENTRATIONS OF EFFLUENT FOR MMER SCHEDULE 4 SAMPLED WEEKLY

Sample Taken		DELETERIOUS SUBSTANCE (mg/L) <sup>1</sup>									Collection Method
During The Week of	Date Sample Taken	Arsenic	Copper	Cyanide	Lead	Nickel	Zinc	TSS	Radium 226 <sup>1</sup>	pH <sup>1</sup>	
3-Apr-05	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
10-Apr-05	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
17-Apr-05	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
24-Apr-05	nd <sup>3</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
1-May-05	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
8-May-05	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
15-May-05	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
22-May-05	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
29-May-05	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
5-Jun-05	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
12-Jun-05	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
19-Jun-05	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
26-Jun-05	29-Jun-05	0.00020	0.00050	0.0050	0.00037	0.00075	0.0137	3.0	0.0050	7.98	Grab

Note<sup>1</sup> - All concentrations are in mg/L except Radium 226 which is Bq/L and pH which is in pH units

Note<sup>2</sup> - "nd" refers to no effluent discharge to sample

### MONTHLY MEAN CONCENTRATIONS OF EFFLUENT FOR MMER SCHEDULE 4

MONTH OF	MONTHLY MEAN CONCENTRATION <sup>1</sup> OF DELETERIOUS SUBSTANCE <sup>3</sup>							
	Arsenic	Copper	Cyanide	Lead	Nickel	Zinc	TSS	Radium 226
April/05	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
May/05	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>	nd <sup>2</sup>
June/05	0.0002	0.0005	0.005	0.000368	0.000754	0.0137	3	0.005

Note<sup>1</sup> - All concentrations are in mg/L except Radium 226 which is Bq/L

Note<sup>2</sup> - "nd" refers to no effluent discharge to sample

Note<sup>3</sup> - Monthly Mean Concentrations - the MEAN value of the concentrations measured in all water samples collected during each month when a deleterious substance is deposited.

### MASS LOADING OF DELETERIOUS SUBSTANCE FOR EACH DAY SAMPLED

Sample Taken		DAILY MASS LOADING OF DELETERIOUS SUBSTANCE (kg/day) <sup>1</sup>								Average Daily
During The	Date									Flow Rate
Week of	Sample Taken	Arsenic	Copper	Cyanide	Lead	Nickel	Zinc	TSS	Radium 226 <sup>1</sup>	(m <sup>3</sup> /day)
3-Apr-05	nd <sup>2</sup>	0	0	0	0	0	0	0	0	0
10-Apr-05	nd <sup>2</sup>	0	0	0	0	0	0	0	0	0
17-Apr-05	nd <sup>2</sup>	0	0	0	0	0	0	0	0	0
24-Apr-05	nd <sup>2</sup>	0	0	0	0	0	0	0	0	0
1-May-05	nd <sup>2</sup>	0	0	0	0	0	0	0	0	0
8-May-05	nd <sup>2</sup>	0	0	0	0	0	0	0	0	0
15-May-05	nd <sup>2</sup>	0	0	0	0	0	0	0	0	0
22-May-05	nd <sup>2</sup>	0	0	0	0	0	0	0	0	0
29-May-05	nd <sup>2</sup>	0	0	0	0	0	0	0	0	0
5-Jun-05	nd <sup>2</sup>	0	0	0	0	0	0	0	0	0
12-Jun-05	nd <sup>2</sup>	0	0	0	0	0	0	0	0	0
19-Jun-05	nd <sup>2</sup>	0	0	0	0	0	0	0	0	0
26-Jun-05	29-Jun-05	0.002	0.005	0.048	0.004	0.007	0.133	29.030	0.048	9,677

Note<sup>1</sup> - Mass Loading is in kilograms per day of the deleterious substance deposited except Radium 226 which is in Bq per day

Note<sup>2</sup> - "nd" refers to no effluent discharge to sample

### MASS LOADING PER CALENDAR MONTH FOR EACH DELETERIOUS SUBSTANCE

CALENDAR MONTH OF	MASS LOADING <sup>1</sup> FOR DELETERIOUS SUBSTANCE (kg/month) <sup>2</sup>								Average Weekly Flow Rate <sup>3</sup> (m <sup>3</sup> /week)	Total Monthly Volume <sup>4</sup> (m <sup>3</sup> /month)
	Arsenic	Copper	Cyanide	Lead	Nickel	Zinc	TSS	Radium 226 <sup>2</sup>		
April/05	-	-	-	-	-	-	-	-	-	-
May/05	-	-	-	-	-	-	-	-	-	-
June/05	0.015	0.036	0.363	0.027	0.055	0.994	217.728	0.363	16,934	58,061

Note<sup>1</sup> - Total Mass Loading for Calendar month calculated by multiplying the Average Daily Mass Loading for the Month x # days in the month

Note<sup>2</sup> - Mass loading units are in kg per month except Radium 226, which is in Bq per month

Note<sup>3</sup> - Average Weekly Flow Rate calculated by multiplying Average Daily Flow Rate x 7 days per week

Note<sup>4</sup> - Total Monthly Volume calculated by multiplying Average Daily Flow Rate for the week of June 26, 2005 x 6 days of flow

## **APPENDIX D**

### **Results of Effluent Characterization**

**Appendix D - Table 1. Effluent Characterization Results - June 29, 2005.**

Facility Name	FDP Name	Effluent	Sample Method	Hardness	Alkalinity	Aluminum	Cadmium	Iron	Mercury	Molybdenum	Ammonia	Nitrate
		Characterization Date										
Teck Cominco Metals Limited - Polaris Mine (Little Cornwallis Island)	Garrow Lake Syphons	6/29/2005	Grab	132	30.7	< 0.1	0.000035	0.024	< 0.00001	< 0.005	0.089	0.0382

Notes:

Only the effluent sample was collected during this event, as the receiving (exposure) and reference stations were frozen. No toxicity samples were collected as the labs (EVS and Stantec) could not receive samples and accommodate testing at this time due to the July 1 holiday, followed by the weekend. Holding times for Hg, alkalinity and nitrate were slightly exceeded due to an oversight by the lab (ALS). A letter explaining this oversight is presented in Appendix E.



## **RESULTS OF EFFLUENT CHARACTERIZATION**

### **AS PER PARAGRAPH 4(1) in Schedule 5**

The final discharge point on Garrow creek began to thaw and flow on approximately June 25, 2005. A routine monitoring sample was collected at the first opportunity, which was on Wednesday June 29, 2005. For this sample, the suite of routine weekly parameters plus additional quarterly EEM parameters were analyzed. EEM effluent characterization parameters for this sample are presented in Table 1. Due to an oversight by ALS, mercury, nitrate and alkalinity were analyzed slightly after the holding times (see attached letter in Appendix E). At this time, only the effluent station (i.e., Garrow Creek) was accessible due to unsafe ice conditions in Garrow Bay, which precluded collection of receiving (exposure) or reference water samples.

While a toxicity program (both sublethal and acute) was considered for this event, the labs were not able to accommodate sample receiving and testing at this time, due to the statutory holiday (i.e., Friday July 1, 2005). Shipment during the holiday would also have been problematic and would have resulted in missed holding times for the samples. Thus, a toxicity program (acute and sublethal) was attempted at the first suitable time, which was in July. This program and the results will be discussed in the 3<sup>rd</sup> quarter report.

Concentrations of deleterious substances in effluent water from the June 29, 2005 sample were all below Water Licence permit limits.

## **APPENDIX E**

### **Letter from ALS Regarding Monthly Parameter Holding Times**