



# BGC ENGINEERING INC.

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### PROJECT MEMORANDUM

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<b>To:</b>	<b>DIAND, Iqaluit</b>	<b>Fax No.:</b>	<b>(867) 975-4286 (sent via e-mail)</b>
<b>Attention:</b>	<b>Mr. Carl McLean, Manager Land Administration Operations</b>	<b>CC:</b>	<b>Dionne Filiatrault (NWB), via e-mail</b>
<b>From:</b>	<b>Holger Hartmaier (Ext. 113)</b>	<b>Date:</b>	<b>October 15, 2003</b>
<b>Subject:</b>	<b>Polaris Mine- Review of 1<sup>st</sup> and 2<sup>nd</sup> Quarter Decommissioning and Reclamation Progress Reports</b>		
<b>No. of Pages (including this page): 10 Pages</b>		<b>Project No: 0131-013-01</b>	

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As requested under Standing Offer Agreement 01-03-6011, BGC has reviewed the First and Second Quarter reports prepared by Teck Cominco for the Polaris Mine Decommissioning and Reclamation Project. The quarterly reporting of progress, including the updating of costs and the reclamation schedule is a requirement under the Water Licence. The Department of Indian Affairs and Northern Development (DIAND) received the two reports on September 9, 2003.

## 1.0 FIRST QUARTER REPORT

This report covers the period from January 1, 2003 to March 31, 2003.

### 1.1 Overview of Report

The report was submitted August 21, 2003 and was prepared by Bruce Donald of Teck Cominco. Copies of the report were sent to the Nunavut Water Board, DIAND and Cascade Management Inc. Note that the new water licence was issued on April 24, 2003 with an effective date of March 31, 2003. This report was the first formal Decommissioning and Reclamation report submitted. The Table of Contents and structure of the report serves as a template for the subsequent reports. Details covered in each section will vary depending on work in progress or completed during each quarter being reported. The Table of Contents includes the following main section headings:

- 1.0 Executive Summary in Inuktitut
- 2.0 Introduction

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**BGC Project Memorandum**

To: Carl McLean

From: Holger Hartmaier

Date: October 16, 2003

Subject: Polaris Mine Closure- Review of 1<sup>st</sup> and 2<sup>nd</sup> Quarter Progress ReportsProj. No: 0131-013-01

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- 3.0 Status of Authorizations and/or Approvals
- 4.0 Unauthorized Discharges and Summary of Follow up Actions
- 5.0 Progress Report of Studies/Plans Requested
- 6.0 Decommissioning and Reclamation Progress Report
- 7.0 Update of Decommissioning and Reclamation Schedule
- 8.0 Update of Estimated Mine Decommissioning
- 9.0 Public Consultation/Participation
- 10.0 Summary of Work Done in Response to Inspection/Compliance Reports
- 11.0 Freshwater Use
- 12.0 Physical Monitoring of Site
- 13.0 Garrow Lake Stratigraphic Monitoring
- 14.0 Summary of Effluent Monitoring and Effluent Characterization
- 15.0 Other Details Related to Water Use or Waste Disposal Requested

Data contained in the Appendices includes:

- Appendix A- Executive Summary in Inuktitut
- Appendix B- Update of Decommissioning and Reclamation Schedule
- Appendix C- Update of Estimated Mine Decommissioning, Reclamation and Monitoring Costs
- Appendix D- Placement of Debris into Little Red Dog Quarry Landfill
- Appendix E- Thermistor Monitoring Data
- Appendix F- Garrow Lake Stratigraphic Monitoring
- Appendix G- Summary of Effluent Monitoring and Effluent Characterization
- Appendix H- CD version of 1<sup>st</sup> Quarter report in PDF Format.

The intent of this memorandum is not to repeat the information contained within the above sections, but to identify issues that may be of a regulatory concern, with particular emphasis on the progress and costs related to the ongoing decommissioning and reclamation plan vis-à-vis the closure bond and the potential outstanding liability remaining. This memorandum, in conjunction with two site visits conducted by BGC in 2003, serve to verify ongoing reclamation work and highlight any issues and concerns that require mitigative measures.

## **1.2 Follow Up Actions required for Unauthorized Discharges**

Teck Cominco reported no unauthorized discharges of water or effluent during the 1<sup>st</sup> Quarter of 2003. On March 20, 2003 there was a spill of 2000 litres diesel fuel reported to the NWT Spill Report Line. The spill occurred through a pinhole leak from a metal line between the tank farm and the accommodations building. The pipe was drained and repaired. The area was marked and will be cleaned up as part of the planned soils remedial work scheduled for the summer of 2004.

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### **1.3 Decommissioning and Reclamation Progress.**

In general activities on site were low for most of the period, with work starting to occur towards the end of the period. The following work was reported completed in 2002, prior to this reporting period:

- Demolition of the Thickener Building
- Demolition of the CRF Building

The following activities were completed during the period:

- Removal of the exterior conveyor between the Product Storage Shed and the Ship Loader.
- Demolition of maintenance building by Ship Loader.
- Demolition and removal of Quonset Hut
- Demolition and removal of Core Shed
- Constructed incinerator building and began incineration of glycol.

### **1.4 Schedule**

The schedule was updated as of March 31, 2003. Details indicate changes to individual items of work, but overall, the decommissioning and reclamation of the site is still forecasted to be completed by the fall of 2004, as originally planned.

### **1.5 Update of Estimated Mine Decommissioning, Reclamation and Monitoring Costs**

The mine closure costs were updated as of March 31, 2003 and forecast to the end of 2011.

In summary, Teck Cominco reported the following breakdown of mine closure costs to the end of the first quarter:

Original Budget	\$47,500,000
Forecast Cost to Complete (2011)	\$53,508,826
Actual Costs to March 31,2003	\$17,868,861

The above costs include expenditures incurred in 2002, since the start of the reclamation and decommissioning project.

Based on the above numbers, the overall forecasted cost to complete the mine closure has risen about 13% since reclamation began. The remaining outstanding liability, based on the

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forecasted costs to complete and the costs incurred to date is \$35,639,965. The costs incurred to date represent about 33% of the forecasted final closure costs.

The main areas of cost increase during the period, based on the detailed breakdown given in Appendix C of the report are:

- Purging and decommissioning of the fuel tanks, original budget was \$53,404. Final cost associated with this work item now forecast at \$422,239.
- The general site grading and reclamation budget was increased from \$7,129 to \$229,095.
- Increased amounts of hydrocarbon-contaminated soils resulting in doubling of hydrocarbon forecasted costs from about \$6,100 to about \$13,000.
- Increase in fuel costs from \$3,986,000 to \$6,518,299.
- Maintenance costs for buildings and equipment have increased, with the greatest increase in the building maintenance costs, which have nearly doubled from the original budget of about \$507,000 to about \$1.1 million.
- Increase in contractor mobilization/demobilization and supervision costs, from an overall budget of \$2.5 million to a forecasted \$3.3 million. This is also reflected in increased travel costs for site staff.
- Approximate doubling in the budgeted amounts for the head office staff for the project management consultant from about \$543,000 to \$1.1 million.

Correspondingly, in other areas, the forecasted costs are less than originally estimated. It is not clear from the data provided, why the costs for each of the items has increased or decreased. The 13% increase in the original budget estimate, shown at the end of the first quarter, with expenditures at 33% of the forecasted cost to complete does indicate a potential for a significant overrun if the trend continues. The report provided by Teck Cominco provides no information as to the percentage of the work actually completed as a result of these expenditures.

## **1.6 Site Monitoring Data**

Teck Cominco have kept records, including photographs of the demolition materials placed into the Little Red Dog Quarry. So far, an estimated 5,705 m<sup>3</sup> of demolition debris has been placed.

A total of 980 m<sup>3</sup> of metals contaminated soils from the Product Storage Building were removed and stored in the underground soil disposal area during the period.

The Garrow Lake Dam thermistors are being read on a monthly basis. Temperature readings for January, February and March were in the range of -11 to -20° C in the core and bedrock foundation.

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In the Operational Landfill, five thermistors were being read. One was destroyed and four remain in operation. The Closure Plan indicated that three will be used to confirm that freezing of the landfill is taking place. Teck Cominco will continue reading all operating thermistors in the meantime. The deepest thermistor is at a depth of about 7.8 m, with the warmest temperature recorded during the period of  $-10.5^{\circ}\text{C}$  at a depth of 5.5 m

Heavy metal pipes have been installed into the pit bottom of the Little Red Dog Quarry. Once the placement of demolition debris has been completed, thermistors will be installed into these pipes to monitor the aggradation of the permafrost.

Stratigraphic monitoring of Garrow Lake indicated a halocline between 9 and 10 m depth under mid-winter ice (Feb.4, 2003) and maximum ice (March 27, 2003) conditions. This depth interval also corresponds to the zone where elevated lead and zinc readings were found in the water samples.

No MMER effluent monitoring was possible at the designated discharge from the Garrow Lake Tailings Impoundment Area during the period as there was no discharge due to frozen conditions.

## **2.0 SECOND QUARTER REPORT**

This report covers the period from April 1, 2003 to June 30, 2003.

### **2.1 Overview of Report**

The report was submitted August 28, 2003 and was prepared by Bruce Donald of Teck Cominco. Copies were sent to the Nunavut Water Board, DIAND and Cascade Management Inc. The structure of the report is based on the template used in the first quarter report. The Table of Contents has the same major section headings, but expanded with additional subsections providing details of work done during the period. These include:

- 1.0 Executive Summary in Inuktitut
- 2.0 Introduction
- 3.0 Status of Authorizations and Approvals
- 4.0 Unauthorized Discharges and Summary Follow up Actions
- 5.0 Progress Report of Studies/Plans Requested
- 6.0 Decommissioning and Reclamation Progress Report
  - 6.1 Earthworks
    - 6.1.1 Dock and Shoreline
    - 6.1.2 Garrow Lake Dam
    - 6.1.3 Operational Landfill

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**BGC Project Memorandum**

To: Carl McLean

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6.1.4	Little Red Dog Quarry Landfill
6.1.5	Exploration Waste Stockpile
6.2	Building Demolition
6.2.1	Mill/Offices/Warehouse Facilities
6.2.2	Product Storage Building
6.2.3	Thickener Building
6.2.4	CRF Building
6.2.5	Accommodation Building
6.2.6	Other Buildings/Structures
6.3	Contaminated Soil Remediation
6.3.1	Marine Dock and Adjacent Foreshore
6.3.2	Fuel Bladder Storage Area
6.3.3	Marine Foreshore- June 2002 Oil Spill
6.4	General Site Cleanup
6.5	Other Site Activities
7.0	Update of Decommissioning and Reclamation Schedule
8.0	Update of Estimated Mine Decommissioning, Reclamation and Monitoring Costs
9.0	Public Consultation/Participation
10.0	Summary of Work Done in Response to Inspection/Compliance Reports
11.0	Freshwater Use
12.0	Physical Monitoring of Site
12.1	Placement of Demolition Debris into Landfills
12.2	Placement of Metals/Hydrocarbon Contaminated Wastes Underground in the Mine
12.3	Thermistor Data
12.3.1	Garrow Dam
12.3.2	Operational Landfill
12.3.3	Little Red Dog Quarry Landfill
13.0	Garrow Lake Stratigraphic Monitoring
14.0	Summary of Effluent Monitoring and Effluent Characterization
15.0	Other Details Related to Water Use or Waste Disposal Requested
Appendix A	Executive Summary in Inuktitut
Appendix B	Update of Decommissioning and Reclamation Schedule
Appendix C	Update of Estimated Mine Decommissioning, Reclamation and Monitoring Costs
Appendix D	Record of Debris Placement into Little Red Dog Quarry Landfill
Appendix E	Placement of Metal and Hydrocarbon Contaminated Wastes Underground in the Mine
Appendix F	Thermistor Monitoring Data
Appendix G	Summary of Effluent monitoring and Effluent Characterization
Appendix H	CD of Report in PDF Format

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The following sections summarize pertinent details and items of regulatory concern.

## **2.2 Follow-up Actions required for unauthorized discharges**

Teck Cominco reported that there were no unauthorized discharges during the second Quarter of 2003.

## **2.3 Decommissioning and Reclamation Progress**

Work activities increased at the site with the return of daylight and warmer weather. Manpower increased over the period from 39 to 126 people. Teck Cominco reported work underway in most areas of the reclamation program during the period. Major work activities completed during the period were:

- Completed removal of the ship loader.
- Glycol freeze pipes in dock cells 1&2 were drained and removed.
- Siphons were installed at Garrow Dam in preparation for lowering water in Garrow Lake.
- Shutdown operation of primary powerhouse on the barge, relocated electrical equipment and bypassed other services from the barge to begin demolition.
- Removal of interior structure and equipment from barge.
- Removal of siding from the barge.
- Draining of fuel and glycol from the barge.
- Removal of bin walls and loadout pockets from product storage building.
- Removed concrete floor slab from CRF building.
- Completed remediation of hydrocarbon contaminated soils around CRF building.
- Completed demolition work in CRF building.
- Completed removal of metals contaminated soils in the dock area.
- Completed remediation of June 2002 hydrocarbon spill in marine foreshore area.
- Incinerated approximately 50,000 litres of glycol and waste fuels.

Major items of work underway during the period included:

- Started removal of clean fill in dock cells 1&2 and draining of freeze pipes in dock cells 3&4.
- Drilling and blasting of cover material in New Quarry.
- Refuse placement into first lift of fill in LRD Quarry.
- Delineation sampling to define remaining sulphide contamination in Exploration Portal area.
- Removal of barge superstructure and cleaning of hull fuel tanks. About 75% of the barge was demolished by the end of the period.
- Meltwater was disposed into the mine.

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- Removed about 60% of the siding on the product storage building. About 35% of the building was demolished by the end of the period.
- Continued with progressive removal of thickener pad frozen foundation (about 50% complete).
- Unexpected hydrocarbons (diesel fuel) were discovered in dock cells 1 & 2, necessitating delineation of contamination.
- Removed about 12,000 m<sup>3</sup> of hydrocarbon contaminated soils in the fuel bladder area and placed it into the underground storage areas.

## **2.4 Schedule**

The decommissioning schedule was updated as of June 30, 2003, based on data obtained from the demolition contractor. The project is still forecasted to be completed by the end of September of 2004.

## **2.5 Update of Estimated Mine Decommissioning, Reclamation and Monitoring Costs**

The detailed estimate of mine closure costs was updated by Teck Cominco as of June 30, 2003.

Original Budget	\$47,000,000
Forecast Cost to Complete (2011)	\$53,860,906
Actual Costs to June 30, 2003	\$24,539,792

Mine closure costs during the period amounted to a total of \$6,670,931. Total reclamation costs to June 30, 2003 were \$24,539,792. Forecasted costs to complete decommissioning, reclamation and monitoring through to 2011 have increased to \$53,860,906, from the first Quarter forecasted estimate of \$53,508,826. The costs incurred to the end of the second quarter therefore represent about 46% of the forecasted costs to complete. This represents an overall increase of about 14% over the original cost estimate of \$47,000,000. The work remaining as of June 30, 2003 represents an estimated outstanding liability of \$28,969,034. This compares with an outstanding liability of \$35,639,965 at the end of the first quarter.

Items where significant (>20%) cost increases have occurred to date are:

- Mine access sealing.
- Garrow Lake siphons and lake drawdown.
- Purging and decommissioning fuel tanks.
- Miscellaneous contract labour.
- General site grading and reclamation.
- Landfill reclamation,
- Contaminated soils cleanup.

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- Fuel supply
- Maintenance of equipment and facilities.
- Contractor's transportation.
- Contractor's mob./demob and supervision.
- Accommodations
- Project management (field staff).

As in the first quarter report, there are no details provided by Teck Cominco as to why costs have increased or decreased from the original budget for each of the items. Also Teck Cominco have not provided any information regarding what percentage of the work at the site is actually completed. At the end of the second quarter, the costs to date are about 46 % of the forecasted cost to complete and the overall increase in the original budget has remained essentially the same as shown in the first quarter. This would be a favourable comment as long as progress on the ground matches the expenditures to date.

## **2.6 Site Monitoring Data**

- Teck Cominco documented the materials placed into LRD Quarry by photographs and an inventory list. All stationary and mobile equipment were verified as being free of hydrocarbons such as lubrication oils, fuels, greases and/or hydraulic oil.
- Approximately 13,300 m<sup>3</sup> of hydrocarbon contaminated soils and approximately 15,200 m<sup>3</sup> of metals contaminated soils were disposed of in the mine during the period.
- Meltwater was disposed of in the underground workings in June.
- Three sets of thermistors were monitored on a monthly basis in Garrow Lake Dam. In general, all temperatures were less than -12° C.
- Four thermistors were monitored in the Operational Landfill. Temperatures were generally less than -13° C throughout the landfill to depths of 7.8 m. Above zero temperatures were noted in the upper 1 m of the cover in the June readings of thermistor strings #4 and #5.
- There was no stratigraphic monitoring of Garrow Lake during the period.
- There was no effluent discharge from the Garrow Lake tailings impoundment area. As a result there was no MMER data collected or reported.

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### **3.0 SUMMARY AND CONCLUSIONS**

The first two quarterly reports for 2003 cover the start of reclamation and decommissioning activities at Polaris. By the end of June, reclamation work was underway in all areas. Costs have increased for some work items from the original budgets. In other areas, the forecasted costs to complete are less than the original budget estimates. Overall, the forecasted cost to complete has increased by about 14% from the original estimate of \$47,000,000. By the end of the second quarter, approximately 46% of the forecasted final reclamation budget had been spent, with significant progress being made in all areas. If the forecasted costs to complete increase according to the 2<sup>nd</sup> quarter trend, then the overall project costs may be as much as 30% above the original budget amount. Note that a significant amount of work will be carried out in the 3<sup>rd</sup> quarter that should identify any major cost oversights.

Teck Cominco have provided no information in these reports to assess the actual degree of work completed with respect to the expenditures to date. Also, no information is provided as to reasons for the cost increases or decreases from the original budget for each of the work items.

The target date for completion of the site closure activities is September 2004. Based on these cost estimates, the potential outstanding liability for site cleanup from the end of June 2003 is \$28,969,034 (to 2011).

Note that the Water Licence has set a security bond in the amount of \$33.7 million. The first \$3.7 million in security was to be paid within 90 days of issuance of the licence. The Water Licence was issued on April 24, 2003. The next \$18 million is due on December 31, 2003, with the final \$12 million due December 31, 2004. Until the next security payment is made in December 2003, there is an unsecured liability of \$25,269,034, as of June 2003.

Under the terms of the Water Licence (Part B, Item 5) "... the amount of security shall not be less than the estimated cost of any work required by the Board to implement corrective measures in the event of proof of evidence that the Licensee has failed for whatever reason to perform reclamation of the undertaking as stated in this License." Although there is no indication that Teck Cominco will fail to meet its obligations with respect to the Polaris Mine decommissioning and reclamation project, regulators should be aware that this License condition was not satisfied as of the end of the second quarter.

Issuance of these quarterly reports to regulators was delayed and it is expected that future reports would be received on a more timely basis.

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Teck Cominco intends to provide copies of the remedial soil reports for the contaminated areas in subsequent quarterly reports. As no areas were completely remediated to the end of the second quarter, none have been included, but some should be anticipated in the third quarter report. In addition, water was discharged from Garrow Lake during the 3<sup>rd</sup> quarter and the results of the MMER monitoring are expected to be included.

Overall, the structure and contents of the reports contain all the information required by the regulators under the terms of the Water Licence and approvals. The cost data that has been provided is summarized by work item, original budget, costs to date and forecast to complete. This provides a detailed breakdown of the work items remaining and areas where increased costs are accruing. Teck Cominco should be requested to include some estimate of the percentage of work actually completed, which is represented by the expenditures to date.

There are several outstanding technical issues that may have an impact on the overall project cost. These include:

- Assessment and mitigation of the subsidence zone above the underground workings.
- Assessment regarding the need to remove the wave break structure in Garrow Lake.
- Final reclamation requirements for the footprint of the Product Storage Shed.

Teck Cominco intends to submit technical proposals regarding each of these items for regulatory approval in the near future.

#### **4.0 CLOSURE**

The above report summarizes the review of the first and second quarter reports prepared by Teck Cominco for the Polaris Mine Decommissioning and Reclamation Project. We trust that the information contained herein meets with your requirements. If you have any questions or require additional information, please do not hesitate to contact me.

Yours truly,

**BGC Engineering Inc.**

*Original Signed by Holger Hartmaier*

Holger Hartmaier, M.Eng., P.Eng.  
Senior Geotechnical Engineer

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