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March 30, 2004

Indian and Northern Affairs Canada
Nunavut District Office,
Building 918
P.O. Box 100
Iqaluit, NU X0A 0H0

Attention: Mr. Carl McLean, Manager, Land Administration Operations

Re: Polaris Mine Decommissioning and Reclamation- Review of 3rd and 4th Quarter Reports

Dear Sir:

As requested under Standing Offer Agreement 01-03-6011, BGC Engineering Inc. (BGC) has reviewed the Third and Fourth Quarter reports prepared by Teck Cominco (TC) 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 Third Quarter report is dated January 19, 2004 and the Fourth Quarter report is dated March 9, 2004.

During the period covered by these reports, a significant amount of decommissioning and reclamation work was carried out, which is reflected in the information contained in the two reports. By the end of 2003, the total decommissioning and reclamation costs were \$43,655,000.00. The estimated costs to complete decommissioning, reclamation and monitoring through to 2011 have increased to \$62,312,000.00, from an original budget of \$47,500,000.00. Based on these figures, the overall project is about 70% complete as of December 31, 2003.

Please note that John Knapp, the Site Manager for TC has resigned effective January 17, 2004. A replacement for John will be named shortly. Bruce Donald of TC will be the primary contact for environmental regulatory issues related to site decommissioning and reclamation activities.

1. THIRD QUARTER REPORT

This report covers the period July 1 to September 30, 2003, which is the main work period at the site for decommissioning and reclamation activities. During this period, INAC and BGC carried out two visits to the site (July 2-3 and September 8-10). As a result of the site visits, TC carried out some follow-up activities, which are reported on in the quarterly reports.

1.1 Overview of Report

This report was prepared by Bruce Donald of TC, and is dated January 19, 2004. Copies of the report were distributed to Nunavut Water Board, Cascade Management Inc. (site managers) and Teck Cominco Metals Ltd in Kimberley and Vancouver, B.C., as well as the Polaris Mine site office.

This is the third quarterly report submitted by TC. The Table of Contents and structure of the report follow the template set in the first quarterly report. The details covered in each section will vary depending on the work in progress or completed during each quarter being reported. As work was carried out on most, if not all areas during this quarter, there is a significant amount of information contained within the body of the report and the attached appendices. Based on volume alone, this quarterly report is at least twice as large as the reports for the first two quarters when site activity was at a minimum and ramping up to the third quarter.

In summary, the Table of contents includes the following headings:

- 1.0 Executive Summary in Inuktitut
- 2.0 Introduction
- 3.0 Status of Authorizations and Approvals
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- 5.0 Progress Report of Studies/Plans Requested
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 - 6.3.4 Product Storage Building
 - 6.3.5 Fuel Bladder Area
 - 6.3.6 Thickener Spills Pond
 - 6.3.7 CRF Plant Area
 - 6.3.8 North Portal Ore Stockpile
 - 6.3.9 Marine Foreshore- June 2002 Oil Spill
 - 6.3.10 Main Snow Dump
 - 6.3.11 Disposal of Hazardous Materials / Special Wastes
- 7.0 Update of Decommissioning and Reclamation Schedule
- 8.0 Project Cost Estimate
 - 8.1 Update of Estimated Mine Decommissioning, Reclamation and Monitoring Costs
 - 8.2 Cost Estimate to Re-construct Garrow Lake Dam
- 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 the Site
 - 12.1 Disposal of Demolition Debris and Contaminated Soils
 - 12.1.1 Disposal of Demolition Debris into the Little Red Dog Quarry Landfill
 - 12.1.2 Disposal of Demolition Debris into the Reclamation Landfill
 - 12.1.3 Disposal of Metals / Hydrocarbon Contaminated Soils Underground into the Mine
 - 12.2 Thermistor Data
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 - 12.3 Geotechnical Inspections
 - 12.3.1 Geotechnical Inspection of Garrow Lake Dam
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 - 12.3.3 Geotechnical Review of the Reclamation Landfill Subsidence Area
 - 12.4 Bathymetric Survey of Garrow Lake
 - 12.5 Erosion Monitoring
 - 12.5.1 Garrow Lake Erosion Pins
 - 12.5.2 Marine Dock and Adjacent Foreshore Erosion Monitoring
- 13.0 Garrow Lake Stratigraphic Monitoring

- 14.0 Summary of Effluent monitoring and Effluent Characterization
- 15.0 Summary of EEM Study Program Progress
- 16.0 Summary of Garrow Lake DFO Study Program Progress

Data contained in the appendices includes:

- Appendix 1 Executive Summary in Inuktitut
- Appendix 2 Surface Melt Water Sample Analysis
- Appendix 3 Analysis of Freeze Pipe Glycol and Soil Samples for Glycol Contamination
- Appendix 4 Update of Decommissioning and Reclamation Schedule
- Appendix 5 Update of Mine Decommissioning, Reclamation and Monitoring Costs
- Appendix 6 Cost Estimate to Reconstruct Garrow Lake Dam
- Appendix 7 Teck Cominco Response to July 2003 INAC Site Inspection
- Appendix 8 LRDQL Water Sample Analysis and Freezing Test
- Appendix 9 Record of Debris Placed into Little Red Dog Quarry Landfill
- Appendix 10 Record of Debris placed into the Reclamation Landfill
- Appendix 11 Record of Placement of Metals / Hydrocarbon Contaminated Soils Underground in the Mine
- Appendix 12 Thermistor Data- Garrow Lake Dam
- Appendix 13 Thermistor Data- Operational Landfill
- Appendix 14 Geotechnical Inspection- Garrow Lake Dam
- Appendix 15 Geotechnical Inspection- Operational Landfill
- Appendix 16 Geotechnical Review of the Reclamation Landfill Subsidence Area
- Appendix 17 Bathymetric Survey of Garrow Lake
- Appendix 18 Record of Garrow Lake Erosion Pin Monitoring
- Appendix 19 Record of Marine Dock and Adjacent Foreshore Erosion Monitoring
- Appendix 20 Summary of Effluent Monitoring and Effluent Characterization
- Appendix 21 Electronic Version of Report on CD.

The intent of this review is not to repeat the contents of this report, but to highlight pertinent details and items of regulatory concern and interest, with particular emphasis on the progress and costs related to the ongoing decommissioning and reclamation plan and potential remaining outstanding liability. This memorandum, in conjunction with the two site visits conducted in 2003 by INAC and BGC, serve to verify ongoing reclamation work and highlight any issues and concerns that require mitigative measures.

1.2 Status of Authorizations and/or Approvals

This quarterly Decommissioning and Reclamation progress report was submitted in compliance with Water Licence NWB1POL0311, issued on April 24, 2003 with an effective date of March 1, 2003. The Polaris Closure Plan, dated March 2001 received its conditional approval on April 15, 2002 by the Nunavut Water Board (NWB) and INAC. Conditions of this joint approval required that TC submit separate project approvals for various components of the closure plan.

As of September 30, 2003, TC reported the status of project approvals received during the quarter, as follows:

1. Closure plan approvals:
 - a. The proposal for decommissioning the Frustration Lake Freshwater System was approved in a letter from the NWB and INAC dated July 4, 2003
 - b. The approval for the decommissioning of Garrow Lake dam by the NWB and INAC has been received.
 - c. The approval for the decommissioning of the marine dock and adjacent shoreline by the NWB and INAC has been received.
2. Application for an Authorization under the Fisheries Act to decommission Garrow Lake dam and to decommission the marine dock was submitted to DFO in October 2001. Approval of the application by DFO was granted in July 2003.
3. Application to the NWB and INAC for additional underground storage locations for disposal of hydrocarbon contaminated soils was submitted on September 16, 2003. Approvals for this application were outstanding at the end of the reporting period.

1.3 Progress Report of Studies / Plans Requested

TC reported that the following plans/ reports were submitted for review during the quarter, as required under the Closure Plan approvals and the Water Licence or both:

- Certified landfill cover design specifications and plans.
- Certified design drawings and specifications for Garrow Lake Dam decommissioning.
- Certified specifications and design drawings for sealing of mine entrances.
- Certified specifications and design drawings for decommissioning of marine dock and adjacent shoreline.

TC reported that the following studies or programs had been carried out during the quarter:

- First phase of the Environmental Effects Monitoring (EEM) program conducted under the new Metal Mining Effluent Regulations (MMER) was conducted in August of Garrow Lake effluent discharge.
- Field work for DFO study program related to Garrow Lake was undertaken. Activities included sampling of water and sediments and collection of sculpins for analysis.
- Weekly inspections of underground area used for disposal of meltwater and water quality sampling.
- Annual geotechnical inspection of Garrow Lake Dam and Operational Landfill.
- Review of subsidence in Reclamation Landfill.
- Preparation of a cost estimate to re-construct Garrow Lake Dam in the event that water quality of Garrow Lake deteriorates.

1.4 Decommissioning and Reclamation Progress

The return of daylight and warmer weather permitted more outside activities. TC reported work underway in most areas of the reclamation program during the period. Major work activities completed during the period were:

- Completed demolition of the barge superstructure, cleaning of barge fuel tanks, dewatering of berthing area, cutting up and removal of barge hull sections to Little Red Dog Quarry.
- Demolition of product storage building. Only the stub columns and partial foundations remained in place at the end of September.
- Completed foundation removal and re-grading of thickener building foundation areas.
- CRF Plant demolition and site grading completed. Hydrocarbon contaminated soils removed.
- Cleaned #1 Tank in fuel tank farm. Tank was partially refilled with fuel from supply ship. In 2004 tank will be decommissioned. The two other tanks remain to be cleaned.
- The majority of the tailings lines were removed. Some lines remained between the barge and tank farm area.
- Reclaim water lines were removed and disposed of into LRD Quarry or underground.
- Removal of the ship loaders was completed.
- Glycol freeze pipes within the dock cells were drained and removed.
- Removal of hydrocarbon contaminated soils within the dock cells was almost completed by the end of the quarter.
- Additional siphons were installed at Garrow Lake Dam to assist in lowering the lake level. Siphoning concluded on September 18, with the lake at elevation 1005.9 m, which is about 30 mm above original lake elevation.
- No decision was made as to action regarding the exposed wave break structure.
- Started removal of dam shell and Styrofoam insulation before freeze up.
- Drilling, blasting, hauling and placing of cover cap materials for the Operational Landfill from New Quarry was ongoing throughout the period. Completed placement of the first 1.2 m of cover.
- Blasted limestone rock in LRD Quarry for top 600 mm layer of landfill cover cap, but material did not meet the required specifications.
- Placed demolition debris from barge and product storage building into LRD Quarry.
- Continued re-grading in Back 40 Area (including CRF Area, New Quarry, North Pit, Subsidence Area and North Portal Area). Re-grading of North Pit completed on August 4.
- Began partial re-contouring of roadways in July and August.
- Initiated removal of hydrocarbon contaminated soils in barge area, but not completed by end of quarter. Soil removal also incomplete in Exploration Waste Dump and stockpile area, Product Storage area footprint and North Portal Ore stockpile.
- Completed remediation of Fuel Bladder spill area.

- Completed removal of metals contaminated soils in thickener spills pond.
- Completed removal of hydrocarbon contaminated soils in the marine foreshore from the June 2002 oil spill.
- Completed remediation of Main Snow Dump area.
- A total of 17,962 imperial gallons of waste oils and fuels were disposed of during the quarter in the on-site incinerator.

1.5 Schedule

The decommissioning schedule was updated as of September 30, 2003, based on information provided by the demolition contractor. Some near term activities were revised due to more detailed planning, however the project is still forecasted to be completed by the end of September 2004.

1.6 Project Cost Estimate Update

1.6.1 Update of Estimated Mine Decommissioning, Reclamation and Monitoring Costs

TC, as of September 30, 2003 updated the detailed estimate of mine closure costs:

Original Budget	\$47,500,000
Forecast to Complete (2011)	\$56,925,108
Actual Costs to September 20, 2003	\$37,094,048

Mine closure costs during the period amounted to a total of \$12,554,256. The forecasted costs to complete decommissioning, reclamation and monitoring through to 2011 have increased from the second quarter estimate of \$53,860,906. This represents an overall cost increase of about 20% over the original cost estimate of \$47,500,000. The costs incurred to the end of the third quarter therefore represent about 65% of the forecasted costs to complete. The work remaining as of September 30, 2003 represents an estimated outstanding liability of \$19,831,060. This compares with an outstanding liability of \$28,969,034 at the end of the second quarter.

Table 1 presents a summary of the closure costs to date;

Table 1 - Summary of Mine Decommissioning, Reclamation and Monitoring Costs

ITEM	QUARTER- 2003 1	2	3
Cost during period	\$17,868,861	\$6,670,931	\$12,554,256
Cumulative Cost	\$17,868,861	\$24,539,792	\$37,094,048
Forecast Cost to Complete	\$53,508,826	\$53,860,906	\$56,925,108
Percentage Complete	33%	46%	65%
Outstanding Liability	\$35,639,965	\$28,969,034	\$19,831,060

In the fourth quarter report, TC presents an analysis of the reasons for the cost variations in each item of the cost estimate.

1.6.2 Cost Estimate to Re-construct Garrow Lake Dam

As required under Part B (5) of the Water Licence, TC prepared a cost estimate to re-construct Garrow Lake Dam in the event that the water quality being discharged from Garrow Lake deteriorates and other mitigative actions fail in restoring acceptable water quality.

The cost estimate was prepared by Cascade Management Inc. and is included as Appendix 6 of the Third Quarter report. The cost estimate is based on the assumption that reconstruction is required after reclamation at the site has been completed and equipment and manpower are no longer located on the island. This would be the situation after the fall of 2004.

In this situation, the necessary equipment, manpower and infrastructure would need to be re-mobilized to the site, increasing the costs. Cascade used their current experience as project managers at the site to develop the costs used in the estimate. Based on this estimate, the cost to re-build Garrow Lake Dam is \$1,250,000, with an accuracy of $\pm 25\%$ and a recommended contingency of 25%.

The following work was included in the cost estimate:

- Engineering, including conducting site investigations and preparation of detailed drawings and specifications for construction and level control of structure.
- Procurement of necessary materials and construction services.
- Construction, field supervision and quality control inspections.
- Clean up and demobilize from site.

Work not included in the estimate:

- Environmental sampling and testing.
- Regulatory approvals and permits
- Escalation.

The work was assumed to be carried out over a 30-day period from mid-July to mid-August, using a local contractor, bid on a Lump Sum Basis. The labour rates used in the estimate were based on current labour rates for the Polaris Project, with applicable additives for Contractor's overhead and overtime premiums.

Since this cost represents an additional long-term liability for regulators, a more detailed review of the cost estimate is warranted. BGC is concerned that the labour and equipment rates used in the estimate may not be representative of the rates that would be charged by a third-party contractor. That is, the current Polaris rates are based on a large-scale, long-term contractual arrangement, with an existing site infrastructure and low contractual risk. Under the current

contract, the contractor is essentially being paid for all the work performed based on unit rates. Under the terms of a lump sum contract, such as proposed for the re-construction of Garrow Lake Dam, the outside contractor may increase his rates compared to current Polaris rates to cover the site risk factors.

The cost estimate assumes that the new dam will remain in place as there is no cost allowance included for removal of the dam and reclamation of the site again, assuming that water quality may return to acceptable discharge quality at some time in the future.

In addition, the cost estimate does not include several, potentially costly and time sensitive items, associated with construction such as:

- Re-establishing either the airstrip or some type of temporary dock facility to mobilize equipment and manpower to the site and establishing road access to the site.
- Re-establishing site access roads from the dam site to borrow areas and quarries used as sources of construction material for the dam. These roads would then, again have to be decommissioned at some point as part of site reclamation.
- Developing and reclaiming sources of construction materials.

From a long term liability perspective, INAC/NWB should be clear as to the total scope of work that should be included in this cost estimate, whether it is one time construction or construction, followed by removal and reclamation.

BGC recommends that TC prepare a new cost estimate that is not based on the current Polaris rates. The site demolition contractor (SNC) would be in a good position to provide an estimate based on returning to the decommissioned site under the proposed lump sum contractual arrangement and knowing the site conditions.

1.7 Physical Monitoring of the Site

1.7.1 Disposal of Demolition Debris Into Little Red Dog Quarry

The report contains a record of the materials placed into the Little Red Dog Quarry, including photographs, a written log and a drawing. During the INAC inspection in July, an orange stain was noted on the surface of the standing water within the Little Red Dog Quarry. TC identified the stain as dye from ANFO manufactured on site that originated from some residue left on materials placed into the quarry. The INAC site inspection report expressed concern that the potential contamination could depress the freezing point of the water. TC obtained samples of the dye coloured water and determined that there was no freezing point depression. The results of this test are included in Appendix 8.

1.7.2 Disposal of Demolition Debris Into the Reclamation Landfill

The Reclamation Landfill, also known as the Subsidence Area Landfill or Sinkhole Landfill, was actively used during the final years of operations as part of the progressive reclamation activities. No disposal of materials has occurred in this area since mining ceased operations.

Previously, it was believed that the disposal records for this area had been lost. TC has now found these records, which include photographs and written records of the material placed into the landfill and are included in Appendix 10.

The records show fill being placed over the materials as the area subsided. From the photos presented in Appendix 10, BGC is of the opinion that many of the items placed into the landfill did not follow the protocols established later for the Little Red Dog Quarry landfill. Specifically, many of the photos show material dumped into piles with no segregation or crushing to minimize voids. The backfill cover was simply dozed over top of the waste piles. There is no record as to the actual thickness of cover on top of the waste within this landfill. BGC is concerned that this area may be subjected to degradation in the long term, as cover materials may collapse into the voids within the debris buried in the landfill.

1.7.3 Placement of Metals / Hydrocarbon Contaminated Soils Underground in the Mine

Appendix 11 contains maps showing the locations where metals and hydrocarbon contaminated soils were placed in the underground openings of the mine. The actual quantities of materials placed were not included with this data but were updated in the 4th quarter report.

1.7.4 Thermistor Data

TC continued to monitor thermistors at Garrow lake Dam (Appendix 12) and in the Operational Landfill cover (Appendix 13). Heavy metal pipes have been installed in the Little Red Dog Quarry Landfill that will be used to insert thermistors, once the landfill is full.

In general, the dam thermistors all show that the core is below freezing year-round, with temperatures within the range of about -6°C to -25°C . The dam inspection report (Appendix 14) contains summary plots of the thermistor data in Garrow Lake Dam. The long term plots seem to indicate a consistent warming trend since January 1991 to the present in all thermistors. The Garrow Lake Dam data presented in the third quarter report represents the last set of readings for this structure, as the thermistors were decommissioned as part of the removal of the dam beginning in the fourth quarter.

The thermistors in the Operational Landfill cover have not yet stabilized to the placement of new cover materials at the surface. The inspection report contained in Appendix 15 summarizes the thermistor data, which goes back to March 1999. The data so far indicates an active zone of less than 1.5 m.

1.7.5 Geotechnical Inspections

EBA Engineering Consultants Ltd. (EBA) carried out geotechnical inspections of the Garrow Lake Dam and Operational Landfill cover during the quarter. Summary reports of these inspections are contained in Appendix 14 and Appendix 15 respectively.

The dam continues to perform well. TC requested that EBA carry out the Operational Landfill cover inspection in response to the letter by INAC following the July site inspection visit. In the letter the request was made to check the physical properties of the cover material to ensure that the thermal properties are the same as those assumed in the design. EBA took samples of the cover material for grain size analysis and moisture content determination. Based on the results of these tests, EBA concluded that the material met the specifications outlined in the design and that the active layer will be less than predicted.

1.7.6 Geotechnical Review of the Reclamation Landfill Subsidence Area

During the July INAC/BGC site inspection, TC was requested to provide more data concerning the nature of the movements within the Subsidence Landfill or "Sinkhole" Area. The quarterly report contains an assessment of the problem in Appendix 16, prepared by Mr. Trevor Feduniak, P.Eng., previously the Senior Mine Engineer in the Mine Engineering Department during operations.

Mr. Feduniak's report reviews the history of the subsidence at Polaris and summarizes the data collected from surface surveys up to October 2002. His conclusions are that apart from the sinkhole area, subsidence is not a concern. The last precise subsidence survey was done in the summer of 2002 while active mining was going on. He recommends that a precise survey be conducted during the summer of 2004 to give an updated picture of the progression of the subsidence and allow a more reliable forecast of future subsidence in the sinkhole to be made. At that time, TC will propose a preferred remedial option.

BGC agrees that more data is required regarding ground surface movement and the rates of movement at various locations since mining has ceased. It appears that ground movements within the sinkhole have not ceased, however accurate measurements within the main zone of movement have not been possible due to loss of benchmarks and ongoing filling associated with site reclamation.

It is important to point out the key differences between the various subsidence mechanisms, as described by Feduniak in Appendix 16.

In general the trough subsidence that occurs as a result of creating an underground opening is due to the sagging of the overlying rock strata into the opening, much like a beam deflecting under load. The characteristic subsidence curve associated with this type of ground movement passes through various stages. Initially there is no ground movement associated with the mining

activity. Eventually, as the width of the opening reaches a certain size, surface movements begin to occur. The rate of movement at the surface accelerates as the width of the underground mine increases. These surface movements have both vertical and horizontal displacement components as indicated by tension cracks on the ground surface. The maximum vertical movement occurs when the span of the opening reaches a critical value. At this point, if no further mining occurs, the surface movements will stabilize. If mining continues to increase the width of the opening, the zone of movement will expand at the ground surface, but the maximum vertical movement measured at the surface will remain constant. This condition applies to the case where the underground openings are relatively thin and tabular, compared to the depth below the ground surface. The settlement at the surface is gradual and the ground above the mined out opening does not fracture. As mentioned by Feduniak, this type of subsidence is well understood and there are mathematical models that can be used to predict the amount and extent of subsidence.

Fracture subsidence or “sinkhole” related subsidence is much more serious. Here the movement of the rock around the underground opening results in fracturing and breaking of the rock mass. The broken rock forming the edge of the excavation “caves” into the void created by mining. Caving continues as a series of steps if the volume of the opening is large enough to contain the caved material. The caving action may result in the formation of a “chimney”, where caving occurs over a relatively small area and propagates rapidly to the surface. In general there is no predictive model available to assess this type of subsidence. The key difference with this mechanism is that caving will continue after mining has ceased, as long as there is room within the underground opening to accommodate the caved material.

It would appear from the data, that fracture subsidence is occurring in the sinkhole area and that propagation of the caving to the surface is a real possibility. It is known that the sinkhole is located above the 202 Stage III stope. TC reported that the block over top of this stope failed and moved downward in excess of 3.5 m at the 850 level during mining (ca. 1994). The excerpt of a report by Golder Associates (1994) contained in Appendix 16 mentions that surface extensometers recorded minor separation in the rock mass at 40-60 m depth, indicating that the rock mass is moving as a relatively cohesive mass, or as a series of large blocks. The zone of block movement is bounded by a series of near-vertical faults that reach the ground surface.

Despite this evidence, the overall analysis by TC seems to be based on the belief that the rate of subsidence will decrease over time and has neglected the caving mechanism as being the prime failure mode in the sinkhole area.

There is no evidence that the movement within the sinkhole zone has stabilized over the last 10 years. Since the stope has not been backfilled, the caving process can be expected to continue until the volume of caved material completely fills the stope, or the chimney reaches the ground surface. As of 2002, the subsidence displacements on the west side of the sinkhole were still in an accelerating phase. The measurements to the east indicate that movements have stabilized.

TC should assess the potential void volume in the un-backfilled stope to determine if the caving process will eventually become self-stabilizing. BGC disagrees that permafrost will be a stabilizing mechanism. The strength of the frozen broken ground will be significantly less than the strength of the intact and frozen rock mass around the stope, which is already undergoing failure and caving by this process.

The presence of this caving zone imposes an unacceptable safety hazard to the site and the potential for long-term post-closure liability. BGC disagrees with TC's conclusions that the rate of subsidence will decrease over time. The fact that TC's surface benchmarks have kept disappearing into the sinkhole indicates that caving is continuing in the post mining condition. The fact that the zone of cracking around the sinkhole zone has not expanded should not be taken as an indication of stability. The caving process will continue to draw in the broken material in the form of a cone until the underground void is filled. The slopes around the margins of this sinkhole zone will also be unstable. As caving proceeds, there is a potential for some of the material near the surface to bridge over the opening, creating an unstable zone that may suddenly collapse. TC has assumed that there is 10-20 metres of overburden overlying bedrock in this area and has had equipment operating within the subsidence zone. This may no longer be the case if active caving has taken place over the last 10 years.

BGC recommends that TC undertake a program of exploration to delineate the subsurface extent of the caving zone around the underground stope. The objective of the exploration program would be to develop methods to permanently stabilize the area for closure. A program of seismic reflection surveys with closely spaced lines would help to delineate the margins of the caving zone, depth of overburden and limits of intact and fractured rock.

1.7.7 Garrow Lake

TC conducted a bathymetric survey of Garrow Lake in August 2003. The results are given in Appendix 17. This survey is the most accurate and detailed survey to date and reflects the conditions of the tailings after mining operations have ceased.

TC has installed erosion pins around the shoreline of Garrow Lake to monitor instability and erosion associated with lowering the water level of the lake. No evidence of erosion has been noted to date. Appendix 18 contains data showing the pin locations, monthly measurements and shoreline photographs.

Stratigraphic monitoring of Garrow Lake during the maximum ice melt period was not carried out due to staffing and equipment problems.

Effluent monitoring from the Garrow Lake tailings impoundment was carried out during the quarter. This is the only quarter when effluent is being discharged. Monitoring was carried out as required by the Water Licence and as set out in Schedule 6 of the Metal Mining Effluent

Regulations (MMER). The results were present in Appendix 20 of the report and showed that all parameters were within permissible limits.

2. FOURTH QUARTER REPORT

This report covers the period October 1 to December 31, 2003.

2.1 Overview of Report

The report was submitted March 9, 2004 by Mr. Bruce Donald of TC to the Nunavut Water Board and INAC. Additional copies were sent to Teck Cominco Metals and to Cascade Management Inc., project managers for the Polaris Mine decommissioning and reclamation program.

The contents of this report are similar to those in the third quarter with the addition of the following Appendices:

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|-------------|--|
| Appendix 1 | Executive Summary in Inuktitut (not ready at time of report preparation) |
| Appendix 2 | Contaminated Soils 2003 Close Out Reports |
| Appendix 3 | Update of Decommissioning and Reclamation Schedule |
| Appendix 4 | Update of Estimated Mine Decommissioning, Reclamation and Monitoring Costs |
| Appendix 5 | Record of Debris Placed into Little Red Dog Quarry Landfill |
| Appendix 6 | Record of Placement of Metals / Hydrocarbon Contaminated Soils Underground in the Mine |
| Appendix 7 | Summary of Effluent Monitoring and Effluent Characterization |
| Appendix 8 | Emergency Spill Response Training |
| Appendix 9 | Workers' Compensation Board Approval of Portal Seal Design |
| Appendix 10 | Electronic Version of Report on CD. |

Gartner Lee Limited (GLL), consultants to TC and supervisors of the soil remediation activities. prepared the close out reports. Remediation of 10 areas was completed to the end of the 4th quarter, 2003. The close out reports for each area are included in Appendix 2 and include the following areas

- Concentrate Storage Shed Area
- Cemented Rockfill (CRF) Plant Fuel Storage Tank
- Former Quonset Huts Fuel Storage Area
- Tailings Thickener Area
- Former Fuel Bladder Storage Area
- Old Crusher Area
- Main Snow Dump
- North Portal Stockpile
- Exploration Stockpile and Shoreline North of Dock

- 2002 Fuel Spill

TC has requested that regulators review all close out reports as they are submitted in the quarterly reports, so that any unresolved issue or concern can be addressed before they demobilize from the site. BGC recommends that TC send all close out reports directly to the regulators as they are done, rather than waiting for the quarterly report, due to the additional time required to prepare and issue the quarterly reports.

TC has requested in this quarter to reduce the reclamation security required for this project to the \$18,000,000 in security currently held by INAC.

2.2 Status of Authorizations and Approvals

As of December 2003, the status of project approvals received during the quarter was as follows:

- Application to the NWB and INAC for additional underground storage locations for disposal of hydrocarbon contaminated soils.
- Application to place metals contaminated soils in LRDQL and remaining hydrocarbon contaminated soils underground in the mine.
- Certified landfill cover design specifications and plans were approved with conditions.
- Certified design drawings and specifications for Garrow Lake Dam Decommissioning were approved with conditions.
- Certified specifications and design drawings for sealing the mine entrances were approved.
- Certified specifications and design drawings for Decommissioning the marine Dock and Adjacent Shoreline were approved with conditions.
- An updated spill response plan was submitted in December based on comments received from regulators.

The request for modification of haulage location (Garrow Lake dam core material into the barge excavation), dated October 15, 2004 was still outstanding as of the end of the 4th quarter.

2.3 Decommissioning and Reclamation Progress

TC continued working as long as possible in the 4th quarter to gain as much extra earthmoving time as possible before freeze up. The following major activities were reported completed during the period:

- Short section of tailings line near Garrow Lake was removed in December.
- Much of the protective berm at the edge of the shoreline adjacent to the marine dock was removed.
- Excavation of Garrow Lake Dam commenced until it became too hard to use a ripper.
- Approximately 98% of the final limestone cap was placed on the Operational Landfill.
- The final clean up of the concentrate storage area floor was completed. TC placed a cover material on the exposed bedrock to isolate trace metals contamination within the

bedrock fractures. More discussion on this item will be presented in Section 2.8.

- Completed confirmatory sampling and clean up of metals and hydrocarbon contaminated soils at the 10 sites listed above in Section 2.1.

2.4 Schedule

TC updated the decommissioning schedule as of December 31, 2003. There were some revisions to near term activities as more detailed planning occurred. The project is still forecasted to be completed by the end of September 2004. TC reported that as of December 31, 2003, the project is 71% complete (excluding site monitoring required subsequent to 2004.)

2.5 Project Cost Estimate Update

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

In summary, TC reported the following breakdown of mine closure costs to the end of the fourth quarter:

Original Budget	\$47,500,000
Forecast Cost to Complete (2011)	\$62,311,705
Actual Costs to December 31, 2003	\$43,655,492

Mine closure costs during the fourth quarter amounted to a total of \$6,561,444. The forecasted cost to complete has increased about 10% from the last quarterly estimate of \$56,925,108. The fourth quarter costs to date therefore represent about 70% of the overall closure costs, including monitoring to 2011. The overall cost to complete represents an overall budget increase of about 31% over the original budget. Based on the work carried out to date, the work remaining as of December 31, 2003 represents an outstanding liability of \$18,656,213. This compares with an outstanding liability of \$19,831,060 and the end of the third quarter. It is important to note that the outstanding liability does not include the contingency cost associated with the reconstruction of Garrow Lake Dam, as discussed in the third quarter report.

Table 2 presents a summary of the closure costs to date.

Table 2 - Summary of Mine Decommissioning, Reclamation and Monitoring Costs

ITEM	QUARTER- 2003 1	2	3	4
Cost during period	\$17,868,861	\$6,670,931	\$12,554,256	\$6,561,444
Cumulative Cost	\$17,868,861	\$24,539,792	\$37,094,048	\$43,655,492
Forecast Cost to Complete	\$53,508,826	\$53,860,906	\$56,925,108	\$62,311,705
Percentage Complete	33%	46%	65%	70%
Outstanding Liability	\$35,639,965	\$28,969,034	\$19,831,060	\$18,656,213

Figure 1 is a graphical representation of the closure cost data to date. Note that the increase in the forecasted cost to complete in the fourth quarter was about the same as the cost of reclamation expended during the period. It is expected that the forecasted costs to complete will be less subject to change in the future as more of the site work is completed and the remaining work becomes better defined.

TC provided an analysis of the forecasted project cost variances relative to the original budget in Appendix 4. The following are some of the major reasons given by TC:

- Demolition costs are proving to be less than originally budgeted due to less manpower and an effective demolition contractor.
- The single biggest variance (\$5.9M) is in the maintenance of equipment and facilities, due to an underestimating of cost per hour of maintenance, plus the additional use of equipment to handle the additional volumes of contaminated soil.
- Major cost increases are associated with the handling of contaminated soils, which are taking more time due to increased quantities and lower productivity. This also results in increased fuel usage and additional manpower and supervision.
- Increased costs for Garrow Lake Dam decommissioning due to additional work not identified in budget, more excavation and more siphoning required to lower lake levels.
- Evacuation and cleaning of tanks by a specialized contractor is costing more.
- Some work items were under budgeted, with no scope change, such as site grading and landfill reclamation.
- Transportation unit costs are higher than budgeted. Unit costs for air travel have increased beyond normal escalation rates. Poor weather has added to layover costs and increased crew levels have increased the number of passengers traveling.

2.6 Reclamation Security Requirements

TC has requested that NWB and INAC adjust the security requirements, as provided in the Water Licence under Part B, Paragraph 3, to the \$18,000,000 currently held. As summarized in the previous section, the outstanding liability as of December 31, 2003 has decreased to \$18,600,000. As work is continuing to progress at the site, it is expected that the actual amount at the completion of this review will be less than \$18,000,000.

BGC agrees that the TC request is reasonable on the basis of work progressing to completion by the end of third quarter 2004. The following considerations should be kept in mind however, with respect to the potential outstanding risks and liability associated with the ongoing closure and reclamation work at Polaris:

- The contingency cost for re-constructing the Garrow Lake Dam, as outlined in Section 1.6.2 is not included in the above amount. As indicated, TC should provide a revised cost estimate.

- The stability of the Reclamation Landfill needs to be evaluated further, as discussed in Section 1.7.6. At present, there is no allowance in the cost estimate for any additional reclamation measures for this area.
- In the fourth quarter, the amount of work forecasted to be done increased by about the same amount as the amount of work completed during the quarter, resulting in a minimal reduction in the total outstanding liability. It is expected that in 2004, the work remaining can be defined more accurately as work progresses and that the escalation associated with the various work components will not result in further significant increases in the outstanding liability.

Assuming that the identified work progresses as forecast, the \$18,000,000 in security should be sufficient to cover the costs associated with the above three items, over the next year. This security amount should be reviewed on a quarterly basis to ensure that it does cover all the remaining outstanding liabilities.

2.7 Physical monitoring of the Site

2.7.1 Little Red Dog Quarry Landfill

Appendix 5 contains details of the quantities and types of materials placed into LRDQL during the period. Most of the material was steel from the product storage building, dock, shoreline and North Portal areas.

2.7.2 Disposal of Metals / Hydrocarbon Contaminated Soils Underground in the Mine

Appendix 6 contains details of the quantities of material placed into the underground workings, as well as plans of the various mine levels showing the locations where contaminated soils have been placed as of December 2003.

TC provided the following information regarding the status of the disposal of contaminated soils as requested by INAC and NWB under the terms of the approval letter dated December 23, 2003: (All volumes are in-situ volumes)

- The original volumes of contaminated materials identified in the decommissioning and reclamation plan:
 - 36,600 m³ of hydrocarbon contaminated soils.
 - 91,500 m³ of metals contaminated soils.
 - **Total 128,100 m³**
- The quantities of soils disposed of to date (all placed underground):
 - 59,270 m³ of hydrocarbon contaminated soils.
 - 118,472 m³ of metals contaminated soils.
 - **Total 177,742 m³**

- The predicted volume of soils yet to be disposed of:
 - 77,600 m³ of hydrocarbon contaminated soils
 - 44,000 m³ of metals contaminated soils.
 - **Total 121,600 m³**
- Usable volumes of disposal space available:
 - 128,000 m³ of space underground for hydrocarbon contaminated soils.
 - 215,000 m³ of space in Little Red Dog Quarry for metals contaminated soils.
- Total volume of contaminated soils:
 - 136,870 m³ of hydrocarbon contaminated soils.
 - 162,472 m³ of metals contaminated soils.
 - **Total 299,342 m³**

Using a swell factor of 20% to convert in-situ volume to loose volume, the amount of hydrocarbon contaminated soils remaining to be disposed of is 93,120 m³ compared with an available space of 128,000 m³ in the mine. The volume of underground space available that was estimated by TC is based on a factor of 75% to reflect the filling efficiency actually experienced underground. The loose volume of metals contaminated soils is 52,800 m³ compared with an available volume of 215,000 m³ in the Little Red Dog Quarry Landfill. The available volume was based on filling the quarry to the top of Bench 5. If required, there is additional volume available in LRDQL.

Table 1 in Appendix 6 gives a breakdown by area of the original volumes, volumes excavated to date, forecast volumes remaining to be excavated and total volumes of hydrocarbon and metals contaminated soils in each area. Appendix A contains the close out reports for those areas that have been remediated.

2.7.3 Thermistor Data

There was no thermistor data presented in the 4th quarter report.

- Removal of Garrow Lake Dam commenced in the 4th quarter and the thermistors were decommissioned. Starting with the 4th quarter 2003, there will no longer be temperature data reported.
- In the Operational Landfill, the reading of the thermistors was temporarily suspended due to the placement of the cover cap. Monitoring will resume in the spring of 2004, when the remainder of the cap has been placed.
- Thermistors will be installed into the steel pipes placed within the Little Red Dog Quarry Landfill once placing of debris and soils is complete.

2.7.4 Erosion Monitoring

There was no erosion monitoring done during the period at Garrow Lake and along the marine dock and adjacent foreshore, due to frozen conditions.

2.7.5 Garrow Lake Water Quality Monitoring

TC reported that it was not possible to complete the summer stratigraphic sampling of Garrow Lake due to unsafe ice conditions. TC intends to conduct sampling in January of maximum ice thickness conditions, which will be reported in the 2004, 1st quarter report.

There was no effluent discharged during the quarter, therefore no effluent sampling was carried out.

TC and its consultants met with Environment Canada's Technical Advisory Committee to review the 2003 summer field program and results and the requirements for 2004. The Garrow Lake DFO study program will be reported in 2004.

2.8 Contaminated Soils Remediation 2003 Close Out Reports

Appendix 2 contains close out reports prepared by GLL for the areas remediated during 2003. TC has requested that regulators review these reports so that any outstanding areas of concern can be addressed before TC leaves the site at the end of September 2004. Due to the length of time required to prepare and issue the quarterly reports, BGC recommends that TC send the close out reports to regulators as soon as they are completed, rather than waiting for the quarterly report. Copies of the close out reports should also be included with the quarterly report for record purposes.

With respect to the sites reported in the 4th quarter, the close out report for the concentrate storage area is the only one with an outstanding area of concern that needs to be addressed by regulators.

During the September 2003 INAC/BGC inspection, TC indicated that they would be submitting a proposal for dealing with the relict metals contamination in the bedrock. The close out report indicates that TC placed a soil cover of well-graded sand and gravel material over the bedrock containing the residual concentrate dust. The cover has a minimum thickness of 0.5 m.

The depth of the cover was selected to eliminate exposure pathways of lead and zinc concentrate to human and ecological receptors, as explained by GLL in Appendix 2-A. It was determined that exposure via dissolved phase pathways was not a concern. The main concern was direct or indirect contact with the contaminated soil. GLL estimated that typical plant root depth at Little Cornwallis Island was less than 10 cm. Since oxidation was not a concern, the depth of 0.5 m (5 times root depth) was a conservative thickness to effectively break the indirect and direct exposure pathways, given the lack of human redevelopment and occupation of the site.

Until regulators have had the opportunity to review and comment on the remediation approach adopted by TC, this area should not be considered as being fully remediated.

From a geotechnical perspective, the preferred approach would have been to ensure that the contaminated bedrock zone was further isolated by permafrost, below the active zone. This would require placing a minimum total thickness of about 1.6 m of fill. With the present 0.5 m of cover, the zone of relict metals contamination within the upper bedrock lies within the seasonal active zone. The potential exists that over time, the zone of contamination may become mixed with the cover soils at progressively shallower depths, resulting in eventual exposure of the zinc and lead dust at the surface. It would remain to be determined if the resulting concentrations of metals, distributed throughout the soil column by this mechanism would still pose a threat to the environment.

3. SUMMARY AND CONCLUSIONS

By the end of 2003, work at the site was estimated to be about 71% complete, excluding the post-closure monitoring period. Actual cost of decommissioning and reclamation as of December 31, 2003 was \$43,655,492, with an estimated cost to complete of \$62,311,705. The estimated cost to complete represents a 31% increase over the original closure budget of \$47,500,000.

Significant progress was made in all areas. Ten areas of contaminated soil have been remediated and close out reports have been prepared for regulatory review.

As a result of the review of the third and fourth quarter reports, TC should address the following issues of concern:

- Review basis of cost estimate for re-construction of Garrow Lake Dam to reflect increased unit rates and need to re-establish, then decommission borrow areas, roads etc. The costs do not include removing the dam again if water quality improves. TC should consult with INAC/NWB to determine what contingencies need to be included under this cost item.
- TC should review with INAC/NWB the adequacy of waste disposal and cover requirements for the Reclamation Landfill.
- The subsidence zone within the Reclamation Landfill needs to be assessed and stabilized.
- The close out reports for remediated areas should be sent to INAC/NWB for review as soon as they are complete, rather than waiting to send them out in the quarterly reports.
- TC have requested that the reclamation security be reduced to the \$18,000,000 currently held by INAC/NWB. This needs to be reviewed by regulators in view of the other outstanding potential liabilities at the site.
- The cover design for the bedrock exposed in the floor of the Product Storage building needs to be reviewed by regulators before accepting that this area is fully remediated.

4. CLOSURE

The above report summarizes the review of the third and fourth quarter 2003 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.
per:



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

HHH/sf

Attachment: Figure 1- Polaris Mine 2003 Closure Cost Summary

Cc: Patrick Duxbury M.Sc., Mine Reclamation Coordinator, Nunavut Water Board

Figure 1 - Polaris Mine 2003 Closure Costs Summary

