

**POLARIS MINE
DECOMMISSIONING AND RECLAMATION PROGRESS REPORT
3rd QUARTER 2003**

**FOR THE
NUNAVUT WATER BOARD &
INDIAN AND NORTHERN
AFFAIRS CANADA**



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POLARIS MINE

DECOMMISSIONING AND RECLAMATION ACTIVITIES

QUARTERLY REPORTING – 3rd QUARTER 2003

SUBMITTED TO

THE NUNAVUT WATER BOARD

AND TO THE

DEPARTMENT OF INDIAN AND NORTHERN AFFAIRS CANADA

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1. EXECUTIVE SUMMARY IN INUKTITUT

Refer to Appendix 1 for an executive summary of plans, reports and studies conducted under this licence during the period July 1, 2003 to September 30, 2003 that has been translated into Inuktitut.

2. INTRODUCTION

This is the third quarterly Decommissioning and Reclamation progress report submitted in relation to the Polaris Mine's Decommissioning and Reclamation Plan ('Closure Plan') and in compliance of the 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 initial conditional approval April 15, 2002. The Closure Plan was jointly conditionally approved by the Nunavut Water Board ('NWB') and the Department of Indian and Northern Affairs Canada ('INAC'). The Closure Plan has subsequently received further approvals. The approvals contain reporting requirements and this document has been prepared to consolidate all of the reporting requirements into one document. This report is being submitted to both NWB and INAC on a quarterly basis with an annual report completed by March 31st of the subsequent year.

3. STATUS OF AUTHORIZATIONS AND/OR APPROVALS

As of September 30, 2003, the status of project approvals received during the quarter was 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.

4. UNAUTHORIZED DISCHARGES AND SUMMARY OF FOLLOW UP ACTIONS

There were no unauthorized discharges of water or effluent during the 3rd Quarter of 2003.

5. PROGRESS REPORT OF STUDIES / PLANS REQUESTED

The routine monitoring required as part of the Closure Plan approvals and the Water Licence are included in other sections of the report and so are not duplicated in this section of the report.

The Closure Plan approvals and/or the Water Licence require submission of the following plans and/or reports:

- a) Certified landfill cover design specifications and plans:
 - These were submitted for review during the quarter.
- b) Certified design drawings and specifications for Garrow Lake Dam Decommissioning:
 - These were submitted for review during the quarter.
- c) Certified specifications and design drawings for sealing the mine entrances:
 - These were submitted for review during the quarter.
- d) Certified specifications and design drawings for Decommissioning the marine dock and adjacent shoreline:
 - These were submitted for review during the quarter.
- e) During August, the first phase of the Environmental Effects Monitoring (EEM) program was conducted as required under the new Metal Mining Effluent Regulations. Sampling of Garrow Lake effluent discharge was undertaken and field data characterizing Garrow Creek and Garrow Bay were collected. The data collected during the August field program will be used to refine the proposed 2004 field season program. The results of the field program will be discussed with the Technical Advisory Committee of Environment Canada prior to year end.
- f) During August, the field work for study program required under the Fisheries Authorization (from the Department of Fisheries and Oceans) related to Garrow Lake was undertaken. Water quality data was collected, sediments sampled and sculpins collected for analysis. At the end of the quarter, the samples collected had all been forwarded to various laboratories for analysis with results pending.
- g) Approval of the Melt Water Disposal Protocol required weekly inspections of the area of the mine being used for melt water disposal, logging of the filling of the storage area, and the requirement to take at least one sample of the melt waters being disposed. The mine underground workings were in active use during the melt water disposal period. Regular inspections of the area were conducted as required and a log of the rate of filling of the storage area was recorded (and filed at Polaris). Several water samples were taken and are presented in Appendix 2.
- h) An Annual Geotechnical inspection of the Garrow Lake Dam and the Operational Landfill are required in the Water Licence. Both of these areas were inspected by EBA Engineering Consultants and their reports are included in Section 12.3.1 and Section 12.3.2 of this report.
- i) Both the Landfill Operating Protocol approval and a site inspection report by INAC in July 2003 requested a review of the subsidence of the Reclamation Landfill area. Refer to Section 12.3.3 of this report for a review conducted Mr. T. Feduniak, P.Eng.
- j) Part B (5) of the Water Licence requires a cost estimate to be provided for the re-construct Garrow Lake Dam in the event that the water quality of Garrow Lake deteriorates. This estimate is provided in Section 8.2 of this report.

6. DECOMMISSIONING AND RECLAMATION PROGRESS REPORT

Manpower levels increased substantially during the period as the return of daylight and warmer weather permitted more outside activities. Manpower on site at beginning of the period was 39 and increased steadily. By the end of the reporting period there were 126 people on site.

6.1. Building Demolition

6.1.1. Mill / Offices / Warehouse Facilities / Barge

- By end of July, the Barge superstructure demolition was 100% complete, the hull tank top was removed and hull fuel tank cleaning was in progress and nearing completion.
- By the end of August the barge fuel tanks had been fully cleaned by the specialized tank cleaning contractor (Smitts).
- The barge berthing area was dewatered to allow completion of cutting up the barge hull.
- As of September 18th the barge hull / mill / office structures had been completely demolished and transported to LRD quarry for burial. The only remaining structure is the access ramp which supports site service lines (water lines, power lines, sewer line) which are still active. This will remain in place until next year.
- Backfilling of the barge hull excavation had not started at the end of the quarter as excavation of contaminated soils around the barge area was in progress.

6.1.2. Product Storage Building

- The remainder of the siding was removed from the building and preparations for structure demolition continued during July.
- The building skeleton was collapsed on August 2nd.
- Structural steel, cladding, conveyor gallery and the majority of the building components were removed from the site and placed into LRD for burial. Only the stub columns and partial foundations remain in place at the end of September. The contractor (SNC) estimates that work is 98% complete in this area.

6.1.3. Thickener Building

- Foundation removal has been completed and re-grading of the foundation areas essentially complete.
- Re-grading of the spills containment area adjacent to the thickener is complete (after removal of metals contaminated soils which have been placed underground as per the approved protocols).
- Approximately ½ shift of re-grading work remains to complete work in this general area as of the end of the 3rd quarter.

6.1.4. CRF Plant

- Hydrocarbon contaminated soils removed.
- Demolition and site grading has been completed in this area.

6.1.5. Tank Farm

- The tank farm has three tanks. Cleaning of Tank #1 was completed on July 20th and was partially re-filled with new fuel from the supply ship. It was cleaned this

year so that in 2004 when it is time to decommission the tank, there will be essentially no sludge to remove.

- The other two tanks remain to be cleaned.

6.1.6. Accommodations Building

- No demolition activities in this area have been initiated as the facility will remain in active use until the summer of 2004.

6.1.7. Other Buildings / Structures

- The majority of the tailings lines have been removed and placed into the mine for disposal. Some lines remain in the area between the Barge and the Tank Farm area.
- Reclaim water lines have been removed. Some were temporarily used to assist in siphoning at Garrow Lake dam and for piping underground. All of the reclaim water lines were disposed of either in LRD quarry or underground at the end of the quarter.

6.2. Earthworks

6.2.1. Marine Dock and Adjacent Shoreline

- Removal of the ship loader was completed.
- Glycol freeze pipes in dock cells have been drained and removed.
- Excavation of clean fill above high tide level was initiated early in the period in cells 1 & 2 after removal of overlying metals contaminated fill. Unexpected hydrocarbon (diesel fuel) contamination was discovered during the excavation of the dock cells. Progress on cell excavation was substantially slowed during the removal of the hydrocarbon contaminated soils. The hydrocarbon contaminated soils were disposed of in the mine as per the Closure Plan protocols.
- The hydrocarbon contamination in cell 2 extended into the corner of cell 3. At the end of the quarter work was nearing completion on removing the remainder of this contamination. As planned, work on dock cells 3 and 4 were delayed awaiting completion of the annual sealift at the end of August so the supply ship could use the remaining portion of the dock. At the end of September, excavation of dock cells 3 and 4 were almost complete to just above high tide elevation. The contractor (SNC) estimates that the removal of the dock area is 60% complete at the end of the quarter.
- Prevention of sediments contaminating the ocean was done through a number of procedural methods as required by project approvals. Fill within the dock cells were excavated while the sheet piles remained in place so that the sheetpiles provided a barrier to contain sediment laden waters. Excavation of the adjacent shoreline was done while a berm was maintained between the work areas and the ocean. Water pumped from excavations in the dock area were directed to settling ponds and/or through filter fabrics prior to being allowed to discharge to the ocean. If observations or measurements indicated that sediment levels were of concern, work was stopped until either the weather improved or sediment controls were improved.
- It was decided in August to defer the final cutting of the sheet pile structures until April 2004 so that this activity could be done while the pack ice is still present.

- The area north of the dock has been re-graded to design elevations. At the end of September, the berm between the ocean and the shoreline was removed once there was ice coverage. The area north of the dock has been partially excavated to design depth and a berm remains in place between the ocean and the excavated area.

6.2.2. Garrow Lake Dam

- Additional siphons were installed at Garrow Lake dam to assist in lowering the lake level.
- Siphoning at Garrow Lake dam was active throughout most of July, August and September. Siphoning of the dam concluded on September 18th with the lake elevation at 1005.9 which is slightly (30mm) above the original elevation.
- Water quality testing continued to demonstrate that key parameters such as zinc levels and turbidity levels were well below permitted levels through out the discharge season as expected.
- The wave break structure is quite visible now that Garrow Lake has been lowered. TCL to consider what actions can be taken to improve the visual appearance without impacting the aquatic environment. No decision as to action was finalized at the end of the quarter.
- The shell of the dam is being removed before it freezes too hard for the winter. This allowed the underlying Styrofoam mixed with fill to be removed and hauled to Little Red Dog Quarry for disposal as per approved protocols.

6.2.3. Operational Landfill

- Drilling and blasting of cover cap material in the New Quarry was undertaken during the period for the lower 1200 mm of the cap. Hauling and placing of the material on the landfill was ongoing through the period.
- In July, blasting at LRD was conducted to produce limestone rock for the top 600 mm layer of the landfill cover cap. The blasting did not produce material that met the design requirements for the cap requirements so the fill will be used elsewhere (too much oversize material). Revisions to the blasting designs are being made to produce material that meets design requirements.
- Placement and compaction of the first two lifts (600 mm each) of the landfill were completed during the quarter. Placement of the final 600 mm lift of the landfill consisting of quarried limestone had not started at the end of September.

6.2.4. Little Red Dog Quarry Landfill ('LRDQL')

- Refuse disposal in LRDQL continued throughout the period with substantial demolition debris from the Barge and Concentrate Storage Shed being hauled there for disposal. Refer to Section 12.1.1 for An update of the materials placed in LRDQL and associated photographs.
- Melt water in LRDQL pit area was evident throughout most of the summer months assisting with minimizing void spaces in the fill. In early July, a dye used to colour Anfo was identified in the melt water. This was cleaned up and samples of the water taken as discussed in Appendix 7 of this report. The sample results are included in Appendix 8.

- Clean fill material from the notch area and adjacent areas around LRDQL were hauled into the pit as infill material to mix with the building debris.
- Materials stockpiled in the quarry are being further processed by a shearer to reduce material sizes (to minimize void spaces). The bailing machine was also active during the period bundling and compacting siding.
- Materials are being placed into the landfill with minimal void space. As a result the elevation of the final fill elevation in the LRDQL will be lower than the entrance notch in the pit wall. Initial plans for the notch were conservative to ensure the notch did not extend deeper than the fill in LRDQL. In 2004 the elevation of the notch will be adjusted to match with the cap in LRDQL once final elevations are determined.
- At the end of September, much of the barge hull structure was laid out of the bench at the bottom of LRDQL. Additional cutting up of this material will be done prior to burial to minimize the amount of fill required to cover the steel.

6.2.5. Back 40 Area (Including CRF Area, New Quarry, North Pit, Subsidence Area, North Portal Area)

- Re-grading of this general area continued to restore the site to more natural appearing contours and to ensure original drainage of the site is restored. Substantial progress was made and work in this area will continue late into the fall.
- On August 4th re-grading of the North Pit area was completed.

6.2.6. Roadways

- Partial re-contouring of roadways was initiated in July and August to minimize final contouring requirements in 2004. As all roads remained in use during the quarter. Culverts have not yet been removed.

6.3. Contaminated Soil Remediation

6.3.1. Marine Dock and Adjacent Foreshore

- As part of the approved protocol for removing the freeze pipes located in the dock area, the type of coolant used in the system was to be determined. The coolant was sampled and sent to a commercial lab which confirmed that the fluid was a combination of diethylene and ethylene glycol (See lab results in Appendix 3). The lab was requested only to determine the type of glycol and not the concentrations for cost reasons so the report indicates the glycol types as either being 'found' or 'not found'. All freeze pipes have been drained and removed consistent with the approved removal protocols. The glycol is being incinerated onsite in a 2 stage incinerator as approved in the Closure Plan. In total, approximately 500 Imperial gallons had been recovered.
- While there was no indication in Phase 1 ESA that there had been spills of glycol, the approved monitoring plan specifies that soils samples would be taken to confirm the absence of glycol contamination. The soils in the dock area were tested for glycol contamination as required by the Closure Plan and no evidence of glycol contamination of soils in was found (refer to Appendix 3).
- Metals contamination in the dock area was delineated and excavated during the period. The metals contaminated soils are being disposed of in the mine as per the approved protocols. Confirmatory samples taken and confirmations received

to determine the disposition of the dock materials. In 2004 confirmatory 'sign-off' reports will be submitted for this area once work on adjacent areas have been completed.

- Work was slowed by the unexpected discovery of hydrocarbon contaminated soils in dock cells 1 & 2. Work removing the hydrocarbon contaminated soils in dock cells 1 & 2 continued throughout July and August. At the end of August remediation had been confirmed to be complete in this area. Some minor contamination extends into cell #3 and at the end of the 3rd Quarter, excavation of this material was underway and nearing completion.

6.3.2. Barge Area

- Excavation of hydrocarbon and metals contaminated soils surrounding and under the Barge area was initiated in August as demolition of the Barge neared completion.
- At the end of September, excavation of contaminated soils below the Barge hull area and widening the footprint of the Barge excavation outline was continuing due to extensive hydrocarbon contamination of the soils. Work in this area will remain a priority as removal of contaminated soils must be completed prior to next spring's melt water run off to prevent contamination of surface water.

6.3.3. Exploration Waste Dump / Stockpile Area

- Prior to closure of the mine, the operations initiated the removal of the waste rock stockpile adjacent to the Exploration Portal. The waste pile contains metal sulphides and some hydrocarbon contamination from shop areas up slope.
- Continuing from June into July, delineation sampling using a drill was conducted to define contamination to be targeted for remediation.
- Excavation of this area approximately 90% completed at the end of the period. Work will be on-going in the 4th quarter.

6.3.4. Product Storage Building

- After removal of the remainder of the Product Storage (Concentrate) Building, final clean up of the metals contaminated soils within the building foot print was initiated. Metals contaminated soils have been removed and in most areas remedial targets have been achieved. Remedial work was not complete in this area at the end of the Quarter. A remedial 'Close-out' report will be prepared by GLL staff and submitted with the 4th Quarter reports.

6.3.5. Fuel Bladder Area

- Confirmatory samples verified that remediation has been completed in this area.
- Cosmetic re-grading of the area disturbed by remedial excavation has been completed. A remedial Close-out report by GLL for this area will be submitted with the 4th Quarter reporting.

6.3.6. Thickener Spills Pond

- Metals contaminated soils were removed from the spills pond during July transported underground for disposal.
- Confirmatory sampling results confirm remediation of contaminated soils have been successful in this area. A remedial Close-out report by GLL will be submitted with the 4th Quarter reporting.

6.3.7. CRF Plant Area

- Remediation of hydrocarbon contaminated soils adjacent to the CRF Plant was completed in July.
- A Close-out report for this area will be prepared and submitted with the 4th Quarter reporting.

6.3.8. North Portal Ore Stockpile

- Cleanup of contaminated soils in the lead stockpile area adjacent to the North Portal were underway in July.
- Work was nearing completion at the end of September.
- A remedial Close-out report will be prepared by GLL staff and included with the 4th Quarter reports.

6.3.9. Marine Foreshore – June 2002 Oil Spill

- Removal of residual hydrocarbon contaminated soils on the foreshore from the June 2002 oil spill was completed by July 12th. Laboratory results confirm remediation is complete in this area.
- Contaminated soils were placed underground in the mine as per the approved protocols.
- A remedial Close-out report will be prepared by GLL staff and included with the 4th Quarter reports.

6.3.10. Main Snow Dump

- Remedial work in this area has been completed and GLL staff will prepare a Close-out report for submission with the 4th Quarter reports.

6.4. Disposal of Hazardous Materials / Special Wastes

- It was planned to ship special waste materials off site for sale, recycling or to a certified disposal company in 2003. The general contractor did not order the waste manifests insufficient time and delays were experienced in obtaining the required manifests for shipping. As a result the manifests were not available in time to be able to meet the shipping schedule. The special wastes on site will therefore be shipped out during the 2004 shipping season.

- Waste oils (hydraulic, engine oil), waste fuel (old fuel, tank cleanings), and glycol are being disposed of in the on-site incinerator as approved in the DRP. The incinerator uses fuel to provide heat to ensure the incinerator operates at the correct temperatures. Volumes incinerated are as follows (Imperial Gallons):

2003	Wastes	Fuel
July	7,489	3,148
August	117	61
Sept.	10,356	3,510
Total Quarter	17,962	6,719
Total YTD	23,624	3,510

Note: June was the only other month in 2003 that significant incineration of materials occurred.

- There have been on-going mechanical problems with the incinerator which has slowed progress incinerating waste fuels, oils and glycol. Complete replacement of its refractory was completed in August. The manufacturer supplied the incorrect refractory for the materials being incinerated. Considerable effort to overcome these problems has been done by the general site contractor (SNC). It is expected the technical problems will be resolved in the near future.

7. UPDATE OF DECOMMISSIONING AND RECLAMATION SCHEDULE

Appendix 4 contains an updated decommissioning schedule current as of September 30, 2003. The source of the data for the schedule is primarily from our demolition contractor. There are some revisions to the near term portions of the schedule due to more detailed planning. The project is still forecast to be completed by the end of September of 2004.

8. PROJECT COST ESTIMATE UPDATE

8.1. Update of Estimated Mine Decommissioning, Reclamation and Monitoring Costs

Appendix 5 contains the detailed estimate of Mine Closure Costs updated as of September 30, 2003 in accordance with Part B, Item 3 or Part G, Item 21 and forecasts of cost to the end of 2011.

In summary, total Mine Closure Costs to September 30, 2003 were \$37,094,000. Estimated costs to complete decommissioning, reclamation and monitoring through to 2011 have increased to \$56,925,000.

8.2. Cost Estimate To Re-Construct Garrow Lake Dam

Part B (5) of the Water Licence requires the preparation and submission of a cost estimate to re-construct Garrow Lake Dam in the event that water quality being discharged from Garrow Lake deteriorates and other mitigative actions fail in restoring acceptable water quality. Cascade Management Inc. developed the cost estimate based on their current project

management experience at Polaris as project managers for the decommissioning and reclamation of the site. This experience provides them with site specific knowledge and access to current actual costs. The estimate provided in Appendix 6 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 at the island. In this situation, the necessary equipment, manpower and infrastructure would need to be re-mobilized to the site increasing the costs. The estimated cost to rebuild the Garrow Lake dam is \$1,250,000. It is important to stress that these costs only become significant after the fall of 2004 once equipment and manpower is demobilized from the site.

9. PUBLIC CONSULTATION / PARTICIPATION

Patrick Duxbury, Mine Reclamation Coordinator, NWB was on site in September participating in a site inspection. After the site visit, Patrick stopped in Resolute for a few days to update residents of the status of the project.

TCL has set aside building furniture and other items and is prepared to consider additional donations but requires firm commitments from the community regarding transportation of the items off site. TCL will not leave materials on the site after we demobilize so arrangements must be finalized by the end of March 2004 or we will be forced to schedule these items for demolition. This has previously been discussed with the local communities and J Knapp the site manager will be writing the communities again stressing the need for them to make plans regarding transportation of materials from site.

Inuit employment was identified in the DRP as one of the opportunities that would be pursued during the decommissioning phase of the mine and formed one of the requirements during tendering of the project work. While the site does not maintain a formal system for tracking Inuit employment, during July when activities were near their peak, a snap shot of our transportation schedule indicates that for the week of July 21 to 26th there were 26 Inuit employees on roll. Numbers of Inuit and non-Inuit employees varied on a weekly basis throughout the 3rd Quarter as activities changed.

10. SUMMARY OF WORK DONE IN RESPONSE TO INSPECTION/COMPLIANCE REPORTS

On July 2nd and 3rd the INAC conducted a site inspection of the reclamation project and issued a report dated July 22, 2003. A copy of the report and Teck Cominco's response is attached in Appendix 7.

During the INAC inspection in July, free standing water in Little Red Dog Quarry was observed. A dye used to colour the Anfo manufactured onsite was observed in some of the water. Concerns of the contamination lowering the freezing point of the water were expressed with a request for the water to be sampled. The dye was removed from the water and the water was sampled. While not requested, it was decided by site staff to demonstrate that the freezing point of the water in LRDQ had not been impacted. A test was conducted by Gartner Lee Ltd. staff and demonstrated that there was no measurable suppression of the freezing point. The results of this test are included in Appendix 8.

Also during the INAC July inspection, TCL was requested to submit material sizing and moisture tests of the bottom layer of cover cap material being placed at the time of the inspection. Results are included in EBA Engineering Consultants landfill inspection report included in Appendix 15 of this report.

INAC conducted a second site inspection from September 8 to 10th. As of the end of the 3rd Quarter, the site inspection report has not yet been received.

11. FRESHWATER USE

Freshwater use from Frustration Lake for all uses during the 2nd Quarter of 2003 was:

July 2003	3,514 cu. M.
Aug 2003	4,814 cu. M.
Sept 2003	<u>18,926 cu. M.</u>
Total 3 rd Quarter	27,254 cu. M.
Total 2 nd Quarter	29,088 cu. M.
Total 1 st Quarter	<u>56,927 cu. M.</u>
Total Sept. 30 YTD	113,269 cu. M.

12. PHYSICAL MONITORING OF SITE

12.1. Disposal of Demolition Debris and Contaminated Soils

12.1.1. Disposal of Demolition Debris Into Little Red Dog Quarry Landfill

The approval letter for Landfill protocols requires us to report with record of materials (preferably in digital form). Refer to Appendix 9 for a listing of both quantities and general descriptions of the types of demolition debris transported to LRDQL during the quarter, drawings of disposal locations, and a photographic log of the work during the period. Any equipment originally containing hazardous materials such as hydraulic oils, fuel, greases and/or batteries are required to undergo an inspection to verify they have been properly prepared for disposal. As decommissioning of the mechanical portions of the barge facility was completed in prior periods, and there were not mobile equipment discarded in the period, there are no hazardous material inspections to report this period.

12.1.2. Disposal of Demolition Debris Into the Reclamation Landfill

The Reclamation Landfill was actively used by the mine during the final years of operations as part of the progressive reclamation activities. The Reclamation Landfill is also known as the Subsidence Area Landfill or the Sinkhole Landfill. No disposal of materials has occurred in this area after the mine ceased operations. Non-hazardous wastes (primarily wood, scrap steel, tires, mobile equipment, ocean going shipping containers, etc.) were placed into this area. A general record of the types of materials disposed of there were maintained and a photographic record was kept. Any equipment containing hazardous materials (fuels, hydraulic fluids, lead-acid batteries) had these materials removed and a document kept verifying that the equipment had been prepared for disposal. Fill from surrounding areas was placed overtop of this area in lifts as the area subsided to ensure the material was well buried.

Previously, it had been believed that all of the disposal records for this landfill had been lost during the initial stages of site decommissioning. Most of these records have been recovered and are included as Appendix 10.

12.1.3. Placement of Metals / Hydrocarbon Contaminated Soils Underground in the Mine

Refer to Appendix 11 for maps and quantities of metals and hydrocarbon contaminated soils placed underground.

12.2. Thermistors Data

12.2.1. Garrow Lake Dam

Garrow Lake dam has three sets of thermistors that are recorded on a monthly basis. This will continue until Garrow Lake has been lowered to its original elevation. This data is reported in Appendix 12.

12.2.2. Operational Landfill

The Operational Landfill currently has four thermistors in operation that are monitored on a monthly basis. The Closure Plan indicates that a minimum of three will be maintained to confirm that freezing of the landfill has occurred.

Refer to Appendix 13 for Data

12.2.3. Little Red Dog Quarry Landfill

Heavy metal pipes have been installed in the pit bottom and will remain in place during the filling of Little Red Dog Quarry Landfill. Once placing of the debris is complete and the pipes are extended to their final elevation, thermistor strings will be installed in the pipes. Thermistor readings will then be recorded on a monthly basis while personnel are on site and after the fall of 2004, they will be monitored during regular site inspections.

12.3. Geotechnical Inspections

Part H, Section 6 of the Water Licence requires that an annual geotechnical inspection be conducted of the landfill and remaining sections of Garrow Dam. Approvals for the Operating Protocols for the Landfills and site inspection reports from this summer required a review of the Reclamation Landfill area subsidence be conducted. These have been completed as required and are discussed below.

12.3.1. Geotechnical Inspection of Garrow Lake Dam

On August 19 and 20, 2002 a geotechnical inspection of the Garrow Lake Dam was conducted by EBA Engineering Consultants Ltd. ('EBA'). EBA inspected for seepage, instability and settlement. They observed the adjacent shoreline, and reviewed 2002 and 2003 ground temperature data and reservoir water level data. In Summary EBA reported that 'It is EBA's opinion that the dam is continuing to perform well.' The complete inspection report dated November 5, 2003 is included in Appendix 14.

12.3.2. Geotechnical Inspection of the Operational Landfill Cover

On August 22, 2003 EBA conducted a geotechnical inspection of the construction of the Operational Landfill cover. EBA reviewed the design drawings, the construction methods and materials being used. Recommendations in their inspection report dated November 10, 2003 included:

1. To visually monitor the landfill cover in the spring run off and heavy rainfall events.
 - This can be done in 2004 while the island is inhabited.
 - Subsequent to 2004 the cover will be inspected during the annual geotechnical inspection in the summer. The slope and cover material of the cover were specifically designed to address snow melt and precipitation events.
2. For at least the first year, keep a stockpile of limestone fill to facilitate any remediation.
 - The construction of the cap will be complete before spring/summer melt and precipitation so that equipment and materials will be available for the first wet season.
3. Areas rutted under the weight of rubber tired vehicles should be graded before the final 0.6 m thick cap is placed.
 - The ruts have been removed.

The geotechnical report is included in its entirety in Appendix 15 of this report.

12.3.3. Geotechnical Review of the Reclamation Landfill Subsidence Area

Mr. Trevor Feduniak, P. Eng. is currently on staff with Teck Cominco at the Polaris site as one of our representatives during the reclamation activities. Mr. Feduniak was previously the Senior Mine Engineer in the Mine Engineering department. He is familiar with the underground operations, the mine design considerations, and the mine subsidence monitoring program. As knowledge of subsidence is very site specific, we selected Mr. Feduniak to review the history of subsidence at Polaris, to document subsidence data collected and to consider the course of action that we need to consider for this area.

In summary, his conclusions are that apart from the 'sinkhole' area of the Reclamation Landfill area of the site, subsidence is not of concern. As the last precise subsidence survey was completed during the summer of 2002 while active mining was still on-going, he recommends that a precise survey of the remaining monitoring stations should be conducted in the summer of 2004. This survey will give an up to-date picture of the progression of the subsidence in the sinkhole area. At that time a more reliable forecast of future subsidence in the sinkhole area will be made and the preferred remedial option will be proposed. Mr. Feduniak's report is included in Appendix 16.

12.4. Bathymetric Survey of Garrow Lake

Section H of the Water Licence and in conformance with the DRP, a detailed bathymetric survey was required after deposition of tailings into Garrow Lake had been completed. This survey was undertaken in August 2003 and is the most accurate, detailed survey taken to

date. The survey was contracted to Focus Engineering Consultants. The results of the survey are included in Appendix 17 of this report.

12.5. Erosion Monitoring

12.5.1. Garrow Lake Erosion Pins

In compliance with Section H of the Water Licence and the DRP monitoring plan, monitoring of Garrow Lake shoreline is required to identify any instability of the foreshore which could result in sedimentation occurring in Garrow Lake. This is being monitored in a number of ways. As required, four rebar pins were installed just above the water line in Garrow Lake in the spring of 2003. The distance from the top of the pin to the ground surface was measured on a monthly basis in July, August and September to determine if there is any measurable erosion occurring. As Garrow Lake was being drawn down through the summer, the pin locations started beside the waters edge in July and by the end of August, the pins were several metres from the waters edge. At the same time as the heights of the pins were measured, photographs were taken of the pin area to visually record whether or not erosion is occurring in each of the locations. As is clear from the September photographs, snow on the ground hampers the value of photographs at this time of the year.

As another check of the water quality in Garrow Lake, as part of the weekly effluent sampling during the discharge season, TSS is measured at the Discharge Point of the siphons at Garrow Dam. There was no indication of any concerns of sediment in the water column from these results.

In summary, there was no evidence of any erosion occurring around the lake through the required monitoring methods or by general observations by the staff conducting the sampling. The locations of the monitoring pins, the pin measurements and the photographs are included in Appendix 18.

12.5.2. Marine Dock and Adjacent Foreshore Erosion Monitoring

As required in the approved DRP, Part H of the Water Licence and in our Section 35(2) Fisheries Authorization, monitoring of the dock and shoreline areas were conducted during the period when work was occurring in those areas. Daily TSS measurements and weekly photographs were taken along the shoreline at 200 metre intervals except for Station 1825 which was adjusted to be adjacent to the dock cells. The stations are numbered to match the section line numbering in the Westmar design drawings of the shore area. Stations monitored include Station 600, 800, 1000, 1200, 1400, 1425, 1600, and 1800.

Appendix 19 contains both the daily turbidity / TSS sampling results and a series of photographs taken on a weekly basis while work is active in the intertidal zone.

Gartner Lee Ltd. staff was tasked with the regular sampling and photographing of the dock and shoreline area. The TSS samples were analyzed in the onsite temporary

laboratory to minimize time delays in obtaining the analysis. Initially, an error in laboratory methodology resulted in an over statement of TSS results. Once the cause of the methodology problem was resolved the staff was able to provide turnaround times of less than a day. Samples were not taken every day during the summer as there were periods where no remedial work in the area was conducted. On a daily basis, one of the samples taken was deemed to represent the background level of turbidity. The sample location selected was either the north or south sample point measured that was outside of the active area of work. If the wind and/or current were moving in a southerly direction, then the most northerly sample point was used. If the wind and/or current were moving in a northerly direction, then the most southerly sample point was used. If TSS levels or visual observations indicated excessive turbidity, work was stopped until the cause of the turbidity had been resolved. There were days where natural turbidity was high due to storm events. Late in the season as the ocean froze over, monitoring was suspended.

13. GARROW LAKE STRATIGRAPHIC MONITORING

The Water Licence requires that a monitoring event of Garrow Lake Stratigraphy be conducted during the mid-winter, maximum ice thickness and at maximum ice melt during the summer. In previous reports, the mid winter and maximum ice thickness sampling have been submitted. The maximum ice melt sampling is normally conducted during mid August when there is usually (but not always) a brief period where Garrow Lake is ice free. One of the key elements of the sampling program is the analysis of hydrogen sulphide found in the lower areas of the lake. The measurement of hydrogen sulphide has historically been done on site due to the time sensitive nature of analyzing the H_2S due to off gassing. This is the first year that the mine is no longer operating and we have had to rely on contracting this work to a consultant who employs one of our previous employees who is an assayer, is familiar with this complex analysis, and is capable of doing it at the site. This was the manner in which we obtained the data in January and March 2003 sampling events. When the consulting company was contacted this summer to arrange for sampling this summer, we were informed that the individual had just resigned and was no longer doing consulting work. We then looked for an alternate method of analyzing for H_2S and determined that there is an electronic instrument capable of doing the analysis onsite. We purchased this unit and had it shipped to site. After many shipping delays by the airlines due to weather conditions in the north, it arrived on site. Upon unpacking it; we discovered that it had been damaged during shipping. We arranged for another unit to be shipped to us but by the time it arrived, Garrow Lake had a thin layer of ice. This ice will need to thicken adequately for it to be safe to conduct the sampling. It is anticipated that the results will be reported in the 4th Quarter report.

14. SUMMARY OF EFFLUENT MONITORING AND EFFLUENT CHARACTERIZATION

Appendix 20 contains the effluent monitoring results as required in Part H in the form set out in Schedule 6 of the Metal Mining Effluent Regulations and as required in Part H of the Water Licence. This will be the only quarter in 2003 where effluent was being discharged from Garrow Lake.

15. SUMMARY OF EEM STUDY PROGRAM PROGRESS

In compliance with the Metal Mining Effluent Regulations, site characterization field studies were undertaken in August of Garrow Creek, Garrow Bay and a reference location. The field program had been presented and approved by Environment Canada's Technical Advisory Committee ('TAC'). Field conditions were extreme as expected and only through the diligence and hard efforts of the seasoned consultants was the program successfully undertaken. Preliminary results will be presented to the TAC prior to year end to obtain guidance regarding the 2004 field program.

16. SUMMARY OF GARROW LAKE DFO STUDY PROGRAM PROGRESS

During the August field program for the EEM study program, the study program required under the DFO Fisheries Authorization was successfully undertaken. Samples were obtained of water, sediments and sculpins from Garrow Lake. Results will be presented in a report to be issued in 2004.