

**DIAVIK DIAMOND MINE
RECLAMATION REVIEW
&
COST ESTIMATE**

Prepared for:

**Indian Affairs & Northern Development
Water Resources Division
Yellowknife, Northwest Territories**

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**DIAMOND MINE
LAC DE GRAS, NORTHWEST TERRITORY**

**RECLAMATION REVIEW
&
COST ESTIMATE**

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1. INTRODUCTION

This report presents a review of the Interim Closure and Reclamation Plan (ICRP) for the Diavik Diamond Mine, on East Island in Lac de Gras. A cost estimate to carry out the proposed work has also been developed as part of this review. It is expected that this cost estimate will be considered in the security requirements for the project. Separate totals for the land and water-related elements of the estimated reclamation liability are developed.

2. INFORMATION SOURCES

The information sources for this review include the following:

- Interim Closure and Reclamation Plan (ICRP) – Version 2, Diavik Diamonds Mine Inc. (DDMI), September 2006,
- Country Rock And Till Storage – Update Design Report, DDMI, August 2001
- Rock Management Plan – Version 3, DDMI, September 2004,
- Rock, Water and Seepage Management Plan, DDMI,
- Processed Kimberlite Containment Facility – Phase 3 Construction As-Built Report, DDMI, February 2005,
- Waste Management Plan – Operational Phase, DDMI, March 2006,
- Comments from other reviewers on acid rock drainage (ARD), permafrost issues, and geotechnical issues.

In addition, a site inspection was conducted on Aug. 2, 2006.

3. REVIEW OF CLOSURE PLAN

3.1. GENERAL COMMENTS

DDMI has developed the mine substantially as planned during the permitting process. The major modification to the mine plan is the improved waste rock management plan. The site inspection did not identify any unexpected conditions that would result in additional reclamation liability.

3.2. INTERIM CLOSURE & RECLAMATION PLAN

The following sections present a review of the ICRP. Previous reviews (BCL, letter to INAC, Sept. 2002 – Appendix A) have identified concerns with the plan. All of the comments presented then are still valid. Only key concerns and new comments are presented below.

DDMI's ICRP addresses all elements of the mine and, although somewhat lacking in specifics or details, is acceptably comprehensive for this stage of the mine development.

ICRP Section 3.2.1 – Terrestrial Habitat

The mine development has affected a variety of habitats, including;

1. heath/tundra,
2. bog/shallow water/wetlands,
3. riparian shoreline,
4. rock outcrop/boulder.

It is recommended that DDMI identify the area and relative value of these various habitats (possibly in a manner similar to that done for fish habitat in ICRP Section 4.2.2 – last paragraph). The purpose of this would be to identify the amount of high value habitat which should be re-established as part of the reclamation activities.

ICRP Section 5.6 – Processed Kimberlite Containment

It is noted that the percentage of fine processed kimberlite (PK) is greater than expected. This may result in a greater area of unfrozen slimes. Even if the pond area is maintained as small as practical, the high moisture content of the fines will impede the frost penetration. Allowance for covering a greater area with “rock spacer” to contain the expelled pore water may be required. As the mine approaches closure, drilling should be conducted to determine the actual extent of unfrozen material.

ICRP Section 7.6 – Country Rock & Till Storage Areas

The thermal modeling of the NCRP indicates that the zero degree isotherm will be situated immediately on top of the till layer. Progression of the zero degree isotherm into the till could allow solifluction or down slope creep of the rock cover to occur. This concern is greatest for the southwest facing slope which will receive greater solar warming due to its aspect. An allowance for a slightly thicker rock cover may be required on the south slopes over the Type III rock.

The Type II rock is addressed in 7.6.4. DDMI states “On the basis of present assessment, it is anticipated that a till cover will not be required for the Type II rock.” What criteria will be used to confirm this prediction?

Caribou access ramps are proposed for the rock piles. Will these be composed of fresh rock placed at the specified locations or by dozing the crest of the rock pile? In either case, it may be necessary to provide a till cap to the ramp as these surfaces will not be compacted like the mine haul roads. Without a layer of fine grain material, the animals may injure their hooves.

Rock and till are to be placed in the South CRTSA. Will these materials be segregated such that the till could be used in reclamation if needed?

Section 8.3.3 – Pit Closure

The median pit water quality (DDMI Water Licence Application) suggests that the flooded pits will have acceptable water quality after flooding, considering the significant dilution which will occur. However, the reported values are sump discharge which includes significant dilution from dike seepage and does not actively flush all ARD zones. What predictive activities are planned to demonstrate final water quality prior to breaching the dikes? What contingency measures could be implemented?

Section 8.7.3 PKC Closure

Hydraulic placement of the coarse PK is planned for filling the PKC pond. This material may be frozen and slightly cohesive. No details are provided as to how the coarse PK will be put into slurry form.

Section 8.9.3 Plant Site

It is assumed that regulatory approval would be obtained for on-site disposal of inert waste (steel, concrete, wood, glass, plastic); subject to a suitable location being identified, development of an appropriate QA/QC for materials being disposed, and a satisfactory cover for the waste. DDMI should develop these details and an estimate of the potential disposal volume.

Section 8.9.4 – Plant Site Closure

It is stated that concrete slabs are to be covered with rock. If available, a till cover may enhance natural or assisted revegetation. There did not appear to be erosion issues in the revegetation trial areas; however, erosion should be considered in the placement of till covers.

Section 10.4.5 – PKC Closure

It is suggested that closure monitoring address the water quality and volume of expelled PK pore water which accumulates in the rock spacer. Due to cryo-concentration, this water could be much more concentrated than the PKC pore water. This water may not ever freeze. Monitoring should verify that all expelled water will be contained. It may be acceptable to remove and treat the expelled water rather than try to contain it.

3.3. SUMMARY OF ICRP REVIEW

There are no major or critical flaws in the ICRP for the Diavik Mine. Although more detail would be beneficial, the plan is acceptable for this stage of the mine development (approximately 14 ½ years of operation remaining). Outstanding issues should be addressed in the next update to the plan. Development and operation of the mine appears to be based upon conservative criteria and detailed engineering. Resolution of the

outstanding issues does not seem likely to materially affect the overall reclamation plan or cost.

4. RECLAMATION COST ESTIMATE

4.1. GENERAL

The primary purpose of the assessment presented in this report is to estimate the reclamation liability. This estimate is to form the basis of financial security so that in the event that the company does not fulfill its obligations then the Government is able to do so without any burden to the citizens of Canada.

An estimate of the cost to carry out reclamation of the Diavik Diamond Mine was to be developed for various stages in the mine life. However, as noted below, there is very little difference between the current and the ultimate liability (assuming no progressive reclamation) due to the relatively minor additional liability associated with the A21 pit and rock pile development. Consequently, only the current and ultimate liabilities have been estimated.

These estimates are based on the following assumptions:

- the company goes bankrupt or abandons the property,
- no allowance for progressive reclamation until after it is completed,
- all work is based on independent contractor rates,
- all costs are 2007 Canadian dollars,
- the cost estimate does not include revenue from recovery of assets,
- the mine is developed substantially as planned,
- the estimate does not include costs for catastrophic events such as failure of dams, dikes or dump slopes.

It has been assumed that, should the company abandon the site, an interim receiver would be responsible for the site for a period of 2 years. After this period, government managed care and maintenance would be carried out for period of 3 years in order to carry out final permitting of the closure plan and tendering of contracts for closure work. The closure

work is assumed to take an additional 2 years. This elapsed period of 7 years is assumed to be sufficient for freeze back of the waste rock pile such that no ongoing or post-closure collection and treatment of seepage is required.

This estimate generally assumes that the mine construction continues to proceed as proposed. It does not assume departures from plan such as dump construction without set-back on terraces for overall slope stability, expansion of the dumps beyond the indicated limits or significant departures from the current understanding on geochemical issues. Any such departure from the mine plan is likely to increase the reclamation liability.

It is recognized that calculation of the reclamation liability without allowance for progressive reclamation is financially punitive to the company. However, until this work is completed it is still an outstanding liability just like any reclamation which is put off until final closure of the mine. Therefore, financial security should be established to ensure that this work is conducted as proposed.

The estimate has been developed using the RECLAIM model, a spreadsheet developed for DIAND for estimation of mine reclamation costs. The model is based, as much as possible, upon costs from other mine reclamation activities completed in the north.

Detailed comments regarding the specific reclamation measures for each component and the detailed reclamation cost estimate are presented in Appendices C and D, for the years 2007 and 2022. General comments regarding the closure measures and the summary total cost are presented in the following sections.

In keeping with conventional engineering practice, and considering the stage of closure planning and the above uncertainties, this estimate includes a contingency of 20%. A lower contingency would be indicative of a plan based on a comprehensive data base of site specific parameters, detailed engineering, and proven reclamation measures. A brief discussion on the issue of uncertainty at it affects reclamation security is presented in Appendix B.

4.2. MARKET FACTOR PRICE ADJUSTMENT

Since its inception, RECLAIM has been updated annually based upon Canadian Consumer Price Index (CPI) as reported by Statistics Canada, and when new reclamation specific unit cost data is available. However, the recent surge in industrial activity in northern Canada has resulted in construction costs reportedly rising at a very high annual rate. There is virtually no statistical data on northern mining related (and reclamation specific) construction trends for this recent period. Some information from other sources can provide some insight. For example, Statistics Canada (CANSIM Table 327-0039) report that Non-residential building costs for Edmonton (the nearest major center for which data is collected) have risen by 30% over the period 2003 to 2006 (index value rose from 118.4 to 154.4 over 3 years). Examination of the rise in costs for the Giant Mine Care & Maintenance program suggest that costs for labor and equipment (parts) are up by 7 – 8 % over each of the past several years. Considering that northern contractors appear to be at their capacity for providing services, it is likely that contractors are seeking higher profits to conduct work.

It is intended that the estimate presented here will provide a reasonable evaluation of the cost in today's dollars should it be necessary to conduct the work. Considering the above, and recognizing that the cost increase may be short term, this estimate includes a “market factor price adjustment” of 20% to reflect the current economic situation in northern Canada. Should there be a decline in economic activity, this factor may be reduced or eliminated in future assessments of reclamation security.

4.3. ESTIMATED RECLAMATION LIABILITY

The estimated total reclamation liability for the Diavik Diamond Mine is listed by mine component for the years 2007 and 2022 is summarized in Table 1. Details are presented in Appendices C and D.

**TABLE 1
 ESTIMATED RECLAMATION LIABILITY
 DIAVIK DIAMOND MINE**

COMPONENT	2007	2022
Open Pits	\$325,191	\$477,787
Underground	\$0	\$632,184
PKC	\$32,117,360	\$32,117,360
Rock Dumps	\$23,896,609	\$24,287,602
Buildings & Equipment	\$15,697,151	\$15,697,151
Chemicals & Contam. Soil	\$837,430	\$837,430
Water Management	\$1,114,935	\$1,114,935
sub-total	\$73,988,676	\$75,164,449
Mob./Demob.	\$10,260,412	\$10,260,412
Monitoring & Maintenance	\$10,228,853	\$10,228,853
Market Factor Price Adjustment @ 20%	\$14,797,735	\$15,032,890
Project Management @ 5%	\$3,699,434	\$3,758,222
Engineering @ 5%	\$3,699,434	\$3,758,222
Contingency @ 20%	\$14,797,735	\$15,032,890
Total Capital Costs	\$131,472,279	\$133,235,938

The estimated reclamation liability is separated into costs for land-related reclamation and water-related reclamation. This segregation is generally easy to define. However, in some cases it is not clear and in these instances the segregation is split equally into land and water portions. Table 2 presents the total land and water-related reclamation liability for the years 2007 and 2022.

**TABLE 2
 ESTIMATED LAND & WATER-RELATED RECLAMATION LIABILITY
 DIAVIK DIAMOND MINE**

YEAR	TOTAL LIABILITY	LAND RELATED LIABILITY	WATER RELATED LIABILITY
2007	\$131,472,279	\$25,102,309	\$106,369,970
2022	\$133,235,938	\$26,545,614	\$106,690,323

4.4. COMPARISON TO 1999 SECURITY ESTIMATE

The ultimate reclamation liability presented here is significantly lower than the amount estimated for the 1999 Water Licence (\$187 million at end of mine life). Key changes are summarized below:

- Pits

- Provision for fish habitat construction has been substantially completed in the A154 pit. Furthermore, this liability is assumed to be covered under the Fisheries authorization. Major change is minus \$2.75 million
- Water quality in the pit does not suggest that measures to mitigate ARD upon flooding will be required. Major change is minus \$4.65 million.
- U/G
 - Addition of numerous vent raise caps
 - Expanded scope of removal of hazardous materials
 - Major change is plus \$0.5 million
- Tailings
 - Re-evaluation of unit costs as short-fall of inert rock has been precluded due to improved waste segregation and assumptions concerning methodology for placement of course PK.
 - Major change is minus \$13.2 million
- Rock Piles
 - Change in waste management leading to reduction in area to be covered with till and inert rock.
 - Change in unit costs and reduction in area to be covered.
 - Major change is minus \$36.1 million
- Buildings & Equipment
 - Re-evaluation of demolition costs.
 - Inert demolition waste disposed of on-site.
 - Net change is plus \$5.0 million.
- Chemicals & Contaminated Soil
 - Reduction in quantity of contaminated soil due to observations of site management practices. Major change is minus \$1.5 million
- Water Management
 - Removal of short-term post-closure water treatment from rock pile. Major change is minus \$2.96 million
- Mobilization
 - Reduced due to reductions in scope of work in primary reclamation activities. Major change is minus \$4.2 million

- Monitoring & Maintenance
 - Scope of post-closure monitoring increased.
 - Addition of interim care and maintenance.
 - Major change is plus \$5.4 million.
- Engineering & Project Management
 - Percentage increased from 3% to 5% of direct costs to reflect current industry practice. Net change is nil, due to reduction in direct costs as above.
- Contingency
 - Percentage reduced to 20% from 25% due to site development being conducted substantially as planned with only beneficial improvements (waste rock management). Net change is minus \$18.4 million.

4.5. SECURITY DEPOSIT

These estimates of the reclamation liability for the Diavik Mine are expected to be considered in the establishment of a security deposit to be provided by Diavik. Inspections should be conducted to ensure that the development is progressing as planned. Where departures are noted (such as dump instability, short fall in the quantity of non-acid generating waste rock, problems with the water balance or retained water content in the PKC, etc.) it may be appropriate to re-assess the security requirements.

Any substantial changes to the mine development plan may affect the reclamation liability. If changes are proposed, then they should serve as a trigger mechanism for re-assessment of the reclamation liability.

These estimates assume that the company does not carry out any of the proposed progressive reclamation. When the company does complete this work, it may be appropriate to re-assess the reclamation security requirements.

5. CONCLUSIONS

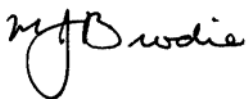
Based on the information reviewed and the above assessment, the following conclusions have been reached.

1. There are no major or critical flaws in the ICRP for the Diavik Mine. Although more detail would be beneficial, the plan is acceptable for this stage of the mine development. A number of minor issues should be addressed in future updates to the plan.
2. The estimated total reclamation liability is:

Year 2007	\$ 131.5 million
Year 2022	\$ 133.2 million
3. A segregation of the reclamation liability into land-related and water-related reclamation activities has been made. The water-related reclamation liability is approximately 80% of the total, and rises from \$106.4 million in 2007 to \$106.7 million in 2022.
4. Regular inspections of the mine operation should be conducted by the Land Administration and Water Resources divisions of DIAND. Departures from the approved mine plan could be trigger points, at the discretion of DIAND, for the re-assessment of the closure liability.

This report presents a review of the reclamation issues and an estimate of the cost for reclamation of the Diavik Diamond Mine. Should there be any questions regarding the approach or conclusion of the report, please contact the undersigned.

Yours truly,
Brodie Consulting Ltd.



M. J. Brodie, P. Eng.

APPENDIX A

REVIEW COMMENTS – September 2002

February 8, 2002

Mr. Sevn Bohnet
Department of Indian Affairs and Northern Development
Water Resources Division
Box 1500
4914 - 50th Street
Yellowknife, NT, X1A 2R3

RE: DIAVIK PROJECT – REVIEW OF UPDATED MINING AND A&R PLANS

Dear Sevn,

Introduction

This report presents a review of the updated mining plans and A & R plan for the Diavik Project. The objectives of this review are to:

1. review the updated reports including:
 - Waste Rock Storage Plan,
 - PKC Plan,
 - Interim A & R Plan,
 - Cost Estimates for Interim & Final Restoration Plan, and,
 - comments from other reviewers as may be provided by DIAND.
2. provide comments on the project plans and the revised objectives of the A & R plan.
3. provide comments on the anticipated approach and scope of the A & R work.
4. provide a brief review and comments on the cost estimate.
5. identify any issues and assumptions with the potential to affect the cost estimate.

An update to the RECLAIM estimate is not required at this time because mining has not commenced.

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Information Sources

The following documents were reviewed in preparation of this report:

- Country Rock And Till Storage Updated design Report, August 2001,
- Processed Kimberlite Containment Facility Updated Design Report, Volumes I and II, April 2001
- Interim Abandonment And Restoration Plan, October 2001,
- Cost Estimates For Interim And Final Restoration Plan, August 2001.

There has not been a site inspection associated with this review.

General Comments

Diavik Diamond Mines Inc. (Diavik) has made several significant modifications to the mine plan, primarily with respect to management of potentially acid generating waste rock. These changes will reduce the environmental risk of the proposed development and the effort required to produce an acceptable closure configuration. The modifications which facilitate progressive reclamation are fully supported in that ultimate closure costs are reduced and there will significant opportunity during operations to evaluate the effectiveness of the closure measures.

Despite the improvements there are still several areas of concern which are described in the following sections.

Review of Country Rock & Till Storage

The design objectives and considerations for the country rock piles are supported. These clear statements provide a good basis for evaluation of any changes to the design of the rock piles, should any be proposed.

A review of the schedule of production of the main rock types suggests that there will always be a surplus of Type I rock in excess of that required to cover the Type III rock. Therefore, premature closure would not require quarrying to produce the necessary cover material.

During the period up to 2007 when the quarry cell is filled, there will be limited opportunity for progressive reclamation of the cell. As was discussed during the permitting phase, construction of the covers on the sides while the internal area is being raised in lifts may prove to be more difficult than expected. No details are provided as to how this work will be conducted. At least the modified mine plan now allows this work to be conducted during the operating period rather than delayed until the end of the mine life. No specifications are provided with respect to moisture content or degree of compaction of the till.

Slope Stability

The potential for creep failure of the foundation was investigated by Diavik. Twelve samples of ice rich soil from 9 boreholes were tested for determination of creep strength. Of these, 2 were from the process plant area, 7 were from the PKC dam areas and 3 were from the north end of the north country rock pile. None were tested from the south-west area of the rock pile. The soil type and ice of the material in this area is similar to that which was tested. The slopes over the quarry in this area are up to 80 m high and 4H:1V. Offsetting this concern is the conservative approach which has been taken by Diavik in evaluating the creep strength of the soils. Therefore the risk of problems is probably low. It would have been better if at least one sample from this area had been tested.

The slope stability objectives for the NCRP are to achieve a minimum factor of safety of >1.3 . This objective is appropriate for low to very low risk situations, primarily as it relates to the potential for runout failure from a geotechnical perspective. Failure of sections of the quarry cover over the biotite schist is not a low risk situation with respect to environmental protection. In my opinion, a higher factor of safety, such as >1.5 , should be considered for these areas.

Quarry Cover

In the southwest area of the NCRP, there are two additional concerns relating to the till and rock cover. The first relates to the geometry and the second to the thermal stability and potential for solifluction.

Drawings 4200-41D9-4025 to 4027 show the plan view geometry of the NCRP at the years 2008, 2009 and 2013. The geometry and rock management in the SW area of the quarry cell is unclear. In 2008, the top of the schist appears to be at 495 m elevation and horizontal (at 7,152,500N and 534,750E). In 2009, this area is covered to elevation 500 m. However, in 2013 at the same location the top of the cover is about 480 m elevation. The placement of schist and cover material in this area need to be re-assessed to ensure that the final slopes are not too steep or flattened to extend beyond the perimeter road.

A second concern with this area relates to the thermal stability and the potential for solifluction failure of the cover. The thermal modeling indicates that the zero degree isotherm will be situated immediately on top of the till layer. Progression of the zero degree isotherm into the till could allow solifluction or down slope creep of the rock cover to occur.

The thermal modeling of the NCRP and cover is based upon current climatic conditions, not long term scenarios which consider the potential for global warming. In addition, this southwest facing slope at 4H:1V will receive greater solar warming due to its aspect than other sections of the cover (which are mostly north facing or horizontal). This area may have a deeper active layer than an equivalent horizontal surface in the mine area. Finally, some snowmelt and rainwater from the top surface of the NCRP will drain down this slope.

It is possible that the combination of potential thermal factors could cause the zero degree isotherm to be within the till layer. Solifluction could occur, however considering the relatively flat slopes this process is likely to be extremely slow. The risk of degradation of the cover is low. Monitoring of site thermal conditions and progressive reclamation should allow sufficient opportunity for any changes to the design. Modifications do not seem warranted at this time.

Later in the mine life the company should demonstrate that the cover in this area will be stable considering the potential adverse effects of: global warming, direct solar heating, and heating from runoff water. A slightly thicker cover could be required in south west area of the NCRP.

The south country rock pile design is described as conceptual only. This is probably acceptable at this time as construction of this pile will not commence for another 11 years and it is expected to be composed of inert rock. The design objectives for this pile should be the same as for the NCRP.

Review of Processed Kimberlite Containment Facility

Long-term stability of the dams and cover on the PKC are critical to ensuring environmental protection. The design of the PKC is essentially unchanged from the permit application except for changes to dam geometry to accommodate a shorter construction period.

During the permitting stage of the project, a number of issues were identified with respect to water management in the fine PK deposition area. The company has recognized that the requirements for a deeper pond in the winter for inventory of process water below the ice could result in tailings discharge onto the ice during this period. Unless the water management issues with respect to ice formation and beach width can be resolved during operations, it is possible that the pond may be larger than envisioned (as was assumed by the reviewers during the permitting stage).

There is some uncertainty as to the input parameters for the thermal modeling. Page 44 of the PKC design report describes a pond depth of 3.0 to 4.5 m in the center of the PKC. However, on page 53 in the thermal analyses section, a depth of 6 m has been used. If this greater depth occurs then the area of the pond will be much greater. At closure there will be more water, a greater pond depth to infill, a larger volume of expelled water to manage, and possibly greater settlement (which could cause ditch failure). The company should monitor and maintain a record of the pond depth and area with time in order that future adjustments to the closure plan are based upon operating data.

Slope Stability

Slope stability analyses are presented in Section 9 of the PKC design report. It is not clear why different seismic parameters (0.015g to 0.020g) are used for the stability evaluations.

The slope stability analyses have considered frozen, partially thawed and fully thawed cases for the foundation. However, it appears that the center of the slip circles do not allow for the potential of a failure of the toe of the dams under partially or fully thawed cases. An insulating blanket may be required to ensure that the foundation material under the toe remains frozen. The partially and fully thawed analyses should consider seismic conditions as these cases apply to long-term stability.

At closure, the seepage collection dams below the East and West dams should be removed. This will prevent a pool of water forming at the base of the dams which could cause thawing of the ice rich soil in the foundation.

Fine PK Cover

Settlement of the fine PK is expected to be 1.5 to 2.0 m, and possibly up to 4 m once the cover is placed. The design and slope of the runoff ditches on the cover must be carefully planned to ensure that they will continue to perform under the influence of differential settlement. It may be necessary to provide for a drilling investigation prior to placement of the cover in order to

determine the extent of the unfrozen slimes. There is no design for the runoff ditches over the PKC cover. The design should demonstrate that frozen conditions will exist below the ditch bottom.

The routing of the spillway from the crest of the West Dam down to Lac de Gras is not shown on the drawings.

It is expected that there will be a discharge of pore water from the slimes area as it freezes. Freezing is anticipated to take 50 to 100 years. Have the thermal analyses considered the effect of the depressed freezing point of the pore water?

The volume of expelled pore water will depend upon the extent of unfrozen material, which in turn will depend on the pond area during operations. No calculations are presented as to the volume of expelled water and the contingency to be provided in the volume of the rock spacer. No details are provided in regards to the proposal to install wells for withdrawal of the initially expelled water. This concept should be more fully developed before it is considered as a viable reclamation strategy.

Future information should identify the number of wells, their location, pump capacity and plans for treatment of the expelled water. This water is likely to be elevated in dissolved constituents due to the freeze concentration effect. It may be beneficial to conduct some tests of the cover, water expulsion and well dewatering concept, such as by constructing and dewatering below a similar cover over the material in the on-land dredged sediment area of the NCRP.

There are some differences in the elevations reported for the final cover. Drawing 4200-41D9-3137 indicates the top of the cover at 463.5 m. Drawing 4200-41D9-3188 shows 5 m of rock and a 4 m cover placed over a filled pond at 451 m elevation. There is a 4.5 m difference. How is the cover thickness adjusted for the expected settlement of the slimes?

Review of Interim Abandonment and Restoration Plan

General

The updated Interim Abandonment and Restoration Plan (A & R) presents several improvements over the original plans presented at the permitting stage. The A & R objectives are reasonable and should be supported by DIAND.

The most important of the changes is the modification of the NCRP which requires less cover area and now allows considerable progressive reclamation to be conducted. In addition, the ability to commence construction of the quarry cover while the A418 pit is being excavated allows placement of the till layer with unfrozen material, which reduces the progressive reclamation cost.

Concerns

The A & R plan (nor the PKC or NCRP plans) does not substantiate why different areas have different thickness of till in the cover. In the NCRP the till over the quarry is to be 1.5 m thick. In the PKC it is 1.0 m thick over the pond and 0.5 m over the coarse PK. If these are a reflection of the designers introducing varying degrees of conservatism in consideration of risk, it may be better to increase the thickness of the insulating rock cover rather than the till in critical areas.

Biotite schist may be exposed in the pit walls in the A154 and A418 pits. No measures to manage poor water quality associated with flushing of contaminants from these areas upon pit flooding are described. Only monitoring is proposed. A contingency plan should be developed.

It is proposed that progressive reclamation of the PKC may start in about 2020 when the production rate decreases. This may be impractical depending upon how the water management is conducted. This activity may result in the beach on one side of the pond being elevated with respect to the other. Design of the pond closure must consider the discharge scenario of the final years of operation.

There is no description as to how the North Inlet Water Treatment Plant will be modified at closure to deal with expelled pore water. There is no description as to how the accumulated sediments in the eight collection ponds will be managed at closure.

This A & R plan introduces the plan for a landfill to contain inert waste upon closure. The inert waste would be buried and capped to introduce permafrost, rather than transported off-site for disposal. This is a reasonable modification. Should there be disposal of worn-out mobile equipment in this landfill then a plan for decontamination prior to disposal should be developed.

The proposal for post-closure monitoring of 5 years seems too short. Provision should be made for longer term monitoring of thermally sensitive elements of the closure plan. These include the cover on the Type III rock and PKC pond area.

Note that this review of the A & R plan does not consider the implications of changes in the mine plan which may arise due to the mining of reserves. It is recognized that there are additional reserves and the PKC has been designed with considerable capacity for expansion. Should the minable reserves be increased then a revised A & R plan should be submitted for review.

Review of Cost Estimates For Interim And Final Restoration Plan

Diavik has presented an estimate of the cost of mine closure in a comprehensive document based on the recently updated mine plans. This document clearly presents the company's rationale and approach to the estimation of the closure cost. Figure 13-1 presents visually the anticipated growth in reclamation liability and the effect of the proposed progressive reclamation. Diavik has done a commendable job in preparation of this document.

A few comments regarding the scope and approach are presented as follows. Note that an independent estimate of the cost of closure for the mine development has not been prepared at

this time. The comments provided here are intended to give perspective to the estimate prepared by the company.

A key aspect of the Diavik estimate is that the company has provided for management, monitoring and contingency costs for only the difference between the total and the progressive reclamation cost. However, should the company default on the progressive reclamation, then the cost for conducting the progressive reclamation would be low by the amount of these provisions. In other words, for the purpose of estimating reclamation security amounts, these provisions should be added to the liability which is to be addressed by progressive reclamation until that reclamation is complete. At any point in time, the reclamation security should be set at an amount sufficient to address all of the outstanding liability assuming that the company does not carry out the progressive reclamation.

The company's approach to calculation of the liability also creates some confusion in presentation of the summary of closure costs. The total cost minus the progressive reclamation credit does not equal the net liability.

It is important to note that the cost to the government would be higher than the total cost calculated by the company if the company fails to carry out the reclamation work. A few factors which cause this are:

- the cover on the rock pile and coarse PK would not be constructed with till and rock which was already loaded on to trucks, the cost of this work would increase by the cost of loading the material,
- there would be additional effort for thawing of the till before it could be excavated,
- there could be other liabilities such as accumulations of hazardous materials.

There should be a provision for engineering costs associated with the reclamation effort. At a minimum, engineering will be required to design the final cover on the PKC pond, thermal

assessments, design caps for shafts, design of erosion control measures on the till piles and to carry out surveying of the general reclamation work.

Diavik has proposed a 10% contingency for the reclamation liability estimate. Considering that there are still a number of outstanding issues with respect to the mine and reclamation plans, a larger contingency is appropriate.

Some specific comments relating to the components of the cost estimate are:

- the activities in table 6-2, PKC closure, do not show the cost of the wells and associated water treatment (these may be included in the water management section however those activity descriptions are misleading and do not appear to include the dewatering wells),
- the unit costs for dike breaching around the pits may be low, especially for the work below the mean water level of the lake,
- the rock pile reclamation costs do not include dozing for surface preparation before cover placement or for the caribou ramps,
- the slope contouring allowance for the till piles seems light and becomes zero by the end of the mine life,
- the costs for construction of the channel on the surface of the PKC cover are low and not respective of the effort to construct a thermally stable ditch on a cover which will be subjected to differential settlement,
- there is no allowance for removal and treatment of the PKC supernatant,
- the cost for hydraulically placing coarse PK in the drained PKC pond is low, this operation may be severely affected by ice or frozen material in the placed coarse PK material,
- the demolition equipment cost of only \$75/hr is low, a single demolition shear will cost more than \$250/hr to operate,
- the cost for removal of contaminated soil is low, (presumably this is for excavation and on-site burial), costs will be higher once on-site engineering and testing costs are included, and the cost of the cap to induce permafrost is added,

- the descriptions in the water management section associated with the NIWTP and monitoring are confusing,
- the total cost for construction management of the reclamation work is about 1% of the total cost, this is low.

Conclusions

Based on the review of the documents provided the following conclusions are presented:

1. Diavik has favorably modified the mine development plans. These modifications have integrated reclamation objectives and issues into the mine plan to reduce environmental risk and closure costs. There is much greater opportunity for progressive reclamation.
2. There are some minor issues to be addressed in the development of the NCRP.
3. Some issues associated with the operation of the PKC pond and the effects on the construction of the PKC cover are still outstanding. These may not be resolvable until after several years of operation. Additional data may need to be collected by drilling in the fine PK area before the cover is constructed.
4. The A & R plan is comprehensive. There are few issues with the proposed reclamation measures.
5. The company's estimate of the anticipated cost for mine closure is well presented. It is thorough and reasonably complete. There are some minor omissions. If it became necessary for the government to carry out the reclamation work, it is likely that the costs would be slightly higher than estimated by the company. This is due to the approach taken by the company in preparing its estimate and the issues identified above.
6. None of the issues identified here seem sufficient to hold up the ongoing development of the project. Resolution of these issues should be pursued through monitoring of the project performance as development and progressive reclamation is carried out.

I trust that this review addresses your current requirements. Please call if you have any questions.

Yours truly,
Brodie Consulting Ltd.

M. J. Brodie, P. Eng.

APPENDIX B

UNCERTAINTY FACTORS
IN
RECLAMATION COST ESTIMATES

Uncertainty and Selection of Contingency in Reclamation Cost Estimates

Modified from: Issues and Methods in Mine Reclamation Cost Estimating, Brodie, 2005.

Uncertainty and selection of an appropriate contingency amount is often the most controversial aspect of rehabilitation security. As with any type of cost estimating process, there is potential for the actual cost to be different from the estimated cost. This arises from a number of factors which introduce uncertainty in the assumed scope and effort of the work. In the case of mine rehabilitation security, uncertainty really means; “What is the likelihood that the actual cost will vary from the estimated cost?”

Factors which may introduce uncertainty into a reclamation cost estimate can be grouped into three broad areas, each of which are described below. It should be recognized that this is not intended to be an exhaustive list. Every mine is a special case and identification and evaluation of uncertainty factors should be conducted on a case by case basis.

Uncertainty factors pertaining to the mine plan consider the:

- Data base of geology and geochemistry (which may result in ARD or metal leaching problems),
- Characterization of critical foundations (such as under dams and waste dumps),
- Application of a new technology or unique application of an existing technology,
- Use of optimistic control strategies (such as blending of acid generating and acid consuming rocks), and,
- Predictions concerning the effectiveness of control measures (such as cyanide degradation in tailings impoundment water).

Uncertainty factors pertaining to the rehabilitation plan are:

- Variability in the extent and type of disturbance at the time of mine closure,
- Expectations for the success of rehabilitation measures, and,
- Potential for difficulty in implementing the closure measures.

Uncertainty factors pertaining to the cost of the rehabilitation work are:

- Cost of equipment, manpower, and consumables such as lime and fuel,
- Duration of time required to complete the work (and the effect on the associated site support costs),
- Availability of qualified contractors to carry out the work.

It is only through consideration of the above factors can the cost estimator select an appropriate contingency. The final determination is still a matter of professional judgment, however the factors described above will help to guide the professional.

APPENDIX C
RECLAMATION COST ESTIMATE
2007

SUMMARY OF COSTS

			YEAR	
			2,007	
COMPONENT TYPE	COMPONENT NAME	TOTAL COST	Land Liability	Water Liability
OPEN PIT	A514,A418,A21	\$325,191.36	\$0	\$325,191
UNDERGROUND MINE	0	\$0.00	\$0	\$0
TAILINGS	0	\$32,117,360.00	\$5,100	\$32,112,260
ROCK PILE	0	\$23,896,609.00	\$1,405,757	\$22,490,853
BUILDINGS AND EQUIPMENT	0	\$15,697,151.08	\$12,715,974	\$2,981,177
CHEMICALS AND SOIL MANAGEMENT	0	\$837,430.00	\$0	\$837,430
WATER MANAGEMENT	0	\$1,114,934.85	\$0	\$1,114,935
POST-CLOSURE SITE MAINTENANCE		\$0.00	\$0	\$0
	SUBTOTAL	\$73,988,676	\$14,126,831	\$59,861,845
		Percentages	19.1	80.9
MOBILIZATION/DEMOBILIZATION	0	\$10,260,412	\$1,959,044	\$8,301,367
MONITORING AND MAINTENANCE	0	\$10,228,853	\$1,953,019	\$8,275,834
Market Factor Price Adjustment	20 %	\$14,797,735	\$2,825,366	\$11,972,369
PROJECT MANAGEMENT	5 %	\$3,699,434	\$706,342	\$2,993,092
ENGINEERING	5 %	\$3,699,434	\$706,342	\$2,993,092
CONTINGENCY	20 %	\$14,797,735	\$2,825,366	\$11,972,369
GRAND TOTAL - CAPITAL COSTS		\$131,472,279	\$25,102,309	\$106,369,970

1 **Open Pit Name: A514,A418,A: Pit # 1**

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost %	Land Cost	Water Cost
A OBJECTIVE: CONTROL ACCESS							
Fence	m		#N/A	0	\$0	\$0	\$0
. Signs	each		#N/A	0	\$0	\$0	\$0
. Ditch, mat'l A	m3		#N/A	0	\$0	\$0	\$0
. , mat'l B	m3		#N/A	0	\$0	\$0	\$0
. Berm	m3		#N/A		\$0	\$0	\$0
B Block roads							
. Other	m3		#N/A	0	\$0	\$0	\$0
.			#N/A	0	\$0	\$0	\$0
. OBJECTIVE: STABILIZE SLOPES							
excavate 2 breaches in dike	m3	10560	sc1h	7.803	\$82,400	\$0	\$82,400
break concrete guides & wall	m3	600	brcl	33.66	\$20,196	\$0	\$20,196
. construct fish habitat	m3	0	sb1h	4.947	\$0	\$0	\$0
. A 418	m3		#N/A	0	\$0	\$0	\$0
C excavate 2 breaches in dike							
break concrete guides & wall	m3	600	brcl	33.66	\$20,196	\$0	\$20,196
. construct fish habitat	m3	0	sb1h	0	\$0	\$0	\$0
A21	m		#N/A	0	\$0	\$0	\$0
. excavate 2 breaches in dike	m3	0	sc1h	7.803	\$0	\$0	\$0
break concrete guides & wall	m3	0	brcl	33.66	\$0	\$0	\$0
. construct fish habitat	m3	0	sb1h	4.947	\$0	\$0	\$0
	kWh		#N/A	0	\$0	\$0	\$0
. Other			#N/A	0	\$0	\$0	\$0
.			#N/A				
. OBJECTIVE: COVER/CONTOUR SLOPES							
. Fill, mat'l A	m3		#N/A	0	\$0	\$0	\$0
. , mat'l B	m3		#N/A	0	\$0	\$0	\$0
. Rip rap	m3		#N/A	0	\$0	\$0	\$0
. Vegetate	ha		#N/A	0	\$0	\$0	\$0
E Other							
.			#N/A	0	\$0	\$0	\$0
. OBJECTIVE: SPILLWAY							
. Excavate channel, mat'l A	m3		#N/A	0	\$0	\$0	\$0
. , mat'l B	m3		#N/A			\$0	\$0
. Concrete	m3		#N/A	0	\$0	\$0	\$0
. Rip rap	m3		#N/A	0	\$0	\$0	\$0
. Other			#N/A	0	\$0	\$0	\$0
F							
. OBJECTIVE: FLOOD PIT							
. Ditch, mat'l A	m3		#N/A	0	\$0	\$0	\$0
. , mat'l B	m3		#N/A	0	\$0	\$0	\$0
. Embankment, mat'l A	m3		#N/A	0	\$0	\$0	\$0
H , mat'l B							
siphon installation/operation	each	2	#N/A	50000	\$100,000	\$0	\$100,000
remove pipes,wires etc	each	2	#N/A	0	\$20,000	\$0	\$20,000
make milk of lime, meter into pit	tonne		#N/A	0	\$0	\$0	\$0

1 **Open Pit Name: A514,A418,A: Pit # 1**

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	% Land Cost	Land Cost	Water Cost
	tonne		ilmh	504.9	\$0		\$0	\$0
	km		mherh	8.5884	\$0		\$0	\$0
OBJECTIVE: BACKFILL PIT			#N/A	0	\$0		\$0	\$0
Fill, mat'l A	m3		#N/A	0	\$0		\$0	\$0
, mat'l B	m3		#N/A	0	\$0		\$0	\$0
Other			#N/A	0	\$0		\$0	\$0
			#N/A	0	\$0		\$0	\$0
OBJECTIVE: DEVELOP WETLAND			#N/A	0	\$0		\$0	\$0
Earthworks, mat'l A	m3		#N/A	0	\$0		\$0	\$0
, mat'l B	m3		#N/A	0	\$0		\$0	\$0
Vegetate	ha		#N/A	0	\$0		\$0	\$0
Other			#N/A	0	\$0		\$0	\$0
			#N/A	0	\$0		\$0	\$0
SPECIALIZED ITEMS			#N/A	0	\$0		\$0	\$0
			#N/A	0	\$0		\$0	\$0
Subtotal					\$325,191	0%	\$0	\$325,191
					Total Pits	Percent Total Land	Total Land	Total Water

1 Underground Mine Name _____		UG Mine # <u>1</u>						
ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost %	Land Cost	Water Cost	
A OBJECTIVE: CONTROL ACCESS								
. Fence	m		#N/A	0	\$0	\$0	\$0	
. Signs	each		#N/A	0	\$0	\$0	\$0	
. Ditch, mat'l A	m3		#N/A	0	\$0	\$0	\$0	
. , mat'l B	m3		#N/A	0	\$0	\$0	\$0	
. Berm	m3		#N/A	0	\$0	\$0	\$0	
. Block adits	m3		#N/A	0	\$0	\$0	\$0	
. Cap shaft	m3		#N/A	0	\$0	\$0	\$0	
. Cap raises at A154/A418	m3		0 SRL	540.6	\$0	100%	\$0	
soil cover on raise cap	m3		0 SB1L	3.264	\$0	100%	\$0	
. Cap raises at A 21	m3		0 SRL	540.6	\$0	100%	\$0	
soil cover on raise cap			0 SB1L	3.264	\$0	100%	\$0	
. Backfill adit A154	m3		0 SCSS	16.065	\$0	100%	\$0	
Contour portal area, A154	m3		0 SB1L	3.264	\$0	100%	\$0	
. Backfill adit, A21	m3		0 SCSS	16.065	\$0	100%	\$0	
Contour portal area, A21			0 SB1L	3.264	\$0	100%	\$0	
. concrete bulkhead, pit portal, A154	allow		0 #N/A	75000	\$0	100%	\$0	
. concrete bulkhead, pit portal, A21	allow		0 #N/A	75000	\$0	100%	\$0	
. Backfill open stopes	m3		#N/A	0	\$0	\$0	\$0	
. Other			#N/A	0	\$0	\$0	\$0	
B OBJECTIVE: STABILIZE GROUND SURFACE								
. Backfill mine	m3		#N/A	0	\$0	\$0	\$0	
. Collapse crown pillar	m3		#N/A	0	\$0	\$0	\$0	
. Contour, mat'l A	m3		#N/A	0	\$0	\$0	\$0	
. , mat'l B	m3		#N/A	0	\$0	\$0	\$0	
. Maintain dewatering (see "MONITORING/MAINTENANCE" c			#N/A	0	\$0	\$0	\$0	
. Other			#N/A	0	\$0	\$0	\$0	
C OBJECTIVE: FLOOD MINE								
. Plug adits	m3		#N/A	0	\$0	\$0	\$0	
. Plug drillholes to surface	each		#N/A	0	\$0	\$0	\$0	
. Grouting	m3		#N/A	0	\$0	\$0	\$0	
. Lime addition, kg/m3 of water	tonne		#N/A	0	\$0	\$0	\$0	
. Lime, purchase and shipping	tonne		#N/A	0	\$0	\$0	\$0	
D OBJECTIVE: HAZARDOUS MATERIALS								
. remove hazardous materials, LABOUR	each		0 LLUGGL	35.7	\$0	50%	\$0	
. remove/decontam. Equipment, electrical	each		0 LUGEL	51	\$0	50%	\$0	
. Other			#N/A	0	\$0	\$0	\$0	
E SPECIALIZED ITEMS								
.			#N/A	0	\$0	0%	\$0	
Subtotal					\$0	#DIV/0!	\$0	
				Total U/G		Percent Total Land	Total Water	

1 | Impoundment Name: _____ Impoundment # _____ 1

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	% Land Cost	Land Cost	Water Cost
A OBJECTIVE: CONTROL ACCESS								
. Fence	m		#N/A	0	\$0		\$0	\$0
. Signs	each		#N/A	0	\$0		\$0	\$0
. Ditch, mat'l A	m3		#N/A	0	\$0		\$0	\$0
. , mat'l B	m3		#N/A	0	\$0		\$0	\$0
. Berm	m3		#N/A	0	\$0		\$0	\$0
. Block roads	m3		#N/A	0	\$0		\$0	\$0
. Other			#N/A	0	\$0		\$0	\$0
B								
. OBJECTIVE: STABILIZE EMBANKMENT			#N/A	0	\$0		\$0	\$0
. breach east dam	m3		#N/A	0	\$0		\$0	\$0
. , fill mat'l A	m3		#N/A	0	\$0		\$0	\$0
. , fill mat'l B	m3		#N/A	0	\$0		\$0	\$0
. Rip rap	m3		#N/A	0	\$0		\$0	\$0
. Vegetate	ha		#N/A	0	\$0		\$0	\$0
. Raise crest	m3		#N/A	0	\$0		\$0	\$0
. Flatten slopes	m3		#N/A	0	\$0		\$0	\$0
C Other								
.			#N/A	0	\$0		\$0	\$0
.			#N/A	0	\$0		\$0	\$0
. OBJECTIVE: COVER TAILINGS			#N/A	0	\$0		\$0	\$0
. coarse PK, doze to slurry sump	m3	2625000	DSL	0.7956	\$2,088,450		\$0	\$2,088,450
. coarse PK - slurry pumping	m3	2625000		0.5	\$1,312,500		\$0	\$1,312,500
. Rock for expelled water from N or S durr	m3	1875000	#N/A	3.6	\$6,750,000		\$0	\$6,750,000
D Rock for expelled water from roads								
. Rock for expelled water from new quarry	m3		#N/A	8.25	\$0		\$0	\$0
. Soil cover, till	m3	1416000	#N/A	4.46	\$6,315,360		\$0	\$6,315,360
. Cover rock from N or S dump	m3	4247000	#N/A	3.6	\$15,289,200		\$0	\$15,289,200
. Cover rock from roads	m3		#N/A		\$0		\$0	\$0
E Cover rock from new quarry								
. Remove & treat supernatant	m3	270000	otpl	0.25	\$67,500		\$0	\$67,500
OBJECTIVE: FLOOD TAILINGS								
. Ditch, mat'l A	m3		#N/A	0	\$0		\$0	\$0
. , mat'l B	m3		#N/A	0	\$0		\$0	\$0
F Raise crest								
. Other	m3		#N/A	0	\$0		\$0	\$0
.			#N/A	0	\$0		\$0	\$0
.			#N/A	0	\$0		\$0	\$0
OBJECTIVE: DEVELOP WETLAND								
. Earthworks, mat'l A	m3		#N/A	0	\$0		\$0	\$0
. Vegetate	ha		#N/A	0	\$0		\$0	\$0
G Other								
.			#N/A	0	\$0		\$0	\$0
.			#N/A	0	\$0		\$0	\$0
OBJECTIVE: UPGRADE SPILLWAY								
. Excavate channel, mat'l A	m3	18000	sc3h	10.6	\$190,800		\$0	\$190,800
H , mat'l B								
. Concrete	m3		#N/A	0	\$0		\$0	\$0
. Rip rap	m3	13000	#N/A	5.65	\$73,450		\$0	\$73,450
. geotextile over ice rich soil	m2	2500	#N/A	10	\$25,000		\$0	\$25,000
I								
.			#N/A	0	\$0		\$0	\$0

1 ings Impoundment Name: Impoundment # 1

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost %	Land Cost	Water Cost
OBJECTIVE: STABILIZE DECANT SYSTEM			#N/A	0	\$0	\$0	\$0
Remove	m3		#N/A	0	\$0	\$0	\$0
Plug/backfill	m3		#N/A	0	\$0	\$0	\$0
Other			#N/A	0	\$0	\$0	\$0
			#N/A	0	\$0	\$0	\$0
OBJECTIVE: REMOVE TAILINGS DISCHARGE			#N/A	0	\$0	\$0	\$0
Cyclones	m3		#N/A	0	\$0	\$0	\$0
Pipe	m	5000	PPLL	1.02	\$5,100	100% \$5,100	\$0
Other			#N/A	0	\$0	\$0	\$0
			#N/A	0	\$0	\$0	\$0
SPECIALIZED ITEMS			#N/A	0	\$0	\$0	\$0
			#N/A	0	\$0	\$0	\$0
Subtotal					\$32,117,360	0.00016 \$5,100	\$32,112,260
					Total Tailings	Percent Total Land	Total Land Water

1 **Rock Pile Name:** _____ **Rock Pile #:** 1

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	Cost %	Land Cost	Water Cost
A OBJECTIVE: STABILIZE SLOPES								
Flatten slopes with dozer, rock pile, north	m3	1501500	dsl	0.71	\$1,066,065.00	50%	\$533,033	\$533,033
Flatten slopes with dozer, till pile	m3	479000	dsl	0.71	\$340,090.00	100%	\$340,090	\$0
Flatten slopes with dozer, till pile, south	m3	0	dsl	0.71	\$0.00	100%	\$0	\$0
Toe buttress, drain mat'l	m3		#N/A	0	\$0.00		\$0	\$0
, fill mat'l A	m3		#N/A	0	\$0.00		\$0	\$0
, fill mat'l B	m3		#N/A	0	\$0.00		\$0	\$0
Other			#N/A	0	\$0.00		\$0	\$0
B								
OBJECTIVE: COVER DUMP					\$0.00		\$0	\$0
till on biotite schist	m3	1031000	#N/A	4.82	\$4,969,420.00		\$0	\$4,969,420
rock on mixed rock & biotite schist	m3	4290000	#N/A	3.96	\$16,988,400.00		\$0	\$16,988,400
till on caribou ramps	m3	6400	#N/A	4.82	\$30,848.00	100%	\$30,848	\$0
rock cover from roads, etc.	m3	0	#N/A	5.65	\$0.00		\$0	\$0
C								
rock cover from new quarry	m3	0						
rock cover on 2.5:1 slopes, incr. cost	m3		#N/A	0.15	\$0.00		\$0	\$0
till islands for reveg.	m3	93300	#N/A	4.82	\$449,706.00	100%	\$449,706	\$0
till islands for reveg., south dump	m3	0	#N/A	4.78	\$0.00	100%	\$0	\$0
OBJECTIVE: UNDERWATER DISPOSAL			#N/A		\$0.00		\$0	\$0
D								
Move material	m3		#N/A	0				
Add lime	m3		#N/A	0	\$0.00		\$0	\$0
E								
Add crushed limestone	m3		#N/A	0				
Other			#N/A	0	\$0.00		\$0	\$0
			#N/A		\$0.00		\$0	\$0
OBJECTIVE: COLLECT AND TREAT			#N/A		\$0.00		\$0	\$0
See "ONGOING TREATMENT" costing component			#N/A		\$0.00		\$0	\$0
F								
OBJECTIVE: DEVELOP WETLAND			#N/A		\$0.00		\$0	\$0
Earthworks, mat'l A	m3		#N/A	0	\$0.00		\$0	\$0
, mat'l B	m3		#N/A	0	\$0.00		\$0	\$0
Vegetate, till pile	ha	31	vhs1	1680	\$52,080.00	100%	\$52,080	\$0
Other			#N/A	0	\$0.00		\$0	\$0
			#N/A		\$0.00		\$0	\$0
SPECIALIZED ITEMS			#N/A		\$0.00		\$0	\$0
			#N/A		\$0.00		\$0	\$0
			#N/A	0	\$0.00		\$0	\$0
Subtotal					\$23,896,609	5.9%	\$1,405,757	\$22,490,853
					Total for	Percent	Total	
					Rock Pile	Land	Total Land	Water

1 Building / Equip Name: _____ Bldg / Equip #: 1

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	%	Land	Land Cost	Water
									Cost
A OBJECTIVE: DISPOSE MOBILE EQUIPMENT									
Decontaminate and ship off-site	km	320000	mherh	8.5884	\$2,748,288	50%	\$1,374,144	\$1,374,144	
. Decontaminate, dispose on-site	each		#N/A	0	\$0			\$0	\$0
. Other	each		#N/A	0	\$0			\$0	\$0
B OBJECTIVE: DISPOSE STATIONARY EQUIPMENT									
. Decontaminate and ship off-site	km	353857	mherh	8.5884	\$3,039,065	50%	\$1,519,533	\$1,519,533	
. Decontaminate, dispose on-site	each		#N/A	0	\$0			\$0	\$0
. Other	each		#N/A	0	\$0			\$0	\$0
C OBJECTIVE: DISPOSE ORE CONCENTRATION EQUIPMENT									
. Decontaminate crushing plant	each		#N/A	0	\$0			\$0	\$0
. Decontaminate tanks & plumb.	each		#N/A	0	\$0			\$0	\$0
. Remove tanks & plumbing	each		#N/A	0	\$0			\$0	\$0
. Other			#N/A	0	\$0			\$0	\$0
D OBJECTIVE: DISPOSE WATER TREATMENT EQUIPMENT									
. Decontaminate tanks & plumb.	each		#N/A	0	\$0			\$0	\$0
. Remove tanks & plumbing	each		#N/A	0	\$0			\$0	\$0
. Other			#N/A	0	\$0			\$0	\$0
E OBJECTIVE: DECONTAMINATE BUILDINGS & TANKS									
. site wide allowance	each	1	#N/A	75000	\$75,000	50%	\$37,500	\$37,500	
. clean explosives facility	each	1	#N/A	50000	\$50,000			\$0	\$50,000
.	each		#N/A	0	\$0			\$0	\$0
.	each		#N/A	0	\$0			\$0	\$0
.	each		#N/A	0	\$0			\$0	\$0
.	each		#N/A	0	\$0			\$0	\$0
.	each		#N/A	0	\$0			\$0	\$0
F OBJECTIVE: MOTHBALL BUILDINGS									
. Building 1	m2		#N/A	0	\$0			\$0	\$0
. Building 2	m2		#N/A	0	\$0			\$0	\$0
. Building 3	m2		#N/A	0	\$0			\$0	\$0
. Building 4	m2		#N/A	0	\$0			\$0	\$0
. Building 5	m2		#N/A	0	\$0			\$0	\$0
. Other	m2		#N/A	0	\$0			\$0	\$0
G OBJECTIVE: REMOVE BUILDINGS									
. Process plant	m2	54000	brs1h	53.856	\$2,908,224	100%	\$2,908,224		\$0
. Maintenance plant	m2	31500	brs1h	53.856	\$1,696,464	100%	\$1,696,464		\$0
. Camp	m3	13275	brs1l	35.904	\$476,626	100%	\$476,626		\$0
. Bulk fuel storage	m2	39375	brs1l	35.904	\$1,413,720	100%	\$1,413,720		\$0
. Power plant/boiler house	m3	11000	brs1h	53.856	\$592,416	100%	\$592,416		\$0
. Ammonium nitrate fuel storage	m2	22500	brs1l	35.904	\$807,840	100%	\$807,840		\$0
. Explosives/cap storage & mixing	m3	600	brs1h	53.856	\$32,314	100%	\$32,314		\$0
. Remove boneyard waste	m2	1700	brs1l	35.904	\$61,037	100%	\$61,037		\$0
. Other			#N/A	0	\$0			\$0	\$0
H OBJECTIVE: BREAK BASEMENT SLABS									
. Building 1	m2		#N/A	0	\$0			\$0	\$0
. Building 2	m2		#N/A	0	\$0			\$0	\$0
. Building 3	m2		#N/A	0	\$0			\$0	\$0
. Building 4	m2		#N/A	0	\$0			\$0	\$0
. Building 5	m2		#N/A	0	\$0			\$0	\$0

1 Building / Equip Name: _____ Bldg / Equip #: 1

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
. Other			#N/A	0	\$0		\$0	\$0
I OBJECTIVE: REMOVE BURIED TANKS								
. Tank 1, decontaminate	m3		#N/A	0	\$0		\$0	\$0
. , excavate & dispose	m3		#N/A	0	\$0		\$0	\$0
. Tank 2, decontaminate	m3		#N/A	0	\$0		\$0	\$0
. , excavate & dispose	m3		#N/A	0	\$0		\$0	\$0
. Other			#N/A	0	\$0		\$0	\$0
J OBJECTIVE: LANDFILL FOR DEMOLITION WASTE								
. Place soil cover	m3	187500	#N/A	5.65	\$1,059,375	100%	\$1,059,375	\$0
. Vegetate	ha		#N/A	0	\$0		\$0	\$0
. Landfill disposal fee	tonne		#N/A	0	\$0		\$0	\$0
K OBJECTIVE: GRADE AND CONTOUR								
. Grade mill area	m2	30750 dsl		0.7956	\$24,465	100%	\$24,465	\$0
. Place soil cover	m3	34050	#N/A	5.65	\$192,383	100%	\$192,383	\$0
. Rip rap on ditches	m3		#N/A	0	\$0		\$0	\$0
. Vegetate	ha		#N/A	0	\$0		\$0	\$0
. Other			#N/A	0	\$0		\$0	\$0
L OBJECTIVE: RECLAIM ROADS								
Haul roads, A 154 & A418 lease	ha	3.71 scfyl		3595.5	\$13,339	100%	\$13,339	\$0
Service roads, A154 & A418 lease	ha	1.6 scfyl		3595.5	\$5,753	100%	\$5,753	\$0
Haul roads, A21 lease	ha	1.8 scfyl		3595.5	\$6,472	100%	\$6,472	\$0
Service roads, A21 lease	ha	1.65 scfyl		3595.5	\$5,933	100%	\$5,933	\$0
Haul roads, PKC & dumps lease	ha	10.13 scfyl		3595.5	\$36,422	100%	\$36,422	\$0
Service roads, PKC & dumps lease	ha	23.2 scfyl		3595.5	\$83,416	100%	\$83,416	\$0
Haul roads, infrastructure lease	ha	14.85 scfyl		3595.5	\$53,393	100%	\$53,393	\$0
Service roads, infrastructure lease	ha	5.4 scfyl		3595.5	\$19,416	100%	\$19,416	\$0
. Haul roads, airstrip lease	ha	0 scfyl		3595.5	\$0	100%	\$0	\$0
. Service roads, airstrip lease	ha	2.9 scfyl		3595.5	\$10,427	100%	\$10,427	\$0
.			#N/A	0	\$0	100%	\$0	\$0
K SPECIALIZED ITEMS								
RECLAIM AIRSTRIP	ha	11 scfyl		3215	\$35,365	100%	\$35,365	\$0
YELLOWKNIFE LANDFILL DISPOSAL FEE		1		250000	\$250,000	100%	\$250,000	\$0
.			#N/A	0	\$0		\$0	\$0
Subtotal					\$15,697,151	81.0%	\$12,715,974	\$2,981,177
				Total Buildings		Percent Land	Total Land	Total Water

Chemicals and Soil

1 Contamination: 1

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost %	Land Cost	Water Cost	
Note: The procedures, equipment and packaging for clean up and removal of chemicals or contaminated soils are highly dependent on the nature of the chemicals and their existing state of containment. Government guidelines should be consulted on an individual chemical basis. Any estimate made here should be considered very rough unless specific evaluations have been conducted.								
A LABORATORY CHEMICALS	km	494	mherh			\$0		
. pallet		50	#N/A	1000	\$50,000	\$0	\$50,000	
B PCB, hauling	litre		#N/A	0	\$0	\$0	\$0	
. PCB, disposal	litre		#N/A	0	\$0	\$0	\$0	
C FUEL			#N/A		\$0	\$0	\$0	
. Type 1, 200 tonnes	km		mherh	8.5884	\$0	\$0	\$0	
. Type 2	kg		#N/A	0	\$0	\$0	\$0	
. Type 3	kg		#N/A	0	\$0	\$0	\$0	
D WASTE OIL								
. Oils/lubricants - burn on-site	litre		#N/A	0	\$0	\$0	\$0	
. Oils/lubricants - ship off-site	litre	650000	#N/A	0.027	\$17,550	\$0	\$17,550	
. removal glycol	litre	20,000		1.25	\$25,000	\$0	\$25,000	
E remove batteries	kg	25,000		0.5	\$12,500	\$0	\$12,500	
. remove paints	litre	1500		0.27	\$405	\$0	\$405	
. remove solvents	litre	7500		0.75	\$5,625	\$0	\$5,625	
. Oils/lubricants - disposal fee	litre		#N/A	0	\$0	\$0	\$0	
. PROCESS OR TREATMENT CHEMICALS								
F Type 1	km		mherh	8.5884	\$0	\$0	\$0	
Type 2	kg		#N/A	0	\$0	\$0	\$0	
Type 3	kg		#N/A	0	\$0	\$0	\$0	
Type 4	kg		#N/A	0	\$0	\$0	\$0	
EXPLOSIVES	kg							
. allow		1	#N/A	10000	\$10,000	\$0	\$10,000	
CONTAMINATED SOILS								
. Type 1, light fuel	m3	5000	CSRL	39.27	\$196,350	\$0	\$196,350	
G Type 2, heavy fuel and oil	m3	2500	#N/A	100	\$250,000	\$0	\$250,000	
. Type 3, metals	m3	250	#N/A	100	\$25,000	\$0	\$25,000	
. Haz. Mat. testing & assessment								
. Technician and analyses	each	1	#N/A	110000	\$110,000	\$0	\$110,000	
H Drilling	each	1	#N/A	75000	\$75,000	\$0	\$75,000	
. Reporting		1		20000	\$20,000	\$0	\$20,000	
. Other			#N/A	0	\$0	\$0	\$0	
. OTHER								
. remove nuclear densometers from mill	each	10	#N/A	4000	\$40,000	\$0	\$40,000	
Subtotal					\$837,430	0.0%	\$0	\$837,430
					Total Chemical	Percent Total Land	Total Water	

1 /ater Management Project: _____ Project # 1 _____

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost %	Land Cost	Water Cost
A OBJECTIVE: STABILIZE EMBANKMENT							
Toe buttress, drain mat'l	m3		#N/A	0	\$0	\$0	\$0
, fill mat'l A	m3		#N/A	0	\$0	\$0	\$0
, fill mat'l B	m3		#N/A	0	\$0	\$0	\$0
Rip rap	m3		#N/A	0	\$0	\$0	\$0
Vegetate	ha		#N/A	0	\$0	\$0	\$0
Raise crest	m3		#N/A	0	\$0	\$0	\$0
Other			#N/A	0	\$0	\$0	\$0
B OBJECTIVE: UPGRADE SPILLWAY							
Excavate channel	m3	680 dsh		2.83	\$1,924	\$0	\$1,924
Place rip rap	m3	190	#N/A	5.65	\$1,074	\$0	\$1,074
Excavate channel	m3	14400 dsh		2.83	\$40,752	\$0	\$40,752
Place rip rap	m3	10400	#N/A	5.65	\$58,760	\$0	\$58,760
Other			#N/A	0	\$0	\$0	\$0
C OBJECTIVE: STABILIZE SEDIMENT CONTAINMENT PONDS							
Place soil cover	m3		#N/A	0	\$0	\$0	\$0
Place geotextile	m2		#N/A	0	\$0	\$0	\$0
Vegetate	m3		#N/A	0	\$0	\$0	\$0
Other			#N/A	0	\$0	\$0	\$0
D OBJECTIVE: BREACH EMBANKMENT							
Remove Fill	m3		#N/A	0	\$0	\$0	\$0
Other			#N/A	0	\$0	\$0	\$0
E OBJECTIVE: COLLECTION PONDS							
Breach 4 dams	m3	2200 dsh		2.83	\$6,226	\$0	\$6,226
place geotextile, 4 by 15,000 m2	m2	60000	#N/A	10	\$600,000	\$0	\$600,000
place rock over geotextile	m3	60000	#N/A	5.65	\$339,000	\$0	\$339,000
Other			#N/A	0	\$0	\$0	\$0
F OBJECTIVE: BREACH DITCHES							
Excavate	m3	7875 dsh		3.1722	\$24,981	\$0	\$24,981
Backfill/recontour	m3	2625 sc1h		7.803	\$20,483	\$0	\$20,483
Vegetate	ha		#N/A	0	\$0	\$0	\$0
Other			#N/A	0	\$0	\$0	\$0
G OBJECTIVE: REMOVE PIPELINES							
Remove pipes	m		#N/A	0	\$0	\$0	\$0
Concrete plug deep pipes	m3		#N/A	0	\$0	\$0	\$0
Other			#N/A	0	\$0	\$0	\$0
H OBJECTIVE: NORTH INLET EAST DIKE							
Excavate/construct spillway	m3	4500 sb3h		4.83	\$21,735	\$0	\$21,735
Excavate & backfill	m3		#N/A	0	\$0	\$0	\$0
Other			#N/A	0	\$0	\$0	\$0
I OBJECTIVE: COLLECT DRAINAGE FOR TREATMENT							
Excavate collection ditches	m3		#N/A	0	\$0	\$0	\$0
Rip rap ditches	m3		#N/A	0	\$0	\$0	\$0
Pipes	m		#N/A	0	\$0	\$0	\$0
Pumps	each		#N/A	0	\$0	\$0	\$0
Collect'n pond, exc. mat'l A	m3		#N/A	0	\$0	\$0	\$0
, exc. mat'l B	m3		#N/A	0	\$0	\$0	\$0
Collect'n pond, fill mat'l A	m3		#N/A	0	\$0	\$0	\$0

Water Management Project: _____ Project # 1 _____

ACTIVITY/MATERIAL	Units	Quantity	Cost	Unit	Cost %	Land		Water
			Code	Cost		Land Cost	Cost	
, fill mat'l B	m3		#N/A	0	\$0		\$0	\$0
Collect'n pond, liner	m2		#N/A	0	\$0		\$0	\$0
J OBJECTIVE: TREAT DRAINAGE (see "ONGOING TREATMENT" for operating costs)								
Build treatment plant	lump sum		#N/A	0	\$0		\$0	\$0
			#N/A	0	\$0		\$0	\$0
Subtotal					\$1,114,935	0.0%	\$0	\$1,114,935
					Total	Percent Total	Total	Total
					Water	Land Land	Water	

1 Mobilization Name: _____ Mob # 1 _____

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost
A MOBILIZE HEAVY EQUIPMENT					
Equipment to regional centre					
. Excavators	km		#N/A	0	\$0
. Dump trucks	km		#N/A	0	\$0
. Dozers	km		#N/A	0	\$0
. Demolition shears	km		#N/A	0	\$0
Equipment, regional centre to site					
. Excavators - 2	km	4800	MHERH	8.59	\$41,224
. Dump trucks - 15	km	120000	MHERH	8.59	\$1,030,608
. Dozers - 4	km	16000	MHERH	8.59	\$137,414
. Demolition shears - 2		9600	MHERH	8.59	\$82,449
. Front end loader 2		4800	MHERH	8.59	\$41,224
. cranes - 2		1600	MHERH	8.59	\$13,741
. service vehicles -10		16000	MHERH	8.59	\$137,414
. km					
B MOBILIZE CAMP					
. allowance		1	#N/A		\$150,000
C MOBILIZE WORKERS					
. rotations over reclamatio period	m-hrs	26000	#N/A	45	\$1,170,000
D MOBILIZE MISC. SUPPLIES					
. Fuel	litre	7000000	#N/A	0.78	\$5,460,000
. Minor tools and equipment	owance	1	#N/A	0	\$500,000
. Truck tires	owance	1	#N/A	0	\$500,000
E MOBILIZE & HOUSE WORKERS person days					
. 20800 man-days	month	740	accml	1346.4	\$996,336
. WINTER ROAD					
. Full winter use	km		#N/A	0	\$0
. Limited winter use	km		#N/A	0	\$0
. #N/A			#N/A	0	\$0
F BONDING lump sum					
. #N/A			#N/A		\$0
G TAXES lump sum					
. #N/A			#N/A		\$0
H INSURANCE lump sum					
. #N/A			#N/A		\$0
Subtotal					\$10,260,412
					Total Mob.

	# of machines	loads/machine km	total round trip mileage
Equipment Mobilization			
excavator	2	3	800 4800
dump trucks	15	10	800 120000
dozers	4	5	800 16000
demolition shears	2	6	800 9600
front end loader	2	3	800 4800
cranes	2	1	800 1600
service vehicles	10	2	800 16000

1 Monitoring & Maintenance **Mon / Mtce # 1**

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost
A OBJECTIVE: POST-CLOSURE INSPECTIONS					
Annual geotechnical insp.	each	8	VIH	\$7,242	\$57,936
Survey inspection	each		#N/A	\$0	\$0
Water sampling	yrs	10	#N/A	\$250,000	\$2,500,000
Reporting	yrs	10	#N/A	\$100,000	\$1,000,000
Other			#N/A	\$0	\$0
B OBJECTIVE: INTERIM CARE & MAINTENANCE					
annual C&M	yrs	3	#N/A	\$2,223,639	\$6,670,917
	month		accml		\$0
	month		#N/A	\$0	\$0
	each		#N/A	\$0	\$0
	allowance		#N/A		\$0
Subtotal					\$10,228,853
					Total Mon./Maint.

ANNUAL INTERIM CARE & MAINTENANCE

	No.	hrs/year	Rate	Annual Cost
Site supervisor	1	3650	\$61.20	\$223,380
laborers	3	3650	\$38.76	\$141,474
equipment operators	2	3650	\$56.10	\$204,765
mechanic	1	3650	\$61.20	\$223,380
electrician	1	3650	\$70.00	\$255,500
envir. coordinator	1	3650	\$61.20	\$223,380
				\$1,271,879 total staff
Fuel, power & heat	L/hr	mon/yr	fuel	
	50	3	108000	
	40	7	201600	
	25	2	36000	
Fuel, mobile equipment	15	12	129600	
			475200 total fuel	
air charter	flights/yr		cost/flight	
	52		4500	234000
camp costs	108 m-months		1320	142560
misc. supplies, allowance				50000
reagents				50000
			Total annual C&M	\$2,223,639

Unit Cost Table

ITEM	Detail	COST CODE	UNITS	LOW \$	HIGH \$	SPECIFIED \$	COMMENTS
1 excavate Rock, Bulk							
	drill, blast, load						
	short haul (<500m) Dump	RB1	m3	9.54	14.28	#N/A	quarry operations for bulk fill
	RB1 + long haul, up to 1500 m	RB2	m3	10.10	14.89	#N/A	
	RB1 + spread and compact	RB3	m3	10.10	14.89	#N/A	
	RB1 + long haul + spread and compact	RB4	m3	10.66	25.76	#N/A	
	RB1 + Specified activity	RBS	m3	#N/A	#N/A	#N/A	
2 excavate Rock, Controlled				0.00	0.00	0.00	
	drill, blast, load						
	short haul (<500m) Dump	RC1	m3	22.44	33.66	#N/A	spillway excavation
	RC1 + long haul, up to 1500 m	RC2	m3	10.66	15.40	#N/A	
	RC1 + spread and compact	RC3	m3	10.10	14.89	#N/A	
	RC1 + long haul + spread and compact	RC4	m3	11.32	16.04	#N/A	
	RC1 + Specified activity	RCS	m3	#N/A	#N/A	147.90	\$145/M3-drift excavation
3 excavate Soil, Bulk				0.00	0.00	0.00	
	excavate, load						
	short haul (<500m) dump	SB1	m3	3.26	4.95	#N/A	LOW cost: excavation of loose soil, high volume
	SB1 + long haul, up to 1500 m	SB2	m3	4.06	6.09	#N/A	LOW cost: excavation of loose soil, 1.5 km haul, high volume
	SB1 + spread and compact	SB3	m3	3.77	5.42	#N/A	
	SB1 + long haul + spread and compact	SB4	m3	4.59	9.13	#N/A	LOW cost: excavation of loose soil, 1.5 km haul, high volume, const. of simple soil cover
				0.00	0.00	0.00	
	SB1 + Specified activity	SBS	m3	2.36	6.51	11.17	LOW cost: rehandle waste rock dump into pit, >500,000 m3, 2 km haul
				0.00	0.00	0.00	SPECIFIED cost: rehandle waste rock, haul 3 km, place & compact on dam
				0.00	0.00	0.00	
	Soil, tailings	SBT	m3	3.09	7.29	0.00	LOW cost: doze tailings, HIGH cost: excavate & short haul
4 excavate Soil, Controlled				0.00	0.00	0.00	
	excavate, load						
	short haul (<500 m), dump	SC1	m3	5.72	7.80	#N/A	
	SC1 + long haul, up to 1500 m	SC2	m3	7.09	9.83	#N/A	
	SC1 + spread and compact	SC3	m3	5.72	11.89	#N/A	HIGH cost: for simple soil covers
	SC1 + long haul + spread and compact	SC4	m3	6.43	19.43	#N/A	HIGH cost: for complex covers & dam construction, spillway repair, LOW volume
	SC1 + Specified activity	SCS	m3	#N/A	#N/A	16.07	SPECIFIED cost: backfill adit with waste rock
Geo-synthetics				0.00	0.00	0.00	
	geotextile, filter cloth	GST	M2	1.01	2.02	#N/A	FOB Edmonton, add shipping & installation
	geogrid	GSG	M2	4.82	0.00	#N/A	

Unit Cost Table

ITEM	Detail	COST CODE	UNITS	LOW \$	HIGH \$	SPECIFIED \$	
	liner, HDPE	GSHDPE	M2	6.01	0.00	#N/A	
	liner, PVC	GSPVC	M2	0.00	0.00	#N/A	
	geosynthetic installation	GSI	m2	0.85	1.02	#N/A	
	bentonite soil ammendment	GSBA	tonne	258.06	291.72	#N/A	FOB Edmonton, add shipping & mixing
Shaft, Raise & Portal Closures				0.00	0.00	0.00	
	Shaft & Raises	SR	m2	540.60	1785.00	#N/A	LOW cost: pre-cast concrete slabs, little site prep. HIGH cost: for hand construction, remote site
	Portals	POR	m3	0.00	209.10	1020.00	HIGH cost: for excavate & backfill collapsed portal SPECIFIED cost: installed pressure plug
				0.00	0.00	0.00	
				0.00	0.00	0.00	
				0.00	0.00	0.00	
				0.00	0.00	0.00	
				0.00	0.00	0.00	
				0.00	0.00	0.00	
5 Concrete work				0.00	0.00	0.00	
	Small pour, no forms	CS	m3	302.94	606.90	#N/A	
	Large pour, no forms	CL	m3	239.70	357.00	#N/A	
	Small pour, Formed	CSF	m3	357.00	1785.00	#N/A	
	Large pour, Formed	CLF	m3	295.80	418.20	#N/A	
6 Vegetation				0.00	0.00	0.00	
	Hydroseed, Flat	VHF	ha	1626.90	5049.00	#N/A	
	Hydroseed, Sloped	VHS	ha	1884.96	5666.10	#N/A	
	veg. Blanket/erosion mat	VB	ha	11220.00	13464.00	#N/A	
	Tree planting	VT	ha	11220.00	13464.00	#N/A	
	Wetland species	VW	ha	56100.00	84150.00	#N/A	
7 Pumps				0.00	0.00	0.00	
	Small, <	PS	each	3060.00	6120.00	#N/A	
	Large, >	PL	each	5100.00	#####	#N/A	large - 250 hp Gould w/diesel motor
8 PiPes				0.00	0.00	0.00	
	Small, < 6 inch diameter	PPS	m	0.51	5.10	#N/A	LOW cost: pipe removal, HIGH cost: supply new pipe SPECIFIED: small, heat traced & insulated pipe
	Large, > 6 inch diameter	PPL	m	1.02	183.60	#N/A	LOW cost: pipe removal, HIGH cost: supply 24" 100 psi HDPE pipe, FOB Edm.
				0.00	0.00	0.00	add shipping & installation

Unit Cost Table

ITEM	Detail	COST CODE	UNITS	LOW \$	HIGH \$	SPECIFIED \$	
9	pump sand BackFill	BF	m3	5.61	16.83	#N/A	
10	Fence	F	m	11.22	168.30	#N/A	
11	Signs	S	each	11.22	33.66	#N/A	
12	rock, Drill and Blast only	DB	m3	11.22	22.44	#N/A	
	(flatten slope, collapse drift)			0.00	0.00	0.00	
13	excavate Rip Rap			0.00	0.00	0.00	
	drill, blast, load						
	short haul (<500 m)						
	dump and spread	RR1	m3	11.17	16.68	#N/A	
	RR1 + long haul	RR2	m3	11.32	17.29	#N/A	HIGH cost: quarry & place rip rap in channel
	excavate rock from waste dump, short haul, spread	RR3	m3	4.28	5.90	#N/A	LOW cost: removal of 18 in minus from dump, long haul and spread
				0.00	0.00	0.00	HIGH cost: removal of coarse rock from dump, long haul, armour spillway
	RR3 + long haul	RR4	m3	4.77	6.38	#N/A	
	specified rip rap source	RR5	m3	#N/A	#N/A	#N/A	
14	Import LimeStone	ILS	tonne	8.98	13.46	#N/A	
15	Import LiMe	ILM	tonne	168.30	504.90	#N/A	LOW cost: bulk shipping, high volume, FOB Vancouver/Edmonton
				0.00	0.00	0.00	HIGH cost: bags delivered to central Yukon, small volume
16	Grouting	G	m3	201.96	244.80	#N/A	HIGH cost: cement, FOB Yellowknife
17	Dozing			0.00	0.00	0.00	
	doze Rock piles	DR	m3	0.87	1.99	#N/A	LOW cost: doze crest off dump
	doze overburden/Soil piles	DS	m3	0.80	3.17	#N/A	HIGH cost: push up to 300 m
18				0.00	0.00	0.00	
				0.00	0.00	#N/A	
				0.00	0.00	#N/A	
19				0.00	0.00	0.00	
				0.00	0.00	#N/A	
				0.00	0.00	#N/A	
20				0.00	0.00	0.00	
			each	0.00	0.00	#N/A	
			each	0.00	0.00	#N/A	
21	Buildings - Decontaminate			0.00	0.00	0.00	

Unit Cost Table

ITEM	Detail	COST CODE	UNITS	LOW \$	HIGH \$	SPECIFIED \$	
	Chemicals	BDC	m3	#N/A	#N/A	#N/A	
	Asbestos	BDA	m2	21.42 0.00	42.84 0.00	#N/A 0.00	LOW cost: removal of asbestos siding & flooring HIGH cost: removal of insulated pipes, friable asbestos
22 Buildings - Remove				0.00	0.00	0.00	
	areas are per floor on 3 m average height			0.00	0.00	0.00	LOW cost: removal and on-site disposal - small wooden structures
	Wood - teardown	BRW1	m2	21.93	33.66	#N/A	
	Wood - burn	BRW2	m2	5.61	11.22	#N/A	
	Masonry	BRM	m2	24.12	33.66	#N/A	
	Concrete	BRC	m	33.66	50.49	6.12	LOW cost: removal of building perimeter walls, HIGH cost: per m3 for bulk concrete SPECIFIED cost: \$/m2 to break floor slab SPECIFIED cost: demolition shear \$/hour operating
	Steel - teardown	BRS1	m2	35.90	53.86	244.80	
	Steel - salvage	BRS2	m2	56.10	84.15	#N/A	
23 Power & Pipe Lines				0.00	0.00	0.00	
	Power lines, remove	POWR	each	21.32	4712.40	#N/A	
	Small, < 6 inch diameter	PPS	m	0.51	5.10	#N/A	LOW cost: pipe removal, HIGH cost: supply new pipe
	Large, > 6 inch diameter	PPL	m	1.02	183.60	#N/A	LOW cost: pipe removal, HIGH cost: supply 24" 100 psi HDPE pipe, FOB. Add shipping
24 Laboratory Chemicals				0.00	0.00	0.00	
	Remove from site	LCR	pallet	1785.00	2366.40	#N/A	
	Dispose on site	LCD	each	#N/A	#N/A	#N/A	
25 PCB - Remove from site				33.66 0.00	39.27 0.00	#N/A 0.00	LOW cost: shipping, handling & disposal from Yellowknife
26 Fuel				0.00	0.00	0.00	
	Remove from site	FR	kg	0.00	1.04	#N/A	
	Burn on site	FB	kg	#N/A	#N/A	#N/A	
27 Oil				0.00	0.00	0.00	
	Remove from site	OR	litre	0.36	1.04	#N/A	
	Burn on site	OB	litre	0.36	0.56	#N/A	
28 Process Chemicals				0.00	0.00	0.00	
	Remove from site	PCR	kg	0.36	2.09	#N/A	
	Dispose on site	PCD	kg	#N/A	#N/A	#N/A	
29 Explosives				0.00	0.00	0.00	
	Remove from site	ER	kg	0.00	2.24	#N/A	

Unit Cost Table

ITEM	Detail	COST CODE	UNITS	LOW \$	HIGH \$	SPECIFIED \$	
	Dispose on site	ED	kg	#N/A	#N/A	#N/A	
30	Contaminated Soils			0.00	0.00	0.00	
	Remediate on site	CSR	m3	39.27	122.40	#N/A	LOW cost: bio-remediate on-site. HIGH cost: ship off-site to landfill as haz. waste
	consolidate & cover	Use cost code iter		0.00	0.00	0.00	
	cover in place	Use cost code iter		0.00	0.00	0.00	
31	Mobilize Heavy Equipment			0.00	0.00	0.00	
	Road access	MHER	\$/km	2.87	8.59	2.09	SPECIFIED cost: \$/tonne/km in cargo plane
	Air access	MHEA	each	#N/A	#N/A	1402.50	SPECIFIED cost: helicopter cost, \$/hr of operation
32	Mobilize Camp			0.00	0.00	0.00	MHERH - winter road usage \$/km
	<20 persons Road access	MC<R	each	#N/A	#N/A	#N/A	
	<20 persons Air access	MC<A	each	#N/A	#N/A	#N/A	
33	Mobilize Workers			0.00	0.00	0.00	
	mobilize	MM<	person	196.86	1009.80	#N/A	LOW cost: road access. HIGH cost: transport by Twin Otter aircraft
	>20 persons	MM>	person	1009.80	1346.40	#N/A	
34	ACCoModation	ACCM	month	1346.40	2019.60	#N/A	LOW cost, accom in existing camp, per man, HIGH cost: - supply new camp
35	Mobilize Misc. Supplies	MMS	each	#N/A	#N/A	#N/A	LOW cost: winter road - limited use, LOW snowfall
36	Winter Road	WR	km	1346.40	2672.40	#N/A	
37	Visual site Inspection	VI	each	3590.40	7242.00	10200.00	
38	Survey site Inspection	SI	each	#N/A	#N/A	#N/A	
39	Water Sampling	WS	each	5610.00	9180.00	#N/A	
40	site inspection RePorT	RPT	each	#N/A	11220.00	#N/A	
41	Security Guard	SG	pers/mc	5610.00	7854.00	#N/A	
42	Maintain Pumping	MP	month	3366.00	#N/A	#N/A	
43	Clear SpillWay	CSW	each	1907.40	5385.60	#N/A	
44	Build Treatment Plant			0.00	0.00	0.00	
	Small (< 1000 m3/d)	BTPS	lump su	#####	#####	#N/A	
	Large (> 1000 m3/d)	BTPL	lump su	#####	#####	#N/A	
45	Operate Treatment Plant	OTP	m3	0.30	1.68	#N/A	
46	SCariFY road and install water breaks	SCFY	km	3595.50	5049.00	#N/A	
				0.00	0.00	0.00	

Unit Cost Table

ITEM	Detail	COST CODE	UNITS	LOW \$	HIGH \$	SPECIFIED \$
				0.00	0.00	0.00
water treatment chemicals				0.00	0.00	0.00
ferric sulphate		ferric	kg	0.68	0.00	0.00
ferrous sulphate		ferrous	kg	0.45	0.00	0.00
lime		lime	kg	0.31	#VALUE!	0.00
hydrogen peroxide, 50%		hperox	kg	1.46	0.00	0.00
Sodium Metabisulfate		Nametab	kg	1.01	0.00	0.00
Caustic soda, 50%		caustic	kg	0.63	0.00	0.00
Sulfuric acid, 93%		sulfuric	kg	0.27	0.00	0.00
flocculant		flocc	kg	5.50	0.00	0.00
copper sulphate		copper	kg	0.00	0.00	0.00
typical shipping, to Whitehorse or Yellowknife			kg	0.07	0.00	0.00
				0.00	0.00	0.00
Typical Labour & Equipment Rates				0.00	0.00	0.00
Site manager			\$/hr	71.40	81.60	0.00
Mine superintendent			\$/hr	0.00	61.20	0.00
Environmental coordinator			\$/hr	0.00	61.20	0.00
Journeyman (mech, elec, weld)	LUGE		\$/hr	51.00	61.20	0.00
Equipment operator			\$/hr	45.90	56.10	0.00
labour - skilled	LLUGG		\$/hr	35.70	38.76	0.00
labour - unskilled			\$/hr	32.64	35.70	0.00
Security / first aid			\$/hr	38.76	48.96	0.00
Admin.			\$/hr	42.84	49.98	0.00
				0.00	0.00	0.00
average				45.46	0.00	0.00
				0.00	0.00	0.00
				0.00	0.00	0.00
				0.00	0.00	0.00
Front end loader, ?, Cat992			\$/hr	0.00	336.60	0.00
excavator, Cat235			\$/hr	0.00	178.50	0.00
dump truck - tandem			\$/hr	0.00	0.00	0.00
dump truck off road, Cat 777			\$/hr	270.30	0.00	0.00
dozer, D8, D10			\$/hr	173.40	306.00	0.00
				0.00	0.00	0.00
				0.00	0.00	0.00
				0.00	0.00	0.00
				0.00	0.00	0.00

APPENDIX D

**RECLAMATION COST ESTIMATE
2022**

SUMMARY OF COSTS

			YEAR	
			2022	
COMPONENT TYPE	COMPONENT NAME	TOTAL COST	Land Liability	Water Liability
OPEN PIT	A514,A418,A21	\$477,787.04	\$0	\$477,787
UNDERGROUND MINE	0	\$632,183.78	\$457,764	\$174,420
TAILINGS	0	\$32,117,360.00	\$5,100	\$32,112,260
ROCK PILE	0	\$24,287,602.00	\$1,796,750	\$22,490,853
BUILDINGS AND EQUIPMENT	0	\$15,697,151.08	\$12,715,974	\$2,981,177
CHEMICALS AND SOIL MANAGEMENT	0	\$837,430.00	\$0	\$837,430
WATER MANAGEMENT	0	\$1,114,934.85	\$0	\$1,114,935
POST-CLOSURE SITE MAINTENANCE		\$0.00	\$0	\$0
	SUBTOTAL	\$75,164,449	\$14,975,588	\$60,188,861
		Percentages	19.9	80.1
MOBILIZATION/DEMOBILIZATION	0	\$10,260,412	\$2,044,260	\$8,216,151
MONITORING AND MAINTENANCE	0	\$10,228,853	\$2,037,973	\$8,190,880
Market Factor Price Adjustment	20 %	\$15,032,890	\$2,995,118	\$12,037,772
PROJECT MANAGEMENT	5 %	\$3,758,222	\$748,779	\$3,009,443
ENGINEERING	5 %	\$3,758,222	\$748,779	\$3,009,443
CONTINGENCY	20 %	\$15,032,890	\$2,995,118	\$12,037,772
GRAND TOTAL - CAPITAL COSTS		\$133,235,938	\$26,545,614	\$106,690,323

1 **Open Pit Name: A514,A418,A: Pit # 1**

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost %	Land Cost	Water Cost
A OBJECTIVE: CONTROL ACCESS							
Fence	m		#N/A	0	\$0	\$0	\$0
. Signs	each		#N/A	0	\$0	\$0	\$0
. Ditch, mat'l A	m3		#N/A	0	\$0	\$0	\$0
. , mat'l B	m3		#N/A	0	\$0	\$0	\$0
. Berm	m3		#N/A		\$0	\$0	\$0
B Block roads							
. Other	m3		#N/A	0	\$0	\$0	\$0
.			#N/A	0	\$0	\$0	\$0
. OBJECTIVE: STABILIZE SLOPES							
excavate 2 breaches in dike	m3	10560	sc1h	7.803	\$82,400	\$0	\$82,400
break concrete guides & wall	m3	600	brcl	33.66	\$20,196	\$0	\$20,196
. construct fish habitat	m3	0	sb1h	4.947	\$0	\$0	\$0
. A 418	m3		#N/A	0	\$0	\$0	\$0
C excavate 2 breaches in dike							
break concrete guides & wall	m3	600	brcl	33.66	\$20,196	\$0	\$20,196
. construct fish habitat	m3	0	sb1h	0	\$0	\$0	\$0
A21	m		#N/A	0	\$0	\$0	\$0
. excavate 2 breaches in dike	m3	10560	sc1h	7.803	\$82,400	\$0	\$82,400
break concrete guides & wall	m3	600	brcl	33.66	\$20,196	\$0	\$20,196
. construct fish habitat	m3	0	sb1h	4.947	\$0	\$0	\$0
	kWh		#N/A	0	\$0	\$0	\$0
. Other			#N/A	0	\$0	\$0	\$0
.			#N/A				
. OBJECTIVE: COVER/CONTOUR SLOPES							
. Fill, mat'l A	m3		#N/A	0	\$0	\$0	\$0
. , mat'l B	m3		#N/A	0	\$0	\$0	\$0
. Rip rap	m3		#N/A	0	\$0	\$0	\$0
. Vegetate	ha		#N/A	0	\$0	\$0	\$0
E Other							
.			#N/A	0	\$0	\$0	\$0
. OBJECTIVE: SPILLWAY							
. Excavate channel, mat'l A	m3		#N/A	0	\$0	\$0	\$0
. , mat'l B	m3		#N/A			\$0	\$0
. Concrete	m3		#N/A	0	\$0	\$0	\$0
. Rip rap	m3		#N/A	0	\$0	\$0	\$0
. Other			#N/A	0	\$0	\$0	\$0
F							
. OBJECTIVE: FLOOD PIT							
. Ditch, mat'l A	m3		#N/A	0	\$0	\$0	\$0
. , mat'l B	m3		#N/A	0	\$0	\$0	\$0
. Embankment, mat'l A	m3		#N/A	0	\$0	\$0	\$0
H , mat'l B							
siphon installation/operation	each	3	#N/A	50000	\$150,000	\$0	\$150,000
remove pipes,wires etc	each	3	#N/A	0	\$20,000	\$0	\$20,000
make milk of lime, meter into pit	tonne		#N/A	0	\$0	\$0	\$0

1 **Open Pit Name: A514,A418,A: Pit # 1**

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	% Land Cost	Land Cost	Water Cost
	tonne		ilmh	504.9	\$0		\$0	\$0
	km		mherh	8.5884	\$0		\$0	\$0
OBJECTIVE: BACKFILL PIT			#N/A	0	\$0		\$0	\$0
Fill, mat'l A	m3		#N/A	0	\$0		\$0	\$0
, mat'l B	m3		#N/A	0	\$0		\$0	\$0
Other			#N/A	0	\$0		\$0	\$0
			#N/A	0	\$0		\$0	\$0
OBJECTIVE: DEVELOP WETLAND			#N/A	0	\$0		\$0	\$0
Earthworks, mat'l A	m3		#N/A	0	\$0		\$0	\$0
, mat'l B	m3		#N/A	0	\$0		\$0	\$0
Vegetate	ha		#N/A	0	\$0		\$0	\$0
Other			#N/A	0	\$0		\$0	\$0
			#N/A	0	\$0		\$0	\$0
SPECIALIZED ITEMS			#N/A	0	\$0		\$0	\$0
			#N/A	0	\$0		\$0	\$0
Subtotal					\$477,787	0%	\$0	\$477,787
					Total Pits	Percent Total Land	Total Land	Total Water

1 Underground Mine Name _____		UG Mine # <u>1</u>						
ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost %	Land Cost	Water Cost	
A OBJECTIVE: CONTROL ACCESS								
. Fence	m		#N/A	0	\$0	\$0	\$0	
. Signs	each		#N/A	0	\$0	\$0	\$0	
. Ditch, mat'l A	m3		#N/A	0	\$0	\$0	\$0	
. , mat'l B	m3		#N/A	0	\$0	\$0	\$0	
. Berm	m3		#N/A	0	\$0	\$0	\$0	
. Block adits	m3		#N/A	0	\$0	\$0	\$0	
. Cap shaft	m3		#N/A	0	\$0	\$0	\$0	
. Cap raises at A154/A418	m3	72	SRL	540.6	\$38,923	100%	\$38,923	
soil cover on raise cap	m3	708	SB1L	3.264	\$2,311	100%	\$2,311	
. Cap raises at A 21	m3	72	SRL	540.6	\$38,923	100%	\$38,923	
soil cover on raise cap		798	SB1L	3.264	\$2,605	100%	\$2,605	
. Backfill adit A154	m3	100	SCSS	16.065	\$1,607	100%	\$1,607	
Contour portal area, A154	m3	2500	SB1L	3.264	\$8,160	100%	\$8,160	
. Backfill adit, A21	m3	2500	SCSS	16.065	\$40,163	100%	\$40,163	
Contour portal area, A21		200	SB1L	3.264	\$653	100%	\$653	
. concrete bulkhead, pit portal, A154	allow	1	#N/A	75000	\$75,000	100%	\$75,000	
. concrete bulkhead, pit portal, A21	allow	1	#N/A	75000	\$75,000	100%	\$75,000	
. Backfill open stopes	m3		#N/A	0	\$0	\$0	\$0	
. Other			#N/A	0	\$0	\$0	\$0	
B OBJECTIVE: STABILIZE GROUND SURFACE								
. Backfill mine	m3		#N/A	0	\$0	\$0	\$0	
. Collapse crown pillar	m3		#N/A	0	\$0	\$0	\$0	
. Contour, mat'l A	m3		#N/A	0	\$0	\$0	\$0	
. , mat'l B	m3		#N/A	0	\$0	\$0	\$0	
. Maintain dewatering (see "MONITORING/MAINTENANCE" c			#N/A	0	\$0	\$0	\$0	
. Other			#N/A	0	\$0	\$0	\$0	
C OBJECTIVE: FLOOD MINE								
. Plug adits	m3		#N/A	0	\$0	\$0	\$0	
. Plug drillholes to surface	each		#N/A	0	\$0	\$0	\$0	
. Grouting	m3		#N/A	0	\$0	\$0	\$0	
. Lime addition, kg/m3 of water	tonne		#N/A	0	\$0	\$0	\$0	
. Lime, purchase and shipping	tonne		#N/A	0	\$0	\$0	\$0	
D OBJECTIVE: HAZARDOUS MATERIALS								
. remove hazardous materials, LABOUR	each	9600	LLUGGL	35.7	\$342,720	50%	\$171,360	
. remove/decontam. Equipment, electrical	each	120	LUGEL	51	\$6,120	50%	\$3,060	
. Other			#N/A	0	\$0	\$0	\$0	
E SPECIALIZED ITEMS								
.			#N/A	0	\$0	0%	\$0	
Subtotal					\$632,184	72%	\$457,764	
				Total U/G		Percent Total Land	Total Water	
						\$174,420		

1 Impoundment Name: _____ Impoundment # 1

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost %	Land Cost	Water Cost
A OBJECTIVE: CONTROL ACCESS							
Fence	m		#N/A	0	\$0	\$0	\$0
. Signs	each		#N/A	0	\$0	\$0	\$0
. Ditch, mat'l A	m3		#N/A	0	\$0	\$0	\$0
. , mat'l B	m3		#N/A	0	\$0	\$0	\$0
. Berm	m3		#N/A	0	\$0	\$0	\$0
. Block roads	m3		#N/A	0	\$0	\$0	\$0
. Other			#N/A	0	\$0	\$0	\$0
B							
. OBJECTIVE: STABILIZE EMBANKMENT			#N/A	0	\$0	\$0	\$0
. breach east dam	m3		#N/A	0	\$0	\$0	\$0
. , fill mat'l A	m3		#N/A	0	\$0	\$0	\$0
. , fill mat'l B	m3		#N/A	0	\$0	\$0	\$0
. Rip rap	m3		#N/A	0	\$0	\$0	\$0
. Vegetate	ha		#N/A	0	\$0	\$0	\$0
. Raise crest	m3		#N/A	0	\$0	\$0	\$0
. Flatten slopes	m3		#N/A	0	\$0	\$0	\$0
C Other							
.			#N/A	0	\$0	\$0	\$0
.			#N/A	0	\$0	\$0	\$0
. OBJECTIVE: COVER TAILINGS			#N/A	0	\$0	\$0	\$0
coarse PK, doze to slurry sump	m3	2625000	DSL	0.7956	\$2,088,450	\$0	\$2,088,450
. coarse PK - slurry pumping	m3	2625000		0.5	\$1,312,500	\$0	\$1,312,500
. Rock for expelled water from N or S durr	m3	1875000	#N/A	3.6	\$6,750,000	\$0	\$6,750,000
D Rock for expelled water from roads							
. Rock for expelled water from new quarry	m3		#N/A	8.25	\$0	\$0	\$0
. Soil cover, till	m3	1416000	#N/A	4.46	\$6,315,360	\$0	\$6,315,360
. Cover rock from N or S dump	m3	4247000	#N/A	3.6	\$15,289,200	\$0	\$15,289,200
. Cover rock from roads	m3		#N/A		\$0	\$0	\$0
E Cover rock from new quarry							
. Remove & treat supernatant	m3	270000	otpl	0.25	\$67,500	\$0	\$67,500
OBJECTIVE: FLOOD TAILINGS							
. Ditch, mat'l A	m3		#N/A	0	\$0	\$0	\$0
. , mat'l B	m3		#N/A	0	\$0	\$0	\$0
F Raise crest							
. Other	m3		#N/A	0	\$0	\$0	\$0
.			#N/A	0	\$0	\$0	\$0
.			#N/A	0	\$0	\$0	\$0
OBJECTIVE: DEVELOP WETLAND							
. Earthworks, mat'l A	m3		#N/A	0	\$0	\$0	\$0
. Vegetate	ha		#N/A	0	\$0	\$0	\$0
G Other							
.			#N/A	0	\$0	\$0	\$0
.			#N/A	0	\$0	\$0	\$0
OBJECTIVE: UPGRADE SPILLWAY							
. Excavate channel, mat'l A	m3	18000	sc3h	10.6	\$190,800	\$0	\$190,800
H , mat'l B							
. Concrete	m3		#N/A	0	\$0	\$0	\$0
. Rip rap	m3	13000	#N/A	5.65	\$73,450	\$0	\$73,450
. geotextile over ice rich soil	m2	2500	#N/A	10	\$25,000	\$0	\$25,000
I							
.			#N/A	0	\$0	\$0	\$0

1 **ings Impoundment Name:** _____ **Impoundment #** **1**

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
OBJECTIVE: STABILIZE DECANT SYSTEM			#N/A	0	\$0		\$0	\$0
Remove	m3		#N/A	0	\$0		\$0	\$0
Plug/backfill	m3		#N/A	0	\$0		\$0	\$0
Other			#N/A	0	\$0		\$0	\$0
			#N/A	0	\$0		\$0	\$0
OBJECTIVE: REMOVE TAILINGS DISCHARGE			#N/A	0	\$0		\$0	\$0
Cyclones	m3		#N/A	0	\$0		\$0	\$0
Pipe	m	5000	PPLL	1.02	\$5,100	100%	\$5,100	\$0
Other			#N/A	0	\$0		\$0	\$0
			#N/A	0	\$0		\$0	\$0
SPECIALIZED ITEMS			#N/A	0	\$0		\$0	\$0
			#N/A	0	\$0		\$0	\$0
Subtotal					\$32,117,360	0.00016	\$5,100	\$32,112,260
					Total Tailings	Percent Land	Total Land	Total Water

1 **Rock Pile Name:** _____ **Rock Pile #:** 1

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	Cost %	Land		Water Cost
							Land Cost	Water Cost	
A OBJECTIVE: STABILIZE SLOPES									
Flatten slopes with dozer, rock pile, north	m3	1501500	dsl	0.71	\$1,066,065.00	50%	\$533,033	\$533,033	
Flatten slopes with dozer, till pile	m3	479000	dsl	0.71	\$340,090.00	100%	\$340,090	\$0	
Flatten slopes with dozer, till pile, south	m3	234000	dsl	0.71	\$166,140.00	100%	\$166,140	\$0	
Toe buttress, drain mat'l	m3		#N/A	0	\$0.00		\$0	\$0	
, fill mat'l A	m3		#N/A	0	\$0.00		\$0	\$0	
, fill mat'l B	m3		#N/A	0	\$0.00		\$0	\$0	
Other			#N/A	0	\$0.00		\$0	\$0	
B									
OBJECTIVE: COVER DUMP					\$0.00		\$0	\$0	
till on biotite schist	m3	1031000	#N/A	4.82	\$4,969,420.00		\$0	\$4,969,420	
rock on mixed rock & biotite schist	m3	4290000	#N/A	3.96	\$16,988,400.00		\$0	\$16,988,400	
till on caribou ramps	m3	6400	#N/A	4.82	\$30,848.00	100%	\$30,848	\$0	
rock cover from roads, etc.	m3	0	#N/A	5.65	\$0.00		\$0	\$0	
C									
rock cover from new quarry	m3	0							
rock cover on 2.5:1 slopes, incr. cost	m3		#N/A	0.15	\$0.00		\$0	\$0	
till islands for reveg.	m3	93300	#N/A	4.82	\$449,706.00	100%	\$449,706	\$0	
till islands for reveg., south dump	m3	46650	#N/A	4.82	\$224,853.00	100%	\$224,853	\$0	
OBJECTIVE: UNDERWATER DISPOSAL			#N/A		\$0.00		\$0	\$0	
D									
Move material	m3		#N/A	0					
Add lime	m3		#N/A	0	\$0.00		\$0	\$0	
E									
Add crushed limestone	m3		#N/A	0					
Other			#N/A	0	\$0.00		\$0	\$0	
			#N/A		\$0.00		\$0	\$0	
OBJECTIVE: COLLECT AND TREAT			#N/A		\$0.00		\$0	\$0	
See "ONGOING TREATMENT" costing component			#N/A		\$0.00		\$0	\$0	
F									
OBJECTIVE: DEVELOP WETLAND			#N/A		\$0.00		\$0	\$0	
Earthworks, mat'l A	m3		#N/A	0	\$0.00		\$0	\$0	
, mat'l B	m3		#N/A	0	\$0.00		\$0	\$0	
Vegetate, till pile	ha	31	vhs1	1680	\$52,080.00	100%	\$52,080	\$0	
Other			#N/A	0	\$0.00		\$0	\$0	
			#N/A		\$0.00		\$0	\$0	
SPECIALIZED ITEMS			#N/A		\$0.00		\$0	\$0	
			#N/A		\$0.00		\$0	\$0	
			#N/A	0	\$0.00		\$0	\$0	
Subtotal					\$24,287,602	7.4%	\$1,796,750	\$22,490,853	
					Total for Rock Pile	Percent Total Land	Total Land	Total Water	

1 Building / Equip Name: _____ Bldg / Equip #: 1

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	%	Land	Land Cost	Water
									Cost
A OBJECTIVE: DISPOSE MOBILE EQUIPMENT									
Decontaminate and ship off-site	km	320000	mherh	8.5884	\$2,748,288	50%	\$1,374,144	\$1,374,144	
. Decontaminate, dispose on-site	each		#N/A	0	\$0		\$0	\$0	
. Other	each		#N/A	0	\$0		\$0	\$0	
B OBJECTIVE: DISPOSE STATIONARY EQUIPMENT									
. Decontaminate and ship off-site	km	353857	mherh	8.5884	\$3,039,065	50%	\$1,519,533	\$1,519,533	
. Decontaminate, dispose on-site	each		#N/A	0	\$0		\$0	\$0	
. Other	each		#N/A	0	\$0		\$0	\$0	
C OBJECTIVE: DISPOSE ORE CONCENTRATION EQUIPMENT									
. Decontaminate crushing plant	each		#N/A	0	\$0		\$0	\$0	
. Decontaminate tanks & plumb.	each		#N/A	0	\$0		\$0	\$0	
. Remove tanks & plumbing	each		#N/A	0	\$0		\$0	\$0	
. Other			#N/A	0	\$0		\$0	\$0	
D OBJECTIVE: DISPOSE WATER TREATMENT EQUIPMENT									
. Decontaminate tanks & plumb.	each		#N/A	0	\$0		\$0	\$0	
. Remove tanks & plumbing	each		#N/A	0	\$0		\$0	\$0	
. Other			#N/A	0	\$0		\$0	\$0	
E OBJECTIVE: DECONTAMINATE BUILDINGS & TANKS									
. site wide allowance	each	1	#N/A	75000	\$75,000	50%	\$37,500	\$37,500	
. clean explosives facility	each	1	#N/A	50000	\$50,000		\$0	\$50,000	
.	each		#N/A	0	\$0		\$0	\$0	
.	each		#N/A	0	\$0		\$0	\$0	
.	each		#N/A	0	\$0		\$0	\$0	
.	each		#N/A	0	\$0		\$0	\$0	
.	each		#N/A	0	\$0		\$0	\$0	
.	each		#N/A	0	\$0		\$0	\$0	
F OBJECTIVE: MOTHBALL BUILDINGS									
. Building 1	m2		#N/A	0	\$0		\$0	\$0	
. Building 2	m2		#N/A	0	\$0		\$0	\$0	
. Building 3	m2		#N/A	0	\$0		\$0	\$0	
. Building 4	m2		#N/A	0	\$0		\$0	\$0	
. Building 5	m2		#N/A	0	\$0		\$0	\$0	
. Other	m2		#N/A	0	\$0		\$0	\$0	
G OBJECTIVE: REMOVE BUILDINGS									
. Process plant	m2	54000	brs1h	53.856	\$2,908,224	100%	\$2,908,224	\$0	
. Maintenance plant	m2	31500	brs1h	53.856	\$1,696,464	100%	\$1,696,464	\$0	
. Camp	m3	13275	brs1l	35.904	\$476,626	100%	\$476,626	\$0	
. Bulk fuel storage	m2	39375	brs1l	35.904	\$1,413,720	100%	\$1,413,720	\$0	
. Power plant/boiler house	m3	11000	brs1h	53.856	\$592,416	100%	\$592,416	\$0	
. Ammonium nitrate fuel storage	m2	22500	brs1l	35.904	\$807,840	100%	\$807,840	\$0	
. Explosives/cap storage & mixing	m3	600	brs1h	53.856	\$32,314	100%	\$32,314	\$0	
. Remove boneyard waste	m2	1700	brs1l	35.904	\$61,037	100%	\$61,037	\$0	
. Other			#N/A	0	\$0		\$0	\$0	
H OBJECTIVE: BREAK BASEMENT SLABS									
. Building 1	m2		#N/A	0	\$0		\$0	\$0	
. Building 2	m2		#N/A	0	\$0		\$0	\$0	
. Building 3	m2		#N/A	0	\$0		\$0	\$0	
. Building 4	m2		#N/A	0	\$0		\$0	\$0	
. Building 5	m2		#N/A	0	\$0		\$0	\$0	

1 Building / Equip Name: _____ Bldg / Equip #: 1

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
. Other			#N/A	0	\$0		\$0	\$0
I OBJECTIVE: REMOVE BURIED TANKS								
. Tank 1, decontaminate	m3		#N/A	0	\$0		\$0	\$0
. , excavate & dispose	m3		#N/A	0	\$0		\$0	\$0
. Tank 2, decontaminate	m3		#N/A	0	\$0		\$0	\$0
. , excavate & dispose	m3		#N/A	0	\$0		\$0	\$0
. Other			#N/A	0	\$0		\$0	\$0
J OBJECTIVE: LANDFILL FOR DEMOLITION WASTE								
. Place soil cover	m3	187500	#N/A	5.65	\$1,059,375	100%	\$1,059,375	\$0
. Vegetate	ha		#N/A	0	\$0		\$0	\$0
. Landfill disposal fee	tonne		#N/A	0	\$0		\$0	\$0
K OBJECTIVE: GRADE AND CONTOUR								
. Grade mill area	m2	30750 dsl		0.7956	\$24,465	100%	\$24,465	\$0
. Place soil cover	m3	34050	#N/A	5.65	\$192,383	100%	\$192,383	\$0
. Rip rap on ditches	m3		#N/A	0	\$0		\$0	\$0
. Vegetate	ha		#N/A	0	\$0		\$0	\$0
. Other			#N/A	0	\$0		\$0	\$0
L OBJECTIVE: RECLAIM ROADS								
Haul roads, A 154 & A418 lease	ha	3.71 scfyl		3595.5	\$13,339	100%	\$13,339	\$0
Service roads, A154 & A418 lease	ha	1.6 scfyl		3595.5	\$5,753	100%	\$5,753	\$0
Haul roads, A21 lease	ha	1.8 scfyl		3595.5	\$6,472	100%	\$6,472	\$0
Service roads, A21 lease	ha	1.65 scfyl		3595.5	\$5,933	100%	\$5,933	\$0
Haul roads, PKC & dumps lease	ha	10.13 scfyl		3595.5	\$36,422	100%	\$36,422	\$0
Service roads, PKC & dumps lease	ha	23.2 scfyl		3595.5	\$83,416	100%	\$83,416	\$0
Haul roads, infrastructure lease	ha	14.85 scfyl		3595.5	\$53,393	100%	\$53,393	\$0
Service roads, infrastructure lease	ha	5.4 scfyl		3595.5	\$19,416	100%	\$19,416	\$0
. Haul roads, airstrip lease	ha	0 scfyl		3595.5	\$0	100%	\$0	\$0
. Service roads, airstrip lease	ha	2.9 scfyl		3595.5	\$10,427	100%	\$10,427	\$0
.			#N/A	0	\$0	100%	\$0	\$0
K SPECIALIZED ITEMS								
RECLAIM AIRSTRIP	ha	11 scfyl		3215	\$35,365	100%	\$35,365	\$0
YELLOWKNIFE LANDFILL DISPOSAL FEE		1		250000	\$250,000	100%	\$250,000	\$0
.			#N/A	0	\$0		\$0	\$0
Subtotal					\$15,697,151	81.0%	\$12,715,974	\$2,981,177
				Total Buildings		Percent Land	Total Land	Total Water

Chemicals and Soil

1 Contamination: 1

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost %	Land Cost	Water Cost
<p>Note: The procedures, equipment and packaging for clean up and removal of chemicals or contaminated soils are highly dependent on the nature of the chemicals and their existing state of containment. Government guidelines should be consulted on an individual chemical basis. Any estimate made here should be considered very rough unless specific evaluations have been conducted.</p>							
A LABORATORY CHEMICALS	km	494	mherh			\$0	
. pallet		50	#N/A	1000	\$50,000	\$0	\$50,000
B PCB, hauling	litre		#N/A	0	\$0	\$0	\$0
. PCB, disposal	litre		#N/A	0	\$0	\$0	\$0
C FUEL			#N/A		\$0	\$0	\$0
. Type 1, 200 tonnes	km		mherh	8.5884	\$0	\$0	\$0
. Type 2	kg		#N/A	0	\$0	\$0	\$0
. Type 3	kg		#N/A	0	\$0	\$0	\$0
D WASTE OIL							
. Oils/lubricants - burn on-site	litre		#N/A	0	\$0	\$0	\$0
. Oils/lubricants - ship off-site	litre	650000	#N/A	0.027	\$17,550	\$0	\$17,550
. removal glycol	litre	20,000		1.25	\$25,000	\$0	\$25,000
E remove batteries	kg	25,000		0.5	\$12,500	\$0	\$12,500
. remove paints	litre	1500		0.27	\$405	\$0	\$405
. remove solvents	litre	7500		0.75	\$5,625	\$0	\$5,625
. Oils/lubricants - disposal fee	litre		#N/A	0	\$0	\$0	\$0
. PROCESS OR TREATMENT CHEMICALS							
F Type 1	km		mherh	8.5884	\$0	\$0	\$0
Type 2	kg		#N/A	0	\$0	\$0	\$0
Type 3	kg		#N/A	0	\$0	\$0	\$0
Type 4	kg		#N/A	0	\$0	\$0	\$0
EXPLOSIVES	kg						
. allow		1	#N/A	10000	\$10,000	\$0	\$10,000
CONTAMINATED SOILS							
. Type 1, light fuel	m3	5000	CSRL	39.27	\$196,350	\$0	\$196,350
G Type 2, heavy fuel and oil	m3	2500	#N/A	100	\$250,000	\$0	\$250,000
. Type 3, metals	m3	250	#N/A	100	\$25,000	\$0	\$25,000
. Haz. Mat. testing & assessment							
. Technician and analyses	each	1	#N/A	110000	\$110,000	\$0	\$110,000
H Drilling	each	1	#N/A	75000	\$75,000	\$0	\$75,000
. Reporting		1		20000	\$20,000	\$0	\$20,000
. Other			#N/A	0	\$0	\$0	\$0
. OTHER							
. remove nuclear densometers from mill	each	10	#N/A	4000	\$40,000	\$0	\$40,000
Subtotal					\$837,430	0.0%	\$0
					Total Chemical	Percent Total Land	Total Water

1 /ater Management Project: _____ Project # 1 _____

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost %	Land Cost	Water Cost
A OBJECTIVE: STABILIZE EMBANKMENT							
Toe buttress, drain mat'l	m3		#N/A	0	\$0	\$0	\$0
, fill mat'l A	m3		#N/A	0	\$0	\$0	\$0
, fill mat'l B	m3		#N/A	0	\$0	\$0	\$0
Rip rap	m3		#N/A	0	\$0	\$0	\$0
Vegetate	ha		#N/A	0	\$0	\$0	\$0
Raise crest	m3		#N/A	0	\$0	\$0	\$0
Other			#N/A	0	\$0	\$0	\$0
B OBJECTIVE: UPGRADE SPILLWAY							
Excavate channel	m3	680 dsh		2.83	\$1,924	\$0	\$1,924
Place rip rap	m3	190	#N/A	5.65	\$1,074	\$0	\$1,074
Excavate channel	m3	14400 dsh		2.83	\$40,752	\$0	\$40,752
Place rip rap	m3	10400	#N/A	5.65	\$58,760	\$0	\$58,760
Other			#N/A	0	\$0	\$0	\$0
C OBJECTIVE: STABILIZE SEDIMENT CONTAINMENT PONDS							
Place soil cover	m3		#N/A	0	\$0	\$0	\$0
Place geotextile	m2		#N/A	0	\$0	\$0	\$0
Vegetate	m3		#N/A	0	\$0	\$0	\$0
Other			#N/A	0	\$0	\$0	\$0
D OBJECTIVE: BREACH EMBANKMENT							
Remove Fill	m3		#N/A	0	\$0	\$0	\$0
Other			#N/A	0	\$0	\$0	\$0
E OBJECTIVE: COLLECTION PONDS							
Breach 4 dams	m3	2200 dsh		2.83	\$6,226	\$0	\$6,226
place geotextile, 4 by 15,000 m2	m2	60000	#N/A	10	\$600,000	\$0	\$600,000
place rock over geotextile	m3	60000	#N/A	5.65	\$339,000	\$0	\$339,000
Other			#N/A	0	\$0	\$0	\$0
F OBJECTIVE: BREACH DITCHES							
Excavate	m3	7875 dsh		3.1722	\$24,981	\$0	\$24,981
Backfill/recontour	m3	2625 sc1h		7.803	\$20,483	\$0	\$20,483
Vegetate	ha		#N/A	0	\$0	\$0	\$0
Other			#N/A	0	\$0	\$0	\$0
G OBJECTIVE: REMOVE PIPELINES							
Remove pipes	m		#N/A	0	\$0	\$0	\$0
Concrete plug deep pipes	m3		#N/A	0	\$0	\$0	\$0
Other			#N/A	0	\$0	\$0	\$0
H OBJECTIVE: NORTH INLET EAST DIKE							
Excavate/construct spillway	m3	4500 sb3h		4.83	\$21,735	\$0	\$21,735
Excavate & backfill	m3		#N/A	0	\$0	\$0	\$0
Other			#N/A	0	\$0	\$0	\$0
I OBJECTIVE: COLLECT DRAINAGE FOR TREATMENT							
Excavate collection ditches	m3		#N/A	0	\$0	\$0	\$0
Rip rap ditches	m3		#N/A	0	\$0	\$0	\$0
Pipes	m		#N/A	0	\$0	\$0	\$0
Pumps	each		#N/A	0	\$0	\$0	\$0
Collect'n pond, exc. mat'l A	m3		#N/A	0	\$0	\$0	\$0
, exc. mat'l B	m3		#N/A	0	\$0	\$0	\$0
Collect'n pond, fill mat'l A	m3		#N/A	0	\$0	\$0	\$0

Water Management Project: _____ Project # 1 _____

ACTIVITY/MATERIAL	Units	Quantity	Cost	Unit	Cost %	Land		Water
			Code	Cost		Land Cost	Cost	
, fill mat'l B	m3		#N/A	0	\$0		\$0	\$0
Collect'n pond, liner	m2		#N/A	0	\$0		\$0	\$0
J OBJECTIVE: TREAT DRAINAGE (see "ONGOING TREATMENT" for operating costs)								
Build treatment plant	lump sum		#N/A	0	\$0		\$0	\$0
			#N/A	0	\$0		\$0	\$0
Subtotal					\$1,114,935	0.0%	\$0	\$1,114,935
					Total	Percent Total	Total	Total
					Water	Land Land	Water	

1 Mobilization Name: _____ Mob # 1 _____

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost
A MOBILIZE HEAVY EQUIPMENT					
Equipment to regional centre					
. Excavators	km		#N/A	0	\$0
. Dump trucks	km		#N/A	0	\$0
. Dozers	km		#N/A	0	\$0
. Demolition shears	km		#N/A	0	\$0
Equipment, regional centre to site					
. Excavators - 2	km	4800	MHERH	8.59	\$41,224
. Dump trucks - 15	km	120000	MHERH	8.59	\$1,030,608
. Dozers - 4	km	16000	MHERH	8.59	\$137,414
. Demolition shears - 2		9600	MHERH	8.59	\$82,449
Front end loader 2		4800	MHERH	8.59	\$41,224
cranes - 2		1600	MHERH	8.59	\$13,741
service vehicles -10		16000	MHERH	8.59	\$137,414
.	km				
B MOBILIZE CAMP					
.	allowance	1	#N/A		\$150,000
C MOBILIZE WORKERS					
. rotations over reclamatio period	m-hrs	26000	#N/A	45	\$1,170,000
D MOBILIZE MISC. SUPPLIES					
. Fuel	litre	7000000	#N/A	0.78	\$5,460,000
. Minor tools and equipment	owance	1	#N/A	0	\$500,000
. Truck tires	owance	1	#N/A	0	\$500,000
E MOBILIZE & HOUSE WORKERS person days					
. 20800 man-days	month	740	accml	1346.4	\$996,336
. WINTER ROAD					
. Full winter use	km		#N/A	0	\$0
. Limited winter use	km		#N/A	0	\$0
.			#N/A	0	\$0
F BONDING lump sum					
.			#N/A		\$0
G TAXES lump sum					
.			#N/A		\$0
H INSURANCE lump sum					
.			#N/A		\$0
Subtotal					\$10,260,412
					Total Mob.

	# of machines	loads/machine km	total round trip mileage
Equipment Mobilization			
excavator	2	3	800 4800
dump trucks	15	10	800 120000
dozers	4	5	800 16000
demolition shears	2	6	800 9600
front end loader	2	3	800 4800
cranes	2	1	800 1600
service vehicles	10	2	800 16000

1 Monitoring & Maintenance Mon / Mtce # 1

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	
A OBJECTIVE: POST-CLOSURE INSPECTIONS						
Annual geotechnical insp.	each	8	VIH	\$7,242	\$57,936	
Survey inspection	each		#N/A	\$0	\$0	
Water sampling	yrs	10	#N/A	\$250,000	\$2,500,000	
Reporting	yrs	10	#N/A	\$100,000	\$1,000,000	
Other			#N/A	\$0	\$0	
B OBJECTIVE: INTERIM CARE & MAINTENANCE						
annual C&M	yrs	3	#N/A	\$2,223,639	\$6,670,917	
	month		accml		\$0	
	month		#N/A	\$0	\$0	
	each		#N/A	\$0	\$0	
	allowance		#N/A		\$0	
Subtotal					\$10,228,853	Total Mon./Maint.

ANNUAL INTERIM CARE & MAINTENANCE

	No.	hrs/year	Rate	Annual Cost
Site supervisor	1	3650	\$61.20	\$223,380
laborers	3	3650	\$38.76	\$141,474
equipment operators	2	3650	\$56.10	\$204,765
mechanic	1	3650	\$61.20	\$223,380
electrician	1	3650	\$70.00	\$255,500
envir. coordinator	1	3650	\$61.20	\$223,380
				\$1,271,879 total staff
Fuel, power & heat	L/hr	mon/yr	fuel	
	50	3	108000	
	40	7	201600	
	25	2	36000	
Fuel, mobile equipment	15	12	129600	
			475200 total fuel	
air charter	flights/yr		cost/flight	
	52		4500	234000
camp costs	108 m-months		1320	142560
misc. supplies, allowance				50000
reagents				50000
			Total annual C&M	\$2,223,639