

March 20, 1999

Mr. Philippe di Pizzo, Executive Director

Nunavut Water Board

P.O. Box 119

Gjoa Haven, N.W.T. X0E 1J0

**RE: ULU PROJECT**

**REVIEW OF A & R PLAN AND RECLAMATION COST ESTIMATE**

Dear Philippe,

## **INTRODUCTION**

As requested, I have prepared this review of the Interim Abandonment and Restoration (A & R) plan and supporting documentation for the Ulu Project. This advanced exploration site is owned by Echo Bay Mines Ltd. It is understood that this review may be considered by the Nunavut Water Board in discussions with the company regarding ongoing A & R planning and security requirements for reclamation liabilities.

## **OBJECTIVES**

The objectives of this review include:

- reviewing the A & R Plan to assess if it is conceptually viable and that the proposed reclamation measures are reasonable,
- reviewing the estimated cost of carrying out the reclamation work (assuming that the work were to be conducted on behalf of the government), and,
- identifying any requirements for studies, design work or reclamation trials that may be necessary in order to successfully complete the reclamation work.

## **INFORMATION SOURCES**

The following information was examined in preparing this review of the reclamation cost.

- Ulu Project, Environmental Overview, Dec. 1991,
- 1998 Annual Report, Ulu Project, Water Licence NWB 2ULU9700, Mar. 1999,
- Ulu Project, Kinetic Testing of Sulphide-Rich Material from Ulu, Klohn-Crippen, April 1998,
- Interim Abandonment and Restoration Plan, Water Licence NWB2ULU9700, Aug. 1998,
- Estimate of Current Mine Restoration Liability, Water Licence NWB2ULU9700, Ulu Project, by Echo Bay Mines Ltd., Aug. 1998,
- 16 color photographs showing an assortment of views of the Ulu Project site, (date & photographer not identified).

I have not inspected the Ulu Project site.

## **SITE DESCRIPTION**

The Ulu Project site is located approximately 150 km of the Lupin Mine site. Access is by winter road or airplane. Site activities have consisted of surface and underground exploration of the gold bearing mineralization.

Mining has involved a ramp to a depth of 155 m over a length of 1762 m. Due to permafrost extending to considerable depth in this area there is no groundwater inflow to the mine. It is understood that the potential for acid rock drainage or metal leaching from the ore and waste rocks is low, due to the low sulphide content of the rocks and the very small quantity of potentially acid generating rock. Stock-piled coarse ore associated with a production scenario was not expected to result in net acid generation in over 50 years.

Infrastructure consists of a 60 man camp, vehicle repair shop, power-house, warehouse, cold storage, office and change rooms. In addition, there is a fuel tank farm, freshwater and sewage system, garbage incinerator and an ore storage area. There is also a quarry,

located at Camp 3, associated with the site development. It is understood that this quarry is reclaimed on an annual basis as it is developed.

## **A & R PLAN**

Echo Bay Mines Ltd. has submitted an Interim A & R Plan which describes the proposed activities to be carried out in order to abandon the site.

The reclamation plan involves sealing or backfilling the two openings to the underground workings, and removal of buildings and equipment. In general, the A & R plan appears to be reasonably complete and the proposed reclamation measures are acceptable. Some aspects require further development as described below.

Placement of non-salvageable equipment in the underground mine is proposed for waste disposal. Before this material is placed underground all hazardous materials (fuels, batteries and oils) should be removed from the equipment.

The A & R plan allows for management of contaminated soil associated with the shop and the fuel storage and handling areas. An audit of hydrocarbon contaminated soil should be conducted. The Government of Northwest Territory document: Guideline for Contaminated Site Remediation, (Feb. 1998), should be reviewed before preparing detailed plans for management of contaminated soil. It is proposed that contaminated soils be disposed of in the underground development. This is not a standard or accepted practice. Allowance for permitting costs should be included in the reclamation cost estimate.

## **RECLAMATION COST ESTIMATE**

All of the comments presented here regarding reclamation costs are based on the assumption that Echo Bay Mines Ltd. does not carry out the reclamation work at the Ulu Project and it becomes necessary for the government and land owners to hire contractors to reclaim the site. This approach is consistent with other assessments of reclamation costs for mining projects in Nunavut made on behalf of the government.

A cost estimate has been provided by Echo Bay Mines Ltd. That estimate appears to be reasonably detailed as it describes the specific quantities of work for the various reclamation activities. Considering that exploration activity ceased in 1998 due to the low price of gold, it is assumed that the site condition is as presented in the reclamation cost estimate.

The Echo Bay Mines Ltd. estimate has been developed using RECLAIM and also using a Lotus spreadsheet. Considering the work presented by the company, it is believed that there is little merit in repeating their work here. Therefore, the approach taken in conducting this review of closure costs is to evaluate the Echo Bay Mines Ltd. estimate with respect to:

- general review of the unit costs and quantities of work,
- any adjustments to reflect the cost of work should it be necessary for the government to carry out the reclamation plan,
- any other omissions in the scope of work.

This evaluation is based on the assumption of no revenue to offset the cost of reclamation.

It is assumed that, if required, reclamation of the Ulu site under government management would coincide with reclamation of the Lupin site. Under this scenario, mobilization of

workers and equipment would be from Lupin. However, demobilization would be to a major centre, probably Yellowknife.

The following elements/adjustments should be added to the Echo Bay Mines Ltd. estimate.

- An adjustment of the 1997 estimate for the effects of inflation up to 2000. At 4% inflation per year this would increase the liability by \$117,000.
- The unit cost for sealing the portal and capping the vent raise appear low. However, backfilling the raise may be less costly than capping. The total amount allowed for closure of the underground development appears reasonable.
- It is assumed that there is no ARD issue with the site. In the event that a quantity of potentially acid generating rock is identified, then it should be disposed of underground. It is assumed that the cost of this work, should it be necessary, would be covered by the contingency.
- The cost allowed for removal of the Weatherhaven tents, accommodation trailers and fuel tanks appear reasonable. The Echo Bay Mines Ltd. report states that these costs are based in part upon quotes from the supplier, however no supporting information is provided.
- The total cost for reclamation of the roads appears low. This is probably not a critical issue and any uncertainty in this item can be covered in the contingency.
- The mobilization costs appear reasonable. However, there is no airfare cost for movement of personnel. Allowance for \$25,000 for air charter costs should be added.
- The on-site camp costs of \$22/man-day are low. Using existing facilities this cost is likely to be in the range of \$45/man-day. Based on 3000 man-days in camp the additional cost would be \$69,000.
- The cost estimate includes \$180,000 for removal of fuel. This amount appears generous. However, removal of some waste oils and lubricants will probably be

required. The allowance of \$180,000 for management of chemicals and petroleum products/wastes is probably sufficient.

- The cost for management of petroleum contaminated soils is low. Even if underground disposal is acceptable, bulk excavation and hauling costs were assumed. Controlled or careful excavation of the contaminated soil will be required. The cost for hauling to the portal appears slightly low. Hauling underground for disposal, especially if re-handling is required will further increase costs. In the absence of details regarding the type of equipment on the site it is recommended that the allowance for contaminated soil be increased by \$5000.
- An allowance of \$5000 for revegetation of the area impacted by the Ulu Project development is recommended.
- No cost allowance for shipment of fuel to the site is needed as the site currently has a fuel inventory. In the event that this is depleted then the reduction in costs for fuel removal can be offset by purchase of additional fuel.
- Addition of a cost allowance for mobilization and demobilization plus winter stand-by of contractors equipment. Specific equipment is expected to include: a dozer, flat bed truck, forklift, an excavator and a scoop tram. These costs are estimated to be in the range of \$50,000.
- Allowance for engineering at 3 % of the reclamation cost should be included. Engineering work is expected to include: geotechnical/civil design, vegetation mixtures, audit and investigation of hazardous materials and contaminated soil.
- Allowance construction management at 3% of the project total should be included.
- Allowance of a contingency at 15% of the project total should be included.

Based on the review of the reclamation cost estimate prepared by Echo Bay Mines Ltd. and adjustment for inflation and omitted items, it is estimated that the government's cost for reclamation of the Ulu Project would be \$1.93 million. A summary of this cost estimate is presented in the following table.

### SUMMARY OF ESTIMATED RECLAMATION COST – ULU PROJECT

ITEM	COST
Ulu Project, 1998 estimated cost (by Echo Bay Mines Ltd.)	\$1,432,576
Inflation adjustment to 2000 at 4% per year	\$117,000
Airfare costs	\$25,000
Camp costs	\$69,000
Contaminated soil	\$5000
Revegetation	\$5000
Equipment mob/demob. and stand-by charges	\$50,000
Sub-total	\$1,703,576
Engineering & construction management @ 3% & contingency @ 15%, (adjusted for \$131,870 included in 1998 estimate)	\$225,880
Grand total	\$1,929,456

### CONCLUSIONS

The Interim A & R plan for the Ulu Project has been reviewed. The preceding comments are based on the A & R plan and supporting information, as no site inspection has been conducted. Review of additional information and/or a site inspection may result in different conclusions.

Irrespective of any comments presented here, Echo Bay Mines Ltd. still has the responsibility for achieving the objectives of the A & R plan and leaving the site in an environmentally acceptable condition. The comments presented here are not recommendations for specific reclamation activities.

In general, the A & R plan presents a reasonable approach for management of the potential impacts which may arise after closure of the site.

In the event that Echo Bay Mines Ltd. is unable or unwilling to carry out the reclamation of the Ulu Project, then it is estimated that the cost to the government to carry out the necessary work will be \$1.93 million. Note that this estimate assumes that the work is conducted in conjunction with reclamation at Lupin. If the Ulu site were sold to another party, then that party could conceivably hold the site after the reclamation of the Lupin site had been completed. In such a case, the cost to reclaim the Ulu site would be much higher due to the costs of winter road access from Yellowknife.

I trust that this report addresses your requirements for reclamation review of the A & R plan for the Ulu Project. Please contact me if you have any questions.

Yours truly,  
Brodie Consulting Ltd.

M. J. Brodie, P. Eng.