ENVIRONMENT CANADA

and

DEPARTMENT OF FISHERIES AND OCEANS

Joint Submission to the

NUNAVUT WATER BOARD

On an Application for Renewal of Water Licence N7L2-0925 (Lupin Mine Operation)

By
ECHO BAY MINES LTD.

MARCH 17, 2000

INTRODUCTION

Environment Canada (EC) and the Department of Fisheries and Oceans' (DFO) intervention to the Nunavut Water Board presents concerns and recommendations with respect to Echo Bay Mines Ltd. Water Licence renewal application for the Lupin Mine operation (N7L2-0925), submitted in July 1999. The licensee has applied to use up to 1,700,000 cubic metres per year of water and to dispose of waste, in connection with mining, milling and associated camp operations.

The Lupin Mine operation began production, using underground mining, in 1983. Gold is presently milled in a 2300 ton per day process plant, with a total of 2,800,000 ounces of gold produced to the present date. The operation of the mill incorporates crushing and grinding of the ore, use of a cyanide leach process to liberate gold particles, followed by filtration and then recovery using zinc precipitation. The main byproduct of the mining and milling processes is mine tailings, consisting of both solids and liquids, which is piped as a slurry to the Tailings Containment Area, or used in paste backfill underground. Sewage from the camp and a portion of the minewater are directed to the Sewage Lakes. Waste rock amounts are nominal, and are generally used for backfill.

This submission describes our concerns and recommendations regarding:

a) Water use amounts;
b) Modification of the Surveillance Network Program (SNP) with respect to: addition of nutrient parameters, addition of Oil and Grease to the Sewage Lakes limits, and addition of bioassay testing under the SNP;
c) Standardization of most effluent limits for both the Tailings Containment Area (TCA) and Sewage Lakes waste streams;
d) Compilation of all Acid Rock Drainage (ARD) data, and preparation of plans for testing of construction rock, and for prevention of tailings acid generation;
e) Identification of areas of surface contamination;
f) Revision of the Abandonment and Restoration (A&R) Plan;
g) Tailings containment capacity and stability;
h) Summarization of the 1992 tailings spill monitoring data;
i) Licence Term; and
j) Security Deposit.

The recommendations presented in this submission are based on information supplied to date by Echo Bay Mines Ltd. Should new or additional information be brought forward by the proponent or identified during the public hearing this submission will be re-examined. Any changes will be brought to the attention of the Nunavut Water Board.

2. ENVIRONMENT CANADA'S MANDATE

The general mandate of EC is defined by the *Department of the Environment Act*. This Act provides the Department with a general responsibility for environmental management and protection in terms of the need to foster harmony between society and the environment for the economic, social, and cultural benefit of present and future generations of Canadians. The Department shares this responsibility with provinces and territories. EC is also responsible for providing environmental advice to federal government agencies and for the preservation and enhancement of environmental quality.

Industrial operations of Echo Bay Mines Ltd. are subject to the following statutes administered by Environment Canada: the *Fisheries Act*, the *Canadian Environmental Protection Act* (CEPA), the *Migratory Birds Convention Act* and *Canada Wildlife Act*. Environment Canada's submission is based primarily on its mandated responsibility for the enforcement of Section 36 of the *Fisheries Act*. Subsection 36(3) of the *Fisheries Act* prohibits the "…deposit of a deleterious substance of any type in water frequented by fish…". A first step towards compliance with this requirement is demonstrating that the effluent is non-acutely lethal. This may be demonstrated by an acute lethality determination such as *Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout* (Reference Method EPS 1/RM/13, July, 1990) and amendments (May, 1996), or other techniques and procedures.

3. DEPARTMENT OF FISHERIES AND OCEANS' MANDATE

Under the authority of the habitat provisions of the *Fisheries Act*, DFO has the responsibility to protect fish habitat. The Policy for the Management of Fish Habitat provides direction for interpreting the broad powers mandated under the Act. The objective of this policy is to achieve a net gain in the productive capacity of habitat for fish resources in Canada. The fundamental strategy for achieving the net gain objective is to prevent further erosion of the productive capacity of existing habitat by applying the No Net Loss Principle to habitat management decisions. Under this principle, DFO strives to work with developers to ensure that projects are designed to maintain productive capacity. Where this is not possible, DFO strives to ensure that unavoidable habitat losses are balanced by habitat replacement or gains on a case-by-case basis.

4. TECHNICAL COMMENTS AND RECOMMENDATIONS

a) Echo Bay Mines Ltd. has applied for water use at the current withdrawal levels of a maximum of 1.7 million cubic metres annually. EC and DFO encourage Echo Bay Mines Ltd. to continue to strive to reduce water usage through improved conservation and recycling practices. This will reduce withdrawals, as well as the amounts of water requiring treatment and handling.

b) Modification of the SNP:

i.) The issue of nutrient loading to the oligotrophic waters of Contwoyto Lake is one which has not been raised previously for this project. EC and DFO recommend addition of total phosphorus, nitrogen (NO_2-NO_3 and Total Kjeldahl Nitrogen) and ammonia for the Sewage Lakes discharge, and of ammonia to the Tailings Containment Area (TCA) discharge, to be measured weekly under the SNP. To identify levels reaching the lake, a new SNP station should be set up in the receiving bay of Contwoyto Lake, and have these nutrient parameters measured monthly during open water.

ii.) Over much of the operational period of the mine, Echo Bay Mines Ltd. have demonstrated a very proactive approach to protection of the downstream fish resources by testing effluent for toxicity, using standard rainbow trout and *Daphnia magna* (water flea) bioassay tests. Such toxicity testing is becoming standard as a licence condition in other jurisdictions, and it is recommended that bioassay testing of discharge from the TCA be conducted at initiation and at termination of decant, and that this be included as a licence condition.

iii.) Oil and Grease (O&G) is not a regulated parameter for discharge from the Sewage Lakes station. Because of the potential for lubricant and fuel residues in minewater, and for oils from the camp wastes, it is recommended that Oil and Grease be added to those parameters which are regulated, and to the SNP for weekly measurement at the discharge from 925-14.

a) The mine releases effluent from two separate waste streams: the TCA, which releases treated tailings effluent into Seep Creek and ultimately Sun Bay of Contwoyto Lake, and the Sewage Lakes discharge, which releases treated sewage effluent and minewater into a receiving stream which drains into an unnamed bay of Contwoyto Lake. Where possible, it is recommended that the renewal standardize licence limits for both these waste streams:

Licence	Existing Limits:		Proposed	
MAC* (mg/L)	TCA (925-10)	Sewage (925-14)	Combined	
As	0.50	0.05	N/A	
Cu	0.15	0.20	0.15	
CN	0.80	N/A	N/A	
Pb	0.10	0.05	0.05	
Ni	0.20	0.30	0.20	
Zn	0.40	0.50	0.40	
TSS	15	35	15	
O&G	5 (grab)	Add	5	
pH	6 to 9.5	6 to 9.5	6 to 9.5	
BOD_5	N/A	30	N/A	
Faecal Coli.	N/A	1000 CFU/DL	N/A	

*Maximum Average Concentration

Rationale: Results from the Sewage Lakes discharge are generally an order of magnitude lower than the lower of the two limits. Arsenic limits cannot be combined however, as each discharge stream is near the current limit. As CN originates in the milling process, it does not need to be measured in the Sewage Lakes discharge stream; nor do BOD_5 and bacteriological parameters need to be measured at the TCA discharge.

b) Data collected to date on acid rock drainage (ARD) potential for tailings, ore, and waste rock should be compiled. Prior to final abandonment, it will be necessary to identify all sites which may be potentially acid generating, and to prepare plans for testing of construction rock, and for prevention of tailings acid generation. There is a need to demonstrate that granular cover is effective in inducing permafrost formation and preventing the release of acid drainage from the tailings. Evaluation of the coarse kimberlite tailings cover should be included for areas of the TCA where this has been used for closure.

c) Further planning for mine closure will need to be done during this licence term, and should include the identification of areas of surface contamination. These could include past spill locations, areas subject to chronic leaks such as refueling sites, emergency dump ponds, and fuel and chemical storage areas. Plans for surface testing should be drawn up, and implemented early enough before mine closure that any required remediation can be done.

d) Echo Bay Mines Ltd. is currently undertaking revision of the Abandonment and Restoration (A&R) Plan. This should be included as a licence condition, and the revised version should address concerns identified in the review of the 1996 draft. It is recommended that this be completed within the next 12 months to facilitate planning of progressive restoration work and identification of any information gaps.

e) Tailings Dams Geotechnical Monitoring: No significant concerns were identified in the 1999 inspection of all retention structures; however, the lack of thermistors was noted. In order to detect any thawing of dam foundations it is recommended that installation of thermistors in Dams 1A and 2 be done.

Tailings pond capacity: The renewal information lists several options for the management of the TCA capacity over the next licence renewal period. Echo Bay Mines Ltd. should provide rationale for selection of which options will be used to increase capacity beyond the currently estimated 5.1 years available. EC encourages selection of options which avoid use of End Lake, thus keeping the footprint to the minimum possible within the TCA. Surveys should be done to confirm current capacity levels, notably for Cells 3 and 5, over the next ice-free season.

f) Compilation of 1992 Spill Data. In 1992 a significant tailings spill occurred from Cell 4 into Long Lake. A summary and interpretation of data collected on the recovery of the lake and residual effects should be compiled, and placed on file with the Nunavut Water Board.

g) A licence term of eight years has been requested by Echo Bay Mines Ltd. Because of the potential for changes in TCA management, or associated with satellite ore bodies and/or possibly diamond processing, it is recommended that the term of this licence be no more than 5 years, so that any evaluations needed (such as tailings chemistry or behaviour) can be identified and/or done prior to issuance of the closure phase licence.

h) The current security deposit of one million dollars does not reflect the actual costs to abandon and reclaim this site, which have been estimated at between $12.6 and $21.1 million for the water-related components. It is recommended that the licence requires the security deposit to match the actual reclamation liability amount for these components. Status of the reclamation costs should be reviewed annually, and provision should be included for credits or refunds to be granted back for progressive reclamation work completed.

4. SUMMARY

The following is a point form summary of recommendations made by EC and DFO:

- Maintenance of the current water usage level, with continued improvements in recycling and conservation;
- Monitoring of nutrients and ammonia from the Sewage Lakes discharge, and of ammonia from the TCA discharge;
- Regulation and monitoring of Oil and Grease from the Sewage Lakes discharge;
- Inclusion of bioassay testing of the effluent from the TCA as a licence condition;
- Standardization of effluent limits where possible;
- Compilation of ARD data and development of plans for further testing;
- Identification of areas of surface contamination;
- Installation of thermistors at Dams 1A and 2;
- Evaluation of TCA capacity and identification of best management measures;
- Update of the A&R plan;
- Compilation of a summary report of the 1992 Spill data;
- Revision of the security deposit amount to reflect actual closure liability for water-related components.
- A licence term of up to five years is suggested.