1.0 INTRODUCTION

Echo Bay Mines Ltd. (EBM) has undertaken an environmental assessment of the **Ulu Project** with the intent of providing the necessary information for the issuance of permits required for the development of an underground gold mine and winter haul road running between the Ulu site and the Lupin mine site. The assessment covers all areas associated with the project including the Ulu site and the proposed winter haul road.

Since the early 1990's various studies have been undertaken to evaluate the **Ulu Project**; its feasibility and effect on the environment and the people inherent to the region. These studies are instrumental in establishing baseline environmental conditions for the area. Several of these studies have been used in the compilation of this submission and are included as appendices. To compliment and update the early studies done by the previous lease owner, EBM initiated another series of studies in the spring of 1996. These studies include investigations into archaeological resources, fisheries, wildlife and vegetation, terrain analysis and the potential for acid rock drainage at the mine site. In addition to these studies, EBM is providing support, both financial and in-kind, to the West Kitikmeot-Slave Study to further expand the knowledge of the environment within the central arctic in which both the Lupin mine site and the **Ulu Project** are situated.

1.1 THE COMPANY

Echo Bay Mines Ltd. is one of the largest producers of gold and silver in North America. In 1995, the company produced more than 750,000 ounces of gold and 11 million ounces of silver from four mines, three located in the USA and one in Canada (Lupin).

The history of Echo Bay Mines Ltd. in Canada's north began at Port Radium, on the shores of Great Bear Lake about 41 kilometres south of the Arctic Circle. Port Radium itself came into existence in the early 1930's when pitchblende was discovered. The ore was mined by Eldorado Nuclear Ltd. until 1961 when the ore body was mined out. EBM leased the former Eldorado property and an adjoining Cominco property which was known to have silver and copper ore within its boundaries. The Eldorado facilities were resurrected, and the mining of silver from the new Echo Bay Mine on the Cominco lease commenced in 1964. By 1976, the silver ore reserves from the initial site were depleted and the old Eldorado Mine was reopened and mined for its silver and copper ore. During these combined mining periods (19 years) until closure in 1982, mill production amounted to 35.5 million troy ounces of silver and 10 million pounds of copper. After the close of production in 1982, an equipment salvage and site

restoration program was initiated. At the completion of this program in 1985, the Port Radium mine site had been returned to its original natural condition.

EBM's Lupin Mine is located in Canada's north, about 80 kilometres south of the Arctic Circle, on Contwoyto Lake. EBM obtained an option on the Lupin property from Inco in 1979 and proceeded with an underground exploration program. In 1980, the decision was made to proceed with development and construction of the Lupin Mine. Construction of the surface facilities and underground development took 20 months to complete. Initially the mill had a nominal capacity of 1000 tons per day. Since then, several expansions and operational changes have increased milling capacity to 2,400 tons per day.

Since bringing Lupin into production, Echo Bay Mines Ltd. has added three other currently operating gold mines: two open pit mines in Nevada (Round Mountain and McCoy/Cove) and one underground operation in Washington (Kettle River). Echo Bay Mines Ltd. is actively exploring for more gold deposits in the Lupin area and around the world.

Echo Bay Mines Ltd. has a healthy financial picture. Despite experiencing a net loss during 1995, the company had US$186 million in cash holdings at year's end as well as total assets of US$892.8 million. Losses were primarily due to increased operating costs due to mining lower-grade ores, and sharply higher explorations and development property expenses (eg. the **Ulu Project** development is being completely financed from within the company).

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1.2 THE ULU PROJECT: OVERVIEW

The **Ulu Project** is the focus of this environmental assessment. The project consists of the Ulu site ore body development and includes the ancillary facilities (camp and exploration infrastructure, airstrip and local all-weather roads) and the winter haul road connecting the Ulu site with the Lupin mine site.

EBM purchased the Ulu site lease from BHP in 1995. The intent of the **Ulu Project** is for EBM to mine the gold bearing ore using underground mining techniques and haul the ore to the Lupin mine site for processing. At the present time, mine exploration is progressing to the stage of mining a five tonne bulk sample and performing approximately 25,000 metres of underground diamond drilling, 3,000 metres of which was completed during the summer of 1996. Bulk sampling and diamond drilling is expected to take about two years to complete (by mid 1998). Over this period, a winter road will be required to accommodate the transport of equipment and fuel from Lupin to Ulu. This road will be similar to that established during the winter of 1995/96. To accommodate future ore haulage the construction of an "upgraded portage" winter road, as described later in this section of the report, and in more detail in Section 4.1.3: Winter Haul Road, will become necessary.

The **Ulu Project** is situated in the Northwest Territories with the underground exploration site at longitude 100° 58' W and latitude 66° 54' N, and the winter haul road running from the underground exploration site to the Lupin mine site (longitude 111° 14' W and latitude 65°46' N). The exploration site is in treeless arctic tundra currently accessible year round by aircraft only. It is about 12 kilometres north of the Hood River, the major drainage system for the area or about 150 kilometres north of Echo Bay Mines' Lupin mine (Figure 1). The climate is severe with winter and summer temperatures typically ranging from -50 Celsius to +30 Celsius. Permafrost in this area typically persists to depths of several hundred metres.

The northern portion of the **Ulu Project**, including the exploration site and a portion of the winter road, is situated on Inuit Owned Land while the remaining winter road is on crown land. The Nunavut Land Claims Agreement legislates that the Kitikmeot Inuit

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Figure 1. Location of the Ulu Exploration Site

must receive benefits and opportunities arising from developments on Inuit Owned Lands. To this end, an Inuit Impact and Benefits Agreement (IIBA) was negotiated between Echo Bay Mines Ltd. and the Kitikmeot Inuit Association in accordance with Article 26 of the Nunavut Land Claims Agreement. The IIBA was signed on September 17, 1996 and establishes the framework for providing employment, training and other economic benefits to the First Nations people in the West Kitikmeot Region of Nunavut. The IIBA was negotiated specifically for the **Ulu Project**. This agreement is the first of its kind signed under the Nunavut Land Claims Agreement.

Long range plans for the **Ulu Project** include the complete development and permitting of an underground mine and winter road capable of handling the vehicles transporting stockpiled ore from Ulu to Lupin. Present estimates indicate a feasible six to seven year mine life (1998-2004) at a production rate of about 273,000 tonnes of ore per year (750 tonnes per day).

The gold deposit lies within three mineral claims which covers a 2 to 3 kilometre wide lobe of mafic metavolcanic and metasedimentary rocks. The lobe is tightly folded into a north plunging asymmetrical anticline dissected by east-west trending faults. Mineralization is within a zone of basalt with subordinate sediments and gabbro. This zone can be traced on surface for 400 metres in a north west direction near the core of the anticline. The 2 to 5 metre thick mineralized zone dips steeply at 70° to 80° to the south west and has been intersected by diamond drilling to depths of about 600 metres. Areas of local thickening up to 10 metres correspond to flexure points along the roughly tabular body. Mineralization is comprised of an intensely silicified zone with arsenopyrite contained in fractures and dilatancies within basalts.

As the ore is mined, it will be stockpiled on an ore storage pad to await transport to Lupin. This ore storage pad has been designed to store ore mined during the period when hauling to Lupin is not possible. Included in the pad design is a system for the collection and testing of runoff prior to release.

Facilities planned for the Ulu site include a 60 man camp with sleeping and dining sections, vehicle repair shop, power house, warehousing, office and change rooms, diesel power generating plant, fuel storage tanks, fresh water and sewage systems, a garbage incinerator and an ore storage area. Explosive and detonator storage will be near Camp 3, about 12 kilometres from the Ulu site. Power for the mine and site facilities will be supplied by four diesel generator sets with a total capacity of 2 megawatts; a fifth generator set is a standby unit for the camp. One portable diesel generator is used for the air strip facilities and two trailer-mounted sets (500 kilowatt total capacity) are for the crusher and main ventilation fan.

To meet the ore transport function, a winter road capable of handling the travel of a fleet of 45 tonne payload (B-train configuration) trucks will be established. About twenty five trucks will be in the fleet, with twenty four hour per day operation during the haul season, December to May. The haul season is expected to be about 150 days; 135 days of hauling ore with 15 days expected to be lost due to poor weather conditions.

Due to the traffic type and trip frequency, the portage sections of the road (ie, the land links between the ice sections of the road) will require upgrading in the form of an aggregate layer to create a smooth running surface and to level any rough, bouldery sections. Considering this, care has been taken to design the road alignment to minimize portage lengths and to avoid rough areas whenever possible. Where avoidance is not possible due to the presence of archaeological sites or environmentally sensitive areas (denning, nesting, etc), the depth of the aggregate layer will be kept to a minimum, thus minimizing the cost associated with excavating and hauling the aggregate as well as minimizing the extent of disturbance at the aggregate source.

The source of aggregate will be eskers adjacent to the haul road right-of-way. Excavation of these eskers will be done such that any environmentally sensitive areas or archaeological sites are given a wide birth. Near the end of each haul road season, the disturbed areas of the eskers will be rounded and contoured to minimize erosion during the summer months.

The total length of the preferred winter haul road route is 171.25 kilometres with 97.25 kilometres being overland. Several potential routes were considered and are further discussed in Section 4.1.3: Winter Haul Road. The preferred route avoids many animal denning and archaeological sites; criteria considered in the route selection process.

An airstrip has been constructed capable of handling small aircraft (ie., Twin Otter) used for the transport of people and some freight to the Ulu site. The strip is approximately 1200 metres long by 23 metres wide and is equipped with lights and an non-directional beacon.

1.3 Echo Bay Mines Ltd. Environmental Policy

Echo Bay Mines Ltd. has exploration programs in several countries and has active mines in Canada and the USA. These activities are conducted in a fashion that meets the applicable laws and regulations of the host country. EBM recognizes that as an industry leader it must be an environmentally responsible and proactive company. To aid the achievement of this goal, EBM has adopted a corporate environmental policy

and is in the process of developing an environmental management system that will be a company-wide standard.

Echo Bay's commitment to environmental responsibility is embodied in the Company's Environmental Policy. This policy was signed on February 15, 1996 by Richard C. Kraus, President and Chief Executive Officer, Echo Bay Mines Ltd. The policy subscribes to the principles adopted by the Mining Association of Canada and The Gold Institute (USA) and includes the following:

Echo Bay Mines will:

- Seek to be environmental leaders in the mining community by integrating responsible environmental management as an essential component of all business decisions.
- Assign accountability and responsibility for implementation of the environmental performance an important factor in the management review process.
- Provide adequate resource, personnel and training so that all employees are aware of and able to carry out their environmental responsibilities in accordance with the environmental policy.
- Communicate openly with employees, the regulatory community and the public on environmental issues, and address concerns pertaining to potential hazards and impacts.
- Design, construct, operate and reclaim all projects in compliance with applicable national and local regulations. In situations where environmental regulations are absent, or less than Echo Bay's standards, apply best management practises to achieve environmental protection.
- Conduct operations in an environmentally sound manner, incorporating the efficient use of energy and materials, and minimizing the use and production of hazardous substances.
- Assess environmental risks and impacts form all activities. Evaluate the regulatory requirements for each project and schedule their implementation as components of the initial project planning process. Establish and maintain appropriate emergency response plans for all activities and facilities. Maintain a self-monitoring program at each facility to ensure compliance.
- Conduct periodic environmental assessments of all Echo Bay facilities and develop and implement action plans to correct potential deficiencies in a timely manner.
- Promote company involvement in environmental enhancement projects and encourage employee participation in such projects.

- Support research to develop more effective measures for compliance with environmental regulations and to increase the protection of the environment from mining related impacts.
- Work in cooperation with industry, the public and government toward the development of environmental policies, laws and regulations which; are cost effective and scientifically sound.

The environmental policy statement is included in Appendix 1. A version translated into Inuinaktun is also included.

The environmental management system (EMS) presently under development is in the form of a manual that describes EBM's commitment to environmental responsibility and how this is to be achieved. The manual addresses the companies organizational structure and individual responsibilities, information and documentation management, planning and the implementation of the environmental program. It also discusses the measurement and reporting of environmental performance.

Incorporated into the EMS manual (work in progress) is a series of environmental standards that will apply both at the corporate level and the site level. The corporate level environmental standards describe world-wide policies and performance expectations for EBM sites, operations and activities. These standards will be reviewed at least annually and updated where appropriate by corporate and project-level staff.

The site level standards set forth policies and performance expectations for environmental management for each of the life-cycle stages of Echo Bay's sites. These standards are known as Life-Cycle Environmental Standards or LCES's. The LCESs drafted are shown as an excerpt from the EMS manual in Appendix 2.