MIRAMAR DORIS NORTH PROJECT

NOISE ABATEMENT PLAN

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1 INTRODUCTION

This noise abatement plan is designed to provide information on monitoring and mitigating noise as per the Miramar Doris North Project Certificate (NIRB 003). The intent of this plan is to detail the monitoring and control program for environmental noise, as well as outline the requirements for occupational noise monitoring, control and worker protection.

The environmental follow-up program described in this document indicates location, duration, timing and type of noise monitoring to be conducted, as well as provides a description of noise control methods that can be employed should mitigation be required.

Occupational related noise management will be an integral part of the on-site health and safety program. The intent for this abatement plan is to describe the commitments and philosophy for noise control in relation to employee health as a reference for the Occupational Health and Safety Program that will be developed for construction and operation activities.

2 ENVIRONMENTAL NOISE MONITORING

The monitoring portion of the noise abatement plan focuses on environmental airborne noise levels only. Measurement of vibration is not proposed at this time; however, controls and abatement are further discussed in Section 2.2.

2.1 SCHEDULE

Monitoring programs will be conducted 3-4 times in each project stage: pre-construction (baseline), construction, operation and reclamation.

The main phase of construction is scheduled to start early in the winter of 2007/2008; however, MHBL does plan to conduct some pre-development work at the Roberts Bay jetty site in the late winter of 2006/2007 to allow for the delivery of construction equipment and materials on the 2007 sealift (barge and tug from Hay River). This work will be limited to development of Quarry 1 at Roberts Bay, construction of the jetty in Roberts Bay, and construction of the beach laydown area and connecting roads. All work on land will be completed prior to the ground thawing in the summer of 2007 (expected in early June), with the jetty being constructed prior to July 15th.

Consequently, baseline data can be collected in 2007 at the future plant and camp area (NM2); at Quarry 2 (NM3) and at Tail Lake (NM4) - (see Figure 3.1) to obtain a full year of baseline data prior to start of main construction in early 2008. However, at Roberts Bay (NM1), baseline data can only be collected in the second half of July and early August prior to the barge arriving. Construction noise data can be obtained at this site in the period of May through mid July.

Specific monitoring periods and dates, other than those discussed above, are yet to be determined; however the date selection will consider the potentially affected Valued Ecosystem Components (VECs). The following are factors that will be used to finalize the scheduling of baseline, construction, operations and reclamation monitoring:

- season;
- periods of blasting at the quarries;
- caribou migration;
- bird migration;
- the month before bear hibernation; and

- times when major wildlife events occur.

Dates for each of the initial 3-4 programs expected in the first year will be proposed and finalized, prior to initiation of the programs, in conjunction with HC, EC and GN-DoE.

In order to establish a preliminary baseline, a series of spot measurements at 1500 m from project facility and infrastructure locations was attempted in November 2006. Weather conditions prohibited successful measurements at that time, and the issues encountered are addressed in this workplan to enable monitoring at any time of the year.

2.2 LOCATIONS FOR MONITORING

Preliminary locations have been selected based on the results of noise modelling for the EIA, location of project noise sources and infrastructure, and VEC factors. Locations also depended on the criteria to be met for the project. We have identified four long-term monitoring locations on Figure 1.

2.3 METHODOLOGY

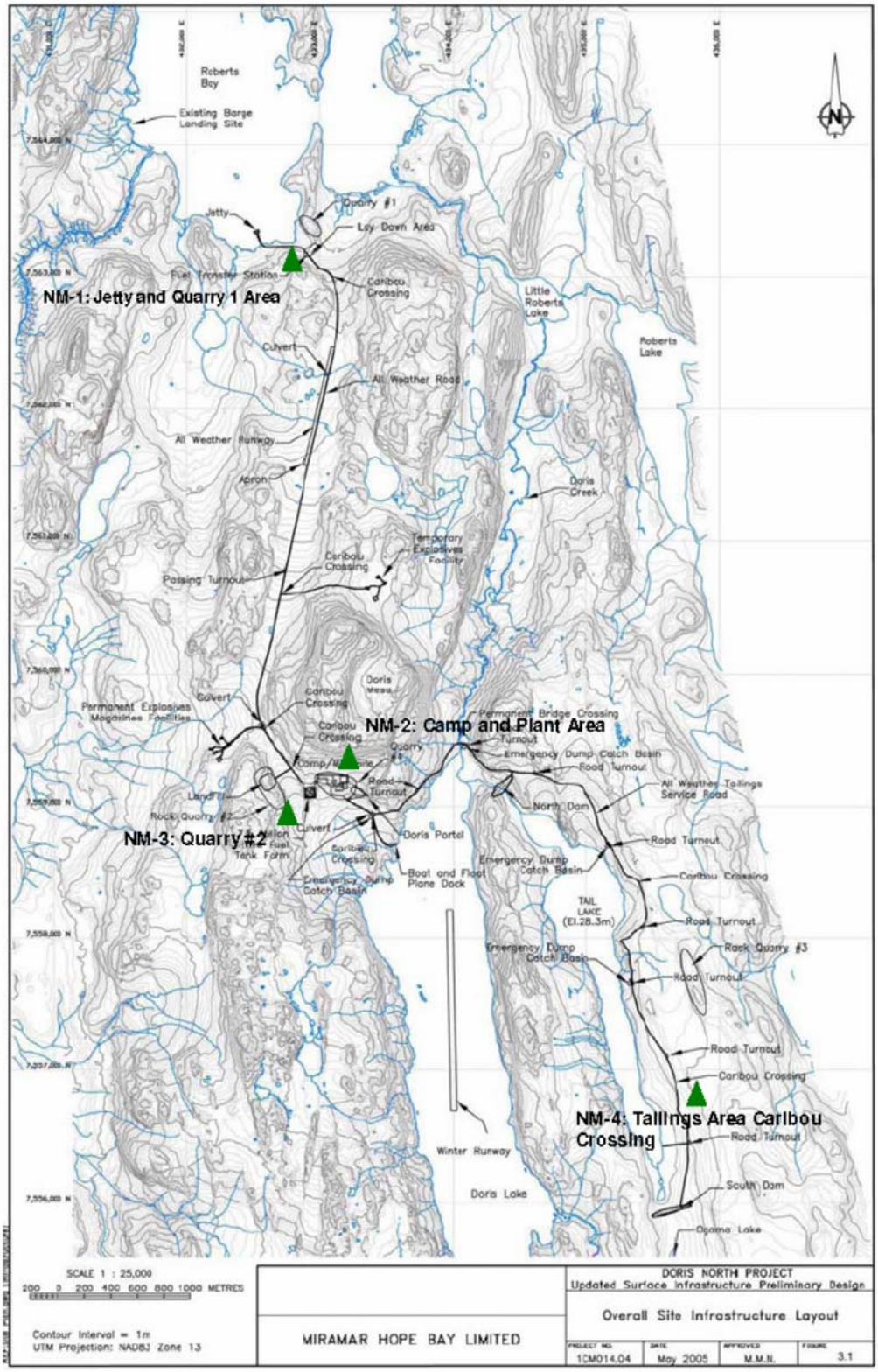
2.3.1 Equipment

Type I or Type II integrating data-logging sound level meters meeting ANSI standards S12.19-1996 or ISO 1996-1, respectively, will be used. For long-term measurements, the meter will be equipped with a weatherproof microphone mount. An appropriate calibrator must be available, and is to be used before and after each measurement period to ensure valid data collection.

The monitoring set-up should be equipped with sound recording capabilities to capture audible noises in the area. Preferably, sound level meters with a synchronized internal sound recording capability will be used. Sound recording will be used to witness long-term measurements, so identification of noise events measured at an unattended station can occur.

Weather data from one of the two on-site weather stations will be used to validate data collected.

Figure 1 Environmental Noise Monitoring Locations



2.3.2 Noise Data Collection

The following overall noise levels will be measured:

- LA_{eq};
- LAF_{max};
- LAF_{min}; and
- LC_{eq}.

In addition, 1/3 band octave data will be collected once per project stage, if equipment is available. Octave band data will also be collected if levels exceeding project criteria are found, in order to locate the primary source requiring mitigation.

Two, 24-hour logging periods will be conducted at each location, at a 1-minute logging rate. It should be noted that if longer monitoring periods at each location be required, the logging rate would need to increase. This may result in loss of definition in measurements, making it difficult to determine the influence of short term noise events, such as aircraft flyovers. Simultaneous sound recordings will also be collected during the measurement period to identify peak events and sources of sound.

2.3.3 Weather Conditions

The following weather parameters will be documented for the time period of each noise measurement.

- temperature;
- relative humidity;
- wind speed;
- wind direction; and
- precipitation.

Weather data from one of the on-site stations will be used.

Acceptable weather conditions for noise monitoring will be:

- wind speeds less than 20 kph;
- relative humidity less than 90%;

- no active precipitation (rain or snow); and
- temperatures such that the meter body can be maintained within manufacturer's specifications.

2.3.4 Field Notes

The following information for field programs will be collected:

- description of the monitoring site with sketch and pictures;
- time of set up and tear down;
- time of calibration;
- type of surface the meter is standing on;
- observed audible noise sources;
- distance from all obstacles in the area (cannot be closer than 3 m to any surface except the ground surface);
- GPS location;
- which meter is being used; and
- weather conditions at each site at the time of set up and tear down, including precipitation and cloud cover.

It is imperative that detailed field notes are recorded during the monitoring period. Site visits by technicians will be conducted (number of site visits depends on scheduling of the monitoring period) to identify audible noise sources and to check equipment.

2.3.5 Field Report

A data report will be completed following each monitoring program. The field reports will generally have, in tabular form, weather and noise data listed hourly, graphical representations of the raw noise data, a description of the methods used, the location of monitoring sites and photos of the sites. Any noise sources that are causing criteria to be exceeded will be identified. Short-term source measurements may be conducted, where necessary, to allow appropriate mitigation design.

Data reports will be provided to the bird and wildlife leads for consideration in their on-going monitoring plans.

A detailed compliance report will be provided on an annual basis. The format and content of this report will be finalized in discussion with HC, EC and GN-DoE.

2.4 LOGISTICS AND MANAGEMENT

Golder will develop and provide a noise monitoring manual and training on the equipment to eliminate the number of trips to the site. The Golder technician will travel to the site for each new phase of the project to ensure that the monitoring is completed correctly.

Logistics will have to consider the northern environment and lack of communication available in the area. The noise meters cannot operate under temperatures of -20°C, therefore a housing device will be supplied or built to keep the meter in nominal temperature operating range. Power to the meter will also be managed, since typical battery power used for these instruments dies quickly (within 24-hours) in extremely cold environments. Solar lighting during winter months would be minimal, and electricity is not readily available; therefore, extra battery power or an instrument housing that encompasses both meter and battery will be considered.

On site communication will be limited. Satellite phones do not work well in certain areas of the world during different times of the day. Radio communication with the camp will be arranged when technicians are at the monitoring sites.

Access to monitoring sites will be considered via helicopter where sites are too difficult to traverse over land.

Wildlife tampering is also a concern for the equipment. Some animals tend to eat cable wire, and use objects such as these for scratching devices. A housing or protection mechanism for the cable wire and securing the tripod to the ground will be used.

Obtaining the data via satellite/remotely is under review, although it is expected that data downloads will be carried out by on-site personnel then transferred electronically for reporting.

QA/QC of data will be conducted only on downloaded data. Field QA/QC of equipment operation may not be practical, as the climate and areas are not conducive for frequent checks. Weather data can be verified in the field with a pocket weather meter. As well, calibration of the equipment will be conducted before and after each 24-hour survey to assure the noise meter and microphone are still properly operating. All information will be recorded by the field technician.

3 HEALTH AND SAFETY NOISE MONITORING

MHBL will have a noise monitoring component of the Doris North Occupational Health and Safety Program. The details of the program have not been finalized as operations are not expected to begin before late 2008. MHBL will have this program fully developed prior to the start of operations. However the noise monitoring component of the Occupational Health and Safety Program will consist of the following elements:

- Pre-Employment Audiometric Testing;
- Annual Employee Audiometric Testing; and
- Workplace Noise Monitoring.

These elements of the noise monitoring program are described in the following sections.

3.1 PRE-EMPLOYMENT AUDIOMETRIC TESTING

MHBL will be arranging to have all employees undergo audiometric testing as part of the pre-employment medical evaluations. The objective is to obtain a baseline of each employee's hearing prior to starting employment at the Doris North Mine. It has not yet been determined whether this will be done off-site or on-site. It will likely be a combination of both, where employees hired through major centers will have their audiometric testing done at certified audiometric testing centers in the city of their hire, whereas employees hired from rural or smaller centers where certified audiometric testing centers are not available will be tested once they arrive at site prior to starting work. MHBL has purchased a manually operated Audiometric Machine, which has now been calibrated, and will be used at the mine site for this pre-employment and follow-up periodic employee audiometric testing.

All employees will receive a general orientation and safety training program upon their arrival at site and before starting work. This program incorporates training on Personal Protective Equipment, including discussion on the use and availability of hearing protection at the mine site, and where hearing protection is mandatory, recommended or not required. MHBL makes this personal protective equipment (including hearing protection) available to all employees at no charge to the employee.

3.2 EMPLOYEE AUDIOMETRIC TESTING

MHBL will conduct follow up audiometric testing on an annual basis for all employees working in areas or in occupations designated as "high noise risk areas." This will include but not necessarily be limited to the following work areas and occupations:

- all employees working in the underground mine;
- all employees working in the mill;
- all heavy equipment operators;
- all employees working around aircraft; and
- any other area where the noise level is 80 dBA or greater.

The objective is to identify hearing problems that possibly could be work related at an early opportunity, so that preventative action can be taken to prevent or arrest further hearing degradation.

3.3 WORKPLACE NOISE MONITORING

MHBL will conduct a program of baseline occupational noise monitoring in each workplace soon after mining, and/or milling operations commence. The objective is to determine what noise levels are created in each of the respective work environments once mining, milling or support operations commence. The baseline data collected will then be used as follows:

- to establish areas and/or occupations that are to be posted as "high" noise areas, where personal protective hearing protection use will be made mandatory;
- to assess the effectiveness of noise mitigation measures built into the facility and equipment design engineering, and to determine where added mitigation measures are needed;
- to obtain information on actual noise levels throughout the workplace so that MHBL's management team, MHBL and contractor employees and the Occupational Health and Safety Committee have real information on ambient noise levels available to them for safety management decisions in the workplaces; and
- to measure ambient noise levels within the mine's accommodation camp, especially in the sleeping areas so that levels can be maintained within these areas at levels conducive to allowing employees to get their needed sleep.

In addition to this baseline noise monitoring, MHBL will conduct periodic noise level surveys throughout all workplaces and within the accommodation camp on a periodic basis (targeted at four times per year) to catch any changes from the baseline condition, and to assess the effectiveness of noise mitigation actions taken. The information collected during these surveys will be reported to the MHBL management team, as well as all MHBL and contractor employees, through postings and to the Occupational Health and Safety Committee to assist them in managing noise exposure in the workplace.

MHBL will maintain appropriate noise monitoring equipment at the Doris North mine site under the care of the Safety Superintendent. All noise monitoring will be conducted under the direction of the Safety Superintendent to ensure appropriate training in the operation of this equipment and in industry accepted monitoring practices.

4 ABATEMENT PLAN

Noise controls and abatement serve a combination of environmental and occupational health and safety (OHS) purposes. The focus of these abatement recommendations is for control of environmental noise. The monitoring reports will document any controls initiated to meet OHS requirements that may also help to control environmental noise. Requirements or criteria relating to controls required for OHS, such as operator noise exposure or indoor plant noise, will be addressed under the on-site Health and Safety Program under development.

4.1 CONSTRUCTION

Construction is scheduled to begin in the second quarter 2007 and run until the beginning of operations. Noise control during the construction phase of the project will be focused on materials handling and transportation sources. Once construction equipment is in the contracting stage, noise control measures can be discussed and handled in detail. Based on experience on other mine projects, the following noise controls are being considered:

- mobile or motorized equipment fitted with mufflers or silencers;
- enclosures, berms, acoustic screening and shrouding where stationary sources requiring control are identified;
- impulse events, such as blasting, will be limited to certain times of the day and year based on wildlife sensitivities;
- limiting the time of day for certain activity (strategic scheduling of noise events); and
- the required minimum altitude limit of 300 m for aircraft flight will be adhered to (with the exception of take-off and landing).

Any sources requiring mitigation identified during monitoring will be addressed using the above mitigation or engineered controls as appropriate. Noise controls that are used will be documented in the annual noise monitoring report.

4.2 OPERATION

The operations phase of the project will run from late 2008 to 2010. Noise control during operations will focus on the quarry and crushing areas (materials handling), power generation, processing, mine ventilation and blasting activities. Initial controls will be documented prior to project start-up, and the list maintained as additional control needs are identified through the monitoring plan. Below lists some types of additional controls that will be considered for this phase of the project:

- strategic placement of waste rock piles to block plant sources;
- ensuring equipment is well maintained;
- ensuring equipment fitted with appropriate mufflers and silencers;
- impulse events, such as blasting, will be limited to certain times of the day and year based on wildlife sensitivities;
- limiting the time of day for certain activity (strategic scheduling of noise events); and
- the required minimum altitude limit of 300 m for aircraft flight will be adhered to (with the exception of take-off and landing).

Blasting will be used as part of the underground mining process, as well as during quarrying activities. All blasting will be conducted following the federal blasting guidelines of Wright and Hopky (1998) as modified by DFO for use in the North. Where possible, effects of noise on fishes due to blasting activities will be reduced by restricting blasting activity to the time of least biological activity or biological sensitivity according to DFO's "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters" (Wright and Hopky 1998) as modified by DFO for use in the North.

Blasting at the four quarry locations will only be conducted during winter, at the period of least biological activity, and when the fish will be farther from shore (i.e., the shallow nearshore areas will have bottom-fast ice to a depth of approximately the two metre contour interval). Conducting blasting during this time period will reduce potential effects of noise on fishes in the area.

4.3 DECOMMISSIONING

Decommissioning the project will start in 2011 and is planned to run for seven years. Noise control during decommissioning will be focused on the tailings pond closure activities, plant and mine areas. Most of the noise sources will be from

transportation vehicles. Initial controls will be documented prior to project start-up, and the list maintained as additional control needs are identified through the monitoring plan. Below lists additional controls that will be considered for this phase of the project:

- ensuring equipment is well maintained;
- ensuring equipment has mufflers and silencers;
- house stationary sources in buildings; and
- the required minimum altitude limit of 300 m for aircraft flight will be adhered to (with the exception of take-off and landing).

5 CRITERIA

The noise standards that are applicable to the Project are those identified in the Doris North Project EIS (MHBL 2005). While there are no regulated Territorial or Federal environmental noise criteria, the EIS committed to a specific set of guidelines regarding environmental noise. Workplace noise for the Doris North Project is regulated by Nunavut under the territorial *Mine Health and Safety Act*.

5.1 EFFECTS ON VECS (WILDLIFE, BIRDS AND FISH)

There are no set noise criteria set out for VECs such as wildlife, birds and fish in any national or international guideline or standard. Since there is no set noise criteria, the information will be passed on to the respective discipline leads to determine the effects of noise within the VEC monitoring programs. Underwater acoustics is a separate discipline from airborne noise, and is discussed separately.

The EIS proposed the Alberta EUB guideline limit of 40 dBA at 1.5 km from project activity as criteria. The noise monitoring program will use this as a benchmark for reporting purposes. We do not propose this as a strict criterion, as VEC requirements should take precedence. Rather, exceedance of this guideline will be the indicator for raising the possibility of noise issues with VEC leads.

Any measurements that indicate a level of 40 dBA at 1.5 km from project activity may have been exceeded will be reported directly Miramar, as well as the project fish and wildlife component leads, for analysis. Any communications will be logged, and the log will be included in the regular noise monitoring reports.

5.2 WORK PLACE NOISE

Two main health effects of working within a high noise environment are hearing loss and stress. Workplace noise can be caused by traffic, pneumatic tools, power tools, machinery, ventilation systems, humans and animals, for example. Regulations followed by the employer are meant to protect workers from too much noise.

Noise exposure limits in Nunavut workplaces are found in the Consolidation of Mine Health and Safety Regulations under the territorial *Mine Health and Safety Act*. An employer must ensure that a worker is not working with a noise level above the limit set in the regulation. The limit is 85 decibels for eight hours within a 24 hour period.

If the worker works with noise levels higher than 85 decibels for eight hours, then the employer has to lower the number of hours the worker works at that noise level, according to precise noise levels and work hours set in the regulation. If the noise level is higher than the legal limit, the employer must give the worker hearing protection equipment; however, before giving the worker hearing protection equipment, the employer is legally obliged to try to lower the noise level, and separate the worker from the source of the noise.

Consequently, MHBL will adopt 85 decibels as its upper noise limit for determining where noise protection must be made mandatory, and as the point where noise mitigation measures should be focused as a priority.

In western countries, sleep problems are an increasingly common problem, owing to lifestyle and environmental factors. Sleep disturbance is one of the most serious effects of environmental noise. World Health Organization guidelines say that for good sleep, sound level should not exceed 30 decibels for continuous background noise, and individual noises events exceeding 45 decibels should be avoided.

Consequently, MHBL will target a noise level of below 30 decibels within the camp sleeping accommodation for continuous noise, and 45 decibels for individual noise events, to reduce sleeping problems for employees while on site. These will be achieved primarily through mitigation measures (insulation and noise baffles) and camp rules of conduct, wherever practical.

6 REFERENCES

Miramar Hope Bay Ltd. (MHBL). 2005. Final Environmental Impact Statement, Doris North Project, Nunavut, Canada. Submitted to the Nunavut Impact Review Board by Miramar Hope Bay Ltd., North Vancouver, BC.

Wright, D.G., and G.E. Hopky. 1998. Guidelines for the use of explosives in or near Canadian fisheries waters. Canadian Technical Report of Fisheries and Aquatic Sciences 2107: iv + 34p.

7 CLOSURE

We trust the above meets your present requirements. If you have any questions or require additional details, please contact the undersigned.

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