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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI

File: NWB1BOS0106/TR/F1

January 12, 2004

By Email and Regular Mail

Mr. Hugh R. Wilson
Manager, Environmental Affairs
Miramar Hope Bay Limited
300-889 Harbourside Drive
North Vancouver, BC
V7P 3S1

Subject: Licence NWB1BOS0106 Amendment Application for a Solid Waste Disposal Site

Dear Mr. Wilson:

The Nunavut Water Board ("NWB") has completed its preliminary review of the Miramar Hope Bay Limited application for amendment of Water License NWB1BOS0106 with respect to the Boston Gold Project and the construction of a Solid Waste Disposal Site. The review under Parts F and J of the License, found the application to be deficient in several areas. The NWB requests that these deficiencies be addressed prior to the application proceeding to circulation for comments. The following summarizes the initial review and issues that require additional submission and clarification.

Part F; Conditions Applying To Solid Waste Disposal, Item 1(a through c)

The application indicates that the Licensee will follow KIA land use license and NWB water license terms and conditions as well as the recommendations of the Consultants, Bryant Environmental Consultants Ltd.(BECL) report prepared for the KIA in 2001. The "Bryant" report touches briefly on the rationale for location of the site, the proposed disposal method and providing suggestions for construction/operation, however it lacks in detail with respect to the design of the facility.

References are made in the report to the two supporting documents, the *Guidelines for the Planning, Design, Operation & Maintenance of Solid Waste Modified Landfill Sites in the Northwest Territories (March 1990)* and the guidelines for landfills in Alberta. The NWT Guidelines should be reviewed to provide the minimum information required for the proposed facility.

Planning and Design

- **Capacity requirements** - The primary focus of the design discussion in the assessment report was in determining the future capacity requirements of the facility. This was based on a generation rate ($\text{m}^3/\text{person}/\text{day}$), operating days and overall term of the project. A factor was included to account for the void spaces of the waste however no factor was included for cover material (used during the operation of the landfill for control of windblown materials/dust). This could reduce the useful capacity of the site by as much as 20% depending on the frequency of cover required.

It was mentioned in the report that materials from the nearby Windy Lake camp are planned to be brought to the Boston facility and this generation has been included in the design capacity. The report also noted “other nearby exploration projects” but failed to include an estimate on the volume of waste generated that may be contributed from these sources.

There are other important design considerations and the *Guidelines (GNWT 1990, Section 5.2)* consider numerous criteria for determining the location of a SWDS. Most are discussed to some extent in the Bryant Report, however several key components were lacking. These included;

- **Local Geology and Terrain** – knowledge of the geology of the site is important in order to predict potential contamination and remedial measures. Stratigraphy, soil types and soil grain sizes require a geological assessment. Terrain was discussed in general terms and was used as the basis for site location. Additional topographical information is required to adequately assess the watershed and drainage in the area. The map included with the application does not indicate the full watershed to the east of the site and potential impact area.
- **Availability of cover material** – The Bryant Report indicated a concern in this area as there are no nearby eskers that could be used for sand or gravel. It identified two sources of construction material to build the containment berms and for cover material. HBJV advised that low grade ore stockpiled on surface (and stored underground) is available for use. Information on the amount of material was unavailable at the time of writing the report. Also, HBJV indicated that the low grade ore was not acid generating but had the potential to leach metals and arsenic.

An alternative source of material was identified that currently serves as the foundation base for the entire Boston camp. Information on the ARD potential of this material, and/or the potential leaching characteristics was not included in the report. Information on the geochemistry and potential impacts of this source and the low grade ore was not made available in the Bryant Report and is required for the application.

A rock crusher is apparently available on site, but it was noted that the unit is “not serviceable and requires repairs”. Therefore, according to the report, materials cannot be produced for construction. It is also recommended (as well as in the Guidelines) that during operations, an interim cover of 0.3m of crush be placed to minimize wind blown litter and dust. This material must also be identified and be available for use.

There is no discussion in the Bryant Report with respect to the size fraction of rock available, nor the capability of the crusher (if it becomes operable) of producing a suitable material for construction. Compaction is recommended to prevent slumping and erosion of the berms, however it does not address the issue of water infiltration and seepage. The report identified a current slumping problem with the east berm wall of Settling Pond No.2. It has not identified the cause for the failure but simply suggests building up the wall and compacting with the other berm walls. Unless the cause is identified, the other berm walls may be prone to the same failure.

- **Geotechnical Factors** – A hydrogeological study of the proposed area should be referenced and will help to establish suitability of the location with respect to water infiltration, ground water flow (if any), the hydraulic gradient and conductivity, water chemistry and need for monitoring wells. Other aspects which might be considered are thaw sensitive and heave prone soils, underlying permafrost, natural ground conditions and foundation preparation requirements (organics removal) and drainage resulting in erosion.

- The Bryant report identifies the availability of geosynthetic materials (page 2, photo #8) on site which could be used as a liner for a solid waste site. There is no mention of the liner and its use later in the report. Based on the construction materials available, this option (or an alternate liner if the one present is not suitable) should be considered within the design.

Monitoring wells (2) are recommended in the Bryant Report. Figure 2 of the report indicates a sampling station #1652-? at the toe of the proposed berm. The map (Figure 1) accompanying the application indicates this same station (1652-2) and one station slightly east and north of the site that is unidentified. The station number used is identified in the License SNP as the Minewater discharge. The report recommends that samples be obtained twice a year; once during spring melt and once prior to freeze up. There is no recommendation as to the depth of the wells (should be associated with the depth of the active layer, however this depth is not known) and the ability to sample during the times of year specified.

Operation and Maintenance

Items 1(d through f) are concerned with the post construction and operation and maintenance of the site. Several items require clarification or submission.

- The Bryant report has recommended that the site only be used for the disposal of inert materials and defines those materials from the Waste Control Regulations of Alberta (June 2001). A summary of materials that fits the inert waste definition in the opinion of BECL is given. This list includes the disposal of incinerator ash which may include some non-inert components (depending on the protocols used and materials incinerated) and be susceptible to leaching considering the proposed SWDS and the potential for seepage. Another concern with the disposal of ash is the potential for wind blown contamination. There were no specific operational criteria noted for the handling and disposal of this material. A detailed description of the operation/maintenance of the incinerator, and if needed, a characterization of the ash (leach test) is integral to the successful operation of the SWDS.
- Item 1(d and e) of the License refers to the operation, maintenance and monitoring of the SWDS. An operation and maintenance manual (conceptual) which includes the method of monitoring of wastes entering the facility as well as any seepages or wind blown contamination resulting from the use of the facility is required.
- Item 1(f) refers to the abandonment and restoration of the SWDS. This item is discussed briefly within the Bryant Report under the recommendations for terms and conditions. The actual abandonment and reclamation of the SWDS needs to be addressed in the application. If 0.75 metres of cover is proposed, then estimates of the volume, types and availability of the material to be used needs to be presented.

Part J; Conditions Applying To Construction

Part J, Item 1 of the License requires that the applicant submit to the Board, design drawings and plans stamped by an Engineer. This includes construction related to facilities for the disposal of solid waste. The assessment report prepared by BECL provides only an assessment and options for the construction/operation of a SWDS at the Boston camp. Design drawings/plans are required to be submitted.

Should you have any questions regarding this matter, please feel free to contact me at your earliest convenience.

Yours truly,

Original signed by:

David Hohnstein, C.E.T.
Technical Advisor Mining