Indian and Northern Affairs Canada | Affaires indiennes et du Nord Canada

Water Resources Division
Nunavut Regional Office
Iqaluit, NU X0A 0H0

Our File: 9545-2 / 174341
Your File: 3BM-CAP

October 1, 2007

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Re: 3BM-CAP / Hamlet of Cape Dorset / Licence Amendment Application / Pre-Hearing Conference and Technical Meeting

Indian and Northern Affairs Canada (INAC) has reviewed the Type B licence amendment application submitted by the Government of Nunavut's Department of Community and Government Services (CGS) for the construction of a new wastewater treatment lagoon, referred to as the P-Lake Wastewater Treatment Facility, in the Hamlet of Cape Dorset. Indian and Northern Affairs Canada understands that the Department of CGS is representing the Hamlet for this licence amendment application. The following advice has been provided pursuant to INAC's mandated responsibilities for the enforcement of the *Nunavut Waters and Nunavut Surface Rights Tribunal* Act (NWNSRT) and the *Department of Indian Affairs and Northern Development Act* (DIAND Act).

Indian and Northern Affairs Canada is pleased to participate in a Pre-Hearing Conference and Technical Meeting for an amendment to the Hamlet of Cape Dorset's Type B licence. In addition to the previously submitted amendment application documentation, supplemental information provided by the proponent on July 30 and August 29, 2007 have been assessed to determine whether INAC has any outstanding concerns with regard to the proposed P-Lake Sewage Lagoon design.

Indian and Northern Affairs Canada recommends that the following comments be taken into consideration when reviewing this licence amendment application:

1. On July 30, 2007, the proponent submitted a revised Microsoft Excel spreadsheet issued by the Nunavut Water Board (NWB) and a set of appendices in response to outstanding issues addressed in the July 11, 2007 meeting between the Nunavut Water Board and the proponent's consultants. Certain appendices are incorrectly labeled (i.e., Appendices IV – VIII) making review more difficult. The appendices should be labeled with those titles provided in the letter addressed to D. Filiatrault of the NWB from B. Roy of the Department of CGS on July 30, 2007. Cover pages are preferred. The incorrectly labeled appendices should be removed from the public registry and replaced with final versions.

2. The Hamlet of Cape Dorset's Type B municipal licence expired on August 31, 2007, therefore Hamlet is consuming freshwater and disposing waste without a valid licence. The proponent should submit an application for renewal or for a new licence. This application should include a plan for reclamation and abandonment plan for the existing waste water treatment lagoon(s).

3. The proponent should confirm the precise location within P-Lake Wastewater Treatment Facility's treatment process that effluent criteria specified in Section 6 of the Final Design Report will be met (i.e., 45 mg/L 5-day biological oxygen demand, 45 mg/L total suspended solids, and 10,000 fecal coliforms per 100 ml). Section 6.1 of the Final Design Report indicates that the short detention lagoon (P-Lake), wetlands area, and outfall to Telik Inlet will reduce the effluent's biological oxygen demand to meet the planned effluent discharge criteria.

4. The proponent should define the wetland that will be used to treat wastewater effluent. Information communicated in the January 2006 Final Design Report and the July 30, 2007 Appendices II and IV (*Marine Environment Assessment from Previous Work* and *Wetland Calculations and Treatment*) indicate that, in addition to the facultative lagoon, wastewater effluent will receive wetland treatment. Section 4.2.2.1 of the Final Design Report states that the outlet of P-Lake is characterized as a small channel that drains into a small wetland area. This small wetland area subsequently drains through a small channel and over a waterfall.

5. The proponent should state whether an engineered structure will be constructed at the treatment wetland's outlet to control effluent discharge. If the proponent wants to include a wetland in its P-Lake Wastewater Treatment Facility, the wetland should have controlled discharge to allow for monitoring of the quality of wastewater effluent from this last point of control.

6. More information is required on the operation of the treatment wetland. The proponent should provide a plan which describes how the treatment wetland will be operated. In addition to any other relevant information concerning the operation of a treatment wetland, the design of engineered effluent retention structures and decant procedures for both the facultative lagoon and the treatment wetland should be described. For example, the proponent should inform the NWB whether it has determined the hydraulic and organic loading rates applicable to its wetland treatment system. The hydraulic loading rate is a critical design parameter and the respective organic loading rate should be assessed to ensure that there will be sufficient aerobic conditions to promote microbial activity necessary for the treatment of wastewater effluent. Doku and Heinke reference a hydraulic loading rate of 100 to 200 cubic metres / hectare per day and a maximum organic loading rate of 4 kilograms BOD_5 / hectare per day for the treatment of secondary effluent

using natural wetland systems in northern conditions.[1] Consultation with treatment wetland research would benefit the design of an effective wastewater treatment facility.

7. Sludge management practices should be included in an Operations and Maintenance Plan specific to the P-Lake Wastewater Treatment Facility. The frequency of sludge removal, the method of removing sludge, and the disposal location for removed sludge should be communicated within this Plan.

8. The July 30, 2007 Appendix II, Marine Environment Assessment from Previous Work, indicates that monitoring studies will be undertaken to determine whether the treatment wetland area will effectively treat the wastewater. The proponent should describe the monitoring studies (e.g., water quality sampling, vegetation studies, climate assessments) and outline how the information will be provided to the Nunavut Water Board and the INAC Inspector.

9. The proponent should conduct a seepage analysis of the P-Lake Lagoon berms and provide this information to the Board at agreed at the July 11, 2007 meeting between the NWB and Department of CGS consultants. The AMEC Earth and Environmental Ltd. (AMEC) August 21, 2007 Geotechnical Assessment Report states that a seepage analysis was not performed because it is assumed that seepage cannot occur through a lined frozen core berm. The proponent should verify this assumption through monitoring. In the AMEC August 20, 2007 Cut-off Trench Excavation Report, 65 percent of the soil profile along the two (2) cut-off trenches was identified as consisting of predominantly of silty/clayey material with the approximate 2 metre trench depth. The remaining 35 percent consisted of bedrock. The stability of the lagoon's berms may become seriously jeopardized if water begins to pass through the underlying silty/clay material (e.g., formation of ice lenses and piping through the berm foundations).

10. The proponent should confirm the retention capacity of the P-Lake Lagoon. Section 5.2 of the Final Design Report states that the lagoon will have a 3.5 m operating depth, 1 m freeboard, and 0.5 m sludge retention area at the lagoon's base. The berm height will be 5 metres. This information contrasts with what is presented in section 3.1.1.3 of the AMEC August 21, 2007 Geotechnical Assessment Report which indicates that the lagoon will have a water depth of 5.4 m after 12 months of filling. INAC recommends that a 1.0 m freeboard become a condition of the licence amendment.

11. The proponent should provide further clarification of its determination that a talik will not form under the lagoon. Section 3.4 of the AMEC August 21, 2007 Geotechnical Assessment Report states that a talik will not form due to the gradual filling of the

[1] Doku, Isaac A. and Heinke, Gary W. Potential for Greater Use of Wetlands for Waste Treatment in Northern Canada, Journal of Cold Regions Engineering Vol. 9, No. 2, June 1995.

lagoon. The proponent should explain the effects of unfrozen ground saturated with water beneath a typical wastewater treatment lagoon.

12. Licence Surveillance Network Program (SNP) sites used to monitor water quality should be determined by the Nunavut Water Board in consultation with an INAC Water Resources Officer. However, INAC recommends that the proponent provide a set of detailed descriptions of suitable SNP site locations to the NWB and the INAC Inspector. These descriptions should include the site coordinates, purpose, and photographic documentation of each SNP site. Following a site inspection, the actual SNP sites will be finalized by the INAC Water Resources Officer and subsequently, the proponent should provide a final document to the NWB which describes each SNP site. These sites should monitor the outflow from the treatment area and if any seepage is occurring below the berms. Estimates of volumes of water, both released from the lagoon and below the treatment area, should be included in the annual reports submitted to the NWB.

Indian and Northern Affairs Canada requests notification of any changes in the proposed project, as further review may be necessary. Please contact me should you have any questions or comments with regards to the foregoing. I can be reached by telephone at (867) 975-4555 or by email at AbernethyD@inac-ainc.gc.ca.

Regards,

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