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Your file - Votre référence  
NWB1JER0410/TR/D8  
Our file - Notre référence  
**9545-1-1-JER-R**

May 25, 2005

Ms. Phyllis Beaulieu  
Manager of Licensing  
Nunavut Water Board  
Box 119,  
Gjoa Haven, NU. X0B 1J0

Dear Ms. Beaulieu,

**Re: Jericho Waste Water Treatment Plant Design Plan**

Thank you for providing INAC with an opportunity to review the above-mentioned plan submitted by Benachee Resources Inc. on April 14, 2005, as required by Part D, Item 8 of Water Licence NWB 1JER0410. This letter summarizes the comments provided by INAC's technical and scientific review team.

INAC's critique is provided in two parts: "General Comments", which provides a brief summary of INAC's overall impression of the plan, and "Specific Comments" which outlines our reviewer's observations related to specific sections of the AEMP.

**General Comments**

The April 2005 Waste Water Design Plan provides a general overview of the wastewater plant alignment, collection system configuration, process performance expectations, effluent management and residuals management. More detailed information has been provided on the mechanical components of the treatment process incorporating the aerated equalization tank, Rotating Biological Contact (RBC) unit, effluent clarifiers, multi-media filter, U.V. disinfection unit, and aerobic sludge digestion area. A professional engineer has reviewed and approved the mechanical aspects of the treatment process (only).

The Waste Water Design Plan submission generally meets the specific water license requirements (as defined in Schedule D, Item 8) with some minor exceptions. Inconsistencies in design criteria, noted in the specific comments below, should be corrected in a revised submission. Limited information is provided with regard to treatment efficiency expectations for the expected range of operating conditions and site monitoring. This could be rectified in a revised submission. Alternatively, much of this information could be incorporated into the "Operation and Management Plan for the Waste Water Treatment Plant" that must be submitted within one year of the effective date of the water license (Part H, Item 5).

The following provides overview recommendations from INAC's technical advisors, regarding the Waste Water Design Plan submission:

1. Correct inconsistencies in treatment unit design parameters and effluent criteria.
2. Provide additional information on treatment process performance expectations over the range of anticipated influent flows, concentrations, and temperatures. Some consideration may be given to incorporating this information in the "Operation and Management Plan for the Waste Water Treatment Plant"
3. Provide additional information on residuals management characteristics, expected volumes, and disposal practices (ie. digested sludge, grease collected within grease traps). Some consideration may be given to incorporating this information in the "Operation and Management Plan for the Waste Water Treatment Plant".
4. Develop an effluent monitoring plan for the periods including wastewater treatment plant commissioning, plant construction, plant operations, and during wastewater treatment upsets. This monitoring plan should be incorporated in the "Operation and Management Plan for the Waste Water Treatment Plant"

## **Specific Comments**

### **Section 1 (Introduction), pg 1**

It is noted in the submission that the treatment system is designed for 200 people. Nevertheless, according to the Mine Plan (PDF file 050223 NWB1JER0410Mine Plan IEDE, report dated February 23, 2005; page 12):

*"Peak occupancy (of the camp) should not exceed 120 during construction and pre-stripping. During the operations phase, occupancy numbers should be on the order of 70 - 90 people."*

The impact on treatment efficiency of operating the system at 50% (or less) of design capacity is not discussed in the submission. The submission also does not discuss the impact of variable loading on treatment plant performance. This should be addressed, and could potentially be incorporated within the "Operation and Management Plan for the Waste Water Treatment Plant".

### **Section 2.1 (Plant operation), pg 1-3**

- Wastewater influent temperature is a critical design parameter for ensuring that the treatment process will achieve the desired effluent criteria. It is noted that the lift station tank is equipped with a submersible heating element for winter operations. Confirmation is required that sufficient heat input will be provided to meet minimum influent temperature criteria (11°C) noted in the attached drawing A1-K17550-10455. This could potentially be incorporated within the "Operation and Management Plan for the Waste Water Treatment Plant".

- There is no discussion regarding operation of a chemical dosing pump for phosphorus treatment. The attached drawing A1-K17550-10455 indicates a metering pump and dosing tank for *"future use"*. This section of the submission should discuss whether the chemical dosing facilities would be used on a routine basis. Details regarding the operation can be incorporated within the Operation and Management Plan for the Waste Water Treatment Plant".
- Sludge digestion and management procedures are briefly described. Expected sludge and biosolids characteristics (volumes, moisture content, etc.) and detailed management procedures should be outlined within the "Operation and Management Plan for the Waste Water Treatment Plant".
- It is noted that the kitchen will have a grease trap to prevent excess grease from entering the RBC unit. Discussion of disposal procedures for collected grease should be incorporated within the "Operation and Management Plan for the Waste Water Treatment Plant".

## **Section 2.2 (Effluent discharge), pg 3-4**

It is noted that very strong sewage is occasionally encountered and will cause a *"subsequent reduction in treatment efficiency"*. As noted in an earlier comment, the submission does not discuss the impact of variable loading on treatment plant performance. This should be addressed, and could potentially be incorporated within the "Operation and Management Plan for the Waste Water Treatment Plant".

## **Section 2.3 (Effluent Characteristics), pg 4**

- The effluent criteria discussed in this section are not consistent with those criteria included in the attached drawing A1-K17550-10455. It is assumed the following effluent criteria (from the drawing) are correct:
  - BOD: 10 mg/L
  - TSS: 20 mg/L
  - Phosphorus: 1.0 mg/L
  - Fecal coliforms: 10 CFU/100 ml

These criteria should be confirmed in a revised submission. The use of the qualifying term, "average", associated with the effluent design criteria in the attached drawing, should be defined.

- The effluent criteria for BOD and fecal coliforms are at or below PKCA effluent criteria (specified in the water license for average and maximum conditions). The TSS effluent criterion (20 mg/L) is higher than the average PKCA effluent TSS standard (15 mg/L). Given the small relative flow contribution of wastewater effluent to total expected flow to the PKCA, the TSS effluent criterion also appears reasonable.

## **Section 3. (Construction Schedule), pg 4**

An implementation schedule has been provided, consistent with the water license requirements.

#### **Section 4. (Contingency Plan), pg 4**

It is noted that during a process upset, " ... sewage waste would be trucked directly to the head of the PKCA and discharged into the rock fill that forms the East and/or Southeast dyke system". It is not clear that the seepage/leachate associated with this type of discharge would be contained within the PKCA. This should be confirmed, and further detailed operational and monitoring plans related to treatment process upsets provided within the "Operation and Management Plan for the Waste Water Treatment Plant".

#### **Attachments (Layout Drawings).**

These two drawings provide a broad overview of the camp and wastewater treatment plant layout, satisfying the requirements of the water license (Schedule D, Item 8).

#### **Attachments (Summary of System Components)**

This attachment provides an overview of system components that is inconsistent (flow, effluent quality, media area) with the attached drawing A1-K17550-10455. It is assumed the drawing information is correct. The summary of system components should be corrected in a revised submission.

#### **Attachments (Design Criteria)**

This attachment provides design criteria that are inconsistent (flow, influent temperature, effluent quality) with the attached drawing A1-K17550-10455. It is assumed the drawing information is correct. The summary of design criteria should be corrected in a revised submission.

#### **Attachments (Engineer approval)**

This attachment provides professional engineering approval of the treatment units, as required by the water license. The approval only addresses the mechanical aspects of the system. As noted earlier, confirmation of process efficiency under the expected range of operating conditions is a requirement of the water license. This information could be provided within the "Operation and Management Plan for the Waste Water Treatment Plant".

#### **Attachments (Additional General Arrangement drawing)**

A (faintly legible) drawing was attached. Nevertheless, the drawing does not appear to be relevant to the wastewater treatment facilities proposed for the Jericho Diamond Mine. If such is the case, this drawing should be removed from the revised submission as it generates confusion.

### **Attachments (General Arrangement drawing, A1-K17550-10455)**


The design criteria and process unit specifications contained on this drawing are not consistent with the design criteria and specifications listed on pages 8 and 9 of the submission. Please clarify which of the two is the correct version.

### **Miscellaneous (Wastewater Effluent and PKCA Monitoring)**

The submission does not address monitoring of wastewater effluent (monitoring during construction is a requirement of the water license; Schedule D, Item 8). The following monitoring recommendations should be considered:

- Wastewater effluent: Schedule K, Table 3 of the water license does not specify monitoring requirements of wastewater effluent during construction or operations. For operational control purposes, it is recommended that routine parameters, nutrients<sup>1</sup> and biological parameters<sup>1</sup> be measured on a monthly basis in wastewater effluent. Flow measurement is also recommended to determine relative loading of contaminants to the PKCA. Wastewater effluent monitoring plans should be incorporated within the "Operation and Management Plan for the Waste Water Treatment Plant".
- PKCA discharge: Schedule K, Table 2 of the water license specifies the monitoring of turbidity and TSS only during construction. Since wastewater effluent will be discharged to the PKCA during this time, consideration should be given to also monitoring nutrients<sup>1</sup> and biological parameters<sup>1</sup> on a monthly basis during construction.

This concludes INAC's comments. Should the NWB or Benachee Resources Inc. have any questions or require clarification on any of the comments in this review, do not hesitate to contact the undersigned.



Robert Eno  
Water Resources Coordinator

c. Greg Missal - Tahera Diamond Corporation

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<sup>1</sup>Specific parameters defined in Schedule K of the water licence