Preliminary Technical Review
Completed by: Joe Murdock
Date: May 26, 2005
Licence: NWB1JER0410 Part D, Item 8 Wastewater Treatment Plant

PART D: CONDITIONS APPLYING TO CONSTRUCTION

8. The Licensee shall submit to the Board for approval, a detailed Wastewater Treatment Plant Design Plan at least sixty (60) days prior to the construction of the Site Water Management Facilities, including drawings stamped by an Engineer. The plan shall be developed in accordance with Schedule D, Item 8.

Document Dated April 2005; Received by NWB April 14, 2005

Schedule D - Conditions Applying to Construction

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8. The detailed design report for the Wastewater Treatment Plant (WWTP) referred to in Part D Item 8 of the Licence shall include but not necessarily be limited to the following:

a. Implementation Schedule;

A construction schedule has been included on page 5 of the WWTP report. The reviewer would suggest further detail on the start up process of the wastewater treatment process such as a monitoring timeline. A better understanding on how the licensee will monitor the plant start up would be appreciated (Please see point f.).

b. Design criteria and parameters;

The reviewer would like to better understand the computation of average water use per day per capita. The licensee indicates that they are to install a *"water and sewage treatment facility capable of handling at least 200 people"*. The licensee has specified the use of a P.J. Hannah Biodisc RBC rated for a daily flow of 22.7 m^3. The reviewer believes the expected daily flow is grossly underestimated. Under the assumption that a single occupancy arrangement of 92 people is in order a requirement of only 247L per capita per day would account for everything ranging from showering, laundry, cleaning and personal use. The reviewer believes a more accurate portrayal would be 400-500L per capital per day. This would equate to 80-100 m^3 per day for the camp. A value of 95 m^3/day is listed on the design drawings. INAC has pointed out this inconsistency.

The reviewer would also like explanation into what "normal operating conditions" are and an explanation into when there is derivation from normal conditions how the system would behave with respect to effluent concentrations of the constituents (BOD_5, SS, etc.).

c. Overall system components;

As treatment efficiency is controlled by temperature the reviewer would recommend the inclusion of a brief statement outlining what provisions are made in insulating the housed WWTP. A simple statement of insulation type

(polyethylene spray application, rigid etc.). The specified 'R' value could also be included to better understand building insulation and ensure temperature remains above the minimum 13° C indicated on the design drawing.

d. Site investigation and alignment;

With regards to examining the location for WWTP placement the reviewer suggests the inclusion of a possible explanation into why the site location was chosen. Site location may be based on a conglomerate of issues identified in a site investigation. An explanation into why the location of the proposed sewage discharge outfalls is also advised.

e. Treatment efficiency expectations;

The treatment efficiency expectations were not directly expressed but an influent and effluent constituent quantity was included.

The reviewer would encourage the licensee to include the following design information:

1. Design RBC Revolutions per minute.
2. The location of baffles if included (legible drawing)
3. How temperature is to be monitored during treatment process.
4. The staging if any (legible drawing).
5. Design loading criteria as specified by the manufacturer (soluble BOD?)
6. The flow orientation with respect to RBC shaft location (Parallel? Perpendicular? Tapered? Step fed?) (legible drawing)
7. Side water depth (depth of submergence)
8. Design specifications for primary + secondary clarifiers (legible drawing)

The reviewer does understand that some of this information could be included in the Operation and Management Plan for the Wastewater Treatment Plant (Part H, Item 5 of the licence) submission. Point 2, 4, 6, 7, and 8 above could be satisfied in a legible plan of the sewage building. The reviewer feels that this plan is necessary and should be included in this WWTP design plan. Removal efficiency is a function of temperature, treatment configuration (how flow is to be processed and flow behaviour within the RBC system), and oxygen transfer capability. Of course a review completed by a professional engineer experienced in wastewater facility design would identify and give explanation to some of the above. INAC recommends a review by an engineer in the field of WWT.

f. Site monitoring to be done during construction;

There appears to be an absence of detail with regard to what site monitoring will be completed during construction. What type of monitoring program will be in place during construction (COD, Solids Determination, Phosphorus, and Coliform Analysis?). What is the frequency of the site monitoring? What independent laboratory will be hired and how will they be reporting to the licensee/regulators? How frequent will the laboratory report? Will raw data be

contained within the appendices of the Operation and Management Plan for the Wastewater Treatment Plant (Part H, Item 5)? How will the monitoring process play out with respect to time? If sufficient difficulties are encountered during start up (as indicated by the monitoring process) will the licensee carry though a process similarly to that listed for a process upset (sewage waste trucked directly to head of PKCA)?

General Comments

A legible site plan of the actual plant layout should be included in this report. This can remedy some of the issues contained within this PTR.

INAC to correct 2nd paragraph (page 1) in their review. "AEMP" should be changed to "WWTP". INAC to also correct 11° to 13° C in the last paragraph of page 2 of their review.

In paragraph 1 of Section 2.1 *Plant Operation* the licensee should understand that aerobic digestion of raw sewage does not reduce TSS but rather the filter operation and clarification. The licensee also identifies how bacteria play a vital role in converting soluble BOD to microorganisms and inorganics. The reviewer suggests the need to identify soluble and insoluble BOD levels in the influent and effluent. This can be administered during the monitoring program carried through the construction phase (Please see point f.) There seems to be a loose use of the term BOD in the report. The reviewer assumes BOD equates to soluble BOD_5. Maybe this should be identified. This may explain the discrepancy identified by INAC.

The last paragraph on page 2 of the WWTP report needs further clarity. Under overloading conditions with an RBC, anaerobic conditions preside towards the biofilm-disc interface. Here H_2S diffuses towards the outer biofilm layer where it will partner with a filamentous bacterium and oxidize. This will form a biofilm (characteristically white) that is difficult to sheer and slough. This will disrupt the system. Once again this may be indicated in a report by an engineer practiced in wastewater as suggested by INAC.

The reviewer would suggest the inclusion of pipe diameters and grade used in the gravity flow pipeline system. Further explanation may be needed to clarify "sufficient diameter" found in paragraph 2 of page 4. The reviewer would suggest specifying a quantitative measure.

The last sentence in the third paragraph on page 3 of the report should read "An added benefit…" rather than and "An add benefit…".

The reviewer assumes the "*single 5 cm drain line*" describes the drain diameter (the first sentence found on page 4). Further clarity may be in order.

The following change should be made in the phrase:

"The PKCA is part of the water license and is permitted as a receiving body for **adequately treated** effluent discharge"

RECOMMENDATION:

Sr. Tech. to evaluate and comment as necessary. The *Operation and Management Plan for the Wastewater Treatment Plant* (Part H, Item 5 of the licence) could fill in most of the missing blanks listed in this review. A review must be conducted by a P.Eng with experience in wastewater treatment layout and efficiency. This review to be obtained by licensee as recommended by INAC.

Regulatory Timeline		
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