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NWB1JER0410/TR/D4  
Our file - Notre référence  
**9545-1-1-JER-R**

November 8, 2005

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

Dear Ms. Beaulieu,

**Re: Jericho Project, C1 Diversion Design Drawings.**

Thank you for providing INAC with an opportunity to review the above-mentioned plan, dated August 30, 2005, and prepared by EBA Engineering Consultants Ltd. for Benachee Resources Inc. (herein referred to as "Benachee").

These documents were submitted to the NWB by Benachee on August 30, 2005 as a requirement of Part D, Item 2; and Part D, Item 16 of water license NWB1JER0410.

It should be noted that INAC's review and acceptance of these drawings does not in any way, release Benachee from its obligation to comply with the spirit and intent of the Water Licence condition under which the drawings were submitted. Benachee is ultimately responsible for correcting any deficiencies in the drawings and/or any liabilities resulting from these deficiencies, which may arise during the course of the project.

INAC's scientific and geotechnical engineering advisors have reviewed the C1 Diversion Geotechnical Design documents prepared by EBA Engineering Consultants Ltd. (EBA) and submitted by Benachee. The documents include:

- C1 Diversion- Geotechnical Design Report, dated August 30, 2005, including figures and photographs.
- Appendix A- C1 Channel Description Excerpt from Jericho Diamond Project Aquatic Studies program (1999) provided by Mainstream Aquatics Ltd. (formerly R.L. & L. Environmental Services Ltd.).
- Appendix B- Borehole Logs from 2003 SRK Technical Memorandum "A", Supplemental Geotechnical Data.
- Appendix C- Drawings, marked "Issued for Construction":
  - Number 1100060006-01a Diversion Channel Site Plan (with air photo base), Rev. 0, dated July 28, 2005.

- Number 1100060006-01b Diversion Channel Site Plan, Rev. 0, dated July 28, 2005.
- Number 1100060006-01c Diversion Channel Profile and Sections, Rev. 0, dated July 28, 2005.
- Number 1100060006-02 Diversion Channel Profile and Sections, Rev. 0, dated July 28, 2005.
- Number 1100060006-03 Diversion Channel Fish Pool Plan and Details and C1 Diversion Culvert Details, Rev. 0, dated August 26, 2005.
- Appendix D- C1 Diversion Channel Drawings from 2003 SRK Technical Memorandum "G", Water Management Facilities Design Criteria.
  - Dwg. 1CT004.06-W-2. Rev. A, C1 Diversion Plan and Cross Sections.
  - Dwg. 1CT004.06-W-3, Rev. A, C1 Diversion Channel Details.
- Appendix E- Liner Construction Specifications.

In addition, INAC's expert reviewers referred to INAC's Intervention for the Water Licence submission, dated November 30, 2004, for additional context in this review.

In preparation of these comments, INAC's advisors have also reviewed the comments prepared by Acres International for the Nunavut Water Board, dated October 20, 2005. In general, INAC concurs with the review comments and recommendations made by Acres to the NWB, and therefore will not repeat similar comments here.

At the time of compiling this submission, INAC's hydrologist has not yet provided his comments with respect to the hydrology/hydraulic design aspects of the C1 Diversion Channel Design Drawings. If the comments are received within the next few days and if the NWB is agreeable, we will present these comments as an addendum to this submission.

In the meantime, INAC has the following comments to offer:

### **General Design Comments**

The design concept presented by EBA represents a modification to the original design concept prepared by SRK in the Water Licence application. Instead of cutting a ditch, as recommended by SRK, EBA is proposing to construct an embankment to minimize the amount of excavation required. The proposed diversion channel consists of a relatively shallow low-flow channel excavated into the thaw-stable active layer soils, with higher flows contained within an embankment constructed on top of the natural ground surface. Although INAC is in favour of the EBA concept, the design documentation lacks discussion on how the flow will be contained within these structures, specifically:

- Seepage through the fill pad and Carat Lake road embankment at the inlet. The original creek channel flows under the road in this area. There is no discussion regarding the depth of the thawed zone along the creek channel and the potential for seepage into the pit. Thermal analysis should be carried out to show that the road embankment will result in permafrost aggradation in the sub-grade, which is

presumably the mechanism being relied on to prevent seepage through this area.

- Seepage through the active layer soils under the Carat Lake road during low flow conditions and through the road embankment during flood conditions in Reach A. This would also require a thermal analysis.
- Seepage through the active layer soils and the insulating berm on the pit side in Reaches B and C. In addition, the analysis should consider the potentially deeper thawed zone along the former creek channel in Reach C, which connects into the pit.

With respect to the proximity of the open pit, there are several design issues relating to the diversion structures that have not been adequately addressed:

- How was the setback distance of 30 m determined? On drawing 1100060006-01b, the C1 diversion structures lie outside the 30 m setback limit. In Reaches B and C however the insulating berm on the pit side lies within the setback limit. Why the difference?
- More detail is required with respect to how the pit wall stability has been assessed in the areas adjacent to the C1 Diversion structures and how this relates to the setback distance.
- INAC concurs with EBA that constructing an insulating berm between the pit and the C1 Diversion in Reaches B and C is a good idea. From a design perspective however, it would seem that the insulating berm is more of a critical structure than the Carat Lake road, yet the road lies outside the setback limit and the insulating berm lies within the setback limit.
- The pit slopes adjacent to the insulating berm are south-facing. Has this factor been taken into account in the design of the insulating berm? There should be a discussion regarding the tie-in of the insulating berm to any thermal protection berms that may be required around the pit boundary to prevent permafrost degradation in the pit slopes.

### **Drawings and Specifications**

- There should be a legend explaining what the different dashed and solid lines represent with respect to drainage features in the pit area on Drawing 1100060006-01b.
- Typical water levels should be shown on all the channel sections.
- On Drawing 1100060006-02, Detail 4- should there be an anchor trench for the geotextile? In Detail 5, there is no constraint on the elevation of the top of the granular fill. The underlying sand and gravel till fill is shown as "0.2 m minimum."
- On Drawing 1100060006-03, why is the concrete cutoff wall not shown as being cast onto the excavated bedrock surface? The "CONCRETE CUTOFF WALL AND BACKFILL DETAIL" in the top right corner of the drawing shows the backfill as "Sand

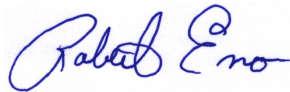
and gravel till", which is inconsistent with the "NOTES" section in the lower right corner of the drawing, where the backfill is to be 50 mm minus crush within 0.5 m of the culvert.

- In the "C1 DIVERSION CULVERT-INLET PROFILE" detail in the lower right corner of the same drawing, it is not clear what the dashed line in the sub-grade is supposed to represent. Is the dry frozen till supposed to be removed?

With respect to the specifications, only those for the liner installation have been provided. There should be specifications covering:

- Foundation preparation.
- Water handling/diversion during construction
- Soil excavation, including saving any topsoil for reclamation purposes.
- Rock excavation.
- Rock foundation preparation for cutoff wall construction.
- Fill materials and construction- including roads and berms.
- Soil and rock disposal
- Concrete and formwork
- Instrumentation

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