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Our File: **4702 025 050 010**

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Re: Tahera Diamond Corporation Water Licence Application Addendum – Outstanding Technical Issues

Tahera Diamond Corp. submitted an addendum to the Nunavut Water Board (NWB) dated Oct. 8, 2004 which seeks to clarify issues which had not been adequately in conformity with the NWB final guidelines. On behalf of Environment Canada (EC), Colette Meloche and I have reviewed the addendum and other file materials, and have noted outstanding issues in the following areas:

Issue 19 of EC's NIRB submission: Water Quality / Nutrient Predictions

- Deficiencies in nutrient, TDS and pH predictions were still outstanding after the NIRB public hearing.
- SRK Consulting, on behalf of Tahera Corporation, provided information related to these issues to Environment Canada in May 2003. This information and some additional information was provided in the water license application.

Nutrients:

Phosphorus:

- SRK stated based on the results of sensitivity analysis completed to model phosphorus concentrations that could occur under "upset" conditions in the first 2 years of mine operation, concentration levels could increase from 0.08 to 0.3 mg/L. Given that the Jericho River had ultra-oligotrophic concentrations of TP at 0.003 to 0.005 mg/l, it seems doubtful that increasing the discharge concentrations to 0.3 mg/l under "upset conditions" would not result in significant increases in the P concentrations in the receiving environment, as this would be approximately at 100 fold increase over existing baseline conditions. Environment Canada recommends that concentrations of TP in the receiving environment be monitored to verify predictions.

Ammonia:

- In response to EC's concerns regarding the underestimation of loss rates from the total explosives used, SRK Consulting provided clarification to EC in an email to Anne Wilson/Colette Meloche dated May 21/04. While EC accepts that dry mines have significantly less loss than wet mines, EC still has concerns that even with the application of the peak rate of loss to all nine years of production, loss rates of 0.73% for waste rock and 0.65% for ore is an underestimation. Environment Canada recommends that ammonia concentrations originating from both the waste rock piles and ore piles be monitored to ensure that the predictions are correct and the receiving water quality is protected.

TDS:

- Section 4.1 of Attachment N5, "Review of Total Dissolved Solids in Proposed Discharge from the Jericho Diamond Project, NU (AMEC 2004) of Appendix U: Technical Memorandum N "Estimates of Receiving Water Quality for the Jericho Project, NU" of the water license application discusses the loadings of major ions in the effluent. As there is no CCME water quality guideline for chloride, AMEC has used the site specific value of 180 mg/L developed for the Ekati mine as the threshold for the protection of aquatic life. AMEC states that although concentrations in the Jericho PKCA exceed this effects level by 4-fold (up to 650 mg/L for chloride), concentrations will rapidly decrease due to dilution once the discharge reaches Lake C3. Magnesium concentrations are also expected to exceed effect levels by a factor of 1.6. Environment Canada notes that concentrations of licensed parameters will be measured at the end of pipe, and recommends that monitoring of downstream concentrations also be implemented to ensure there are no significant ecosystem-level changes in Stream C3 as a result of these elevated levels.
- Section 4.4 "Other Effects" of Attachment N5, "Review of Total Dissolved Solids in Proposed Discharge from the Jericho Diamond Project, NU (AMEC 2004) of Appendix U: Technical Memorandum N "Estimates of Receiving Water Quality for the Jericho Project, NU" of the water license application states that while the concentrations of TDS predicted in the effluent are different from the concentrations naturally present in the affected lakes, they are well within the concentrations associated with water bodies supporting healthy aquatic ecosystem. EC anticipates that the increasing concentrations of TDS will result in ecological shifts in the communities present in the affected lakes/streams in the Jericho watershed. A thorough monitoring program needs to be developed to examine these potential changes. The monitoring program should be developed (as described in EC's original recommendation Issue 23) and implemented. This issue is still outstanding from the guidelines conformity review.

pH:

- The pH of the effluent is predicted to be 8.84 in the Jan 2003 FEIS (Table 5.6, Appendix D.2.1) based on leach tests performed by SRK Consulting. However, in Section 4.1 of Appendix U: Technical Memorandum N "Estimates of Receiving Water Quality for the Jericho Project, NU" of the water license application, the pH of the discharge from the PKCA is predicted to be 8.1 Environment Canada requests clarification regarding why predicted pH value of the effluent discharge has decreased.

General Comments on Predictions/Proposed Discharge Limits:

- Tahera Corp. has proposed site specific receiving water quality objectives for aluminum, cadmium, copper, TDS and nitrite which are based on dilution modeling and maintaining specific minimum dilutions. In general, the receiving environment objectives are reasonable, but Environment Canada also notes that water quality parameters must be measured at end of pipe for compliance with Section 36(3) of the *Fisheries Act*.
- Section 4.1 of Appendix V: Technical Memorandum O states that discharge limits for pH, TSS and phosphorus were not developed following the same method that was used for the other parameters of concern. Rather, the discharge limits for pH, TSS and phosphorous were determined by adopting the limits established for the Ekati and Diavik diamond mines. Were site specific issues taken into consideration when establishing discharge limits for these parameters or where the other license limits accepted prima-facie?
- Section 2.3 of Attachment O1 of Appendix V: Technical Memorandum O provides a discussion regarding data that indicates that the proposed discharge criteria for copper (4 μg/L) was shown to be exhibit chronic toxicity to *B. calyciflorus* (a rotifer), EC recommends that rotifer species be included in the aquatic biota monitoring program, as they have been reported to be present in Lake C3 and could provide an important dietary component for larval fish.
- Section 3.4 of Attachment O1 of Appendix V: Technical Memorandum O states that proposed receiving water objective for cadmium (0.17 ug/L) should not be set any higher than this because of the sensitivity exhibited by *H. gibberum* to cadmium. *H. gibberum* composes a significant component of the zooplankton biomass of Lake C3 and therefore is a major component of the diet of fish. However, AMEC goes on to state that if meeting this discharge limit proves problematic, additional investigations could be conducted to determine if a higher guideline could be implemented. Environment Canada does not recommend raising this level any further, as it is already well above CCME guidelines and could impact the aquatic ecosystem.
- Section 4.3 of Attachment O1 of Appendix V: Technical Memorandum O discusses the site specific factors affecting aluminum toxicity. It is stated that the site specific value proposed (0.16 mg/L) is likely conservative due to the mitigating effects of silicates and neutral pH on aluminum toxicity. Environment Canada recommends that a monitoring program be developed to determine the extent that these mitigating effects come into play, given the relative absence of data regarding aluminum toxicity at mid-range pH levels.

NOTES:

- Section 1.2 of the main water license application states that the settling pond dam and associated spillway located downstream of the PKCA have been removed from the project design and are now a contingency element. In its place, the construction of a divider dyke within the PKCA, and the option of constructing addition internal dykes within the PKCA in the event that suspended solids are a problem, are proposed to address the issue of the suspended solids. However, Section 3.2 (p. 28) states that the PKCA has an emergency spillway to prevent overtopping of the dam. Environment Canada requests clarification to determine if the spillway is part of the design or not.
- Section 2.0 of Appendix L “Wastewater Treatment Plant Operations Plan” provides the technical specifications for the RBC waste water treatment plant that is proposed to be used at the Jericho Site. These technical specifications are then compared to the Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest

Territories (1992). Tahera should compare the technical specifications for the plant to the Guidelines for the Discharge of Treated Municipal Effluent developed by the Nunavut Water Board for Nunavut. Tahera should also note that the NWB guidelines are in the process of being updated.

ADDENDUM

- Section 4.1(i)(iv)4 of the addendum describes PKCA closure cover materials proposed. A recent review of the Ekati operations noted that because of the clay minerals in coarse kimberlite, it will weather down to fine processed kimberlite texture over time. For this reason, it is likely that the top cover layer will need to be greater than 0.3 m in depth.
- Pre-impact data for dissolved oxygen should be collected over this next winter.
- Section 4.3(b)(i)6(c) of the Addendum indicates that the use of flocculants is being proposed for settling in the tailings drop box (presumably this is in the plant?). Previous correspondence (Appendix E) indicates that flocculants would not be used in the tailings pond, but if needed would be applied to recycled water in the process plant. Will this be feasible if only seasonal water recycling is done?
- Section 4.5(c)(ii)1.(c) supplies loading calculations, but notes that isopleths would involve generating over 240 plots for each scenario. EC accepts that this could be onerous to generate and to review, and notes that we will expect validation of numerical predictions as monitoring data become available over time, which will allow tracking and predictions of concentrations.

Please note that this is not necessarily an exhaustive review, as there has been limited time to review the full file materials. More specific comments on the proposed discharge criteria values will be provided prior to the public hearings. Unfortunately Environment Canada will not be able to send a representative to the upcoming technical meetings, but we are planning to attend the final hearings in December if accommodation and/or transportation work out.

Please do not hesitate to contact me at (867) 669-4735 with any questions or comments regarding the foregoing.

Yours truly,

Anne Wilson
Water Pollution Specialist

cc: Steve Harbicht (Head, Assessment & Monitoring, EPB)
Mike Fournier (Environmental Assessment Coordinator, EPB)
Colette Meloche (Environmental Assessment Specialist, EPB Iqaluit)
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