Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

Water Resources Division
3rd Floor Bellanca Building
PO Box 1500
Yellowknife, NT

File: MV2003L2-0013
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BHP Billiton Diamond Inc.

November 19, 2007

To: Zabey Nevitt
Executive Director
Wek'eezhi Land and Water Board
c/o Box 2130
Yellowknife, NT X1A 2P6

Dear Mr. Nevitt:

Re: Interim Closure and Reclamation Plan for BHP Billiton Diamond Inc. EKATI - Section 3 Comments

Indian and Northern Affairs Canada - Water Resources Division (INAC-WRD) has conducted a review of Section 3, in particular the relevant Sections of Chapter 6 (6.4 to 6.6 and Appendix D). These Sections provide information regarding closure of the Long Lake Containment Facility (LLCF), Dams Dykes and Channels, and Buildings and infrastructure, respectively. Water Resources also retained John Brodie to review Section 3, (attached). INAC-WRD provides the following comments.

Chapter 6.4 Processed Kimberlite Containment Facilities
Permafrost

As the tailings begin to freeze from the top down, the freezing front will continue to release solutes in advance of the freezing front. A progressively higher concentration of solutes will be present in the pore water. Solutes may affect surface water quality. There is also a likelihood that the pore water will build up pressure as it is forced against bedrock or pre-existing permafrost. Increased pore water pressure can lead to the movement of solute-rich pore water into surface water and the deformation of the tailings. Due to these concerns, INAC believes that more information regarding the freezing of the fine tailings and

associated water should be provided. Questions that should be addressed include:

- What is the freeze point depression of the pore water?
- What is the concentration of solutes (at 25 cm intervals) through the profile of unfrozen/frozen tailings to the freezing front?
- What is the water quality, water pressure, and depth (distance from surface) of the pore water?
- There is a clear, positive correlation between the height of vegetation, snow depth and ground temperature. Taller vegetation is associated with deeper snow, and increased ground temperatures. BHPB has indicated that it intends to revegetate the tailings; however, freezing is the chosen method of tailings containment. The potential rise in ground temperature as a result of revegetation should be further investigated.

These questions are critical in determining the effect the pore water will have on the water quality of small, relatively shallow ponds that are expected to exist in Cells A and C which will ultimately drain into Cell E and the receiving environment. Reclamation research related to the Long Lake Containment Facility, identified in Figure 65 (p. 219), should also focus on the thermal evolution of the processed kimberlite tailings, including pore water expulsion, pore water pressure, and the establishment of permafrost.

Table 57 Closure Objective for PKCF (LLCF)

The criterion listed in the original table (p. 215), indicates that the goal is for permafrost to aggrade into the processed kimberlite. Although INAC believes that this single criterion is inadequate on its own, the revised table makes no reference to permafrost or any criteria for ensuring permafrost has successfully aggraded. Additionally, there is a need to consider pore water development and its constituents, due to its potential impact on surface water quality as outlined in our previous comment.

Table 58 Phase 1 Closure Activities

BHPB indicates that closure of Phase 1 Pond is scheduled for 2008 and will include post closure activity monitoring. Will ground temperature profiles be part of the monitoring program to determine the effect of the coarse rock cover on the ground temperatures? Will this monitoring extend into the pore water and will pore water monitoring occur?

6.4.7 Design for Closure

Page 218 refers to the rotation of processed kimberlite discharge spigots to reduce the incorporation of ice lenses and further maximize the holding capacity of the upper cells. INAC understands that the spigots are not rotated in the winter; however, it is during the winter that the majority of ice lenses form due to extreme weather conditions. How will BHPB minimize the formation of ice lenses in winter?

Figure 65 LLCF Research Study Plan

INAC feels the following issues should be address by BHPB as part of their research plan:

- the effect of revegetation on the frozen tailings should also be assessed
- the potential effect of pore water on the long term water quality should be assessed and monitored
- the potential for the cultivars to escape and spread into the surrounding native vegetation should also be studied further and, if at all possible, native species should be used exclusively for revegetation

Chapter 6.5 Dams, Dykes and Channels

6.5.3.3 Settling Facilities

What are the contingencies should the water quality at the Two Rock Settling Facility not meet discharge criteria to the receiving environment?

6.5.4.1 Dams and Dykes

This section describes a potential worst case scenario of global warming combined with the failure of the thermosyphons. It is stated that it would be hundreds of years before there would be appreciable thaw within either the core of the dam or foundation soils. BHPB should also explore the possible effects of extreme storm events (i.e. 1 in 100 or 1 in 200 year storms) both separately and in conjunction with the presented scenarios.

Table 62 Closure Criteria Dams, Dykes and Diversion Channels

BHPB should take the steps necessary and develop criteria to ensure that revegetated areas do not contribute to permafrost degradation. It is generally known that vegetation structure is positively correlated with snow depths, and that a thicker snow cover inhibits heat loss from the ground surface, leading to warmer ground temperatures.

INAC would also bring to the Board's attention that many of the same issues exist with the Closure Objectives and Criteria as identified previously. INAC has issue with the objectivity of the term "significant", the vagueness of "vegetation cover (%)" and the implied reference to current water licence effluent criteria as part of closure criteria. It is understood that BHP will be revising the plan and will be better suited to provide additional criteria as research on these items progress. However, without defined closure criteria it is extremely difficult to provide sign-off on any potential progressive reclamation, which is necessary to release the securities associated with particular mine components. Note BHPB has indicated it plans to reclaim the Phase 1 Pond as early as 2008.

INAC-WRD thanks the Board for the opportunity to provide comments. Should there be any questions or concerns regarding this review please contact Marc Casas (867) 669-2664, casasm@inac-ainc.gc.ca.

Sincerely,

Original signed by

Robert Jenkins
A/Manager
Water Resources Division

BRODIE CONSULTING

MEMORANDUM

DATE: November 16, 2007

TO: Nathen Richea, INAC Water Resources

FROM: John Brodie, P. Eng.

SUBJECT: Ekati Mine, ICRP Sections 6.4 & 6.5; Comments

Review of the Ekati Mine ICRP is divided into 4 groups. This memo relates to Sections 3 (ICRP Sec. 6.4 and 6.5 specifically). My comments are as follows:

Section 6.4 PKC Containment Areas

- In general, the modified plan to cover the exposed tailings surfaces with a blend of rock and vegetation, depending upon the tailings properties, appears to be an improvement on earlier closure plans.

- It is noted that deposition of the tailings has resulted in beaches with decreasing grain size further from the spigot points, and Extra Fine Processed Kimberlite within the pond area. The extent of this material and a characterization of its material properties is not presented in the ICRP. This material could have a significant effect on the reclamation strategy for the water interface zone with respect to construction methodology, settlement and long-term stability of the final surface. This section of the ICRP should be considered "incomplete" until this deficiency is addressed.

- Table 54 presents the LLCF historic tonnage and volumes as of the end of 2005. This should be updated as the plan is the 2007 revision.

- Section 6.4.3.1 describes the planned deposition of tailings, including the sequencing of the spigot discharge to limit tailings deposition to the thickness of the active layer. This is a good concept and should reduce the amount entrained ice. However, it will not eliminate ice entrainment in water interface zone where the depth of the active layer may be relatively thin due to the high moisture content. This is likely to be within the talik zone of the final impoundment. The potential for long-term settlement due to melting of ice in this area should be provided for in the reclamation strategy.

- In section 6.4.4.2, the reclamation strategy for the water interface zone is described. It is noted that EFPK is expected to "push up through the rock as the rock settles down to become supported by permafrost". It is not clear that there is permafrost under the EFPK material. It seems quite possible that the rock could sink completely out of sight into the EFPK. <u>This element of the reclamation strategy is unproven and there does not appear to be a precedent for how to deal with the EFPK.</u> Consideration should be given to conducting a test on a small area, say 0.5 ha, and monitoring the settlement in the spring. Testing and research is discussed in Section 6.4.9 and Table 65. No information is provided as to the specifics of the testing or when this work might be done.

- Section 6.4.4.3 addresses revegetation of the central zone. Native grasses and sedges are to be used. Considering the large areas which will be reclaimed, there should be a description of the plans which show how the native seed requirements will be met.

- Section 6.4.4.5 addresses water management. No design criteria for hydraulic structures are presented. Part 7 of Table 57 suggests that a 1:100 year design event will be applied. There does not appear to be a standard for the hydraulic capacity of internal structures within tailings ponds. The Canadian Dam Assoc. (CDA) recommends a design inflow flood between the 1:100 and 1:1000 annual probability of exceedance for low consequence structures. This applies to operational

conditions. For the post-closure condition, the lowest end of the spectrum seems inappropriate. Consideration should be given to a higher design standard for post-closure hydraulic structures.

- Table 57 summarizes the PKC closure criteria. In section 2 it is noted under physical stability that cover materials are to be safe for wildlife travel. The granitic waste rock is very sharp and angular. Construction of the covers will involve much less vehicle traffic on the top surface than occurs on the top surface of the waste rock dumps. Consequently, the tailings cover surface is certain to be less suitable for animal travel. The ICRP should describe how the surface will be prepared such that it meets the criteria.

- Table 57 summarizes the PKC closure criteria. In section 7 it is noted under biological stability that vegetation recovery capacity is to be demonstrated to recover after disturbance (fire, grazing). How will this be demonstrated?

Section 6.5 Dams, Dykes and Channels

- Section 6.5.2.1 addresses dams and dykes. The LLCF dams and dykes are described as "an integral part of the operation and closure phase of that (LLCF) facility." Reference is made to section 6.4 – PKC facility for further information. However, there is essentially no discussion or information on these structures, other than a single paragraph in Section 6.4.4.5. The ICRP describes that the remaining dykes in the LLCF will eventually silt up. It is recommended that this be further described, with emphasis on implications for long-term water levels and routing around the dykes, and evolution of thermal stability.

Section 6.6 Buildings & Infrastructure

- No comments. Conceptual descriptions provided in the ICRP are adequate at this stage of development.

Appendix D Engineering

- No comments. This section provided little additional information to supplement Vol. I of the ICRP.