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December 8, 2011

File: W2009L2-0001

Mr. Eric Denholm
BHP Billiton Diamonds Inc.
#1102, 4920-52nd Street
Yellowknife, NT X1A 3T1

Dear Mr. Denholm:

Re: Wastewater and Processed Kimberlite Management Plan Version 2.0

The Wek'èezhì Land and Water Board (WLWB) met on December 5, 2011 to consider BHP Billiton's Wastewater and Processed Kimberlite Management Plan Version 2.0, as required under Part G, Item 1 of Water Licence W2009L2-0001.

At this time, the WLWB has approved the Wastewater and Processed Kimberlite Management Plan (WPKMP) Version 2.0.

The WLWB requires that BHP submit an updated WPKMP as Version 3.0 at least 60 days prior to the deposition of fine processed kimberlite in Beartooth pit, or by July 1, 2012, whichever comes first. Prior to, or together with WPKMP Version 3.0, BHP must address the recommendations listed below:

- *Submit an updated Long Lake Containment Facility (LLCF) Water Quality Prediction Model.*
- *Submit a report on pit water quality predictions.*
- *Identify all available means, known at this time, of delaying or avoiding the use of Cell D as a contingency for fine processed kimberlite (FPK) deposition and provide some indication of the factors affecting selection of each contingency. BHP should also improve section 4.9 to make it a more systematic identification/evaluation of the uncertainties associated with FPK deposition.*
- *Considering the potentially significant impacts of depositing FPK into Cell D of the LLCF: if BHP becomes aware of the necessity to deposit FPK into Cell D, the company must notify the WLWB immediately and submit an updated, comprehensive analysis of alternatives to depositing FPK into Cell D, including the internal dike option, one year prior to when deposition is expected to begin. This will ensure that all parties, including the Board, have the opportunity to review these options and that the Board has the information it needs to approve any changes that would need to be included in an updated WPKMP.*

- *Explain the plan for any monitoring that can be accomplished prior to FPK deposition in Beartooth pit without triggering safety concerns and the FPK monitoring that will take place when the pit becomes accessible.*
- *Assess, as soon as possible, the potential to use Panda/Koala pits for FPK deposition.*
- *Explain the apparent discrepancy in planned water levels for Cell B and Cell C.*
- *Correct section 4.8.3 to read "Cell C East" rather than "Cell E East."*

Timely completion of the requirements listed above is anticipated and appreciated. Please see the attached Staff Report and Review Comment Table for further information and contact Regulatory Specialist Brett Wheeler at 867-765-4590 (brett@wlwb.ca) if you have any questions or concerns.

Sincerely,

A handwritten signature in black ink, appearing to read "V Camsell-Blondin". The signature is fluid and cursive, with a long horizontal stroke at the beginning.

Violet Camsell-Blondin
Chair, WLWB

Copied: BHP Distribution List



STAFF REPORT

| | |
|--|----------------------------------|
| Company: BHP Billiton Canada Inc. (BHP) | |
| Location: Ekati Mine (Lac de Gras) | License: W2009L2-0001 |
| Date Prepared: Nov 29, 2011 | Meeting Date: Dec 5, 2011 |
| Subject: Version 2.0 of BHP's Waste Rock and Processed Kimberlite Management Plan | |

Purpose/Report Summary

The purpose of this staff report is to present to the Board BHP's submission of the Wastewater and Processed Kimberlite Management Plan Version 2.0, for approval, as required by Part G, Item 1 of Water Licence W2009L2-0001.

Background

The purpose of the Wastewater and Processed Kimberlite Management Plan (WPKMP) is to provide a comprehensive description of the sources, types, and management of Processed Kimberlite and all other waste discharged to the Long Lake Containment Facility, the King Pond Settling Pond, the Phase 1 Tailings Containment Area, Two Rock Sedimentation Pond, or to the Receiving Environment, as well as any proposed treatment of the waste (see Attachment 3a – Map – for locations of various ponds/facilities). Processed Kimberlite means material rejected from the process plant after the recoverable diamonds have been extracted. It is divided into two fractions: (1) Coarse Processed Kimberlite with diameter greater than 0.5 mm is trucked to the Waste Rock Storage Area at Ekati, and (2) Fine Processed Kimberlite with diameter less than 0.5 mm is pumped as a slurry (with water) to the Long Lake Containment Facility. Fine Processed Kimberlite (FPK) can also be referred to as tailings, and is the focus the WPKMP, reviewer comments, and this staff report.

BHP submitted Version 1.0 of the WPKMP February 5, 2010 and it was conditionally approved in June 2010; the required revisions to were submitted in August 2010 as Version 1.1. Version 2.0 of the WPKMP was submitted to the WLWB on October 21, 2011, following a meeting organized by BHP to discuss the content of the WPKMP in Yellowknife on July 28, 2011. Version 2.0 of the WPKMP was distributed for review on Oct 26, 2011, the deadline for comments was Nov 16, 2011, and the deadline

for BHP's responses was November 23, 2011. Comments were submitted by Aboriginal Affairs and Northern Development Canada (AANDC) and the Independent Environmental Monitoring Agency (IEMA). BHP provided responses to each comment/recommendation and also provided a response letter (see Attachment 1) summarizing why, in the company's view, WPKMP 2.0 should be approved by the Board.

The attached Review Comment Table includes the comments/recommendations submitted by AANDC and IEMA, responses from BHP, and responses recommended by Board staff.

The major change in Version 2.0 compared to previous versions of the WPKMP is BHP's proposal to deposit FPK in Beartooth pit to avoid using Cell D of the Long Lake Containment Facility (LLCF). BHP's objective is to maintain Cell D as a water management pond free of kimberlite for as long as possible, although the company is unable to commit to keeping Cell D totally kimberlite-free at this time. As outlined in BHP's cover letter to the WPKMP (see Attachment 2), the deposition of kimberlite into the Beartooth pit was considered during environmental assessment and is included in the scope of Water Licence W2009L2-0001: "This Licence also entitles BHP to... deposit processed kimberlite into the Beartooth pit for the purpose of creating a pit lake..." BHP proposes a minimum 30 m depth of water over the FPK in Beartooth pit at closure; this depth was discussed during environmental assessment and the Robertson GeoConsultants Report (Appendix D of the WPKMP) considers 30 m adequate to prevent re-suspension of FPK. The separation of FPK below from clean water above will be important for achieving the closure objective of a self-sustaining aquatic ecosystem in the Beartooth pit lake.

Appendix D of the WPKMP is the *Ekati Mine 2011 FPK Deposition Alternatives Study* (Robertson GeoConsultants), which presents an evaluation of various FPK deposition options and compares them to the "current plan" (FPK deposition in Cell D, without an internal dike). The options are evaluated based on storage volume, ease of implementation, environmental impacts, closure issues, and financial costs. A summary table of the options evaluation conducted by Robertson GeoConsultants is included as attachment 3c. Appendix D provides the technical basis for the revised FPK deposition plans that are proposed by BHP in WPKMP Version 2.0.

BHP has also provided a conformity table identifying where in the WPKMP document the information requirements of Part G, Item 1 of the Water Licence are addressed (see Appendix A of the WPKMP included as attachment 4).

Discussion

Comments on the WPKMP Version 2.0 by both AANDC and IEMA were thoughtful, thorough, and very helpful to Board staff. Overall, Board staff are of the opinion that BHP's responses adequately address the concerns raised by these two review organizations.

General Discussion

AANDC's review comments raise several concerns regarding the use of Beartooth pit for FPK deposition, including: monitoring during deposition, the instability of the pit walls, contingency plans for FPK and water management, pit water quality and closure and reclamation issues. AANDC summarizes their recommendation as follows (see AANDC comment 1 in the attached Review Comment Table): "...given the uncertainties related to depositing FPK into the Beartooth Pit, AANDC believes that placing FPK into the Beartooth Pit should be deferred until more information is available..." regarding the concerns noted above.

Issues identified by IEMA include water quality in the Beartooth pit and the potential impacts of pit water on the LLCF. Key recommendations from IEMA are:

- BHP should implement a water quality and water stability monitoring program for Beartooth pit; and
- BHP should submit the LLCF Water Quality Prediction Model Version 3.0 to the WLWB.

IEMA also raises the question of how much detail should be required in management plans and reiterates their willingness to assist the WLWB in addressing this issue. IEMA's comments/recommendations do not voice any disagreement with depositing FPK in Beartooth pit.

BHP's response letter is focused primarily on the comments submitted by AANDC and argues that, despite some uncertainties, the concept of FPK deposition in Beartooth pit is technically sound and the benefits far outweigh the relatively limited risks. BHP suggests that now is the right time to begin FPK deposition in Beartooth pit because there is need for additional deposition areas and, in the short term, Cell D is the only alternative to Beartooth Pit. The benefits of using Beartooth pit, in comparison to the current plan to deposit FPK in Cell D, are summarized in BHP's response letter as:

1. secure deposition of FPK (reducing settlement/sediment risk),
2. further deferral of the use of Cell D for FPK (Cell D retained as a polishing pond);
3. reduced beach areas requiring reclamation in the LLCF (reducing the total area disturbed);
4. establishment of operating procedures that could be used to manage kimberlite deposition into a larger pit in future; and
5. the further reduction of minewater entering the LLCF in the short term (reducing current water quality risks – i.e. nitrate/chloride).

The need for short term deposition alternatives is reasonable and Board staff agrees that the use of Beartooth pit is preferable to Cell D for this purpose. AANDC's concerns have been addressed, to some degree, in BHP's responses to AANDC comments 11, 12, 21, 22, 23, 24, 25 and in BHP's response letter. Board staff are of the opinion that the information provided by BHP in WPKMP Version 2.0, the response letter, and the Review Comment Table constitutes an adequate response to AANDC's concerns.

Board staff agree with BHP's assertion that "The retention of Cell D as a long-term water management pond free of processed kimberlite is desirable." Although AANDC recommends delaying FPK deposition

in Beartooth pit, AANDC appears to agree with the general statement above: for example, comment 7 recommends that the polishing like process of Cell D be maintained and comment 9 expresses concern that poor water quality in Cell E may result if FPK is deposited in Cell D. AANDC recommends further consideration of an internal dike in Cell D for these same reasons, i.e. maintaining polishing process and protecting Cell E water quality. AANDC is not confident that use of Beartooth pit will prevent the use of Cell D (AANDC comment 2).

The benefits of depositing FPK in Beartooth pit rather than Cell D are substantial, while the options evaluation presented by Robertson GeoConsultants supports BHP's statement that "there is no increased environmental risk" relative to the current plan: Cell D without an internal dyke (see BHP's response to AANDC comment 11). Table 9 of the Robertson GeoConsultants report gives a +3 rating, which indicates reduced environmental risk (see Attachment 3c).

Water Quality

Beartooth pit is currently used to divert underground minewater away from the LLCF as part of BHP's management of nitrate and chloride in the LLCF. In BHP's response to AANDC comment 11, the company explains that in order to deposit FPK in Beartooth pit, some minewater will need to be removed and reclaimed to the process plant and/or pumped to the LLCF. Both IEMA (comments 6,7,9) and INAC (comments 11,12, 16) ask for further information regarding water quality and contingencies for Beartooth pit water as well as potential impacts of Beartooth pit water on the LLCF. BHP's response to AANDC comment 12 states that the company's intent is to "safely release the water accumulated in Cell D such that some or all of the underground minewater can again be safely passed through the LLCF while achieving the EQC in the effluent discharge."

In the response to AANDC comment 11, BHP notes that a 'worst-case scenario' for Beartooth pit water quality during operations could result in minewater needing to remain in Beartooth and alternative locations needing to be used for FPK, such as Cell D. BHP appears confident that this will not occur (see FPK deposition discussion below). Contingency options for poor water quality in Beartooth pit have been identified by BHP as pumping to the LLCF at a reduced rate or, at closure, to Panda pit/underground (see response to AANDC-12). Reporting on pit water quality predictions is scheduled for 2012 as part of Reclamation Research Plan #3. The current closure contingency for unacceptable water quality in the LLCF is water treatment. Although additional work is required regarding detailed closure strategies and contingency measures, this is true for many components of the mine – not only the Beartooth pit – and a certain amount of uncertainty will always exist.

The potential impacts on the LLCF from minewater in Beartooth are a more immediate concern. IEMA has requested that BHP submit its LLCF Water Quality Prediction Model to the Board to aid in the review and resolution of potential water quality issues in the LLCF related to water from Beartooth pit. BHP has proposed to update the Model after the Board makes a decision regarding WPKMP 2.0 and then submit it.

- *Board staff recommend that BHP submit an updated LLCF water quality prediction model.*

- *Board staff recommend that BHP submit a report on pit water quality predictions prior to, or together with, the WPKMP Version 3.0.*

FPK Deposition

The key contingency in case of problems with FPK deposition in Beartooth pit is to fall back on the current plan to use Cell D. Board staff recognize that the use of Cell D as a contingency may not be avoidable in all cases, however, all available options should be exhausted first. If Cell D is used as a contingency due to an issue in Beartooth pit (e.g. insufficient capacity), then the primary environmental benefit of depositing FPK into Beartooth - keeping Cell D free of FPK - would be lost. IEMA (see comment 3) has requested additional detail regarding uncertainties in FPK deposition and “adaptive management”. BHP’s response is that monitoring, predictions, and contingencies are developed in an ongoing manner, rather than having a pre-established adaptive management plan. Board staff agree with this approach; however it is reasonable for BHP to provide a list of all possible contingencies (in addition to Cell D) and the expected order of implementation. If there are other contingencies for FPK deposition besides Cell D, then all parties can better evaluate the likelihood of Cell D being used.

AANDC (comments 7, 9) voices concerns regarding the deposition of FPK into Cell D in the absence of an intermediate dike that would divide the Cell into two areas: one for FPK deposition, and one as a water management pond free of FPK. Board staff acknowledge that BHP has identified FPK deposition in Cell D as a contingency measure and does not currently have plans to deposit FPK in this Cell.

- *Board staff recommend that BHP identify all available means, known at this time, of delaying or avoiding the use of Cell D as a contingency for FPK deposition and provide some indication of the factors affecting selection of each contingency. BHP should also improve section 4.9 to make it a more systematic identification/evaluation of the uncertainties associated with FPK deposition.*
- *Considering the potentially significant impacts of depositing FPK into Cell D of the LLCF, if BHP becomes aware of the necessity to deposit FPK into Cell D, the company must notify the WLWB immediately and submit an updated, comprehensive analysis of alternatives to depositing FPK into Cell D without an internal dike one year prior to when deposition is expected to begin. This will ensure that all parties, including the Board, have the opportunity to review these options and that the Board has the information it needs to approve the changes that would need to be included in an updated WPKMP.*

Monitoring

Monitoring inside Beartooth pit is currently not possible due to safety concerns related to instability in the pit walls. In BHP’s response to AANDC comment 22, the company notes that geotechnical engineers will continue to assess conditions quarterly and environmental monitoring in the pit will proceed when conditions are deemed safe. Section 5.4 of the WPKMP describes only water quality monitoring in the Beartooth pit and notes that “addition of processed kimberlite into the Beartooth Pit will require additional monitoring.” Although safety considerations currently preclude any in-pit monitoring,

- *Board staff recommend that BHP explain the plan for any monitoring that can be accomplished prior to FPK deposition without triggering safety concerns and the FPK monitoring that will take place when the pit becomes accessible.*

Panda/Koala Pit

Stage 4 (5+ years from now) of the *Timeline of Deposition Plan* (section 4.8.4 of the WPKMP) identifies "assessment of the Panda/Koala Pit option for final FPK deposition." Board staff are unclear as to what further assessment would be undertaken beyond the assessment provided in the Robertson Geoconsultants Report. If additional storage capacity becomes necessary, Board staff encourage BHP to pursue the option of using Panda/Koala pits for FPK deposition (pending availability and lessons learned from Beartooth) rather than Cell D.

- *Board staff recommend that BHP assess Panda/Koala pits for FPK deposition as soon as possible.*

Flocculent Plants

Both AANDC (comment 6) and IEMA (comment 10) raise questions regarding the use of flocculent plants. BHP's response explains that flocculent plants are maintained as an operational contingency measure to be implemented at the discretion of BHP in order to ensure that EQC for TSS are met prior to discharge to the receiving environment. Board staff notes that although meeting the EQC is not optional, deciding if/when to use the flocculent plants is up to BHP.

Additional Board Staff Recommendations not listed above

Board staff recommend that:

- *BHP explain the apparent discrepancy in planned water levels for Cell B and Cell C (AANDC comment 8).*
- *BHP correct section 4.8.3 to read "Cell C East" rather than "Cell E East."*

Conclusion

The Wastewater and Processed Kimberlite Management Plan satisfies the specific requirements under Part G, Item 1 of Water Licence W2009L2-0001, however, comments and recommendations provided by AANDC and IEMA have raised important questions for BHP and the WLWB to consider.

Board staff believe version 2.0 of the Wastewater and Processed Kimberlite Management Plan contains an appropriate level of detail and provides the technical basis to support proposed changes to Fine Processed Kimberlite (FPK) management at Ekati.

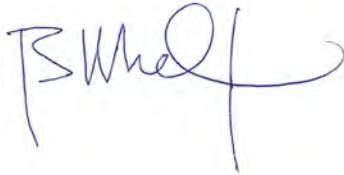
Recommendations

Board staff make the following recommendations:

1. The Board approve version 2.0 of the Wastewater and Processed Kimberlite Management Plan.

2. The Board direct BHP to address the specific recommendations outlined in this Staff Report and submit WPKMP Version 3.0 at least 60 days prior to the deposition of fine processed kimberlite in Beartooth pit, or by July 1, 2012, whichever comes first.

Respectfully submitted,



Brett Wheler
Regulatory Specialist



Ryan Fequet
Regulatory Coordinator



Kathy Racher
Technical Coordinator

Attached:

1. Review Comment Table, BHP's response letter, cover letters from AANDC and IEMA
2. BHP's cover letter to the WPKMP
3. Figures and Tables
 - a. Map of the Ekati Mine site
 - b. Life of Mine Plan
 - c. Table 9 from the Robertson Geoconsultants Report: Summary of FPK Deposition Options Evaluation (Appendix D of the WPKMP)
4. WPKMP Appendix A: Summary of Specific Requirements for the Wastewater and Processed Kimberlite Mngement Plan Version 2.0 (includes Part G, Item 1 of BHP's Water Licence and a conformity table).
5. WPKMP – on CD

Review Comment Table

W2009L2-0001 - BHP - Wastewater and Processed Kimberlite Management Plan - Version 2.0 (WLWB)

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| Proponent: | BHP Billiton Canada Inc. |
| File(s): | W2009L2-0001 |
| Document(s): | W2009L2-0001 - BHP - WPKMP - Version 2.0 - Oct 21_11 (15MB) |
| Reviewer Comments Due By: | Nov 16, 2011 |
| Proponent Responses Due By: | Nov 23, 2011 |
| Distribution List: | Oct 26 at 17:23 . |
| Contact Information: | Brett Wheler 867-765-4590 Ryan Fequet 867-765-4589 |

Comment Summary

| Proponent General File Comments | |
|---------------------------------|--|
| ID | Proponent General File Comment |
| 1 | BHP Billiton cover letter to responses on WPKMP V.2.0. |

| INAC-WRD: Nathen Richea | | | | |
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| ID | Topic | Reviewer Comment/Recommendation | Proponent Response | Board Staff Response |
| 28 | General File | Comment: Cover Letter | | |
| 1 | General Comment - Processed Kimberlite Deposition Plan | Comment: The Deposition Plan identifies a need for 35M m3 of space to place FPK at the EKATI site. Approximately 15M m3 (3 years) of space remains in the existing Cells of the LLCF. A combination of strategies, including increasing storage capacity in the LLCF and diverting FPK into Beartooth Pit, are | Nov 23: BHP Billiton disagrees that the uncertainties related to FPK deposition into Beartooth Pit are of a magnitude that require additional study prior to implementation. Section 3.5.4 of Appendix D of the WPKMP (the | Nov 29: AANDC's concerns have been addressed, to some degree, in BHP's responses to AANDC-11,12,21,22,23,24 and in BHP's response letter. Board |

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| | | <p>identified for providing 34M m3 of additional storage space. Depositing FPK into Cell D of the LLCF is identified as a contingency. Beartooth Pit will provide approximately 7M m3 or 1.5 years of FPK storage, and is recommended as the first option to be brought online. However AANDC feel that there are still many unanswered questions regarding pit/FPK monitoring during disposal into Beartooth pit, the instability of pit walls mentioned in this report and implications of FPK, wall instability and pump flooding as part of final closure of Beartooth pit.</p> <p>Recommendation: AANDC's comments identify a number of uncertainties related to using Beartooth Pit as a disposal location for FPK. AANDC recognizes that depositing FPK into the Beartooth Pit was assessed during the Environmental Assessment for the Sable, Pigeon and Beartooth development, and is within the Scope of the current water licence. However, given the uncertainties related to depositing FPK into the Beartooth Pit, AANDC believes that placing FPK into the Beartooth Pit should be deferred until more information is available on pit monitoring during deposition, deposition contingency plan, predicted pit wall stability, pit water quality, EFPK settling and implementing the proposed pit reclamation strategy (i.e. placing a 30 m clean water cover).</p> | <p>RGC Report) identifies the uncertainties in volume estimations that are inherent in planning for kimberlite deposition. Beach angles, in-place densities, precision in topography and inability to access every area of topographic relief are common to all of the deposition options - but to varying degrees. The report indicates that these uncertainties are less for the open pit options than for the surficial (LLCF) options. This is one reason for the high comparative rating of the Beartooth pit option. Beaching angles are a minor rather than primary consideration in a confined space such as Beartooth pit. Also, there is greater certainty in the precision of the volume estimates and the ability to access all of the estimated storage volume for FPK deposition. The specific uncertainties referred to in the comment (pit monitoring, contingency, pit wall stability, pit water quality, EFPK settling, pit reclamation strategy) are addressed in various AANDC comments and responses below. The attached cover letter to these responses provides additional comment on why BHP Billiton sees this as the opportune time to implement the Beartooth pit option.</p> | <p>staff are of the opinion that the information provided by BHP in the WPKMP Version 2.0, the response letter, and the responses here constitutes an adequate response to AANDC's concerns, although not a comprehensive response.</p> <p>Please see the General Discussion section of the Staff Report.</p> |
| 2 | 1.3 - Overview of Wastewater and PK | <p>Comment: The plan mentions that Sable and Pigeon operations are not included as part of this wastewater and processed kimberlite management plan. Currently, BHPB is trying to accommodate an additional 35 M m3 of PK. The options presented only account for 34 M m3 of FPK storage. It is likely that at least 1 M m3 of FPK will need to be deposited in Cell D, later in the mine life. However, if</p> | <p>Nov 23: Correction: The Pigeon open pit is included in FPK deposition planning for the WPKMP (i.e., it is part of the estimated 35M m3 storage requirement). Figure 9 of the RGC (Appendix D) Report shows the Life of Mine Plan used for the FPK deposition plan and includes the Pigeon open pit.</p> | <p>Nov 29: Proponent response is acceptable. Board staff understand that the Pigeon pit is included in the Life of Mine Plan and that FPK from Pigeon has been considered in the FPK volumes discussed in WPKMP 2.0.</p> |

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| | <p>Pigeon comes online (a real possibility) there is not enough space for the FPK under the proposed strategy and likely more tailings will go into Cell D. AANDC notes that part of the original plan was to consider the placement of an intermediate dike in Cell D to store FPK and still maintain the polishing pond aspect of this cell. This option has not been fully considered, even though there are likely to be settling problems with deposit of FPK and EFPK into Cell D.</p> <p>Recommendation: BHPB should consider that actual FPK storage requirements may amount to considerably more than has been assumed. BHPB should further consider the implications of depositing considerably more FPK into Cell D. BHPB should further consider the construction of the intermediate dike in Cell D if and when FPK is deposited into this cell in the future.</p> | <p>What WPKMP Version 2.0 does not provide is a description of Pigeon minewater management in S.2 because the site has not been developed for mining; those updates would be provided prior to construction of the Pigeon pit as required under Part G Item 1(b) of the Water Licence. The Sable open pit and other licenced potential sources of ore such as Fox Low Grade are secondary considerations that are discussed in the RGC (Appendix D) Report (S.2.4.2 and 4.1.2). These secondary ore sources are not currently part of the Life of Mine Plan. The Life of Mine Plan is reviewed annually and can change based on a number of geological, mining and economic factors. The RGC Report identifies a feasible approach for the secondary possible ore sources should they come on-line. The approach would be to use firstly the Panda/Koala open pits (pending their availability and confirmation of operating parameters from experience at Beartooth pit) or, failing that, Cell D. The use of the Panda/Koala open pits becomes possible for these ore sources because underground mining is scheduled to have been completed in the Koala mine by that time. As regards the likelihood of using Cell D in future, BHP Billiton has taken a conservative approach to planning for FPK deposition. An example of this approach is the use of 5M m³ per year of storage volume required. This volume is greater than a reasonable expectation would be but is used for long term planning,</p> | |
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| | | | <p>nonetheless, specifically to provide a conservative approach that balances against some of the uncertainties in planning storage volumes. The conservative approach adopted and the inherent uncertainties in available storage volumes in a large facility contribute to why BHP Billiton is comfortable with the 34M versus 35M m³ FPK balance and asserting that FPK deposition into Cell D is not a certainty; rather a contingency. In short, there is no certainty that Cell D will ever be used for FPK deposition if the plan proposed by BHP Billiton is adopted; rather Cell D remains a viable contingency location and BHP Billiton will endeavour to maximize the use of the other approved areas. The RGC (Appendix D) Report describes several approaches and possible locations for an internal dike within Cell D (S.3.2.2). The concept of a dike was previously discussed (i.e., 2005) but never adopted as a plan; it remained a contingency if required to protect BHP Billiton's ability to achieve EQC's in the the effluent released from Cell E. The retention of Cell D as a long-term water management pond free of processed kimberlite is desirable and that possibility was the basis for initiating the options analysis. BHP Billiton would provide pre-notification to the Water Board and, thereby, all other parties of a planned use of Cell D for FPK deposition. At that time further discussion would be held that focussed on current information regarding FPK storage volume requirements, FPK</p> | |
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| | | | beach angles, settlement and in-place densities, and risks to TSS concentrations in Cell E. | |
| 3 | 2.1.3 - Misery Site Water Quality | <p>Comment: Section 2.1.3 identifies that the pushback at the Misery Pit will allow mining activities to extend to a depth of 300 m below surface. Water management, as identified in Figure 13, will remain the same as present, i.e. water will be pumped to the King Pond Settling Facility (KPSP) for discharge once Water Licence discharge criteria are met. Experience at the main EKATI site, as well as at the other diamond operations, has shown that water quality deteriorates as mining progresses deeper. Greater inflows of connate groundwater lead to a corresponding increase in ion concentrations, notably chloride, in the minewater. The current wastewater management plan does not identify whether the planned deeper mining activities at the Misery Pit will impact the pit water quality, and what contingencies are available in the event that water cannot be discharged from the KPSP.</p> <p>Recommendation: AANDC is aware that chloride and concentrations of other ions are not regulated in the current water licence. However, AANDC also notes that BHPB has identified elevated chloride concentrations as a management issue in the minewater at the main EKATI site. The plan should identify predictions for Misery Pit water quality as mining depth increases, and identify what water management contingencies are available if required.</p> | <p>Nov 23: Open pit mining at the Misery pit is planned to remain within permafrost. Geotechnical information at the Misery site confirms that the depth of permafrost is in the order of 400 m below surface. This eliminates the risk of elevated chloride in the pit water that would require special management. The only areas at EKATI where highly elevated chloride has been encountered is in the Panda/Koala underground mines which extend well below permafrost (in the order of 600 m below surface). Mining completely within permafrost was, in fact, a consideration in the selection of open pit versus underground mining at the Misery site and was, therefore, considered and investigated. There is no expectation that the concentrations of other ions in pit sump water would increase with depth in the Misery pit to the degree where special management would be required. Nonetheless, contingency options for the Misery site minewater exist should BHP Billiton's ability to achieve the EQC in water released from King Pond be compromised. These options include source control where possible, local-area treatment (developed to address the specific water quality issue at hand) or removal of minewater to the Main EKATI site where other options may be available. BHP Billiton's underlying objective is to achieve the EQC in the</p> | <p>Nov 29: Proponent response is acceptable. Board staff acknowledge that mining within permafrost will reduce potential water quality issues; however, contingencies must still be maintained and regularly reviewed by BHP in order to ensure that water quality continues to meet the licenced EQC, as well as water quality objectives in the receiving environment.</p> <p>Board staff note that the EQC will be reviewed with BHP's Water Licence renewal application in 2012.</p> |

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| | | | Water Licence at the point where water is released to the receiving environment. In the case of chloride for which there is no EQC, BHP Billiton has developed a receiving water site-specific water quality objective that is used to assess potential environmental effects. The SSWQO was circulated and reviewed by the Water Board in 2008/09. | |
| 4 | 4.3 - Processed Kimberlite | <p>Comment: One point mentions that the Cone Penetration Test found clear water to a depth of 5m. The following point mentions that there is increased salinity within the upper 5m.</p> <p>Recommendation: These statements are confusing and can be interpreted as contradictory. They should be better described. It is assumed that the statements mean that water within the upper 5m is clear of EFPK.</p> | <p>Nov 23: The reference to the water being "clear" means clear of suspended sediment.</p> | <p>Nov 29: Proponent clarification is appreciated and care should be taken to be more "clear" in future descriptions of water quality.</p> |
| 5 | 4.4 - Processed Kimberlite Characterization | <p>Comment: If weathering and evaporative processes are producing white salt crusts on older areas of the FPK deposits, how is this going to be addressed during operations and at the closure of the mine? Potential issues include solubility during rain and snow melt and potentially acting as a wildlife attractant.</p> <p>Recommendation: What are the implications of these white salt crusts on water quality (dissolution with rain water or snow melt) or wildlife during operations and at closure.</p> | <p>Nov 23: The surficial evaporite is not an operating concern to water quality or wildlife. The evaporite is magnesium carbonate, which is not an attractant for wildlife and not a water quality risk. The long-term implications for closure (a possible risk to vegetation growth) will be investigated under the Reclamation Research Plans in the Interim Closure and Reclamation Plan. The LLCF Reclamation Pilot Research Study scheduled for 2014 will include this investigation.</p> | <p>Nov 29: Proponent response is acceptable. Board staff acknowledge that magnesium carbonate, being a non-sodium-based evaporite, is not generally considered an animal attractant, although it has the potential to affect water hardness. Board staff anticipate reviewing implications for closure as Reclamation Research Plans are advanced.</p> |
| 6 | 4.5 - Flocculants | <p>Comment: This section references using in-line flocculent plants along the pipelines to the LLCF and minewater to King Pond. However, the plan mentions that these plant are not being currently used and states that there is no intention to</p> | <p>Nov 23: The flocculent plants were used earlier in mine operations as mitigation against the uncertainties in sediment settlement within the LLCF and King Pond. Also, there were</p> | <p>Nov 29: Proponent response is acceptable.</p> <p>Please see the Flocculent Plants discussion in the Staff</p> |

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| | | <p>reactivate these plants in the future.</p> <p>Recommendation: Why were these plants used before? How was it determined that flocculent was needed for these wastewater streams? What has changed to stop use of these treatment systems? Will these systems be used in the future if conditions warrant and, if so, what conditions would warrant their use? Would treatment of effluent prior to discharge to the environment be considered if conditions of water in Cell E were deteriorated in the future?</p> | <p>periods of lake dewatering and initial pit sump pumping that may have produced elevated sediment concentrations in minewater that heightend the uncertainty. It is now well established that flocculation of minewater is not required to achieve very low TSS concentrations in effluent released from the LLCF and King Pond. This is evident in the SNP results provided monthly to the Water Board. Because the flocculent plants are in place, BHP Billiton chooses to keep them so that they could be re-activated if necessary. The trigger would be that BHP Billiton can not, or is certain that it could not, meet the EQC for TSS in effluent released to the receiving environment. This situation is not anticipated. Treatment of effluent prior to discharge could be a viable continency measure in some circumstances.</p> | <p>Report.</p> |
| 7 | 4.6.1 - Cells | <p>Comment: AANDC agrees that there will likely be a delay in the placement of FPK in Cell D but suggests that Cell D will likely receive FPK in the future (most likely will if Pigeon and Sable come online). Options to maintain the polishing like process of Cell D should be assessed including the placement of an intermediate dike.</p> <p>Recommendation: AANDC feels there should be further consideration for an intermediate dike in Cell D, if and when FPK is deposited in this cell in the future.</p> | <p>Nov 23: See response to comment AANDC-2 for a correction on the inclusion of Pigeon pit in the FPK deposition plan, regarding BHP Billiton's suggested likelihood of using Cell D for FPK deposition in future, and regarding BHP Billiton's assessment of an internal Cell D dike.</p> | <p>Nov 29: Please see the FPK Deposition discussion in the Staff Report.</p> |
| 8 | 4.6.2.1 - Long Lake Containment Facility | <p>Comment: Section 4.6.2.1 identifies that a "heat traced" culvert provides a hydraulic connection between Cells B and C to allow a normal transfer of water and maintain a 1 m freeboard in Cell B. This Section further identifies that the Cell C Dike will be</p> | <p>Nov 23: Water will continue to flow from Cells A and B into Cell C through operations and closure. BHP Billiton understands the question and will seek to meet with AANDC Water Resources</p> | <p>Nov 29: <i>Board staff recommend that BHP explain the apparent discrepancy in planned water levels for Cell B and Cell C.</i></p> |

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| | | <p>raised to 461 m, which will increase the operating water levels in Cells A and C to 460 m elevation, from the previous 458 m. However, this Section and Figure 12 indicate that water levels in Cell B will remain at 458 m. The remaining discussion of LLCF water management suggests that water is intended to flow from Cells A and B into C, then into D and finally into E. The plan does not indicate how water levels in Cell B will be maintained lower than in Cell C.</p> <p>Recommendation: Confirm the planned operating levels in Cell B and identify how they will be maintained. Confirm whether Cell B dikes will also be increased and, if so, what the additional storage in Cell B would be.</p> | <p>staff to review the operating plan, elevations and other pertinent details. BHP Billiton will report back to the Board on this meeting prior to construction of the Dike C Raise, which is tentatively scheduled for summer 2012 pending approval of the WPKMP V.2.0. This sidebar discussion should not affect the Board's decision-making on the WPKMP at this time.</p> | |
| 9 | 4.6.2.2 - Cell D | <p>Comment: AANDC is concerned that placing FPK in Cell D (in the future) when Dike D infiltrates to Cell E may cause poorer water quality in Cell E. This could then require water treatment during later operating years and at closure. However, this could be curtailed if the intermediate dike is placed to close off a small portion of Cell D and maintain a polishing pond. It is noted that this pond would be smaller in size and volume.</p> <p>Recommendation: BHPB should consider the options available to prevent or limit infiltration from Cell D to Cell E, if and when FPK is placed in Cell D in the future.</p> | <p>Nov 23: See response to comment AANDC-2 regarding BHP Billiton's suggested likelihood of using Cell D for FPK deposition in future, and regarding BHP Billiton's assessment of an internal Cell D dike. Also, the scenario described by AANDC in comment AANDC-10 is a viable management method to reduce the risk of seepage through Dike D if necessary (water level in Cell E slightly higher than Cell D).</p> | <p>Nov 29: Please see the Cell FPK Deposition discussion in the Staff Report.</p> |
| 10 | 4.6.2.3 - Cell E | <p>Comment: It seems that there is a potential for water to be higher in Cell E than Cell D even though they both provide a 1.0m freeboard against Dike D (448.3m at Cell D vs. 449m at Cell E)?</p> <p>Recommendation: BHPB to confirm the maximum operating levels of Cell D and Cell E or clarify that pumping occurs when water levels are higher in Cell D.</p> | <p>Nov 23: The water level in Cell E is limited by the height of Dyke D. The maximum operating water level in Cell E is the same as Cell D at 449 m (1 m below the nominal crest elevation of 450 m). Prior to about 2008, the operating practice was to pump Cell D slightly lower than Cell E in the fall, specifically to create a winter gradient</p> | <p>Nov 29: Proponent response is acceptable.</p> |

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| | | | that minimized seepage from Cell D to E. This practice has changed in recent years in response to managing nitrate concentrations in Cell D. However BHP Billiton may return to this practice in future as it can be a constructive management approach in some circumstances. | |
| 11 | 4.7 - Beartooth Pit Water Management | <p>Comment: Section 4.7 identifies that diversion of surface minewater from the AN Storage Facility and underground minewater from Panda and Koala away from the LLCF and into the Beartooth Pit is a key part of BHPB's current response to elevated nitrate and chloride concentrations in the LLCF. Page 40 of the Robertson Geoconsultants (RGC) EKATI Mine 2011 FPK Deposition Analysis Study assumes that this practice will continue for the life of the mine, and will provide a benefit in that the increased salinity appears to improve settling of EFPK. Page 41 of the RGC Analysis Study indicates that water will need to be pumped out of the Beartooth Pit during operations, either for recycle to the process plant or for discharge through the LLCF, if FPK is deposited into Beartooth Pit. This water must be removed from the Beartooth Pit, "otherwise the pit would fill overly quickly with slurry water and the amount of FPK solids deposited would be reduced to the point where the value of the option could be questionable." Removing water from the Beartooth Pit to facilitate FPK disposal may interfere with use of the Beartooth Pit as a minewater management structure and to mitigate against poor water quality in the LLCF.</p> <p>Recommendation: Since using the Beartooth Pit as a minewater management structure appears to be important to managing LLCF water quality, identify how this function will be retained in the event that FPK is placed into the Beartooth Pit, and</p> | <p>Nov 23: There are two likely means of removing "excess" water from Beartooth pit for the purpose of FPK deposition: pumping water to the process plant for re-use in processing, and/or pumping water to the LLCF for release to the environment. These two approaches could, in fact, be combined if water pumped to the plant for processing is then sent from the plant to the LLCF. In 2011 and through 2012 underground minewater will be diverted to the Beartooth pit, at which time the situation will be re-evaluated. BHP Billiton's intent continues to be to safely release the water accumulated in Cell D such that some or all of the underground minewater can again be safely passed through the LLCF while achieving the EQC in the effluent discharge. The use of Beartooth pit for FPK deposition, in fact, assists with the short term resolution of water issues in the LLCF by diverting a substantive inflow (process plant discharge water) to Beartooth Pit. A 'worst-case' scenario might occur if BHP Billiton was unable to remove excess water from Beartooth pit during mine operations. In this event, FPK deposition could stop short of the</p> | <p>Nov 29: Proponent response appears to be accurate in that "there is no increased environmental risk" relative to the current plan: Cell D without Internal Dyke. However, if Cell D is used as a contingency due to insufficient capacity in Beartooth pit, then the environmental benefits of depositing FPK into Beartooth would be less significant. (The environmental benefits of the Beartooth pit option compared to the current plan are summarized in Table 6 of the Robertson Geoconsultants Report as: "Eliminate FPK settlement/sediment risk; retain Cell D as polishing pond; reduce current nitrate/chloride risk.")</p> <p>Please see the General Discussion section and the FPK Deposition discussion in the Staff Report.</p> |

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| | | water must be removed and pumped to the LLCF. | targeted 7M m3 and alternate deposition locations might need to be identified (such as the contingency use of Cell D). In this event BHP Billiton would not have realized all of the potential of Beartooth pit as an FPK deposition location and would have incurred costs that did not return the anticipated value. This is a cost risk that BHP Billiton is willing to carry because it is confident that this situation will not arise. Note that even under this situation, there is no increased environmental risk. | |
| 12 | 4.7 - Beartooth Pit | <p>Comment: The redirection of surface minewater from the AN Storage Facility and underground minewater from Panda and Koala into Beartooth Pit was done to reduce potential effects in the receiving environment downstream of the LLCF. It is likely that this water quality will get worse as more water is pumped from deeper in the underground. However, storing this water in Beartooth coupled with the placement of FPK could cause conditions within Beartooth pit to require additional mitigations options including water treatment.</p> <p>Recommendation: BHPB should further explain contingency options if the water quality in Beartooth Pit is too poor to allow reconnection to the natural environment upon closure (incomplete settling of EFPK or poor than expected water quality).</p> | <p>Nov 23: The contingency options for closure if water quality does not meet the closure criteria remain as they were described in the initial application for use of Beartooth pit as a minewater retention pond. Water could be pumped to the LLCF at a controlled rate that achieves the EQC for discharge from Cell E. Once operation of the process plant is complete and process water is no longer being pumped to the LLCF, the LLCF will have greater assimilative capacity for other minewater. Alternately, water could be pumped from Beartooth pit into the much larger Panda pit where the water would sit in the deepest parts of the underground and open pit mines.</p> | <p>Nov 29: Proponent response is acceptable: two feasible contingency options are identified.</p> <p>Please see the Water Quality discussion in the Staff Report.</p> |
| 13 | 4.8.1 - PKDP Background | <p>Comment: It mentions that alternative operation and development options were presented in 2004 and 2005, and the previous version of the WPKMP was produced and approved in 2010. However, there has been a shift in the deposition plan between 2010 and 2011, what has shifted PK storage plans in the past year? AANDC notes that</p> | <p>Nov 23: The options assessed and presented in the WPKMP are not in response to any shortage in deposition capacity. The options assessment and the proposed deposition plan are an effort to make the best use of the available options. There is (and always</p> | <p>Nov 29: Proponent response is acceptable. Board staff agree that increased use of Cells A, B, C, as well as the use of alternatives such as the Beartooth Pit, are an improvement to the current</p> |

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| | | <p>expansions to the LLCF have been tabled and approved before.</p> <p>Recommendation: BHPB should better explain how previous expansions of the LLCF progressed to accommodate existing and projected FPK production. It is understood that the expansion of the LLCF is a scaled response and options are currently being presented to address shortages over the years.</p> | <p>has been) ample storage capacity in the LLCF for all of the FPK to be produced through the Life of Mine. The FPK deposition plan has always included the use of Cell D beginning with the Environmental Assessment in 1996. In 2004/05 there was a "5-Year Review" which shifted the focus of the deposition plan from a somewhat even distribution of FPK throughout Cells A, B, C and D to a heavily weighted use of Cells A, B and C that would defer the use of Cell D until later in operations. This preserved the use of Cell D as a minewater management area for a longer period of time and created time for additional opportunities (such as Beartooth pit) to materialize. The current WPKMP (V.2.0) and FPK options assessment is advancing the strategy of deferring the use of Cell D for FPK deposition, including the use of other opportunities (such as Beartooth pit). In this analysis, it is possible that the use of Cell D for FPK deposition might be avoided altogether. BHP Billiton feels that it is proposing an improvement to the existing, approved plan, which is to deposit FPK into Cell D beginning approximately 2014.</p> | <p>plan.</p> <p>Please see the General Discussion section of the Staff Report, as well as the Robertson GeoConsultants Report (Appendix 4 of WPKMP Version 2.0).</p> |
| 14 | 4.8.3 - Recommended Deposition Plan | <p>Comment: BHPB can not guarantee that Cell D will not receive FPK and no internal dike has been proposed to maintain polishing potential. This may lead to a requirement for treatment of effluent discharge in later years of operation and at closure. There is also a potential that treatment may be required as a contingency for poor settling or water quality in Beartooth pit.</p> | <p>Nov 23: See response to comment AANDC-2 regarding the 34M / 35M m3 FPK balance and the concept of an internal Cell D dike. If the estimated storage volumes in Cells A, B and C and Beartooth pit are not realized then the stated contingency plan of FPK deposition into Cell D would be implemented. The storage capacity of</p> | <p>Nov 29: Proponent response is acceptable.</p> <p><i>Please see the Water Quality and FPK Deposition discussions in the staff report.</i></p> <p>BHP is currently authorized to deposit FPK into Cell D and</p> |

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| | | <p>Recommendation: There is a shortfall of 1 M m3 of FPK storage even with the options presented in this plan. BHPB should describe where this FPK will be deposited and what volume of additional FPK could be expected if the effectiveness of the other options is not as planned (3%-5% loss of storage = 1.02 to 1.7 M m3 = over 2 M m3 of FPK storage required).</p> | <p>Cell D is adequate for all of the remaining FPK even in the absence of any other options.</p> | <p>the current closure contingency for unacceptable water quality is water treatment. The Timeline of Deposition Plan (section 4.8.4 of the WPKMP) under Stage 4 (5+ years) identifies "assessment of the Panda/Koala Pit option for final FPK deposition." Board staff do not know what further assessment would be undertaken beyond the assessment provided in the Robertson Geoconsultants Report. <i>Board staff recommend that this option be assessed as soon as possible.</i></p> <p>Please see the Panda/Koala Pit discussion in the Staff Report.</p> |
| 15 | 4.8.3.2 - Clean Water Cover | <p>Comment: A 30 m clean water cover at the surface of the pits is proposed as a suitable depth to mitigate against poor pit water quality. The WPKMP identifies that this depth may be too deep, but that additional study would be required before a shallower cover could be proposed. The 1995 EIS for the NWT Diamonds Project proposes the 30 m depth, but support for this value was not readily identifiable within the EIS documents.</p> <p>Recommendation: Conduct the studies required to confirm the actual depth of clean water cover required to cap the pit lakes and incorporate this depth into future WPKMPs.</p> | <p>Nov 23: As stated, BHP Billiton believes a 30 m depth of water over FPK is a conservative and environmentally protective restriction on FPK deposition into Beartooth pit. This creates a firm limit on FPK deposition until such time that monitoring information and other studies might indicate a change. Any proposed change to the 30 m water depth would be proposed to the Water Board for its approval.</p> | <p>Nov 29: Proponent response is acceptable. Clear evidence would need to be provided to support any proposal for reducing the depth of clean water cover.</p> <p>Board staff suggest the question of the appropriate clean water cover is best addressed in BHP's Reclamation Research Plans and not within the WMKMP.</p> |
| 16 | 4.8.3.2 - Fresh water cap over FPK-water slurry | <p>Comment: The plan as discussed in the EA suggests that a 30 m cover of fresh water will be placed over the FPK-water slurry. However,</p> | <p>Nov 23: The operating procedures for pumping fresh water into Beartooth pit for closure have not been developed.</p> | <p>Nov 29: Proponent response is acceptable.</p> |

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| | | <p>pumping fresh water into the pit will cause mixing of the water cover over the FPK. This is something that needs to be considered further as a contingency for FPK settling is 10-20 yrs, what is the contingency if pumping in fresh water causes the resuspension of FPK. Note the fresh water quality will be much better than mine water (connate water stored during mining operations) and may not enhance FPK settling.</p> <p>Recommendation: BHPB to explain how the 30 m fresh water cover would be pumped into the pits and the contingencies in the event that FPK is resuspend and required time to settle. BHPB should also explain what contingencies are available in the event of poorer water quality in Beartooth pit at closure.</p> | <p>This level of detail for implementation of closure actions is appropriate to more advanced stages of the ICRP. BHP Billiton respects the comment and the risk identified but feels this is not a fundamental risk to the option of FPK deposition into Beartooth pit. Rather it is an operating procedure to be resolved in future. There are means of managing inflow energy dissipation if such are necessary and this will be assessed as part of the future pumping implementation plan.</p> | <p>Board staff agree the details AANDC is requesting are most appropriately addressed in future iterations of the Closure and Reclamation Plan.</p> <p>Please see the Water Quality discussion in the Staff Report.</p> |
| 17 | 4.8.3.2 - Completely filling Beartooth with FPK | <p>Comment: BHPB makes reference to filling Beartooth pit with FPK but indicates that this is not considered in this plan and would require a major change in the closure plan.</p> <p>Recommendation: AANDC is curious to know whether this concept is currently being considered by BHPB or if this concept may come up in the future if a shortfall in FPK storage is realized?</p> | <p>Nov 23: The concept of completely filling Beartooth pit to surface with FPK is not currently being considered by BHP Billiton. Nonetheless, this concept could be discussed in future if desired.</p> | <p>Nov 29: Proponent response is acceptable.</p> |
| 18 | 4.8.3.2 - Engineering pipeline design | <p>Comment: AANDC does not understand the push to have FPK placed in Beartooth pit immediately. AANDC understands that as is, the LLCF will provide an additional 3 years of FPK storage. During these 3 years, expansions to the LLCF cells is scheduled to occur, increasing the available storage time in the LLCF. AANDC believes that there are uncertainties regarding using Beartooth Pit which must be addressed prior to depositing FPK in the pit. For example, it is unclear if or when BHPB will be monitoring conditions within Beartooth pit during the deposition of FPK (i.e. safety concerns), .</p> | <p>Nov 23: See response to comment AANDC-1 regarding BHP Billiton's view on uncertainties related to the use of Beartooth pit not being of a magnitude warranting delay of implementation. Also, operational management of FPK deposition in the LLCF has evolved over the 13+ years of operations to include a number of key considerations. In short, effective management of the facility requires a number of active and available deposition locations. Minimizing ice</p> | <p>Nov 29: Proponent response is acceptable. The need for additional deposition areas in the short term is reasonable and Board staff agree that the use of Beartooth pit is preferable to Cell D. Although additional work is clearly required regarding closure strategies and contingencies, this is true for many components of the mine. Any monitoring during deposition,</p> |

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| | | <p>Recommendation: AANDC feels that it would be best practice to further understand the operational, management and closure strategies (including contingencies) for placing FPK in Beartooth pit prior to its approval.</p> | <p>lensing in the FPK, for example, is a key consideration and requires the availability of several deposition areas to enable the deposition of thinner layers of FPK. In short, BHP Billiton could not effectively manage the facility without creating additional deposition areas in the short term as Cell B reaches its currently accessible storage capacity. Beartooth pit is evaluated as a superior option to use of Cell D or enlargement of Cell B to the east and can be developed in a viable timeframe to provide a deposition area that can be integrated with ongoing use of Cell A (north) and Cell C. The Cell C West, Cell A South and Cell C East options do not meet this objective in the short term and, therefore, the primary alternative to Beartooth pit is Cell D.</p> | <p>including for safety purposes, is the responsibility of BHP.</p> <p>Please see the General Discussion section in the Staff Report.</p> |
| 19 | 4.9.1 - Water Quality | <p>Comment: 3rd bullet point: There is reference to the chemocline. 5th bullet point: Suggests 'investigate and implement water treatment options'.</p> <p>Recommendation: AANDC is unclear what structure is being referenced, the LLCF or Beartooth pit. Why is water treatment options only considered after all other options are assessed? AANDC notes that water treatment is a BMP.</p> | <p>Nov 23: Regarding the reference to a chemocline in bullet no.3, this would be possible in the case of reclaim water pumping from Beartooth pit where meromictic conditions existed within the pit. Regarding water treatment, this is a contingency option in nearly all cases and in some circumstances may be the preferred measure. BHP Billiton also looks for options to address issues through changes to water management practices.</p> | <p>Nov 29: Board staff were also unclear what structure is being referenced, the LLCF or Beartooth pit. BHP's response suggests that pumping reclaim water from below the chemocline refers to the Beartooth pit – Board staff suggest that BHP clarify this in the text of the WPKMP.</p> <p>BHP's response also clarifies that water treatment is considered as a contingency and is not necessarily the last or least preferable contingency option.</p> |
| 20 | 4.9.3 - EFPK Settlement | <p>Comment: This section suggests that improved settlement of EFPK monitored in Cell C is likely</p> | <p>Nov 23: The laboratory column tests described in the Appendix D (RGC)</p> | <p>Nov 29: Board staff note that the laboratory column tests do</p> |

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| | | <p>linked to pond water salinity and effects of ice formation under constrained, shallow-water conditions. A precise mechanism is not provided. Increased understanding of the phenomenon would provide greater confidence that the increased salinity in the Beartooth Pit waters will result in good EFPK settling.</p> <p>Recommendation: Confirm the mechanism leading to improved EFPK settling. Identify whether there is a point at which increased salinity is detrimental to EFPK settling.</p> | <p>Report demonstrate that FPK/EFPK will settle out of the water column under laboratory conditions. The recent field investigations (CPT testing) show that good settlement of FPK/EFPK occurs in the field. This field performance monitoring is gained through operating experience. All indications are that settlement will be enhanced within the confined space of Beartooth pit and with the elevated salinity present as compared to Cell C. BHP Billiton sees no benefit at this stage of the operation in further laboratory testing or modeling of FPK/EFPK settlement. In the event that settlement is much poorer than anticipated, BHP Billiton will adjust operating procedures to address the issue or, ultimately, suspend FPK deposition into the pit. This will all be managed within the defined "ceiling" of 30 m below the pit overflow.</p> | <p>not appear to have examined the effects of salinity nor ice formation on settling. However, BHP's assertion that "all indications are that settlement will be enhanced within the confined space of Beartooth pit and with the elevated salinity present as compared to Cell C" appears reasonable and it is BHP's responsibility to adjust operating procedures and employ contingencies as necessary.</p> <p>Please see the Monitoring discussion in the Staff Report.</p> |
| 21 | 4.9.3 Settlement of EFPK | <p>Comment: This section mentions that the uncertainty increases dramatically when considering EFPK deposition into Cell D and that there is a risk of excess sediment in the water of Cell D.</p> <p>Recommendation: AANDC understands the purpose of installing the intermediate dike is to mitigate these risks.</p> | <p>Nov 23: The concept of an internal dike within Cell D is for the purpose of mitigating the risks of elevated sediment in Cell D water by isolating a smaller, upstream area for FPK deposition. The concept is described and evaluated in the Appendix D (RGC) Report.</p> | <p>Nov 29: Proponent response is acceptable.</p> |
| 22 | 5.3 - Beartooth Pit Monitoring | <p>Comment: Section 5.3 identifies that conditions within the Beartooth Pit will not be monitored, due to safety concerns, until the water level has risen to a safe height. The safe height is not indicated. Section 6.2 identifies that closure water quality prediction models are being developed as part of the closure planning process, but does not indicate when the modelling results will be available. AANDC notes that the October 2004 Terms of Reference for</p> | <p>Nov 23: Regarding the elevation within Beartooth pit at which access to the pit water could be safely achieved, BHP Billiton assesses and will continue to assess access conditions quarterly. This is a serious consideration that BHP Billiton will not compromise. The assessment is conducted by geotechnical engineers who possess</p> | <p>Nov 29: Proponent response is acceptable.</p> <p>Please see the Monitoring discussion in the Staff Report.</p> |

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| | | <p>Sable, Pigeon and Beartooth Pit Lake Studies included several models related to pit lake stability and pit water quality, with deliverable dates in 2007. AANDC is not aware that these deliverables have been completed.</p> <p>Recommendation: Identify the elevation at which monitoring of conditions within the Beartooth Pit would commence, and identify when this would be expected to occur. Identify when the pit lake water quality models will be available, and incorporate the modelling results into future plans. The plans should include action levels and associated responses in the event that monitoring results do not meet the model predictions.</p> | <p>the qualifications and accountability to make a decision. If access for environmental sampling can be safely achieved, then sampling will proceed. The WPKMP (S.5.3) describes the water sampling that would take place. Regarding pit lake water quality prediction models, modelling for all of the EKATI open pits is the focus of Reclamation Research Plan #3 under the recently approved Interim Closure and Reclamation Plan. The scheduled reporting date is 2012. Note that the modeling referred to here and, presumably, in the AANDC comment is for closure and will not attempt to predict operational water quality during deposition of FPK. Ultimately, closure water quality criteria will be established for the EKATI open pits that BHP Billiton will plan to achieve prior to any discharge taking place.</p> | |
| 23 | 5.3 - Beartooth Pit monitoring WQ vs. safety | <p>Comment: AANDC is concerned that approval of placing FPK into Beartooth pit is premature if at present there is no formal plan to monitor the FPK conditions and water quality within the pit during the initiation of this activity. Before approval, we must have an acceptable monitoring strategy and reporting schedule for results. Additionally, consideration of thresholds and stop action points would be required to prevent unforeseen or unfavourable conditions in the pit (e.g. FPK deposits in a talus like form along one side of the pit wall and does not evenly distribute).</p> <p>Recommendation: BHPB should prepare a monitoring plan and contingency plan for placing FPK in Beartooth pit.</p> | <p>Nov 23: The WPKMP describes monitoring (S.5.3) for Beartooth pit. See response to comment AANDC-22 for further information regarding safe pit access for environmental sampling. Reporting of results would take place through the established reporting mechanisms for the Water Licence Annual Report. See response to comments AANDC-12 and -14 regarding contingencies for Beartooth pit.</p> | <p>Nov 29: Please see the Monitoring discussion in the Staff Report.</p> |
| 24 | 5.3 - Beartooth | <p>Comment: Stability of the walls is a concern.</p> | <p>Nov 23: Correction: meromictic</p> | <p>Nov 29: Board staff</p> |

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| | Pit stability | <p>Especially at closure when the formation and maintenance of a meromictic condition is required to protect the environment. A wall failure would most likely cause a mixing and/or turnover event. AANDC understands the plan always included filling all pits with water but there is an added dimension of risk for Beartooth if pit walls are unstable (i.e. water mixing and turnover events).</p> <p>Recommendation: BHPB must describe what mechanisms will be used to stabilize the pit walls in Beartooth pit for operations and closure to prevent wall failures and potential mixing/turnover events.</p> | <p>conditions are not known or understood by BHP Billiton to be required to protect the environment. Meromictic conditions may occur in Beartooth pit after closure. Further, given the presence of chloride-rich underground minewater in the pit, this condition might possibly be purposely catalysed or enhanced if desired. However, the presence of meromixis creates the risk that is identified in the AANDC comment and, therefore, is not a given as a desired outcome. Also, there is no intent that BHP Billiton will stabilize pit walls for closure. BHP Billiton will assess wall stability and possible failure modes as a means of planning for the eventual naturalization of the pit perimeters over time. The presence of FPK in the pit will reduce the risk of deep-seated wall failures, meaning that the likely failure mechanism will be ravelling of the crest. The assessment of risks to water quality related to wall failures causing mixing of a meromictic pit lake will be conducted through the ICRP once the stability analyses and pit lake water quality models are available.</p> | <p>acknowledge AANDC's concern regarding maintenance of meromixis as well as BHP's assertion that this may not necessarily be the closure condition of the Beartooth pit lake.</p> <p>Please see the Water Quality discussion and the Monitoring discussion in the Staff Report.</p> |
| 25 | 5.3 - Beartooth Pit closure & reclamation | <p>Comment: Though all pits were intended to be filled with water as per the ICRP, the increased uncertainty and potential risks associated with this plan for Beartooth (monitoring, contingencies, instability of pit walls, mixing/turnover) suggests further research/information is required prior to moving forward. Thawing of the pit walls (permafrost degradation from filling) may add to pit wall instabilities.</p> <p>Recommendation: AANDC wishes to have more</p> | <p>Nov 23: A thermal analysis of Beartooth pit wall thawing that was conducted by EBA Engineering as part of BHP Billiton's evaluation of the use of the pit for minewater retention. This was for the purpose of assessing safety risks to workers in the Panda underground mine. Over the 10-year timeframe modelled thaw-back would not be anticipated to be substantively different for a pit filled</p> | <p>Nov 29: BHP has responded to the portion of the comment addressing permafrost degradation. AANDC's other concerns have been addressed, to some degree, in BHP's responses to AANDC-11,12,21,22,23,24, and BHP's response letter. Board staff are of the opinion that the information regarding</p> |

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| | | information on the aspects. | with FPK covered by water (pers. comm. EBA Engineering). Longer term thermal analyses have not been conducted and are not considered necessary or helpful information for operational planning. The EBA Report (2009) was provided to the Water Board in 2009 and is too large to upload with these responses. The report can be provided to AANDC on CD if desired. | AANDC's concerns provided by BHP both in the WPKMP Version 2.0 and the responses here is adequate. Please see the General Discussion section of the Staff Report. |
| 26 | 5.3 - Thermistors | <p>Comment: In 2009 a thermistor string was installed between Beartooth and Panda pits. Installation was difficult and the thermistor string is no longer operational. AANDC notes this string was placed to assess the permafrost condition between the pits when BHPB received approval from the WLWB to store mine water in Beartooth pit. Concern was raised on the potential for mine water to drain/seep into the U/G operations beneath Panda pit.</p> <p>Recommendation: Are there any plans to install another string of thermistors to provide this permafrost information.</p> | <p>Nov 23: The thermistor string was difficult because the borehole was deep and the thermistors were operational for a relatively short period of time. The thermistor readings served the primary purpose of confirming the depth of permafrost at that location and enabling the thermal analysis referred to in response to comment AANDC-25. BHP Billiton does not plan to replace this borehole/thermistor string. Additional ground temperature monitoring locations are envisioned to be in the Waste Rock Storage Areas per Reclamation Research Plan #7.</p> | <p>Nov 29: Proponent response is acceptable.</p> |
| 27 | 5.6 - LLCF Nitrate Reduction Experiment | <p>Comment: The experimental method for nitrate reduction within the LLCF has not been successful over the past two years. Will BHPB be conducting these studies again in 2012 or beyond? If so, when will the WLWB and Inspector be notified? This is a concern because as mentioned, "too much phosphorus entering into the receiving environment downstream of the LLCF could result in negative environmental effects through toxicity, algal blooms and associated BOD."</p> <p>Recommendation: If fertilizer is continually added to Cell D and there is no increase in algae, it must</p> | <p>Nov 23: BHP Billiton has reported to the Water Board on the Cell D nitrate reduction experiment for 2008/09 and 2010. Those reports document the intensive monitoring of water quality, including phosphorus, that took place in Cells D and E to ensure that excess phosphorus was not accumulating in the LLCF or being released to the environment. In fact, a slight increase in phosphorus levels in Cell D in the absence of algal growth resulted in the immediate shut down of fertilizer</p> | <p>Nov 29: Proponent response is acceptable.</p> |

| | | be determined where the additional phosphorus is going. As mentioned in this report, it may be transferred through to Cell E (exfiltration) and discharged to the receiving environment. | application in 2010, leading to the poorer than anticipated general result in nitrate reduction. BHP Billiton has documented this risk in numerous reports and site visits for regulators and manages the program accordingly. | |
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| Independent Environmental Monitoring Agency: Kevin O'Reilly | | | | |
| ID | Topic | Reviewer Comment/Recommendation | Proponent Response | Board Staff Response |
| 1 | General File | Comment: This is the covering letter for the Independent Environmental Monitoring Agency's comments on the 2011 Wastewater and Processed Kimberlite Management Plan. | | |
| 2 | Permafrost around Beartooth Pit | <p>Comment: Pg. 5-2 and 5-3, 5.3 Beartooth Pit, there is no discussion of whether the filling of Beartooth with FPK would influence the maintenance of the permafrost around the pit any differently than the existing deposition of minewater. Was this covered in the 2009 EBA study mentioned, but not referenced (the study is referenced in Appendix D and should be made available by BHPB available)? Was any data collected from the thermistor cable between Beartooth and Panda before it no longer worked and did that data support the EBA study?</p> <p>Recommendation: The Board should examine the issue of whether an operating thermistor string between Beartooth and Panda is required and, if so, direct the company to replace the failed one.</p> | <p>Nov 23: See response to comment AANDC-26 regarding the thermistor string adjacent Beartooth pit. Note that BHP Billiton does not intend to maintain permafrost around open pits. Some thaw-back may occur during operations and will continue when the pits are filled with water. See response to comment AANDC- 25 regarding thermal analysis by EBA at the Beartooth pit including a note on providing the EBA (2009) report.</p> | <p>Nov 29: BHP's response to AANDC-26 states that "The thermistor readings served the primary purpose of confirming the depth of permafrost at that location and enabling the thermal analysis" conducted by EBA. BHP's response to AANDC-25 notes that: "Over the 10-year timeframe modelled thaw-back would not be anticipated to be substantively different for a pit filled with FPK covered by water (pers. comm. EBA Engineering)." Presumably the reason for this lies in the conservative assumptions made by EBA in completing its 2009 analysis including assuming that the contents of Beartooth "would remain in unfrozen conditions all the time in the thermal analysis"</p> |

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| | | | | (page 6 of EBA2009). As well, in EBA 2009 there is no mention of needing to confirm the results through ongoing thermal monitoring between Beartooth and Panda. Therefore, there is no evidence at this time that the thermistor needs to be replaced. |
| 3 | Adaptive Management | <p>Comment: Pg. 4-16, 4.9 Operating Uncertainties and Mitigation Strategies, states the following: “The very nature of these uncertainties precludes a pre-determined response plan because one does not know what the risk is until it is identified. Instead, the ongoing cycle of monitoring and review of information will be used to identify trends and to then develop the most appropriate response plan based on the circumstances at hand.” The approach described here is not consistent with adaptive management which, by definition, attempts to identify the uncertainties and make testable predictions for future performance. By ‘precluding a pre-determined response plan’ because of unknown risks, BHPB is rationalizing why a contingency plan cannot be prepared. Instead, it proposes to craft a response on an ad hoc basis as the upset condition develops. This approach is at odds with prevailing industry standards and with best practices, and should not be permitted.</p> <p>Recommendation: This section of the WPKMP should be revised to reflect the principles of adaptive management and the precautionary principle.</p> | <p>Nov 23: BHP Billiton believes a 30 m depth of water over FPK is a conservative and environmentally protective restriction on FPK deposition into Beartooth pit. This creates a firm limit on FPK deposition until such time that monitoring information and other studies might indicate a change. Any proposed change to the 30 m water depth would be proposed to the Water Board for its approval. As deposition into Beartooth pit continues, additional data and information will be collected allowing us to better predict potential future performance and then implement contingencies or adaptive/ad hoc management if required. Mitigation can include suspending FPK deposition into Beartooth Pit providing time to come up with an appropriate solution.</p> | <p>Nov 29: Board staff agree with BHP’s approach; however it is reasonable for BHP to provide a list of all possible contingencies (in addition to Cell D) and the expected order of implementation. If there are other contingencies for FPK deposition besides Cell D, then all parties can better evaluate the likelihood of Cell D being used.</p> <p>Please see the FPK Deposition discussion in the Staff Report.</p> |
| 4 | FPK Deposition Options | <p>Comment: Pg. 4-11, 4.8.3 Recommended Deposition Plan, did BHPB consider thickening the FPK before disposal to provide for additional space in the available capacity?</p> | <p>Nov 23: Thickening of the FPK has been considered but is not in practice at this time. Thickening (i.e. paste) in the current process plant set-up is not</p> | <p>Nov 29: Proponent response is acceptable. FPK thickening has been considered and is carried out to a limited extent;</p> |

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| | | <p>Recommendation: BHPB should provide an explanation as to whether FPK thickening was considered an option during its internal evaluation of LLCF options and why thickening was rejected.</p> | <p>feasible due to pumping constraints and additional processing equipment needs. The process plant will attempt to send the highest density slurry to the Beartooth Pit to maximize its available storage volume. Currently the PK is thickened in the process plant, however not to the point where special pumps and pipes are required.</p> | <p>further thickening is not planned due to logistical challenges. Thicker tailings may be feasible for Beartooth pit than for the LLCF and BHP will attempt to send the thickest tailings possible to Beartooth.</p> |
| 5 | Beartooth Pit Water | <p>Comment: Pg. 4-7, 4.7 Beartooth Pit, the description of how long Beartooth Pit may be used as a sump is helpful but a more detailed discussion of the criteria or key factors in deciding when minewater may be returned to the LLCF or used in ore processing should be provided. This information would be helpful in understanding and modelling LLCF water quality as the Beartooth minewater may be moved into the LLCF.</p> <p>Recommendation: BHPB should provide an explanation as to when Beatooth pit water will be removed to allow for PK deposition and the factors or criteria that will be used to determine whether the water will be reclaimed for ore processing or sent to the LLCF.</p> | <p>Nov 23: See response to comment AANDC-11 regarding pumping from Beartooth pit to the LLCF. The criteria for pumping from Beartooth pit to the process plant for recycle process water is the discretion of the Process Plant Superintendent based on suspended sediment or other factors not negatively impacting plant performance or equipment.</p> | <p>Nov 29: BHP's response to AANDC-11 states: "...In 2011 and through 2012 underground minewater will be diverted to the Beartooth pit, at which time the situation will be re-evaluated..." Board staff understand that minewater could be reclaimed to the process plant and then pumped to the LLCF and also that some minewater will remain in Beartooth pit during FPK deposition.</p> <p>Please see the Water Quality discussion in the Staff Report.</p> |
| 6 | Beartooth Pit Water | <p>Comment: Appendix D, Pg. 43, 3.4.1.3 Environment [Beartooth], the third paragraph discusses the environmental benefit of diverting minewater to Beartooth but this water may be put through the LLCF as Beartooth is filled with PK. BHPB has expended significant resources to manage nitrate and chloride in the LLCF but the 2011 WPKMP may see Beartooth pit water moved to the LLCF. The implications of the movement of Beartooth pit water for water quality in the LLCF is not discussed.</p> <p>Recommendation: BHPB should discuss how and</p> | <p>Nov 23: See response to comment AANDC-11 regarding pumping water from Beartooth pit to the LLCF. 'The water quality in the LLCF will be monitored for change with the addition of Beartooth Pit water. There is no change to the management of the LLCF with the discharge EQC being maintained at all times. In the short term this will help water quality and reduce nitrate concentrations in the LLCF. In the longer term the LLCF will be able to accept the Beartooth Pit</p> | <p>Nov 29: Board staff acknowledge that it is BHP's responsibility to employ operational procedures, largely at the discretion of the company, in order to ensure the EQC are maintained at all times. (Board staff note that the licenced EQC will be reviewed with BHP's Water Licence renewal application). In the response to AANDC-11, BHP notes that a 'worst-case</p> |

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| | | to what extent LLCF water quality may change as a result of the addition of Beartooth pit water, and any management measures that may be necessary. | water while achieving the EQC's at the discharge from Cell E. | scenario' could result in minewater needing to remain in Beartooth and alternative locations used for FPK, such as Cell D. BHP appears confident that this will not occur. Please see the Water Quality and FPK Deposition discussions in the Staff Report. |
| 7 | Beartooth Pit Water | <p>Comment: Appendix D, Pg. 44-45, 3.4.1.4 Closure [Beartooth], this section discusses the effects on closure of using Beartooth for PK deposition but the assumption is that water quality within Beartooth will allow for the pit to be reconnected. Assuming that some minewater will continue to be stored in Beartooth, predictions of water quality with and without PK would be helpful. This information would be helpful in assessing the risks of PK deposition into Beartooth and better evaluating environmental benefits and costs.</p> <p>Recommendation: BHPB should provide some explanation of what the Beartooth pit water quality will be with and without the addition of PK.</p> | <p>Nov 23: Water quality prediction modelling for the EKATI open pits is the focus of the Reclamation Research Plan #3 under the recently approved Interim Closure and Reclamation Plan. The scheduled reporting date is 2012. Also see response to comment AANDC-12 regarding closure water quality contingencies.</p> | <p>Nov 29: Proponent response is acceptable: reporting on water quality predictions is scheduled for 2012; BHP's response to AANDC-12 identifies pumping water from Beartooth to either the LLCF or the Panda pit/underground as contingency measures.</p> <p>Please see the Water Quality discussion in the Staff Report.</p> |
| 8 | Beartooth Pit Water Quality Monitoring | <p>Comment: Pg. 5-2 and 5-3, 5.3 Beartooth Pit, monitoring does not appear to include any objectives related to whether meromixis is taking place or to verify pit water modelling that might be done (see pg. 6-3, bullet 6).</p> <p>Recommendation: BHPB should clarify whether the objectives of Beartooth pit water monitoring include whether meromixis is taking place and verification of pit water modelling (water quality and water stability).</p> | <p>Nov 23: The monitoring information collected in Beartooth pit (S.5.3) will serve those objectives (whether meromixis is taking place and verification of water quality modeling).</p> | <p>Nov 29: Proponent response is acceptable.</p> |

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| 9 | Beartooth Pit Water Quality Monitoring | <p>Comment: Appendix D, Pg. 59, 4.3 Environment recommends quarterly pit water monitoring (water column profiles) inside Beartooth but notes safety concerns and that this may not be possible or only in winter. Pit water modelling was supposed to be completed in 2007 under the approved Pit Lakes Studies Terms of Reference.</p> <p>Recommendation: BHPB should begin pit water modelling for Beartooth as quickly as possible and make efforts to verify the results and recalibrate the model using monitoring data. The results of this modelling should be reported to the WLWB.</p> | <p>Nov 23: See response to comment IEMA-7 regarding pit water quality modeling. Per response to comment IEMA-8, monitoring information can be used to verify the modelled predictions. The work will be reported to the Water Board through the established requirements for the Water Licence Annual Report, Annual Reclamation Research Report or other topic-specific reports.</p> | <p>Nov 29: Proponent response is acceptable: as part of Reclamation Research Plan #3, reporting on pit water quality predictions is scheduled for 2012. Also, BHP has offered to distribute its LLCF water quality prediction model suggesting that after resolution of WPKMP 2.0 would be the appropriate time.</p> <p><i>Board staff recommend that BHP submit an updated LLCF Water Quality Prediction Model.</i></p> <p>Please see the Water Quality discussion in the Staff Report.</p> |
| 10 | | <p>(Comment from IEMA cover letter added to Table by Board Staff)</p> <p>Appendix A. Water Management Contingencies in the 2011 WPKMP</p> <p>The Agency's January 11, 2011 letter on the conformity check of the 2009 WPKMP raised concerns around the lack of detail on various water management contingencies. The wording of the respective sections in the 2011 WPKMP (pg. 2-2 and 2-3) remains essentially unchanged.</p> <p>Pg. 2-2, 2.1.1 An in-line treatment plant may be used to add flocculent, but no details are provided on the criteria used to determine when flocculent will be used, anticipated quantities or characteristics of the flocculent (note further information provided in s. 4.5 is helpful, but does not provide criteria).</p> <p>Pg. 2-3, 2.1.4 Fox Site section states that an in-line treatment plant may be used to add flocculent, but</p> | <p>IEMA did not include this comment in the Review Comment Table; therefore, BHP did not have the opportunity to respond in the WLWB's preferred format.</p> | <p>Please see BHP's response to AANDC-6.</p> <p>Please see the Flocculent Plants discussion in the Staff Report.</p> <p>Please see the Water Quality discussion in the Staff Report.</p> |

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| | <p>no details are provided on the criteria used to determine when flocculent will be used, anticipated quantities or characteristics of the flocculent.</p> <p>Pg. 2-3, 2.2.3 Misery Pit section states that an in-line treatment plant may be used to add flocculent, but no details are provided on the criteria used to determine when flocculent will be used, anticipated quantities or characteristics of the flocculent.</p> <p>Pg. 4-3, 4.3 Processed Kimberlite states that control room operators vary the amount of flocculent and coagulant depending on the settling characteristics of the plant feed. How is this determined? What criteria are used to add flocculent and coagulant?</p> <p>Pg. 2-4, 2.2.4 Beartooth Pit section states that minewater has been diverted “when it is beneficial to divert certain minewater sources away from the LLCF”, but no details are provided on the criteria used to determine when this happens, anticipated quantities or characteristics of the minewater. This information would be important to know in terms of any pit water quality modelling or pit water quality predictions for Beartooth and understanding when minewater will be discharged into the LLCF.</p> | | |
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bhpbilliton
resourcing the future

BHP Billiton Canada Inc.
Operator of the EKATI Diamond Mine

BHP Billiton
#1102 4920-52nd Street
Yellowknife NT Canada X1A 3T1
Tel 867 669 9292 Fax 867 669 9293
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November 23, 2011

Wek'èezhìi Land and Water Board
#1, 4905 – 48th Street
Yellowknife, NT
X1A 3S3

Attention: Ms. Violet Camsell-Blondin, Chair

Re. EKATI Diamond Mine Wastewater and Processed Kimberlite Management Plan

BHP Billiton Canada Inc. submitted a revision (Version 2.0) to its Wastewater and Processed Kimberlite Management Plan for the EKATI Diamond Mine (WPKMP) on October 20, 2011. The primary changes in Version 2.0 are the use of the mined-out Beartooth pit and additional areas of Cells A and C of the Long Lake Containment Facility for deposition of fine processed kimberlite (FPK). This plan will advance the previously established objective of extending the use of Cell D as a kimberlite-free water management pond. The proposed plan may avoid the need to use Cell D for kimberlite deposition at all.

The submission of Version 2.0 followed a lengthy period of general discussion of the primary concepts with various reviewers, culminating in a meeting held in Yellowknife on July 28, 2011. BHP Billiton interpreted the tone of conversations as generally supportive. In fact, the use of an open pit for FPK deposition has long been a topic of discussion and has been recommended by reviewers in the past. BHP Billiton believes that this is now the opportunity to implement the plan.

Written review comments have been received from only two parties: the Independent Environmental Monitoring Agency and Aboriginal Affairs and Northern Development Canada. Specific responses to each comment or question have been posted to the Board's on-line registry.

Many of AANDC's comments and questions are directed to their recommendation that the Board should not approve the use of Beartooth Pit at this time because further study is required. BHP Billiton disagrees with this recommendation and provides an expanded response on this topic below.

The WPKMP provides all of the necessary technical information on:

- laboratory and field studies that demonstrate the settling capabilities of FPK;
- a description of various options for FPK deposition, including benefits, risks, uncertainties and drawbacks for each;
- a discussion on uncertainties generally and how each option is subject to its own nature and degree of uncertainty; and
- an evaluation of deposition options that clearly places Beartooth pit as a preferred location.

What this technical work verifies is that it is a good idea to use Beartooth pit for deposition of fine processed kimberlite. That is why, in BHP Billiton's view, the concept was discussed as part of the two EKATI Environmental Assessment processes and was subsequently written into the Scope of the Water Licence. That is why, in BHP Billiton's view, the concept has been discussed and recommended by reviewers in the past.

BHP Billiton is also saying that this is now the time to implement the plan. Effective management of the LLCF requires a number of active and available deposition areas at all times. With Cell B of the LLCF now approaching its effective storage capacity, BHP Billiton will be developing new deposition areas and Beartooth pit has been identified as the preferred option.

There is an acknowledged experimental aspect to the use of Beartooth pit. Operating procedures on how to place kimberlite into the pit to achieve the best settlement will need to be established through trial and error in some instances. The overriding protection to the environment through this process is that kimberlite will not be placed within 30 m of the top of the pit. This "ceiling" ensures a safety zone of at least 30 m water cover over kimberlite, which is what was described in the initial EKATI Environmental Assessment.

The overriding benefits of the use of Beartooth pit are secure deposition of fine processed kimberlite, further deferral of the use of Cell D for kimberlite deposition, reduced beach areas requiring reclamation in the LLCF, and establishment of operating procedures that could be used to manage kimberlite deposition into a larger pit in future.

A positive and important secondary benefit is the further reduction of minewater entering the LLCF in the short term. BHP Billiton continues to pro-actively manage nitrate concentrations in the LLCF according to published guidelines and the diversion of process plant water to Beartooth pit will assist with this work in the short term. Once the water that is currently contained in the LLCF has been safely released to the environment, the LLCF will again provide its full capacity for receiving controlled inflows of minewater (possibly from Beartooth pit) while continuing to achieve EQC at the discharge location.

Finally, in its cover letter to comments and questions the Monitoring Agency suggests that BHP Billiton circulate an update to its LLCF Water Quality Prediction Model. BHP Billiton will be happy to do so. Because the proposed WPKMP V.2.0 is likely to have a strong effect on the model update (i.e., FPK deposition into Beartooth Pit), BHP Billiton proposes to update the model and circulate a report following the Board's resolution of WPKMP V.2.0.

Thank you for your efforts and those of your staff in addressing the request for approval of WPKMP V.2.0. BHP Billiton would like to proceed with shipping the necessary bulk supplies (pipelines specified for the Beartooth pit) to EKATI on the 2012 winter road for immediate construction if the Board agrees with and approves the plan. In this case deposition could commence in fall 2012.

Please contact the undersigned at 669-6116 if you have any questions.

Sincerely,

BHP Billiton Canada Inc.

A handwritten signature in black ink, appearing to read "E. Denholm". The signature is written in a cursive style with a large initial "E".

Eric Denholm, Superintendent – Traditional Knowledge and Permitting
EKATI Diamond Mine



INDEPENDENT ENVIRONMENTAL MONITORING AGENCY

P.O. Box 1192, Yellowknife, NT X1A 2N8 ■ Phone (867) 669-9141 ■ Fax (867) 669-9145
Website: www.monitoringagency.net ■ Email: monitor1@yk.com

November 16, 2011

Kathy Racher
Technical Director
Wek'eezhii Land and Water Board
#1-4905 48th Street
Yellowknife NT
X1A 3S3

Dear Kathy

**Re: Agency Comments on the 2011 Wastewater and
Processed Kimberlite Management Plan**

The Independent Environmental Monitoring Agency has taken a keen interest in the Ekati Wastewater Processed Kimberlite Management Plan (WPKMP) given the importance of maintaining downstream water quality. In this covering letter the Wek'eezhii Land and Water Board (WLWB) will find some general comments regarding the WPKMP and some specific comments that did not warrant a place in the accompanying comment table.

General Comments

The Agency notes that the 2011 WPKMP is generally clearer than other recent versions and that the flow and amount of information has improved. We were pleased to see that BHPB has reinstated the use of a version numbering system. The 'conformity table' in Appendix A is a new, and helpful, addition. Appendix D (EKATI Mine 2011 FPK Deposition Alternatives Study) is an important contribution as it provides a sound and updated technical basis for revising the tailings deposition operation in LLCF. It also addresses some of our earlier concerns around inadequate information for supporting the plan components.

As it has done on previous occasions, the WLWB should request that BHPB submit the various supporting documents for the 2011 WPKMP identified in Appendix D, especially the LLCF Water Quality Prediction Model, Version 3.0. The reasons for this is that water quality related to PK (specifically the tailings pond) is one of the most important issues and there are many stakeholders aside from BHPB who can assist in making sure this aspect is well managed. Circulating the model would help.



There are several places in the WPKMP where BHPB indicates that various water treatments may be undertaken but no criteria are provided regarding when such management practices will be used (see Appendix A to this letter). The Agency has raised this issue in the past. We recall the WLWB proposing to set up a separate process to address the issue of how much information should be required in management plans, and would like to reiterate our keen interest in this and our willingness to assist in this process in whatever way the Board might find helpful.

The Agency is also of the view that there should be an explicit water quality and water stability monitoring program for Beartooth pit so we can all gain a better insight into what is happening there and to better evaluate future pit options and risks at Ekati. The use of a pit for minewater, and potentially for processed kimberlite disposal, is a new development for northern mining and there is likely to be much to learn.

Specific Comments

- Pg. 1-2, 1.1 General, there is reference to the Misery pushback activities having commenced. BHPB had committed to provide a brief project description but this has not been distributed to date.
- Pg. 1-4, 1.3.3 Processed Kimberlite, a definition of EFPK should be provided at this point even though it occurs later in Appendix D.
- Pg. 4-13, 4.8.3.3 Dike C Raise/Cell C West, second sentence, change “exciting” to “existing”.

We thank you for the opportunity to submit comments and we would be happy to discuss them with you and others at your convenience.

Sincerely,

A handwritten signature in black ink, appearing to read "W.A. Ross". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Bill Ross
Chairperson

cc. Society Members
Bruce Hanna, Fisheries and Oceans
Lisa Lowman, Environment Canada

Appendix A. Water Management Contingencies in the 2011 WPKMP

The Agency's January 11, 2011 letter on the conformity check of the 2009 WPKMP raised concerns around the lack of detail on various water management contingencies. The wording of the respective sections in the 2011 WPKMP (pg. 2-2 and 2-3) remains essentially unchanged.

Pg. 2-2, 2.1.1 An in-line treatment plant may be used to add flocculent, but no details are provided on the criteria used to determine when flocculent will be used, anticipated quantities or characteristics of the flocculent (note further information provided in s. 4.5 is helpful, but does not provide criteria).

Pg. 2-3, 2.1.4 Fox Site section states that an in-line treatment plant may be used to add flocculent, but no details are provided on the criteria used to determine when flocculent will be used, anticipated quantities or characteristics of the flocculent.

Pg. 2-3, 2.2.3 Misery Pit section states that an in-line treatment plant may be used to add flocculent, but no details are provided on the criteria used to determine when flocculent will be used, anticipated quantities or characteristics of the flocculent.

Pg. 4-3, 4.3 Processed Kimberlite states that control room operators vary the amount of flocculent and coagulant depending on the settling characteristics of the plant feed. How is this determined? What criteria are used to add flocculent and coagulant?

Pg. 2-4, 2.2.4 Beartooth Pit section states that minewater has been diverted "when it is beneficial to divert certain minewater sources away from the LLCF", but no details are provided on the criteria used to determine when this happens, anticipated quantities or characteristics of the minewater. This information would be important to know in terms of any pit water quality modelling or pit water quality predictions for Beartooth and understanding when minewater will be discharged into the LLCF.



File: W2009L2-0001

November 16, 2011

Brett Wheler
Regulatory Specialist
Wek'eezhii Land and Water Board
#1 – 4905 48th Street
Yellowknife, NT X1A 3S3

**Re: BHP Billiton – Wastewater and Processed Kimberlite Management Plan
ver. 2.0, October 2011**

Aboriginal Affairs and Northern Development Canada – Water Resources Division has reviewed BHP Billiton Canada Inc.'s, Wastewater and Processed Kimberlite Management Plan, Version 2.0 and provides the attached comments, in the Comment Table format, as requested by the Wek'eezhii Land and Water Board.

Thank you for providing AANDC with the opportunity to comment on the above plan. If you have any questions or concerns, please feel free to contact Mr. Paul Green at 669-2402 or paul.green@aandc-aadnc.gc.ca or Mr. Nathen Richea at 669-2657 or nathen.richea@aandc-aadnc.gc.ca .

Sincerely,

for Robert Jenkins
Manager
Water Resources Division
Aboriginal Affairs and Northern Development Canada
NWT Region

BHP Billiton Canada Inc.
Operator of the EKATI Diamond Mine



BHP Billiton EKATI Diamond Mine
#1102 4920-52nd Street
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Tel 867 669 9292 Fax 867 669 9293
bhpbilliton.com

October 20, 2011

Wek'èezhii Land and Water Board
#1, 4905 – 48th Street
Yellowknife, NT
X1A 3S3

Attention: Ms. Violet Camsell-Blondin, Chair

Dear Ms. Camsell-Blondin

Re: EKATI Diamond Mine - Wastewater and Processed Kimberlite Management Plan Version 2.0

The Wastewater and Processed Kimberlite Management Plan (WPKMP) describes BHP Billiton's approach to management of all of the wastewater and all of the fine processed kimberlite (FPK) that is within the scope of the EKATI Water Licence. Version 1.1 of the WPKMP, which was provided to the Wek'èezhii Land and Water Board in August 2010, is currently in effect. The attached report (V.2.0) is a proposed update to the WPKMP that, if approved by the Board, will supercede all previous versions.

The changes proposed in Version 2.0 represent an opportunity to advance the established approach for FPK deposition by further deferring, and possibly eliminating, the need for deposition into Cell D of the Long Lake Containment Facility (LLCF). Future FPK deposition would centre on accessing new upstream depositional areas in Cells A and C of the LLCF and also utilizing the mined-out Beartooth Pit. The primary benefit is that Cell D remains in use as an additional minewater retention and mixing pond (additional to Cell E). There are some general uncertainties (Life of Mine planning, storage capacity estimates, FPK beaching angles, contingency planning, etc.) that preclude a definitive assessment of whether Cell D will be needed for FPK deposition in future. Nonetheless, its use will, at the least, be substantially deferred under Version 2.0 of the WPKMP, which is of benefit.

The use of Beartooth pit for FPK deposition was considered during environmental assessment and is included in the Scope of the Water Licence. The concept has been discussed since that time and, in some instances, has been previously recommended by reviewers. To ensure that FPK deposition does not compromise closure objectives, BHP Billiton is proposing to maintain a minimum 30m depth of water over FPK for closure of the Beartooth pit. This is the depth of water that was discussed during environmental assessment. A technical review of FPK deposition options by Robertson GeoConsultants Inc. is appended to the WPKMP, in which a water depth of 30m for closure is deemed adequate and possibly overly-conservative; meaning that additional technical studies might find that a shallower water

cover that would provide additional capacity for FPK would also meet closure objectives. Such studies are a future possibility. The established 2m operating freeboard for the Beartooth pit will remain in place to protect against inadvertent over-filling of the pit with water.

Accessing additional areas of Cells A and C of the LLCF combined with FPK deposition into the mined-out Beartooth pit is an opportunity that BHP Billiton believes should be acted upon. These changes were presented to reviewers in concept at a workshop in July 2011 and the response was generally positive, identifying the same benefits that BHP Billiton sees. BHP Billiton is requesting that the Board approve Version 2.0 of the WPKMP and is prepared to begin work this winter. If BHP Billiton is able to receive the Board's approval in time to ship the necessary pipelines and other bulk materials on the 2012 winter road, then the pipeline could be operational by fall 2012.

Thank you for your consideration of this request. If you have any questions please contact Mr. Eric Denholm, Superintendent – Traditional Knowledge and Permitting, at 669-6116.

Yours sincerely,

A handwritten signature in black ink, appearing to read "E. Denholm". The signature is written in a cursive style with a large initial "E".

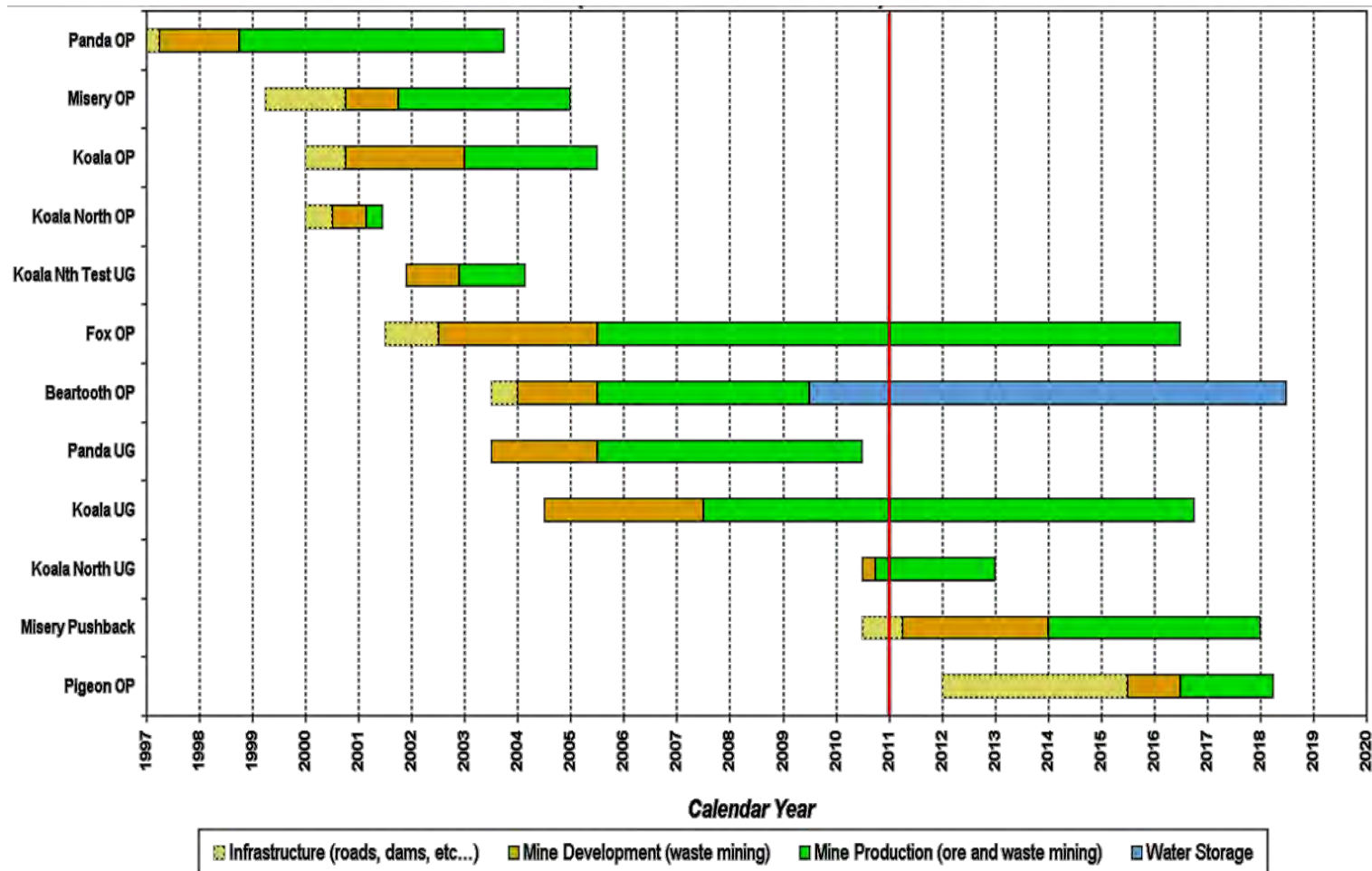
Eric Denholm, Superintendent – Traditional Knowledge and Permitting
EKATI Diamond Mine



EKATI Diamond Mine - Main Camp Area



EKATI Diamond Mine - Misery Area



Life of Mine Plan

Figure 1

3.5.3 Evaluation Summary

The individual evaluations per topic were pooled as shown in Table 9 to provide a summary rating for each option.

Table 9. Options Evaluation, Summary

| Option | FPK Storage Volume (Mm ³) | Implementation | Environment | Closure | Costs | Summary Rating |
|--|---------------------------------------|----------------|-------------|---------|-------|----------------|
| Cell D Without Dyke (<i>Current Plan</i>) | 0 (20-32) | 0 | 0 | 0 | 0 | 0 |
| Cell D With Dyke | -1 (12-15) | -3 | +1 | +1 | -3 | -5 |
| Cell C West/Dyke C Raise | -2 (6) | -2 | +2 | +1 | 0 | -1 |
| Cell A South | -2 (4) | -1 | +2 | -2 | +3 | 0 |
| Cell B East | -2 (5) | -1 | +2 | -3 | -2 | -6 |
| Cell C East | -3 (2) | -2 | +2 | +1 | +3 | +1 |
| Beartooth Pit | -1 (7) | 0 | +3 | +2 | +3 | +7 |
| Panda/Koala Pit | +2 (>50) | -3 | +3 | +3 | +3 | +8 |
| Fox Pit | +2 (>50) | -3 | +3 | +2 | 0 | +4 |

Appendix A

WATER LICENCE W2009L2-0001 – Summary of Specific Requirements for the Waste Water and Processed Kimberlite Management Plan Version 2.0

Under **Part G.1a** of Water Licence W2009-L2-0001, which also covers the Sable, Pigeon, and Beartooth developments, the following information is quoted and is specified for inclusion within the Plan:

Part G: Conditions Applying to Waste Disposal

1. Wastewater and Processed Kimberlite Management Plan

- a) The Licensee shall operate in accordance with the Wastewater and Processed Kimberlite Management Plan as approved by the Board. Amendments to the Plan shall be in accordance with the NWT Water Board's "Guidelines for Tailings Impoundment in the Northwest Territories, February 1987" or any subsequent editions, and shall include, but not be limited to the following:
 - i. a comprehensive description of all sources and types of Waste related to the Project where not provided in the Acid/Alkaline Rock Drainage (ARD) and Geochemical Characterization Plan, or the Waste Rock and Ore Storage Management Plan as approved by the Board,
 - ii. a description of any proposed physical or chemical treatment of Waste prior to Discharge to the Long Lake Containment Facility, the King Pond Settling Pond, the Phase 1 Tailings Containment Area, Two Rock Sedimentation Pond, or to the Receiving Environment,
 - iii. a description, including maps to scale, of the locations of monitoring stations for ground temperature, water quality, water Discharge and Processed Kimberlite elevation, including the sampling protocols and frequency to be undertaken at each station,
 - iv. a schedule of Processed Kimberlite Discharge within the Long Lake Containment Facility over the term of this Licence, including detailed maps showing deposition locations,
 - v. stage-volume curves and water balance calculations showing life expectancy of the Long Lake Containment Facility and Two Rock Sedimentation Pond,
 - vi. an anticipated schedule of volumes of Discharge to and from the Two Rock Sedimentation Pond and King Pond Settling Pond,
 - vii. a series of contingency options should Two Rock Sedimentation Pond approach or exceed capacity, and
 - viii. any operational changes and Modifications, which may impact the Wastewater and Processed Kimberlite Management Plan;
- b) The Licensee shall submit to the Board for approval, sixty (60) days prior to the Construction of both the Sable and Pigeon pits, an updated Wastewater and Processed Kimberlite Management Plan.

Appendix A

WATER LICENCE - W2009L2-0001 - Summary of Specific Requirements for the Wastewater and Processed Kimberlite Management Plan Version 2.0

| Reference | Section |
|---------------------|--|
| Part G: 1. a). i | Section 1.3 Overview of Wastewater and Processed Kimberlite Section 2.1 Management of Surface Minewater Section 2.2 Management of Open Pit Minewater Section 2.3 Management of Underground Minewater Section 3 Management of Sewage Section 4.2 Process Water Section 4.3 Processed Kimberlite Section 4.4 Flocculants |
| Part G: 1. a). ii | Section 2.1.1 Main Camp and Fuel Storage Berms Section 2.1.2 Panda and Koala Pits Section 2.1.4 Fox Site Section 2.2.3 Misery Pit Section 4.3 Processed Kimberlite Section 4.4 Flocculants |
| Part G: 1. a). .iii | Section 4.5.2 Water Management Section 4.7.2 Evaluation of Deposition Options Section 5.1 Water Quality and Aquatic Monitoring Programs |
| Part G: 1. a). iv | Section 4.7.4 Timeline of Deposition Plan |
| Part G: 1. a). v | The nature of FPK deposition strategy does not lend itself to simple elevation filling curves for the Cells of the LLCF. This is because the deposition strategy requires FPK beaches of various slopes that extend above water. That is, there is no single elevation that will represent FPK deposition into each cell. The dykes establish the maximum operating water elevation at 1 m of freeboard. The FPK surface will extend to various upper elevations above the water level depending on the elevation of the local spigot point and the general topography of the land. The FPK surface will continue below the water level at a different slope angle. This is the strategy that lends itself to maximizing the use of available storage capacity in Cells A, B and C as agreed through the previous collaborative review process described in below. |
| Part G: 1. a). vi | Not applicable for this update |
| Part G: 1. a). vii | Not applicable for this update |
| Part G: 1. a). viii | Section 2.1.3 Misery Site Section 2.2.3 Misery Pit Section 4.7.2 Evaluation of Deposition Options Section 4.7.3 Recommended Deposition Plan |