EKATI DIAMOND MINE ICRP COMMENT /RESPONSE TABLE – SECTION 4

7.0 Temporary Closure
8.0 Environmental Assessment
9.0 Progressive Reclamation
Appendix F Reclamation Research Plan
Appendix G Post Closure Monitoring

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
Chapter 8.0: Environmental Assessment								
1	IEMA – 1	Chapter 8	Purpose	This entire chapter is confusing. The opening of Sec.8.1 seems to recognize, rightly, that what is needed at the end of reclamation and closure activities is an assessment of residual environmental impacts. However, the bulk of this section appears to be a summary of environmental conditions as of the present time. It also refers in several places to the assessment of 'potential' and 'predicted' impacts when we should be talking (at the end of mine life) about actual, measurable impacts. This chapter should be rewritten to provide a description or study design of how BHPB will assess the residual environmental impacts of the project once closure has been completed.	BHPB is agreed to removing Section 8.2 which discusses current environmental conditions at EKATI. The ICRP TOR – Environmental Assessment section outlines the following: 'The environmental assessment section will provide the reader with an assessment of the predicted environmental condition in the receiving environment, including any predicted residual risks and effects at the minesite for the post closure period. The assessment assumes that the proposed physical reclamation has been fully completed.' The June 3 ICRP TOR Reviewer Comments Table (INAC-38) requested that this section compare predicted impacts to those that were considered acceptable in the original EA's. BHPB included this request, but instead of placing it in Section 4.8 Lessons Learned, placed it more appropriately in the Environmental Assessment Section, 8.4. At this stage of ICRP planning, which focuses on the end of the reclamation period, after mining operations cease, all impacts are predictive. Actual impacts have been provided in Section 8.2. Updated assessments of residual environmental impacts would be completed with successive updates of the ICRP. In addition BHPB provides environmental impact reports to stakeholders every 3 years, from mining operations startup to the end through to full and final reclamation of the Project (Environmental Agreement, Article V Section 5.2 a).).	**Section 8.3** will be updated to mention that Environment Impact Reports will be completed through to end of the reclamation of the Project, with reference to the Environmental Agreement.		
2	IEMA – 2	Chapter 8		DIAND's *Mine Site Reclamation Guidelines for the Northwest Territories* suggests that two other documents are important closure tools and should be prepared following closure. First, a *Reclamation Completion Report* which describes the closure work undertaken should be prepared at the end of reclamation work. Second, a *Performance Assessment* for reclamation activities be prepared once the initial follow-up monitoring period has ended, presumably several years after reclamation. This report is to compare the success of the reclamation and closure measures against the originally stated closure objectives. These reports should be explicitly		BHPB agrees that the Reclamation Completion Report and the Performance Assessment Report should be incorporated into the Closure Planning Schedule. **Section 9.2** will be updated to ensure inclusion of these 2 reports.		

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				incorporated into the description and schedule of closure planning tasks in the current ICRP, perhaps in this section. BHPB should also think about where its proposed post-closure environmental assessment fits into that schedule. In our view, this assessment should probably be undertaken concurrently with the *Reclamation Completion Report*. One advantage of doing this is that the assessment can then inform the follow-up monitoring program, and results discussed in the later *Performance Assessment*.				
3	IEMA – 3	Chapter 8	8.4	It is not clear why this section is here, since it merely summarizes some of the remaining pit lake studies, and then tells us that no further work is planned until after the ICRP is finalized. Most if not all this information is available elsewhere. Progress on the pit lake studies is alarmingly slow. According to the schedule of work provided by BHPB in the 2004 TOR, tasks 1-8 were to have been completed by July 2007. No work on completing the pit lake studies as per the original TOR has apparently been taken since the end of 2005. There is considerable urgency in getting this work completed, especially given the looming planned closure date of the Beartooth pit.	Section 8.4 includes a summary of predictive water quality, in pit lakes, LLCF and seepage from WRSA, predicted loadings and stability in pit lakes, and predicted effects on terrestrial and wildlife resources. BHPB believes these tie directly into the predicted effects outlined in Table 84 and has important bearing on what the predicted effects of operations and reclamation activities will have at mine closure. Section 8.4 is a summary of work completed on the pit lakes studies since 2005. BHPB stated at the January 21/08 ICRP Working Group Meeting that the Pit Lakes Studies are continuing and are expected to be completed by end 2008.	No Revision Proposed.		
4	IEMA – 4	Chapter 8	Table 84	Table 84 presents a summary of '2007 Predicted Residual Effects for Post Reclamation'—why? Why are we interested in a prediction at this point about residual effects? When it comes time to do the assessment following completion of reclamation and closure activities, we will want an analysis of the actual residual impacts relative to the pre-1995 baseline, not the 2007 predictions. What might be helpful in table 84 is to present any information which suggests that changes in the VECs are occurring relative to baseline, how this might be mitigated as part of reclamation and closure, and what residual impacts might remain. Table 84 has a column to address the potential residual effects however it was almost all filled in with N/A, yet many should not be N/A. Air Quality- there are no contingencies during reclamation period. Why not? Under the Wildlife heading it is unclear why during reclamation that "*Wildlife access ramps, berms & culverts removed*" is identified as a contingency.	As part of the 2007 ICRP update BHPB reviewed the potential residual effects on the environment after mining operations are completed. The review included a look at the residual effects outlined in the original EIS for closure, residual effects assessed in the EKATI Diamond Mine Impact Report 2006, changes to the mine plan and the recent changes in the ICRP for the larger mine components. The results of the review were a more current and applicable list of potential effects during the reclamation period, contingencies to reduce those effects predicted in the reclamation period, and the predicted residual effects after contingencies were in place. The above process is outlined in Section 8.3. BHPB believes that changes in how VEC's are assessed, changes to the mine plan and updated methods of reclamation and closure should all factor into predicted residual effects at mine closure, these should be reviewed with each update of the closure plan. By ignoring the above changes and potential impacts that occur throughout the life of the mine, and solely reviewing potential effects from the original assessment to those at the end of the mine operations (a span of approx 25 years) would be negligent on the part of BHPB. Changes to VEC's relative to the baseline 1995 assessment have been provided in the EKATI Diamond Mine Environmental Impact Report 2006, and were included as part of the assessment for potential residual	**Table 84.** The contingency for wildlife access/use of roads will be changed. Wildlife access ramps will be removed from this contingency since these ramps would provide beneficial use for wildlife.		

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					effects for the 2007 ICRP, the results of which are presented in Table 84. Air Quality – please refer to BHPB's response in Section 2 Response Comments Table (Tracking # 164) and Section 3 Response Comments Table (Tracking # 47) regards air quality and fugitive dust. Wildlife – Wildlife use of roads has been identified as a concern by stakeholders. In response to this concern BHPB included the contingency of removing obstacles which may impact wildlife (egs. culverts, berms).			
5	IEMA - 5	Chapter 8	8.6.2	LLCF Model Set-up - simulations do not consider the evolution of water quality during the lifetime of the mine. Why not? Is this a correct method?	Modeling of the LLCF is ongoing during mining operations and reports on operations modeling are being developed. BHPB is committed to maintain water quality discharge from the LLCF below Water Licence levels during mining operations, and therefore at mine closure in 2020 levels of regulated parameters will be at or below Water Licence levels. The modeling of the LLCF at closure uses the same model for operations. For the ICRP modeling predictions commence in 2020 at the end of operations.	No Revision Proposed.		
6	IEMA – 6	Chapter 8	8.7.3	Breeding Bird / Habitat - there is no mention that revegetation on LLCF may have a residual effect by attracting upland breeding birds and/or migratory birds (geese, waterfowl) that could intake contaminants through eating vegetation or direct ingestion of kimberlite sand.	It is not currently possible to fully evaluate the effect of a revegetated LLCF on birds, as the LLCF is not revegetated. Previous (and ongoing) studies examining LLCF revegetation can provide some information to address the issue of whether there is significant contaminant uptake by vegetation and subsequently by animals.	No Revision Proposed.		
7	ENR – 1	Chapter 8. Table 84	Predicted Post Reclamation Residual Effects	BHP Billiton (BHPB) indicates that non-attractant vegetation will be planted as a way of mitigating the uptake of metals by foraging wildlife at the LLCF area (table 84). Over time, non-attractant vegetation may not persist, or may be out-competed by vegetation that is attractive to wildlife, thereby negating the attempt to mitigate the uptake of metals by wildlife. • BHPB should commit to maintaining the non-attractant vegetation at the LLCF until the possibility of metal uptake is insignificant. Alternately, BHPB should determine how persistent non-attractant plantings are when in competition with species attractive to grazers.	BHPB agrees with ENR that non-attractant vegetation may eventually be replaced by attractive forage vegetation, or continue with non attractive vegetation. Research should be completed to assess what successional vegetation will establish on the LLCF, under the influence of natural colonization, changes to the geochemical makeup of the PK from weathering and competition from other vegetation which may be attractants for wildlife. As well, a risk assessment should also be used to assess the level of risk to wildlife from consuming the various plants which a) are foragable, b) accumulate metals to the level that will negatively effect wildlife, and c) would be grazed by wildlife at the volumes that would negatively effect wildlife.	**Table 46 (Appx F) Land 4** will be updated to include under Planned Research: 2. Research vegetation succession on the LLCF and how the changes in plant cover might impact grazers.		
8	ENR – 2	Section 8.7.3	Breeding Bird/Habitat	Page 301, last paragraph states, "… once the pits are flooded the water levels will remain essentially stable and any remaining highwalls will be available for nesting habitat and will remain unaffected." Given that rising water levels could affect nesting habitat, depending on how much the water level increases - "essentially stable" should be quantified in order to determine if water levels could potentially be a threat to nesting birds. • BHPB should identify what "essentially stable"	Agree - water levels must be quantified. BHPB will include this as part of the hydrologic assessment of flooded pit lakes. Refer to Table 43 (Appx F), Water 2. In Section 8.7.3 BHPB states that landscape will return to a **condition** that more closely **resembles** pre-disturbance **conditions** before the open pits were developed. Therefore the **effects** on falcon nesting habitat after the closure plan has been implemented is predicted to be negligible'. BHPB does not suggest or state that the landscape will physically resemble pre-disturbance.	**Section 8.3** will be updated to include quantification on how post mining conditions will resemble pre-disturbance, and how the pre-disturbance landscape will have negligible effects on falcon nesting habitat.		

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				water levels are, and give a +/- idea of how much water levels are expected to fluctuate once the pit lakes are flooded. In addition BHPB's ICRP states (with respect to the flooding of the open pits) "The landscape will return to a condition that more closely resembles pre-disturbance conditions before the open pits were developed. Therefore the effects on falcon nesting habitat after the closure plan has been implemented is predicted to be negligible". • Considering the pits, and/or the pit lakes were not in existence prior to the presence of the mine, stating that the pit lakes will cause the landscape to resemble a pre-disturbance condition is misleading. ENR suggests that this be rephrased.				
9	INAC – 1	Chapter 8	General	In general there is a lack of detailed information. The chapters are basic summaries and often simply refer to references, which are not available or difficult to track down. A preferred solution is to provide more detail in the ICRP and make the references available (i.e. On CD).	The Reclamation Research Plan provides summaries of the research which in most cases is detailed more thoroughly in reports. Most of the reports referenced in the Research Plan have been provided to regulators and communities. Should reviewers require these reports BHPB is happy to provide them.	No Revision Proposed.		
10	INAC – 2	Section 8.2	Figure 78 – Water Balance	Using the numbers provided in Figure 78 there appears to be approximately 2.84 million m^3 of water being removed from the LLCF into Leslie Lake. Using the number provided in Figure 78 the following calculations (approximations) were made: Inputs (Cells A, B, C) ---------- 6.5 Mm3 Withdrawn for Processing Plant-- 5.14 Mm3 Surplus---------- 1.36 Mm3 Discharge to Leslie Lk---------- 4.2 Mm3. Therefore there is an excess of approximately 2.84 Mm3 (4.2 – 1.36) of water being removed annually from the LLCF. - Can you explain what this means to the water balance of the LLCF? - Is it due to volume of solids, or precipitation? - How is ice entrainment being considered in this schematic?	Acknowledged.	**Section 8.2** will be reviewed to ensure that appropriate data has been provided or referenced in the ICRP for Figure 78.		
11	INAC – 3	Section 8.3	Table 84	The vast majority of the described effects are listed as being negligible or minor. Considering that some of these parameters are not well known and are still being researched, it would appear premature to claim that the effects will be negligible or minor. More information is required to make these claims -For LLCF water quality the contingency is water	Please refer to the 1995 EIS where all residual effects for Post-Decommissioning were either negligible, N/A (not applicable), or positive impact. The purpose of the EKATI Diamond Mine Environmental Impact Report 2006 was to update residual effects based on a comparison with the 1995 assessment, under current	**Section 8.6** will be updated to include more information regarding the type of Water Treatment System, or methods which BHPB intends to use as a contingency, if water		

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				treatment during the reclamation period. INAC-WRD requests more information be included in the ICRP regarding the type of Water Treatment System or methods which BHPB intends to use as a contingency if water treatment is determined to be required during the reclamation period.	conditions and environmental controls. The 2007 ICRP review referenced both of these assessments when assessing the potential residual effects for Post Reclamation.	treatment is determined to be required during the reclamation period.		
12	INAC – 4	Section 8.4	Pit Lake Load Balance Models	BHP states at the start of this section that it is only a summary and a pit lake report will be forthcoming. Considering the importance of this document, can BHP confirm that the pit lake studies and the final report will be completed by December 31st, 2008 or earlier?	BHPB has stated at the Working Group Section 3 Working Group meeting (Jan 21/08) and at the Pit Lakes Presentation Mar 20/08 that the Pit Lakes Studies are planned for completion by December 2008. INAC staff were present at both of these meetings.	No Revision Proposed.		
13	INAC – 5	Sections 8.4.2 & 8.4.3	Pit Lake WQ & Stability	INAC-WRD would like to thank BHPB for organizing the presentation on the issues surrounding pit lake water quality and stability, they were very informative and helpful. They did however highlight the complexity of these systems and the difficulty in modeling and prediction. This only emphasizes the need to implement a pit lake study sooner rather than later so some of these variables can be answered before closure.	Acknowledged.	No Revision Proposed.		
14	INAC – 6	Section 8.4.4	Source Lake Extraction Rates	INAC-WRD is concerned that average values are used to determine the drawdown of the source lakes and prediction of downstream effects. Table 19 (p-115) indicates that Ursula Lake will be used as a source lake for 14 years. Considering the extended time frame, there are certain to be years of low water. Therefore, a range of possible scenarios would be more appropriate. For example use a series of possibilities ranging from high to low flow years. You can then use these ranges to provide details describing at what flow or drawdown level mitigation (i.e. reduce or stop pumping) will be required.	An average value is appropriate given the relatively long-time frame, 14 years. There will certainly be variation in precipitation from year to year, and the average is believed to be a good representation of the long-term expectation for acceptable water extraction flow. Flow reduction or interruptions to pumping are expected to mitigate unacceptable effects of drawdown, and more detailed estimates of pumping versus high/low precipitation years will be provided in the final design and permitting stages of closure planning.	No Revision Proposed.		
15	INAC – 7	Section 8.6.1	Physical Configuration of LLCF	This section states that 'A relatively small volume of Kimberlite will also have been discharged into Cell D during the final years of operations, creating a beach in the northwest corner of the cell'. This is a change of plans from restricting PK to Cells A, B, and C and possibly using the pits for the remainder. Furthermore considering that this will be deposited towards the end of mine life, the impact at closure will be greater. How will these potential impacts be mitigated?	BHPB has at no time stated that the PK would not be discharged to Cell D, but pumped to an exhausted pit. BHPB has proposed the use of an exhausted pit as a possible option, and will continue to research whether this option is feasible. This proposal is confirmed in Section 3.4.2 of the Approved WWPKMP which states that BHPB will 'Delay discharge of FPK to Cell D for as long as possible. If the use of Cell D can be delayed beyond 2014 there is a potential for a mined-out pit to become available for depositing processed kimberlite, thereby avoiding the storage of FPK in Cell D.' The current plan is to store approx 6.0 Mt of FPK and 1.5 of EFPK in Cell D (Section 3.4.6 of the WWPKMP) and to flood the Beartooth pit with water drawn from Lac de Gras (Section 6.1.6.1 of the ICRP). Placement of PK in Cell D was included in the design of the facility and outlined in the 1995 EIS. This plan has not changed, except that with the current WWPKMP less PK will be deposited in the facility. Mitigation for the PK in the facility, including Cell D is the polishing pond in Cell E.	No Revision Proposed.		
16	INAC – 8	Section 8.6.2	Model Set up	The effect of subsurface porewater expulsion should be considered in the model.	For the model, it was assumed that the volume of runoff that would seep through the kimberlite beaches would pick	No Revision Proposed.		

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					up far greater loads of various parameters than loads expelled from consolidation of submerged tailings. The chemistry of water seeping through the tailings beaches was assumed to be identical to the chemistry of pore water. Therefore, incorporating effects of expelled subsurface pore water would have a negligible effect on the water quality modeling results.			
17	JW – 1	Section 8.0 Figure 78		Is there a matching table (spreadsheet) that supports the values in the table? What are the uncertainties in these values? Are losses (which are not shown) attributed to primarily evaporation? From which "stations" are the values based on measurements and which ones on calculations (from other stations)?	There is no matching spreadsheet for Figure 78. This figure is in fact best described as a water flow diagram. For a more complete and up to date water flow diagram for the mine site elements, see the *Environmental Agreement and Water Licences Annual Report 2007* (April 2008). Flow estimates at downstream lakes are based on watershed area and average precipitation, and are meant as a rough representation of flows (for context). No attempt was made to estimate variability for this purpose.	No Revision Proposed.		
18	JW – 2	Section 8.4.1		With respect to connate water – all pits have created a 'cone' of depression; also, as the pits deepen groundwater generally increases in TDS concentration, but also rate of inflow – largely from connate water. At some point the system stabilizes as the rate of groundwater withdrawal equals the rate of recharge. TDS concentrations may or may not stabilize depending on several variables. When the pits are refilled, some of the inputs will go to groundwater storage. In essence, the water balance of the pit system must quantify both surface water and groundwater components. Ekati's systematic records of sump pumping and TDS concentrations (for example) during pit development should help in quantifying and developing a model for filling in the pits. How has this data been incorporated in the pit lake studies to date (how will it be used in the future)? It appears from the Pit Lake studies (in ICRP and presentation), however, that the groundwater component has not been equally considered (or perhaps not at all). (For example, what are the geometries of the cones of depressions around each pit?) This may lead to large uncertainties in predicting TDS of the pit water and the total water volume required from source lakes. What is being done to reduce these uncertainties?	Deep groundwater at EKATI is confined to strata below the permafrost, which is approximately 320 m deep. Therefore, significant depression of the deep groundwater occur only for open pits and underground workings that have been, or will be, developed below the permafrost. These pits/underground workings include Koala, Panda and Fox. Between 2003 and 2007 (5 years) approximately 1.7 Mm^3 of mine water was pumped from the underground workings to the LLCF. A considerable quantity of this water was surface water reporting to the underground workings from the open pits. In comparison, the combined volume of Panda and Koala open pits are nearly 86 Mm^3. Therefore, although underground mine water will continue to be pumped from the underground workings until mine closure the dewatered subsurface structures are not expected to affect the water balances considerably. However, the interactions between the saline groundwater and the fresh surface water are very important for predicting the physical stability (meromixis) of the future pit lakes. Therefore, the issues associated with groundwater flow and recharge will be studied in detail during the Pit Lakes Studies currently in progress. A range of possible scenarios with respect to groundwater and surface water interactions will be considered in the Pit Lakes Studies.	No Revision Proposed.		
19	JW – 3	Section 8.4.3		P 290, 3rd paragraph: What is meant by a "semi-analytic model"? The name implies minimal ability to quantify processes. With respect to lake stability and meromixis, how more refined or quantitative will future evaluations/models be (what modeling is proposed?) – in order to establish some level of confidence in predictions?	An 'anaytic' solution is an exact mathematical solution to a set of model equations; exact solutions are rare. By 'semi-analytic' we mean a model whose solution is partially analytic and partially numerical. 'Semi-analytic' should not be confused with 'semi-empirical' or 'qualitative'.	No Revision Proposed.		

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				P 291 (after Table 85): calculations assumed isothermal conditions. This may reflect conditions in some deep pit lakes, but not all – what happens to salinity stability in non-isothermal conditions?	There are two approaches to modeling pit-lakes that will be explored. An off-the-shelf model is only as good as the equations, assumptions and coefficients that are put into it. There are a number of processes important to meromixis that remain a significant challenge for any model and some processes are not included. The off-the-shelf models have not been developed or rigorously tested for northern pit-lakes, and the consequences of these models are unpredictable in new situations. Rather than beginning with an off-the-shelf model Rescan feels there is more to be gained by characterizing the major factors affecting meromixis and representing these using semi-analytic and box models in which we know the level of assumption involved. These models start with all of the relevant physics and build by calibration to observed data. In Rescan's experience, this is the surest route to confidence in the results. This work can be used post-closure as the basis for adding processes and critically testing off-the-shelf models such as DYRESM, CE-QUAL-W2 and ELCOM when empirical data become available in partially filled pits. During fall overturn, there comes a point when the surface cools to the same temperature as the deep water; the lake is said to be isothermal. If the lake is meromictic, the salinity will have to maintain the stability during this time, to prevent mixing between the surface and deep water.			
20	JW – 4	Chapter 8.0 Figure 79		It is not clear how ΔSt is represented on the graph – as it is defined as the reduction in stability over the cooling period, but the graph plots St* versus ice thickness (i.e., not cooling period). Also, the positions of Zone 2 Pit and Waterline have fairly high TDS (e.g., 800 and 1100 mg/L, respectively) but plot near the 10 mg/L line. Please explain?	One of the times that meromixis is most vulnerable to breakdown is during fall cooling. One way to determine whether or not meromixis will breakdown during fall cooling is to examine the change in salinity stability during the fall. First, using a box model, the stability of the pit lake is computed for the start of fall cooling, here chosen to be the end of August. This model predicts that the salinity stability at the start of fall, St*, will increase both with salinity and with increased ice-cover during the previous winter. This salinity stability will resist fall overturn as the pit cools. The figure compares the salinity stability of the proposed EKATI Fox pit lake at the start of fall cooling, St*, to the decrease in salinity stability, DSt, that was observed at the Colomac Zone 2 and Equity Waterline pit lakes. If the initial August stability at Fox, St*, is less than the decrease in salinity stability, DSt, observed at other pit-lakes, meromixis is unlikely.	No Revision Proposed.		

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					It is the work done by wind and convection to change the salinity stability that is important in the Zone 2 and Waterline pit lakes. For this example, it was assumed the same work was done by wind and convection at all three sites; and the intent is to quantify the differences between sites.			
21	JW – 5	Section 8.4.4		It's not clear how the 'drawdowns' were calculated, over what time scale (e.g., monthly averages vs simulated daily flow) what data was used (e.g., regional vs site-specific gage data) or what assumptions were used. Please explain using tables and charts noting data sources, application of actual or estimated values, etc. What were the assumptions in calculation of "rebound" time? Three years seems like a long time for Ursula Lake to recover without having adverse downstream effects. Perhaps, if the analysis was presented graphically over the 3 year period would help. The following statement is incorrect, "…the natural seasonal ranges of elevations …are an order of magnitude greater than the pumping losses." The estimated change due to pumping (5 to 8 cm) in Ursula Lake is 14 to 23% of the estimated natural seasonal range of 35 cm – this is clearly less than one order of magnitude. Also, this is based on an average year scenario – if pumping were to follow a couple dry years then it is plausible that water level drawdowns due to the prescribed pumping rates will be lower than the seasonal low estimated from just one year. The water balance model runs should be conducted for not just individual years (as in the 1:10 or 1:25 year low) but several successive years of low rainfall (as well as wet years).	The drawdowns were calculated using a daily time step in the water balance model. This allowed freshet response to be resolved. Monthly values were used for several hydrological parameters in the model. Values for precipitation and evaporation were derived from on-site data. The model was calibrated against observed data from hydrometric stations that were operated at the outflows of Upper Exeter and Ursula lakes. Rebound time was defined as the time from the end of pumping until lake surface elevation returned to the pre-pumping value. The incorrect statement is noted, and should be stated as "… the natural seasonal ranges of elevations… are approximately 5 times greater than the pumping losses."	**ICRP Vol 1 Section 4.8.4** will be corrected to "… the natural seasonal ranges of elevations… are approximately 5 times greater than the pumping losses."		
22	JW – 6	Section 8.4.5		The predicted values assume average lake level/rain/flow conditions since June to arrive at the October levels. Effects analysis should consider more conservative scenarios. References to HEC-RAS modeling are provided, but without any discussion of field data collected, strategy for data collection, methods used, model assumptions, etc. It is difficult to accept the modeling results without some level of back-up. Perhaps this information is provided in references already provided. Please provide references or back-up for modeling work. For example, it is apparent from Figure 80 that a number of cross sections were represented downstream of the outlets to the next lake. How representative are these cross sections? How were they surveyed? What is the variation of channel geometry (width, depth, roughness, gradient, etc) along this flow path? (Only one spot is needed to restrict passage). What were the model assumptions?	The predicted values are based on average conditions, however, the ranges reported describe 1-in-10 wet and dry year estimates. The HEC-RAS model was developed based on cross-sectional surveys conducted at both the Upper Exeter Outflow (5 transects) and Ursula Outflow streams (10 transects). Surveys were conducted with an RTK GPS unit. Surveyed transects were selected to be representative of the range of morphological units observed in each stream (*e.g.*, pool, riffle, glide, cascade).	**Section 8.4.5.** References for the modeling results will be provided.		
23	JW – 7	Section 8.4.6		Are downstream reduction %'s based on solely on the increased watershed area? What is the natural variability in runoff/stream flow per unit area in the Ekati	Yes, downstream reduction %'s are based on watershed scaling. While natural variability is high in the EKATI area, at the scale of 10 to 100 km^2, watershed area is a useful	**Section 8.4.6.** Information will be provided to backup the statement that 'pump		

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				region? The conclusion that "… pumping rates used as the basis for pump flooding will not significantly reduce fish habitat…" cannot be fully supported based on the level of analyses presented to date. Please see comments above for suggested level of sensitivity required (e.g., assessing successive dry years).	metric for calculating the relative magnitude of effects.	flooding will not significantly reduce fish habitat'.		
24	JW – 8	Section 8.4.7.3		The conclusion that "…habitat appears homogenous throughout the upper 1.2 m of the littoral zone" seems to misrepresent the physical environment. For example, homogenous implies uniform substrate throughout, when it is more likely that for any given lake, the substrate has variable proportions of bedrock, boulders, cobbles, gravels and fines but at a given depth (or zone of depth) the overall proportions may be similar thus providing organisms specific habitat requirements throughout the 1.2 m zone. Thus, it is not necessarily clear how homogenous conditions are, or whether there are subtle changes within the 1.2 m zone that provide advantages or disadvantages to certain species. Further, it is not clear from the analyses presented in 8.4.4 what the actual lake level reductions would be with respect to this upper 1.2 m zone.	The word "homogeneous" refers only to the absence of statistically significant changes with elevation in the percentages of each of the five substrate categories: sand, gravel, cobble, boulder and bedrock. It does not refer to the horizontal distribution of substrate categories, which is patchy over a wide range of spatial scales, nor was it intended to imply that substrate is uniform in either dimension. The purpose of the analysis of vertical distribution of substrate categories (described in the four paragraphs below) was to determine whether the small reductions in elevations of the lake surface that will result from pumping water to fill the pits lake (described in the fifth paragraph below) will result in loss of unique fish habitat. For each of the two lakes (Upper Exeter and Ursula), the average percentages of each of the five substrate categories and two vegetation categories (submergent and emergent) were calculated for each of ten elevation classes by pooling data over all sections of each lake. An interval width of 0.25 m was chosen because the range of elevations was approximately 2.5 m and no more than ten elevation classes were required to show trends. To normalize the frequency distributions of the substrate particle size percentages and vegetation percentages, a prerequisite of parametric statistics, all percentages were transformed with the arcsine[$(X/100)^{0.5}$] transformation, where X = percentage. Averages and standard errors (SE) of those transformed percentages were then calculated for 0.25 m-wide elevation classes for each lake. Plots of those averages on the mid-point of the elevation classes showed no consistent trends over the entire elevation range, although there were some trends for parts of the elevation range. For example, percent sand in Ursula Lake appeared to increase with increasing elevation for approximately three-quarters of the elevation range. That conclusion was tested by comparing average arcsine-transformed percentages among elevation classes for each of the two lakes using one-way Analysis of Variance. No significant (α=0.05) differences among average percentages were found for boulder, cobble or sand of Upper Exeter Lake or for bedrock of Ursula Lake, and no significant difference among average percentages were found for emergent or submergent vegetation for both lakes. Significant differences were found for bedrock	No Revision Proposed.		

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					and gravel in Upper Exeter Lake and boulder, cobble, gravel and sand in Ursula Lake. However, in all of those cases, post-hoc comparisons of average percentages (using the Bonferonni correction for degrees of freedom) showed that the differences were restricted to the very largest and smallest averages. This analysis confirmed the conclusion reached from visual examination of the plots – that differences in average percent substrate category were relatively minor and did not follow a consistent trend with elevation. Mass balance modelling of the two lakes for the 1 in 10 year wet and dry conditions predicted reductions in lake surface elevation as a result of water extraction. For the recommended pumping rates (0.4 m^3/s for Upper Exeter Lake and 0.2 m^3/s for Ursula Lake), reductions in elevation for the low-flow month of October were predicted to range from 0.05 to 0.08 m in Upper Exeter Lake and from 0.04 to 0.08 m in Ursula Lake. These losses are small relative to the 1.2 m-wide range of littoral zone habitat measured in August 2006 and to the natural seasonal ranges for both lakes (35 cm for Upper Exeter Lake and 40 cm for Ursula Lake). Since littoral zone habitat is "homogeneous" over this depth range (*i.e.*, there is no structuring by depth), there will be no loss of unique fish habitat.			
25	JW – 9	Section 8.4.7.4		It is not clear how the referenced mass balance modeling was conducted and how the wet, average and dry condition scenarios were simulated. Please explain. Also, please note questions/comments to HEC-RAS modeling in comment to 8.4.5. The estimated decreases in stream flow (35-60% for Upper Exeter and 20-50% for Ursula) appear to be rather significant, especially if this decrease is sustained for a long period. Thus, the conclusion that "… the magnitude of these reductions during the low flow period of October was predicted to be relatively minor…" does not seem supported.	Wet, average, and dry conditions were based on return-period precipitation estimates for the site. These have been derived from on-site meteorological and hydrological monitoring since 1997. Annual runoff was calculated by assuming a runoff coefficient of 0.5, which is the average runoff coefficient observed from on-site hydrometric monitoring stations. Annual runoff was partitioned based on the average monthly flow distribution derived from on-site hydrological monitoring. Monthly flow was further partitioned to daily flow estimates to incorporate peak flow during freshet. Hydrographs produced by the model were calibrated against observed data from hydrometric stations at the Upper Exeter Lake and Ursula outflows.	No Revision Proposed.		
26	JW – 10	Chapter 8.0 Table 84		Some of the potential and residual effects rankings appear quite arbitrary, especially since the definitions of the environmental effect are vague. For example, for negligible – damage is limited to a minimal area of low significance. The reasoning appear circular (no independent criteria). How are these effects actually measured? What does minimal mean? How is it determined? What does minor mean, etc? How will these rankings/ratings be used?	The rankings for negligible effect were based on the Enterprise Wide Risk Management rankings for level of risk to Natural Environment. This is an industry wide method of ranking. The purpose of this ranking for residual effects in Table 84 was to maintain consistency with the risk assessment completed in Appendix E. The rankings are used to asses the level of effect (also measured as environmental risk) on VEC's at the completion of reclamation, and to assist with contingency planning. The Environmental Impact Report 2006 has the following definitions for Negligible and Minor Residual Effects:	No Revision Proposed.		

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					Negligible (Physical) Variable affected in a localized area during a short time period. (Biological) A specific group of individuals in a localized area affected during a short time period. Minor (Physical) Variable affected during less than one decade. (Biological) A specific group of individuals affected during less than one generation. The above rankings are comparable to the rankings used in the 2006 Impact report, with the addition of temporal measures of effects. BHPB would be agreeable to either ranking system.			
27	JW – 11	Section 8.6.2		Model sensitivity of climatic conditions is vague. What climatic conditions and how will these be varied? How would excess water in Cell E occur? What do current trends of water quality parameters suggest (i.e., could they exceed Water License criteria by time of closure)? It is not clear how natural runoff is estimated. Are annual runoff coefficients used? If so what are these based on? How is seasonal variation considered?	A Monte Carlo approach was used for the climatic sensitivity analysis. The model was executed several thousand times. For each year included in the runs, a value for total annual precipitation was selected randomly from a precipitation distribution developed from precipitation data specific to the EKATI site. The minimum and maximum (or 5^{th} and 95^{th} percentile) water quality parameter concentrations were then analyzed to determine the sensitivity of the water quality results to variations in precipitation. Excess water would occur in Cell E if water was held back for a period of time (*i.e.,* if pumping of water from Cell E to Leslie Lake were to be stopped for a period of time). The current trends in water quality indicate that it is very unlikely that any parameters in the current Water Licence would be exceeded at closure in 2020. A runoff coefficient of 0.5 was used in the model for all watersheds. This value was based on 11 years of observations made at the EKATI mine site. The model was run on a monthly basis. The seasonal distribution of runoff (percent of total per month) was assumed to be the same each year.	No Revision Proposed.		
28	JW – 12	Section 8.6.3		It is not clear why parameters would continue to exceed water license criteria for up to 15-20 years, given that after closure loadings should decrease or cease due to the aforementioned “dilution”? “…the results of the sensitivity analysis indicated where this uncertainty has the greatest impact on model results.” …where does the uncertainty have the greatest impact? How often are model updates expected (based on a continual supply of new data)?	The exceedences referred to in Section 8.6.3 are exceedences of the CCME Guidelines *not* of the Water Licence Criteria. The effects of uncertainties on modeling results are dependent on the water quality parameter in question. Detailed investigation will only be completed for parameters that are of potential future concern in terms of protecting downstream aquatic habitat. The model is a tool that is used to address specific water quality concerns or proposed water management initiatives. Therefore, the model will not be updated according to a set schedule but will be re-evaluated on an ongoing basis based as required.	No Revision Proposed.		
29	JW – 13	Section 8.7.1		What does “affected” mean in the clause “a specific group of individuals in a localized area are affected…”?	Negligible is defined as ‘A specific group of individuals in a localized area affected during a short time period.’ In this	**Section 8.7.1** will be updated to provide		

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				Non-lethal?	context the ranking is referring to non-lethal since 'no caribou collisions [or injuries to caribou] with vehicles have occurred at EKATI' during the period of mining operations. BHPB continues to mitigate against caribou injuries on roads by construction of access ramps, reporting of wildlife near roadways to the Environment Dept and stopping vehicle traffic when wildlife are on roads. The above definition is found in the Environmental Impact Report 2006 (Table 6.1-1).	reference to the Environmental Impact Report 2006.		
30	JW – 14	Section 8.7.2		Reason for "minor" ranking is unclear; how will only "less than one generation" of wolverines be affected when activities will simultaneously affect several generations (assuming longevity of 8-10 years) and period of mining and closure much longer?	BHPB agrees that mining operations would have more than one generation effect on wolverines over the life of the mine. Closure operations (commencing in 2020) which will include air traffic, mobile equipment movements and the use of landfillling are not expected to continue over more than one generation, and therefore the residual effects are expected to be minor.	**Section 8.7.1** will be updated to ensure that the minor predicted residual effect on wolverines is discussed in the context of closure, and not operations.		
31	JW – 15	Section 8.8.2		The IPCC issued their latest report in November 2007. It appears that the context of the information in this section references the 2001 report. The 2007 report provides a substantial body of new research and knowledge with more up-to-date predictions – so this section should be updated to reflect the latest IPCC findings and interpretations. One noted deficiency is the lack of any discussion related to the effects of climate change on precipitation – in particular, and effects associated with a plausible scenario of increased annual precipitation in the Ekati region (Lac de Gras general area) – with concurrent changes in the seasonal distribution of precipitation.	The ICRP was written in 2006 and filed with the WLWB in January 2007, as required. New information since the date of submission will be included in the next update of the ICRP, following the approval of this Plan. BHPB cannot provide continuous updates to the ICRP that is currently under review each time new information is published. BHP Billiton's suggestion in this regard is that this Working Group process proceed to an expeditious conclusion so that the ICRP can be reviewed, and ultimately approved, by the Board. This will then enable the next stages of reclamation planning, including the development and incorporation of new information, to proceed. Climate change will impact precipitation patterns in the long-term; however, the thermal performance of the existing infrastructure is likely influenced more by changes in the mean annual temperature than precipitation changes. Changes in precipitation could impact on the performance of hydraulic structures, such as diversion channels or weirs. Conceptual designs for these structures are generally dictated by constructability and not hydraulic capacity. As a result, the hydraulic capacities often exceed the anticipated design flow event. However, these structures should be checked against anticipated precipitation changes during detailed design.	No Revision Proposed.		
Chapter 9: Progressive Reclamation								
32	IEMA – 7	Chapter 9	General	This chapter lists reclamation activities already completed (why?); and it provides definitions for the levels of closure planning (why?) with a reference to the Closure Plan Schedule in Appendix D. There is no description of any planned progressive reclamation activity, which is what this section should do. This section does state that over the next 3 years 'a number of mine area components are scheduled to be in the	Reclamation activities already completed and listed in Section 9.1 are outlined as part of the ICRP TOR. Table 27 Appendix D provides the reclamation schedule. This schedule has since been updated and sent to the WLWB on Mar 7/08.	The definitions for the levels of closure planning have been provided in Appendix D and therefore will be removed from Chapter 9.0. **Table 27 (Appx D)** will be moved to Chapter 9.0.		

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				pre-feasibility stage of closure planning.' However, no further information is provided. If no 'progressive reclamation' is planned, then the ICRP should tell us.				
33	IEMA – 8	Chapter 9	Section 9.1	How is draining a lake (Airstrip L) considered reclamation? plant cover on top soil stockpiles is not progressive reclamation as the topsoil will be used later. Revegetation study sites are not progressive reclamation-they are research activities.	BHPB agrees that the draining of the Airstrip Lake and the research work to stabilize topsoil piles should not be included as progressive reclamation.	**Section 9.1** – draining of Airstrip Lake and plant cover work on topsoil piles will be removed.		
34	IEMA – 9	Chapter 9	Section 9.2.1	Stages and Schedule for Closure Planning and Reclamation. The Agency does not support BHPB's statement that 2 years prior to actual closure of mine is the time frame that "sets the benchmark for future closure and progressive reclamation planning...". Progressive reclamation should occur as opportunities present and that the mine plan should be developed with progressive reclamation activities in mind, as the concept 'design for closure' implies. The current life of mine plan does not have any large mining components for progressive reclamation prior to end of life of mine. In the near future, Beartooth pit (to be completed in 2009), Cell B (finished in 2013), and Panda, Koala, Beartooth WRSA (finished in 2009) will be competed. Altering the Life of Mine Plan to finish Cell B earlier would present a progressive reclamation opportunity. Using Beartooth pit, the WRSA and Cell B and allow for "learning" experiences and to improve closure methods would demonstrate adaptive management. BHPB should have a schedule of progressive reclamation activities that coincides with the life of mine plan.	BHPB does not infer that 2 years prior to actual closure of mine is the time frame that "sets the benchmark for future closure and progressive reclamation planning...". and this should not be taken out of context. The statement that "This timeframe sets the benchmark for future closure and progressive reclamation planning and outlines when conceptual, pre-feasibility, feasibility and execution of the plan is required." It is stated in this section that at least 2 years prior to final closure plan delivery the closure designs should have been developed to a final feasibility level. The definition of feasibility is provided later in this section. Table 27 is a schedule of progressive reclamation activities that coincides with the life of mine plan.	No Revision Proposed.		
35	ENR – 3	Chapter 9	Progressive Reclamation	ENR suggests that perhaps this section could be presented in a tabular format to include, but not be limited to the following; facilities or mine components, activities undertaken, reclamation success (i.e. re-vegetation), and on-going work required etc.	Agree.	**Chapter 9. Section 9.1** will be updated to group mine reclamation completed into the mine components listed in Section 6.0.		
36	INAC – 9	Section 9.2	Progressive Reclamation Planning	INAC-WRD-WRD is unclear how BHP is planning for the closure of large mine components prior to 2020. The following statement is confusing, "Closure of large mine components scheduled for reclamation prior to 2020 will entail planning and plans, to a small degree of the main EKATI mine closure, from conceptual through to execution." Can BHP explain their plan more clearly? BHP states that over the next 3 years, many of the mine components will be in the pre-feasibility stage of closure planning. What will be done for those mine components that are scheduled to be closed prior to 2011 (e.g. Phase 1 Pond, Panda/Koala/Beartooth WRSA, Beartooth pit, etc.)?	At the Working Group meeting for the Section 3 review (January 21/08) BHPB stated the following: Given that some of the major mine components at EKATI would be available for reclamation prior to the approval of the next ICRP, BHPB would provide a separate, detailed closure plan for these components to the WLWB prior to commencement of reclamation work.	No Revision Proposed.		
37	JW – 16	Section 9.1		What is Ekati's criteria for determining that certain areas are no longer needed for mine operations? How are suspensions/changes in operations or activity considered?	The EKATI Life of Mine (LOM) Plan is the criteria for determining when areas are no longer part of the mining operations. Suspensions, changes in mining activities are addressed with updates of the LOM Plan.	No Revision Proposed.		

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Appendix F RECLAMATION RESEARCH PLAN – Table 43: Open Pits								
38	INAC – 10	Appendix F. Table 43. Open Pits.	General	-The Research Objectives and Planned Research headings are not clearly connected to closure criteria or objectives. Considering that this is a Reclamation Research Summary Table, the research should be more clearly linked to closure criteria and/or objectives. -The research summaries are far too vague and do not provide enough information to determine if the work being done is adequate. In order to help resolve this problem, a greater level of detail is required in the research summaries and the reference material cited should be made available (i.e. On CD or website) -The research tables do not reference timelines or deadlines for the research. There are no timeframes for research results, so it is difficult to determine if they are aligned with the closure dates established in the mine plan.	BHPB met with the IEMA on Apr 18/08 to discuss linkages between the Reclamation Research Plan and reclamation activities for the minesite. It was agreed that the linkages should be based on reclamation uncertainties, and the research identified to address these uncertainties. To do this the following adjustments will be made to the ICRP: 1. Sections 6.1 through 6.6 will each include a section on 'Uncertainties Related to Reclamation Planning'. These sections will include approx 4 key questions/uncertainties which need to be addressed in the Reclamation Research Plan. 2. The Reclamation Research Plan will include research which addresses these uncertainties, by outlining these in the Research Objective, and by including an additional component 'Remaining Uncertainties' which will outline those uncertainties remaining (at the time of ICRP update). This adjustment will address INAC's concern related to linkages between closure objectives/criteria and research. Uncertainties will include those questions (ie. research needed) to address refinement of closure criteria). Timeframes for research have been provided in Table 1 (which was delivered to the WLWB Mar 7/08). However references to the tables were not included.	**Sections 6.1 through 6.6** and **Tables 43 through 48** in Appx F will be updated as discussed. **Tables 43 through 48** will be updated to include reference to Table 1.		
39	IEMA – 10	Appendix F, Table 43. Open Pits. Land 1	Research Objectives	Using revegetation to stabilize pit walls is not a conventional reclamation technique. Is pit wall stabilization identified by BHPB as a closure issue? Is it an issue that can be addressed through revegetation? It is not explained why this is a proposed closure option?	BHPB has not stated that pit walls will be stabilized with vegetation. The Reclamation Research Plan states that 'pit lake edges and channel banks connected to pit lakes' will be stabilized with vegetation. This will reduce bank erosion where fine materials are exposed to wave action, and surface runoff.	No Revision Proposed.		
40	IEMA – 11	Appendix F, Table 43, Open Pits. Land 1	Planned Research	This section is titled 'planned research', but none of the following sub-sections describe any future research. The section is silent on what work still needs to be done to achieve the stated objective.	The section 'Planned Research' outlines the research ongoing and yet to be completed.	No Revision Proposed.		
41	IEMA – 12	Appendix F, Table 43, Open Pits. Land 1	Planned Research 1	Trial studies are mentioned, but none are described. WHAT is the research activity here? Where and when will this work be undertaken? How will it be done?	Trial studies are identified under Research Completed b) Plant Growth and Maintenance.	No Revision Proposed.		
42	IEMA – 13	Appendix F, Table 43, Open Pits. Land 1	Planned Research 2	Where are the sites 'similar to pit edges' and, more importantly, how will this 'testing' be done?	Sites similar to pit edges and their associated research are identified under Research Completed b) Plant Growth and Maintenance.	**Table 43, Land 1** will be updated to ensure the sites discuss are linked to the 'sites similar to pit edges' under Planned Research 2.		

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43	IEMA – 14	Appendix F, Table 43, Open Pits. Land 1	Planned Research 3	Information below indicates that a seed collection and storage program has been initiated, but there is no information that species being collected are 'terrain stabilizing'. Nothing is mentioned about the 'propagation program'	Information on seed species used for 'terrain stabilizing' is found under 'Results from Completed Research', 1st paragraph. This paragraph identifies seeds collected and used for bank stabilization in the Panda Diversion Channel. More information (research setup, methodology, and results) are found in the references for ABR, also in this paragraph. The Propagation Program is ongoing, and no results are available for this update of the ICRP.	No Revision Proposed.		
44	IEMA – 15	Appendix F, Table 43, Open Pits. Land 1	Planned Research 4	'Identifying locations' is a closure planning activity, not research—the answer to which will only be evident once pit infilling has been completed. If BHPB maintains this is a research activity, then how (and when) is this research to be undertaken?	Research work will include identification of the final pit lake water levels (with expected seasonal fluctuations), an assessment of the pit lake edges (including upper banks) which will remain above lake level and which will consist of fine materials that have the potential to be mobilized by surface runoff. The methodology for this research has not been determined at this time. The scheduling for the research is provided in Table 1 Reclamation Research Plan Schedule.	No Revision Proposed.		
45	IEMA – 16	Appendix F. Table 43, Open Pits. Land 1	Planned Research 5	So how is this research going to be done? This research activity is not further described.	Research which assists colonization along stream banks is further described under 'Research Completed' b).	No Revision Proposed.		
46	IEMA – 17	Appendix F, Table 43, Open Pits. Land 1	Planned Research 6	No information is provided on how or when this will be undertaken.	The methodology for this research has yet to be determined, and will be included in the next update of the ICRP. The scheduling for the research is provided in Table 1 Reclamation Research Plan Schedule.	No Revision Proposed.		
47	IEMA – 18	Appendix F, Table 43, Open Pits. Land 1	Research Completed a).	So does this information fit into future reclamation research and, if so, how?	Acknowledged.	**Table 43 (Appx F) Research Completed a)** will be updated to state how the information provided fits into planned research for pit lake perimeters.		
48	IEMA – 19	Appendix F, Table 43, Open Pits. Land 1	Research Completed b).	What is this research? The reclamation work done so far has focused on physical rehabilitation that has 'assisted plant establishment'. What has been learned here in terms of applicability to pit perimeter revegetation?	Acknowledged.	**Table 43 (Appx F) Research Completed b)** will be updated to include what has been learned from the research.		
49	IEMA – 20	Appendix F, Table 43, Open Pits. Land 1	Research Completed c).	What is the status of this program? Is it continuing? What has been achieved? How much more needs to be done? What is happening with the propagation program? Are the species being collected effective in achieving the 'terrain stability' objective?	Results for this research are provided under 'Results from Completed Research'. This section outlines that the program is still ongoing. The species are collected to test for effectiveness of terrain stabilization. A list of procedures has been developed and are followed when seed collecting and storing. Please refer to Tracking # 43 for discussion on the Propagation Program.	**Table 43 (Appx F) Research Completed c)** will be updated to include reference to studies where seeds collected have been effective in achieving site stabilization.		
50	IEMA – 21	Appendix F, Table 43, Open	Results From Completed	The wording 'could be useful' is not helpful. We need to know what will be used. Where are the data to show that these species could be used to stabilize pit	At this time the results found have potential use for pit lakes, but as yet no pit lakes are available for actual research. Definitive wording will be applied once the	**Table 43 (Appx F) Results from Completed Research** will be updated		

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		Pits. Land 1	Research	perimeters? What are the plants' characteristics that make them suitable for terrain stabilization?	materials and techniques have been applied to reclamation work of pit lakes.	to ensure information is provide on the characteristics which make the plants researched suitable for terrain stabilization.		
51	IEMA – 22	Appendix F, Table 43, Open Pits. Land 1	Results From Completed Research	This species might have established itself 'very well', but how do we know it is suitable for pit perimeter stabilization?	Please refer to Tracking # 50.	No Revision Proposed.		
52	IEMA – 23	Appendix F, Table 43, Open Pits. Land 1	Results From Completed Research	How is the riparian habitat 'similar to future pit lake perimeters'?		**Table 43 (Appx F) Results from Completed Research** will be updated to include how the riparian habitats studied are similar to those expected at future pit lake perimeters and channel banks.		
53	IEMA – 24	Appendix F, Table 43, Open Pits. Land 1	Results From Completed Research	Maybe these species can establish, but can they meet the objective of 'stabilizing' the terrain? These are different objectives. If all we're going to do is 'establish' a vegetation cover, then this seems to indicate that we know now what species are able to do this, and no further research should be required. If 'stabilizing terrain' is an objective, then it appears that some field experiments are in order--but these are nowhere described.	Please refer to Tracking # 46. Planned Research for this objective is twofold and includes sourcing and testing various plants to see if they establish, and to focus the type of vegetation used on those plants that can stabilize lake edges and channel banks.	No Revision Proposed.		
54	IEMA – 25	Appendix F, Table 43, Open Pits. Land 1	Results From Completed Research	Was Fred's Channel planted with species that are 'terrain stabilizing'?	The reclamation intention for Fred's Channel was to establish terrain stabilizing vegetation. However, as stated in 'Results from Completed Research' 3rd paragraph, this work has been hampered by shifting stream channels. The reclamation work at Fred's Channel is ongoing.	No Revision Proposed.		
55	IEMA – 26	Appendix F, Table 43, Open Pits. Land 1	Results From Completed Research	Fred's Channel sounds like a more dynamic environment for establishing vegetation than a pit perimeter. How do the two environments compare? Is willow proposed as a species for the pit wall stabilization? This needs further discussion to demonstrate the relevance of this information to the objective at hand.	Should pit lakes require riparian vegetation for stabilization (assessment of areas for vegetation establishment has been identified as part of the research), riparian vegetation will assist in stabilizing pit lake edges. There is no intention of using willows to stabilize pit walls (here defined as steep granite faces) but low lying areas or banks which have high fines content. Both pit lake edges and channel banks connected to pit lakes will be dynamic areas, influenced by wave action and seasonal water levels.	**Table 43 (Appx F) Results from Completed Research**. See response to Tracking # 52.		
56	IEMA – 27	Appendix F, Table 43, Open Pits. Land 1	Results From Completed Research	The description of 'specific procedures' sounds like we now know what species we are collecting to achieve the reclamation objective--but do we? And if we do, then why is this listed as a research problem in this table?	'respective procedures' not 'specific procedures' has been used in Land 1 Results from Completed Research. It has been identified as completed research because it entailed a study on how and when to collect different types of plant species, and how to prepare them for storage and germination. The procedures focus on standardized methods of 'how to' store and manage plants, not on 'what' particular species are to be collected. As discussed	No Revision Proposed.		

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					under Results from Research this work is continuously updated and refined as more information comes available. Please refer to Tracking # 43 for discussion on the Propagation Program.			
57	IEMA – 28	Appendix F, Table 43, Open Pits. Land 1	Application of Results From Research	Several species are listed here as having 'assisted with channel bank stabilization. What data have been collected to demonstrate their 'terrain stabilizing' characteristics? Is it proposed that these will be used for pit wall stabilization?	Please refer to Tracking # 55 with respect to pit wall stabilization.	**Table 43 (Appx F) Results from Completed Research**. See response to Tracking # 52.		
58 (111)	DFO – 1	Appendix F, Table 43, Open Pits Land 1	Vegetation Research	Vegetation research should be expanded to include identifying aquatic plant species that can be established in the shallow areas of the pit lakes. It should also be determined how colonization of these plant species can be encouraged in these areas.	The research objective for vegetation has been identified in Table 43 (Appx F) Land 1 to ensure that the pit perimeter and bank areas are stabilized (to reduce erosion into pit lakes). BHPB does no see a need to vegetate shallow areas to reduce erosion. Research into aquatic plants is not necessary to fulfill this objective.	No Revision Proposed.		
59 (115)	INAC – 11	Appendix F, Table 43 Open Pits	Land 1	The vegetation section was informative, particularly the seed collection, storage and propagation program. What areas of the mine will be reclaimed using local seed sources. The use of local seed sources is encouraged and preferred over native cultivars. Will the references for this section be made available?	Please refer to Appendix F Table 45 (Land 2), Table 46 (Land 4), Table 47 (Land 1), and Table 48 (Land 2) for discussion on locations where indigenous vegetation will be used for reclamation. All references in Table 43 Land 1, with exception of the SOP in xi) are public documents, and have been distributed to reviewers. Should reviewers require these reports they are asked to contact BHPB.	No Revision Proposed.		
60 (124)	JW – 17	Appendix F, Table 43 Open Pits Land 1	Open Pits Research	The closure objectives for the Open Pits include mitigation of significant adverse environmental effects to identified valued ecosystem components and a consideration of the relevant expectations of stakeholders for post closure land use, including biodiversity, sustainable development and respect of traditional values and ensure long-term care and maintenance is not required. The criteria for the revegetation on these areas include: • the disturbed sites have been enhanced to encourage natural recovery of vegetation; • indigenous vegetation is used for rehabilitation; and • vegetation assemblages have been identified and functional.	Please refer to the email from WLWB (Sarah Baines) to the ICRP Working Group Apr 29/07 which includes the Reclamation Goal, Operating Principles, Closure Objectives and Closure Criteria. Please also refer to the WLWB letter May 25/07 to the ICRP Working Group directing BHPB on the Reclamation Goal, Objective Framework. The closure objectives for open pits listed by the reviewer are no longer objectives, but operating principles. Please refer to Table 21 (Appx C) provided to the WLWB June 20/07 for the current closure objectives and criteria for Open Pits.	No Revision Proposed.		
61 (125)	JW – 18	Appendix F, Table 43 Open Pits Land 1	Open Pits Research	The proposed research does not directly address these reclamation objectives or criteria, therefore it is difficult to determine if research results will meet the necessary objectives. The research to date has focused on an investigation of plant establishment and colonization of a range of species on riparian areas adjacent to channels. Three species were identified as successful but we do not know if the reclamation objectives require the establishment of a broader range of species for biodiversity or land uses. In the absence of any data on how the three successful plant species will perform on the shores of a pit lake,	Please refer to Tracking # 60 with respect to current closure objectives and criteria for the ICRP. Section 6.1.4 states that "Beach areas that are able to support riparian habitat will be encouraged through stabilization work and some plant seeding if required." Table 21 (Appx C) has 3 objectives which focus on vegetation: Land 1, 4 & 5. Vegetation will be used to stabilize pit perimeters. Namely bank areas. BHPB agrees that 1 year may not be adequate for completion of the physical work to apply this vegetation particularly in those years where a number of pits lakes finish filling (eg Panda and Koala is simultaneously flooded) and therefore	**Table 27** will be updated to include an additional year for open pit reclamation, to allow for 2 years of revegetation work at pit perimeters. **Table 43** (Appx F) will be updated to identify the research needed to determine affects from wave action on vegetation at lake edges, and to		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				the results from the shores of a channel are inferred to reflect reclamation of a lakeshore riparian area. No results were discussed on how wave action or other physical conditions found in a lakeshore environment would affect the success of revegetation with these three species. The listed planned research items (#4 Identify locations around closed pit perimeters where vegetation colonization will be required to enhance stabilization and #5 Determine how colonization can be encouraged along pit lake edges) may address these issues in the future but this is not clearly identified.	the physical reclamation work to plant and/or seed vegetation should be increased by an additional year. Monitoring vegetation has been included in Table 49 (Appx G) and takes place over 5 years following reclamation work.	include the results from riparian habitat work at the mouth of the Panda Diversion Channel (Upper Panda Lake and Kodiak Lake).		
62 (126)	JW – 19	Appendix F, Table 43 Open Pits Land 1	Reclamation Schedule	The time identified in the schedule for decommissioning and closure of pits appears to reflect the time necessary to flood the pits and it may not be possible to revegetate the perimeter of the pit with riparian species prior to the pits filling to their final water level. Additional time should be allowed in the schedule for the establishment of vegetation after pit filling and further time would be necessary to monitor the success of this revegetation. Research of pit revegetation (above final water level) should be initiated as soon as possible on a pit wall or alternate site that replicates the physical characteristics of the walls (i.e. slopes, materials, drainage). It appears from the schedule that Beartooth Pit will be completed mining in 2009 and should be filled with water two years later. Research should be initiated in this pit as soon as possible, on the establishment of riparian vegetation.	Please refer to Tracking # 61 with regards to pit perimeter vegetation. BHPB is agreed that pit perimeter vegetation research should commence as soon as possible. This should take place once the disturbance from operations has ceased, and the area is safe for access.	Please refer to Tracking # 61.		
63 (263)	LKDFN – 4	Appendix F. Table 43. Open Pits	Land 1	Locations that require enhanced surface stabilization around closed pits will be researched. Vegetation used around closed pits, has the potential to come in contact with pit surface water and/or bound water within the substrate material (i.e. surface soil) that is altered by pit surface water chemistry (e.g., within the vadose zone). There is no planned research to assess metal uptake toxicity, or associated risks, of vegetation used for enhanced stabilization around closed pits, even though there is potential for this to occur. **From Section 2 Comment/Response Table Tracking Number 59**, BHPB "does not believe a risk assessment is necessary" for riparian areas and species because "substrate material for vegetation establishment at these sites would either be in-situ tundra soils salvaged lake sediments and/or topsoil'. These substrate materials may not pose a large risk for vegetation toxicity if they do not come in contact with, or are in close proximity to, pit lake water, and if these materials	Vegetation stabilization work will be completed mostly above the water line. The potential for metal uptake by plants will be included in the research should the water quality modeling for pit lakes indicate that there is potential for metal levels in the pit lake water that could be accumulated by plants, and in turn negatively impact grazers. A risk assessment will be completed if a risk is determined. However, at this time BHPB believes this risk is negligible.	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				are determined to not be a risk for vegetation. BHBP's response does not address the risks associated with substrate materials and vegetation having contact either directly, or indirectly, with pit lake waters that have elevated concentrations. **From Section 2 Comment/Response Table Tracking Number 60**, BHPB does acknowledge that "vegetation risk assessments will be conducted if modeling results [pit lake water quality model] indicate poor water quality in pit lakes", and therefore recognize that pit lake water quality can impact vegetation around pit shorelines, including submergent or emergent vegetation. It is likely that vegetation would be established before pit water quality has reduced to levels that would provide minimal impact on the environment. Research into the risks associated with metal uptake toxicity of vegetation used for surface stabilization around closed pits should be included in LAND 1 research activities. Reliance on the pit lake water quality model to assess vegetation risk requires a model that can adequately predict water quality. Predictive modeling is a challenging endeavour (and is currently a research activity) and would require quantifiable thresholds and triggers to determine vegetation risk levels. This should not be the sole tool to assess risk for vegetation toxicity.				
64 (58)	IEMA – 29	Appendix F, Table 43, Open Pits. Land 2	Research Objective	Is this question related to the first one? If so, shouldn't this research question be answered before trying to figure out what species of plants will be needed to stabilize pit terrain? What if the perimeters are found to be sufficiently stable without requiring revegetation?	No, Land 2 is not related to Land 1. Land 1 looks at vegetation to stabilize the land surface, whereas Land 2 looks more at the geotechnical (subsurface) stability.	No Revision Proposed.		
65 (59)	IEMA – 30	Appendix F, Table 43, Open Pits. Land 2	Planned Research	It is not clear why any of the three listed activities are being contemplated. No closure issues are identified. While the 'research references' sub-section identifies a lot of engineering and modeling work done for pit operations, none of this appears to be relevant for closure planning as 'n/a' has been entered under the 'applications' sub-section.	References (inside the brackets) in the 2nd and 3rd tasks under Planned Research note the Tracking #'s from Section 2 Comments Table where requests for this information have been provided by the Working Group. Eg. Section 2 TK# 44 references the IEMA's concern regards failure of physical structures.	**General Formatting for Reclamation Research Table**. To avoid confusion N/A (not available) will be replaced with 'Results from research have not yet been applied to the reclamation work'.		
66 (60)	IEMA – 31	Appendix F, Table 43, Open Pits. Land 2	Planned Research	What is the predicted problem being addressed in Task 1? What, for example, has the talik depth below the pit bottom got to do with reclamation planning?	Estimation of the talik zone thickness is important to assess the long term stability of the pit lakes. Section 6.1.7.1 of the ICRP notes that no structures have been identified which could impact the long term stability of the pit lakes nor is the talik zone expected to move far enough into the pit walls to cause large scale failures; however, there is potential for small or medium sized sloughing resulting from thaw near the pit wall crest. Knowing the thickness of the thaw zone is important to assess this potential. From a stability perspective, the talik zone in the pit sidewalls is of greater concern than the talik thickness	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
					under the pit; however, the depth of the talik below the pit lake may impact on groundwater patterns, particularly if the talik intercepts the bottom of the permafrost.			
67 (61)	IEMA – 32	Appendix F, Table 43, Open Pits. Land 2	Planned Research	What is the predicted problem being addressed in Task 2?	Please refer to Section 2 Tracking # 44 where BHPB has agreed to conduct predictive modeling of 'what the pit perimeter stability will be after mine operations are completed' (Research Objective). It should be noted that research is intended to answers questions and uncertainties, and is not specific to addressing 'problems'.	No Revision Proposed.		
68 (62)	IEMA – 33	Appendix F, Table 43, Open Pits. Land 2	Planned Research	Task 3 is not a research activity. This can be done now with some digital elevation modeling to generate x-sections for planning work.	Acknowledged.	**Table 43 (Appx F) Land 2 Planned Research,** Task 3. BHPB will remove this task and include it as part of a section on Engineering Design Questions in Section 6.1 of the ICRP Vol 1.		
69 (63)	IEMA – 34	Appendix F, Table 43, Open Pits. Land 2	Research Completed	So what are the closure issues identified in the 'technical design reports'? What further research needs to be done if these reports describe the 'expected stability of pit walls' as described?	Most of the reports related to pit slope design and evaluation focus on pit wall stability during mining operations. However, these reports also contain much of the geological and geotechnical information which will assist the modeling of pit wall stability after mining operations cease and with pit flooding.	No Revision Proposed.		
70 (64)	IEMA – 35	Appendix F, Table 43, Open Pits. Land 2	Research Completed	What is relevance of the temperature cable installations to needed further research?	Ground temperature cables assist in understanding the location of thaw zones around the pit walls, and provides a better understanding of pit wall stability.	**Table 43 (Appx F) Research Completed** will be updated to provide the relevance of ground temperature information.		
71 (65)	IEMA – 36	Appendix F, Table 43, Open Pits. Land 2	Results From Research Completed	What is the predicted problem which might require the 'specific research' in the future?	Acknowledged.	**Table 43 (Appx F) Results from Completed Research** will be updated to state that future research will focus on Task 2 (Planned Research).		
72 (66)	IEMA – 37	Appendix F, Table 43, Open Pits. Land 2	Application of Results From Research Completed	If there is no application of the work undertaken to date, then why is this information presented here?	Acknowledged.	Please refer to response provided in Tracking # 65.		
73 (264)	LKDFN – 5	Appendix F. Table 43. Open Pits	Land 2	The depth of the talik zone in the open pit sidewalls and at the pit bottom, at pit closure are to be researched. Installation of temperature cables will likely be used to assist in estimating talik zone. Research into ground temperatures during mining operations and during pit filling, in addition to pit closure, likely would provide valuable information into ground temperature changes that could assist in determining depth of talik zone and pit perimeter stability, at pit closure. Planned research should be expanded to include these measurements. Pit perimeter stability should consider, but not be	Acknowledge.	**Table 43 (Appx F) Land 2** will be reviewed to ensure the appropriate data is collected for the stability modeling.		

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				limited to, geotechnical, thermal, and hydrogeological characteristics (media conductivity and groundwater flow), and pit-to-pit interactions. These items should be targeted to obtain data to understand the physical system, inputs for the predictive model, and for calibration of the predictive model. The planned research should include these items and data collection. Presumably subsurface geotechnical characteristics have been well characterized to for stably pits during operations. Thermal characteristics were discussed above. Research needs into hydrogeological characteristic and pit-to-pit interactions have not been identified in the ICRP; each can impact pit stability and pit water quality and should be included in planned research. The methodology, model assumptions, measured and assumed inputs parameters, and site-specific data that are required to complete predictive modeling were not provided. A comparison of what is known, what isn't known, and required inputs for the model would provide context into if the planned research is sufficient. Presumably this will be included in supporting technical studies and revised in future ICRI'; however, without these details it is difficult to assess the validity and completeness of the planned research. Additionally, without specific details of frequency of measurements and location of measurements to be completed during the research phase, it is impossible to comment on the appropriateness of the methods selected.				
74 (67)	IEMA – 38	Appendix F, Table 43, Open Pits Water 1	Research Objective	It is not clear why this item is here. BHPB appears to have conducted much of the data required to understand how pit flooding will affect the various source water bodies. Remaining unknowns are not identified. This item appears not to constitute further reclamation 'research', and could be deleted from this table.	A number of questions remain regarding the volumes of water to be withdrawn from source lakes. Please refer to Section 2 Tracking #'s 81, 115, 123, 126 where reviewers have raised these questions, and to the BHPB responses. Please also refer to Tracking # 79.	No Revision Proposed.		
75 (68)	IEMA – 39	Appendix F, Table 43, Open Pits Water 1	Planned Research 1	No further description of these studies is provided.	Detailed description of the baseline studies is available in the referenced documents in Research Completed a). This section also notes that the regional data from these studies is, and has been useful in water balance studies which are used to estimated water withdrawal from source lakes.	No Revision Proposed.		
76 (69)	IEMA – 40	Appendix F, Table 43, Open Pits Water 1	Planned Research 2	The following sub-section indicates this has already been done.	Agree.	No Revision Proposed.		
77 (70)	IEMA – 41	Appendix F, Table 43, Open Pits Water 1	Planned Research 3	The following sub-sections indicate this work has been completed. If so, why is this here? If not, what further work needs to be done?	The Reclamation Research Plan includes an outline of work planned under 'Planned Research'. Work completed to date has been included under 'Research Completed'. Tasks 1 through 4 have been undertaken at a conceptual level, but require more detailed study.	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
					Please refer to Tracking # 74 for discussion on the continued studies for water extraction from source lakes.			
78 (71)	IEMA – 42	Appendix F, Table 43, Open Pits Water 1	Planned Research 4	This, too, seems to have been completed.	Please refer to Tracking # 74 for discussion on the continued studies for water extraction from source lakes.	No Revision Proposed.		
79 (112)	DFO – 2	Appendix F, Table 43, Open Pits Water 1	Water Extraction Levels from Source Lakes	It is DFO's understanding that the numbers provided regarding reduced stream flows and potential littoral zone losses in Ursula and Upper Exeter lakes are not firm and will be refined as more information is obtained. DFO would appreciate confirmation of this as there is currently not sufficient data to determine that the proposed pumping rates would not negatively impact littoral and stream habitat.	Agree	**Table 43 (Appx F) Water 1** will be reviewed to ensure that BHPB states research on water withdrawal from source lakes will continue.		
80 (116)	INAC – 12	Appendix F, Table 43 Open Pits	Water 1	Similar to comments made in tracking number 6, INAC-WRD is concerned that a reduction in outflow of 21.5% for Ursula Lake and 18.1% for Upper Exeter may result in downstream impacts. This is particularly true considering that the values are based on average precipitation values and do not consider impacts and mitigation of a low flow year.	The resulting downstream effects were estimated to be a 13% reduction for Lower Exeter Lake Outflow, and 13% and 11% reductions for Unnamed Outflow and Duchess inflow, respectively. Please also refer to ICRP Section 2 Comments Table Tracking # 115, 126 and 127.	No Revision Proposed.		
81 (123)	EC-1	Appendix F, Table 43 Open Pits Water 1	Water Extraction Levels from Source Lakes	It is EC's understanding that the numbers used to provide the data describing the natural variability within the littoral zones of Upper Exeter and Ursula Lake are based on very limited data points. EC is not comfortable with the predicted effects of extraction rates provided and would like to see increased monitoring to ensure that the true extent of natural variability is captured. Furthermore, it is also EC's understanding that monitoring of the lake levels is a requirement under the water licence, however it appears that we do not have a comprehensive data set for the lake levels at this time.	There are 3 years of on-site lake water level monitoring at Ursula Lake, and 5 years of hydrological monitoring at the Ursula Outflow stream. There are 4 years of lake level monitoring at Upper Exeter Lake, and 3 years of hydrological monitoring at the Upper Exeter Outflow stream. The water balance model was calibrated to results from the lake level monitoring. By considering the 10-year wet and dry precipitation, the modeling results incorporate the observed range of annual lake level variation. Please also refer to ICRP Section 2 Comments Table Tracking # 115, 126 and 127, where BHPB has committed to the continued refinement of this research.	No Revision Proposed.		
82 (127)	JW – 20	Appendix F, Table 43 Open Pits Water 1	Planned Research 1	The concept "…conduct baseline studies" is vague. Does this mean measure lake water levels, outflow rates, etc.? For how long will these studies be conducted (what constitutes a sufficient period of record) and over what seasons? What are methods and degree of accuracy (data uncertainty) in resulting water balance calculations, and in estimates of daily and monthly flows, etc?	Under the Aquatic Effects Monitoring Program plan, two years of baseline data are required to assess aquatic impacts under the AEMP. For water extraction studies, three to four years of lake levels and outflow rates at Ursula and Upper Exeter were collected. The water balance model was calibrated based on observed lake level variation and outflow rates, and produced reasonable results. The model was run for average precipitation, as well as 10-year wet and dry conditions to assess the sensitivity of the results.	**Table 43 (Appx F) Water 1** Planned Research task 1 will be updated to provide a more defined list of parameters in the baseline study.		
83 (128)		Appendix F, Table 43 Open Pits Water 1	Planned Research 4	Natural lake level fluctuations are seasonally dependent as well as have annual variations dependent on climate trends. What kind of quantitative analyses will be conducted to estimate monthly/seasonal/annual maximum and minimum flow (e.g., 10 or 'xx' year low flow conditions) and lake level conditions. This analysis	The model was run for average precipitation, as well as 10-year wet and dry conditions, and considered a range of pumping rates.	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				will help to develop criteria for lake withdrawals – which may have seasonal limitations based on the downstream minimum flow requirements (as well as lake levels).				
84 (129)	JW – 21	Appendix F, Table 43 Open Pits Water 1	Research Completed	a) The referenced regional baseline data was completed in 1995. This analysis should be updated to the present; any recent or long-term trends should be identified from this work that might affect water balance calculations. b) Will any more data be collected, and if not, why? c) What has been attempted to measure in Upper Exeter Lake? Runoff is not constant through year – so using annual coefficient is not appropriate. There is a need to understand seasonal variations to estimate max pump rates, unless can be demonstrated flow demand is negligible. d) The results from Diavik (1998) needs to be updated to reflect actual data not predictions.	a). The hydrological parameters used in the water balance were derived based on analysis of data from an extensive network of monitoring stations at EKATI collected from 1997 to 2006 (including AEMP reporting), as well as supplemental regional data. b). Monitoring is on-going at EKATI. In terms of hydrological and meteorological monitoring, five automated hydrology stations are operated every year during the open water season as part of the AEMP. Another 5 to 6 stations are operated as part of other on-going monitoring programs for the EKATI mine site. One 10 m meteorology station is operated year-round at EKATI (the Koala Meteorology Station). Another station installed in Polar Lake is active during the open water season. Please also refer to ICRP Section 2 Comments Table Tracking # 115, 126 and 127. c). Lake levels and outflow rates have been monitored at Upper Exeter Lake. The water balance model was run on a daily time step, allowing resolution of seasonal variation in flow (i.e., capturing freshet peak flows, and fall low flows). d). Agree	a). **Table 43 (Appx F) Water 1** Research References will be updated to include current AEMP Reports.		
85 (130)	JW – 22	Appendix F, Table 43 Open Pits Water 1	Results from Competed Research	Data presented for Ursula, Upper Exeter and Lac de Gras appear to reflect end of year or average annual conditions. What will be the seasonal minimum water levels and outflow rates? Flow reduction at the mouth of the Coppermine does not seem relevant…what is the flow reduction at the outlet of Lac de Gras? Assumption that no pumping will be concurrent with pumping at Diavik – how will this be licensed and enforced?	The reduction in flow rate was calculated for the lowest flow period (October), which was considered to be the most critical time. Flow reduction from Lac de Gras was estimated as 2% The comment on permitting is noted, however, licensing and enforcement are a regulatory responsibility.			
86 (131)	JW – 23	Appendix F, Table 43. Open Pits Water 1	Application of Results from Research	What research in 2006 was used to assist in establishing timing of flooding? Does “continued collection of outflow volumes [and] lake level data” include outflow rates (i.e., streamflow data)?	Streamflow data, water levels, nearshore habitat type and slopes, precipitation records, topographic information and pit volumes, was some of the research information used to assess timing of pit flooding. Monitoring of lake levels and streamflow are part of on-going environmental monitoring programs at EKATI. A number of lakes and streams are monitored throughout the claim block area.	No Revision Proposed.		
87 (265)	LKDFN – 6	Appendix F. Table 43. Open Pits	Water 1	With respect to source water lakes for pit flooding, a summary of what is currently known, specific items to be measured along with their location and frequency, and comparison to items needed to appropriately determine volumes and rates of water to be withdrawn from source lakes was not provided. Data gaps should	A summary of what is to be completed and what is provided under Planned Research and Results from Research respectively. References have been provided for more detailed information. The issues raised in the ICRP Section 2 Comments Table	No Revision Proposed.		

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				be identified. Some of these issues were raised in Section 2 Comment/Response Table Tracking Number 135 with respect to detailed operations and water source quantity prediction. Additionally, **Section 2 Comment/Response Table Tracking Number 136 and 139** further questioned the extent and completeness of the hydrologic and climate databases and hydrographs (this information is also essential for achieving WATER 2 research). Without these specific details it is difficult to assess the completeness of the planned research. Presumably these details will be provided in a report to fulfill Part D: Conditions Applying to Dewatering and Drawdown, of the water licence. However, it would be effective to understand research activities beyond a conceptual level to ensure maximum benefit to support technical reports submitted to achieve water licence requirements.	were addressed. Water withdrawal from source lakes will not be covered under current water licenses.			
88 (266)	LKDFN – 7	Appendix F. Table 43. Open Pits	Water 1	Criteria to determine impacts on aquatic habitats in the source lakes and downstream water bodies were not detailed. A summary of items that could be considered as criteria would assist in understanding if the proposed research plans are sufficient. Quantifiable triggers and thresholds to determine impacts are required in Adaptive Management plans. An outcome of the proposed research should contribute towards developing triggers and thresholds for aquatic impact impacts to support Adaptive Management plans and this concept should be included in WATER I research.	Please refer to Table 21 (Appx C) Water 1 for source lake closure objective and criteria. Please refer to Closure Monitoring Tables 49 through 54 (Appx G) for response thresholds which have been identified when monitoring closure criteria, and to ICRP Section 2 Comments Table Tracking # 285 with respect to Adaptive Management.	No Revision Proposed.		
89 (267)	LKDFN – 8	Appendix F. Table 43. Open Pits	Water 1	Research into source lake water quantity is a main focus of WATER 1 research. Has consideration been given to changes to source lakes and downstream water-bodies water quality during pit flooding? Is source lake water quality part of the research completed to evaluate impacts on aquatic habitats in the source lakes and downstream water bodies? A planned research activity to assess impacts on aquatic habitats should be explicit in WATER 1 research.	The Water 1 Research Objective is to determine changes in water volumes (from water withdrawal) that may affect aquatic habitats in the source lakes. This includes water quality. Please also refer to ICRP Section 2 Tracking # 81 for addition of water quality to Table 21 (Appx C).	No Revision Proposed.		
90 (72)	IEMA – 43	Appendix F, Table 43, Open Pits Water 2	Research Objective	Not clear what closure 'research' issue is being addressed. Are not final pit lake elevations readily determined from a glance at topographic contour maps? Sufficient baseline data on watershed flow rates have already been collected. What further 'research' is required to address closure planning?	Not all pit lake water level elevations will be the same as the original lake prior to mining. Final pit lake elevations may be determined by elevation of outlet channel (eg. new channels will have to be established for Sable, Fox, Beartooth inflow and between Panda and Koala). In addition open pits have in many cases been widened from the original lake perimeter, with surrounding pit walls higher than the original shoreline, in which case final pit lake surface elevations may be higher than original	**Table 43 (Appx F) Water 2** BHPB will remove this from the Reclamation Research Plan and include it as part of a section on Engineering Design Questions in Section 6.1 of the ICRP Vol 1.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
					shorelines.			
91 (73)	IEMA – 44	Appendix F, Table 43, Open Pits Water 2	Research Planned 1	Baseline is already known. What is its relevance to closure?	Please refer to Tracking # 90.	Please refer to Tracking # 90.		
92 (74)	IEMA – 45	Appendix F, Table 43, Open Pits Water 2	Research Planned 3	How are flow rates related to the closure plan?	Please refer to Tracking # 90.	Please refer to Tracking # 90.		
93 (75)	IEMA – 46	Appendix F, Table 43, Open Pits Water 2	Results From Research Completed	This should be a straightforward engineering/planning exercise. Why the delay?	Please refer to Tracking # 90.	Please refer to Tracking # 90.		
94 (76)	IEMA – 47	Appendix F, Table 43, Open Pits Water 2	Application of Results From Research	What does 'n/a' mean here? If the results from the research are not applicable to closure planning, then why is all this information cited here?	N/A means not available. Please refer to Tracking # 90.	Please refer to Tracking # 90.		
95 (132)	JW – 24	Appendix F, Table 43, Open Pits Water 2	Planned Research	Will this research help establish criteria for pit filling? To protect habitat and/or encourage development of habitat only?		Please refer to Tracking # 90.		
96 (133)	JW – 25	Appendix F, Table 43. Open Pits Water 2	Research Completed	Will the final watershed boundaries be any different than today? If not, how will this affect habitat (rates and volumes of input)?	The final watershed boundaries for the source lakes are not expected to be significantly different than today?	Please refer to Tracking # 90.		
97 (77)	IEMA – 48	Appendix F, Table 43, Open Pits Water 3	Research Planned	These tasks are already answered, or are at any rate simple engineering tasks that could be answered quickly with existing data, are they not? The answer to #2 appears to be self-evident--no, it is not possible. Item #4 may be relevant research, but we are not told why or how this will be done, or when.	Task 2: Based on some of the physical dimensions of the Panda and Koala pits described in Tracking # 90 Task # 2 may be possible. Task 4: The question needs to be answered should one or more of the underground plugs fail. Table 1 Reclamation Research Plan Schedule provides the timeframe when research for Open Pits will be completed.	**Table 43 (Appx F) Water 3** The Research Objective will be changed to 'Determine what effect/s there will be on water quality in the Panda and Koala pit lakes should one or more of the underground plugs fail.'		
98 (78)	IEMA – 49	Appendix F, Table 43, Open Pits Water 3	Results From Completed Research	If the research questions have already been answered, then why is this item here?	Acknowledged.	Pleases refer to Tracking # 97.		
99 (79)	IEMA – 50	Appendix F, Table 43, Open Pits Water 3	Results From Completed Research (undergroun d plugs)	Why is the 'research' on final pit lake elevations without underground plugs not completed at this point? When is it going to be done?	At the time of writing the current approved 2000 Interim Closure Plan (in 1999) the underground mine design had not been completed, and connections between the Panda and Koala Mines were unknown. There has been a delay in determining the type of plug because BHPB has yet to resolve whether Panda pit will be flooded while mining operations continue in the Koala Underground. The	No Revision Proposed.		

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					updated pit flooding option will require this question be answered prior to flooding Panda and Koala pits in 2021 (Refer to Table 27. Closure Planning and Reclamation Schedule).			
100 (80)	IEMA – 51	Appendix F, Table 43, Open Pits Water 3	Results From Completed Research (Baseline)	It is not clear how the baseline situation is relevant to the closure situation. This should be explained.	Hydrologic and meteorological baseline information is important in establishing water balances for final pit lakes.	**Table 43 (Appx F) Water 3** will be updated to ensure the relevance of the research is explained.		
101 (117)	INAC – 13	Appendix F, Table 43 Open Pits	Water 2 and 3	INAC-WRD is confused regarding the difference between “research on pit lake final elevations” and the “estimated final lake level elevations for pit lakes”. It seems that final pit lake elevations are available. Will BHP provide both the predicted levels for pit lake with and without plugs?	Acknowledged	Please refer to Tracking # 90 and 97.		
102 (134)	JW – 26	Appendix F, Table 43. Open Pits Water 3	Research Objective	It is not clear how the objective to understand can be met? What will be an “understanding” of effects or what level of understanding is sought? Research objectives should be tied to or lead to establishing criteria.	Acknowledged.	**Table 43 (Appx F) Water 3** The Research Objective will be changed to ‘Determine what effect/s there will be on water quality in the Panda and Koala pit lakes should one or more of the underground plugs fail.’		
103 (135)	JW – 27	Appendix F. Table 43. Open Pits Water 3	Planned Research	Explain data needs and how data will be collected for level of accuracy required. 1. How will final elevations be determined? What is limiting factor? 3 Long term stream flow under what conditions? Explain data needs and how data will be collected for level of accuracy required. 4. What does “risk assess the effects” indicate for data collection strategies?	1. Please refer to Tracking # 97. Preliminary data have been used for the 2007 ICRP to provide a conceptual estimate of the final pit lake elevations for Panda and Koala. The method for determining final elevations has not been determined at this time.	Please refer to Tracking # 97. **Table 43 (Appx F) Water 3.** Task 3 will be updated to include ‘determine long term stream flow under baseline regional conditions’. Task 4 will be removed as this is covered under the Research Objective (Refer to Tracking # 97).		
104 (136)	JW – 28	Appendix F, Table 43, Open Pits Water 3	Research Completed	a. What is the extent (temporal) of regional baseline data and when was it last updated? Database consults of what sources? b. What kind of hydrological and meteorology monitoring has occurred? c. What are the controlling factors for final lake elevations? d. What kind of plug is necessary /adequate?	a. Available regional data for the Arctic is low compared with other regions of Canada. Most of the stations operated by the Water Survey of Canada are on large rivers, and extrapolation of hydrologic indices from these stations is generally not appropriate for the small to medium sized watersheds of interest in the EKATI area. The most relevant regional stations are Akkutuak Creek near Baker Lake (15 km^2, 17 year record), Qinguq Creek near Baker Lake (432 km^2, 28 year record), and Atitok Creek near Dismal Lakes (217 km^2, 13 year record). In addition to these stations, a substantial dataset has been accumulated since baseline monitoring began at EKATI. To date some stations have been monitored for over 10 years. b. Five automated hydrology stations are operated every year during the open water season as part of the AEMP.	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
					Another 5 to 6 stations are operated as part of other on-going monitoring programs for the EKATI mine site. One 10 m meteorology station is operated year-round at EKATI (the Koala Meteorology Station). Another station installed in Polar Lake is only active during the open water season. c. The factors controlling the final lake elevations are the natural contours as well as the elevation of the constructed outfalls of the lakes. High pressure, engineered plugs would be required for flooding while operations continue in the Koala Underground mines. Whereas low pressure plugs would be required for simultaneous flooding.			
105 (268)	LKDFN – 9	Appendix F. Table 43. Open Pits	Water 3	If underground plugs fail after pit lakes are flooded, the effects on pit lake stratification are to be researched by characterizing the risk. Pit lake stratification without plug failure would likely need to be understood and characterized, as an interim process to fully develop risk measures. Research into pit lake stratification that includes biological characteristics, chemical characteristics, and temperature with depth and season would be critical to achieve this planned research. Thus, WATER 4 research into long-term pit lake water quality is tied to WATER 3 research objectives. Does BHPB agree with the above statement? If not, why not?	Agree.	No Revision Proposed.		
106 (269)	LKDFN – 10	Appendix F. Table 43. Open Pits	Water 3	Research into risk and effects to pit lake stratification, downstream aquatic habitats, and surface flow to downstream watershed should have an objective of contributing to quantifiable triggers and thresholds for various criteria that can be used in defining an appropriate contingency measures within an Adaptive Management plan. The research plan should be amended to include this goal. Criteria to support evaluation of risk should be defined beyond a conceptual level and reported to allow for a full assessment of the appropriateness of the research.	Please refer to Table 43 (Appx F) Water 4 which has the research objective of pit lake water quality, and particularly to the 5th task under Planned Research which looks at the long term stability. Please refer to ICRP Section 2 Comments Table Tracking # 285 with respect to Adaptive Management.	No Revision Proposed.		
107 (81)	IEMA – 52	Appendix F, Table 43, Open Pits Water 4	Planned Research	This section should describe the remaining work to complete the pit lake studies and provide rationale as to why some of the original tasks have been modified or dropped, specifically original tasks 3, 7, 8 and 9 (e.g. fish habitat research is now limited to effects of pit filling on source lakes, rather than fish habitat or passage within pit lakes). While items 1-7 are acknowledged closure planning tasks, there is no information here on how those items yet to be done will be carried out. The Agency is particularly concerned about how this research will be completed in time for the closure of the Beartooth pit and how this pit could serve as an adaptive management pilot project, but no details are	The remaining work to be completed in the Pit Lakes Studies is provided under the Planned Research listed tasks.	**Table 43 (Appx F) Water 4** Planned Research will be updated to include when the Pit Lakes Tasks will be completed, in line with BHBP's response in Tracking # 3.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				provided in this version of the ICRP.				
108 (118)	INAC – 14	Appendix F, Table 43 Open Pits	Water 4	INAC-WRD stresses that these pit lake studies and the pending report is crucial to the review and assessment of BHP's Interim Closure and Reclamation Plan.	Acknowledged.	No Revision Proposed.		
109 (137)	JW – 29	Appendix F, Table 43. Open Pits Water 4	Research Objective	Suggest change determine to predict.	Agree	**Table 43, (Appx F) Water 4** Research Objective will be changed to 'Predict long term pit lake water quality for all pits in the mine plan'.		
110 (138)	JW – 30	Appendix F, Table 43. Open Pits Water 4	Planned Research	1. What lakes worldwide? For example, are they discussed in Lawrence and Pieters 03/30/08 presentation? 2. What type of data requirements are being reviewed? 3. How will runoff and waste characterization be assessed? 4. Suggest describe and quantify models? Suggest assess and quantify water budgets. 5. How will pit lake stability be assessed? 6. Suggest change determine to describe potential impacts and mitigation measures. 7. How will water quality in pits with waste rock fill be modeled? In general: How long are these studies? How much data will be collected and when? What is contingency period for completing research, conducting pilot studies prior to or during pit filling?	1. Please refer to *Pit Lake Studies Task 1 Review of the State of Knowledge of Pit Lakes* which was completed and submitted to the WLWB December 2005. 2. Examples of data required to complete the Pit Lakes studies include: - flow and water quality data for all sources contributing to the pit lakes. - schedule for infilling of the lakes. - information about how the lakes will be filled and managed. - information about temporary and permanent surface diversion structure. - data concerning the composition of the pit walls. - estimates of loadings of water quality parameters reporting to the water in the pit lakes from different minerals in the pit walls and from kimberlite. 3. Runoff water quality and waste characterization will be assessed by analyzing on-site waste rock seep data, open pit sump water quality and by geochemical modelling. 4. The descriptions of the models and water balances will be quantitative. 5. The stability of the pit lakes will be assessed *via.* a modelling approach (See Results from Completed Research). 6. Comment noted. 7. The water quality will be modelled using a mass balance model, which will account for all inputs of loadings and water to the pit lakes along with climatic variability. The model will be run on a monthly time step. The Pit Lakes studies will take approximately one year and will be completed by year end 2008. Therefore, the contingency period for completing research and pilot studies is 9 to 10 years (assuming mine closure in 2020). Much of the data that will be used in the studies comes from operational monitoring. A data gap analysis was submitted to the Water Board in 2005 as *Pit Lake Studies Task 2 Review Data Requirements, Available Data and Data Gaps.* Collection of data to address data gaps was initiated following the completion of the gap analysis and are ongoing.	No Revision Proposed.		
111	LKDFN –	Appendix	Water 4	BHBP has completed a study into data gaps for pit	The purpose of the gap analysis was to identify all know	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
(270)	11	F. Table 43. Open Pits		lakes closure. Will all identified data gaps be targeted to be filled with the proposed research? If not, what gaps will remain and how will these gaps impact pit lake water quality predictions? Does BHBP agree that a summary of gaps identified, impact on pit lake water quality and pit lake water quality predictions in relation to future research to fill the gap, in addition to reference to a separate technical report, would provide clarity into the appropriateness and completeness of the proposed research?	data gaps. If there are particular gaps that reviewers identify as missing and should be included, BHPB would welcome those suggestions. BHPB presented an outline of the Pit Lakes Study to the Working Group on Mar 20/08. At that presentation BHPB had stated that the final task for the study would be a summary of the pit lakes work. This opportunity would be used to address additional gaps which have been identified since the outset of the work.			
112 (271)	LKDFN – 12	Appendix F. Table 43. Open Pits	Water 4	Pit wall runoff and the characterization of waste is a planned research. Details of methods to complete have not been provided and therefore impossible to assess if the research findings will be appropriate~ for the purpose of determining long term pit lake water quality. Consideration should be given to understanding weathering rates and erosion process of the pit walls and geochemical rock-water interactions and reaction rates for different environments (i.e., saturated vs. unsaturated, reduced vs. oxygenated conditions). One of the goals of the research should be to obtain input reaction rates and site specific data to allow for appropriate predictions of loads for the water and load balance model. Could BHBP comment if these items are included in planned research? If not, why not?	Please refer to the Pit Lakes Studies Terms of Reference included under Water 4 Research References i). Geochemical interactions have been included in the research. Please refer to Sections 2.3.1 and 3.3 of the Terms of Reference for Sable, Pigeon and Beartooth Pit Lake Studies, 2004.	No Revision Proposed.		
113 (272)	LKDFN – 13	Appendix F. Table 43. Open Pits	Water 4	Further to research planned for the water and load balance models, a summary of the model inputs, source and sinks for water and chemicals identified, nutrient sinks, data requirements, and inherent model assumptions in comparison to available information are needed to assess the appropriateness and anticipated outcomes of the research. Such models require a detailed understanding of the physical system, source input parameters, reaction rates, including measured data for model calibration and validation. The research program should aim to obtain any required information to allow for reasonable predictions and confidence of long-term pit water quality. Does BHPB agree that a summary of information identified above would provide valuable data to determine long-term pit water quality? Does BHPB agree that providing this information would allow for a more complete understanding of the planned research and the research goals? If so, when and what method is best appropriate to present this information for review? If not, why not?	Agree. Please refer to Terms of Reference for Sable, Pigeon and Beartooth Pit Lake Studies, 2004.	No Revision Proposed.		
114 (273)	LKDFN – 14	Appendix F. Table 43. Open Pits	Water 4	Water quality measurements within pit lakes during flooding could provide valuable information for water and load balance models, in addition to, further understanding of the physical system.	Water quality measurements will be dependent on safe access to the open pits during flooding, and will be part of the reclamation work. BHPB has included the commencement of water quality sampling 2 years prior to	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				Although, water quality measurements during pit flooding and at different depths within the water column may not be a closure activity, the data gained will likely provide for a better predictive capabilities and inputs for the closure model. Water quality measurements of pit lake water during flooding should be obtained on a regular basis during flooding, not only two years prior to final water level elevations as referenced in **Appendix G, Table 49, Water 3.**	flooding completion, but would most likely commence this sooner in some pits. However, for some pits this will be at the commencement of flooding.			
115 (274)	LKDFN – 15	Appendix F. Table 43. Open Pits	Water 4	Potential impacts and mitigation measures for water extraction from sources lakes are to be researched. One of the goals of this research should be to identify criteria that can be used to further develop triggers and thresholds for Adaptive Management plans. This concept should be included as part of the planned research.	Please refer to ICRP Section 2 Comments Table Tracking # 285 with respect to Adaptive Management.			
116 (275)	LKDFN – 16	Appendix F. Table 43. Open Pits	Water 4	The overall research objective is to determine long term pit water quality. An overall closure goal is to have pit lake water quality reach levels so that the water can be discharged to the receiving environment. Will research be conducted to predict when pit lake water may be discharged for 1) mine operations leading to final closure (mine operations plan inputs are important to assess the starting point for closure concentrations), and 2) various closure conditions? Water quality predictions provide valuable information to develop criteria for contingency and Adaptive Management plans, including trigger and threshold values for water discharge strategy.	The timing of pit lake water discharge from pits is provided in Table 21 of the ICRP Vol 1. The purpose of the Pit Lakes Studies is to predict water the water quality will be for pit lakes. The results from the modeling will assist in determining contingencies and any needed changes in pit lake discharge. Water will not be discharged from pit lakes if it does not meet water discharge criteria.	No Revision Proposed.		
117 (276)	LKDFN – 17	Appendix F. Table 43. Open Pits	Water 4	BHBP plans to eliminate fish passage to and through pit lakes. DFO's understanding was that "BHPB would... reclaim the aquatic ecosystem and restore watershed connectivity" (see Section 2 Comment/Response Table Tracking Number 13), What, if any, research is needed with respect to pit water quality to allow for fish passage to and through pit lakes at closure? Will research be planned to address these issues? If not, why not?	The research to ensure water quality meets water license criteria (including water for fish and aquatic life) is provided in Table 43 (Appx F) Water 4. Please also refer to ICRP Comments Table Section 2 Tracking 1 where DFO has signed Fisheries Act authorizations (FAA) and Compensation Agreements with BHPB which establish that fish habitat lost through the project has been compensated for and is not a reclamation requirement.	No Revision Proposed.		
118 (277)	LKDFN – 18	Appendix F. Table 43. Open Pits	Water 4	Pit water quality can impact the littoral areas as well as near shore riparian areas. Will shallow littoral areas be established at pit closure? What research is required to appropriately achieve this? (related to Section 2 Comment/Response Table Tracking Number 6 and 24).	Vegetation will be used along channel banks and pit perimeters where required to stabilize and prevent erosion. Please refer to Section 6.1.4 ICRP Vol 1. where BHPB discusses beach areas. Please also refer to Table 43 (Appx F) Land 1 for the research plan for vegetation, and Tracking # 58 and # 121 for BHPB's response related to fish habitat creation.	No Revision Proposed.		
119 (278)	LKDFN – 19	Appendix F. Table 43. Open Pits	Water 4	The ICRP has proposed water discharge criteria from pit lakes (detailed in Section 2 Comment/Response Table Tracking Number 2 and related to Section 2 Comment/Response Table Tracking Number 95) that are similar to current water licence discharge criteria at	Research on expected pit lake water quality for the pit lakes at EKATI has been identified in Table 43 (Appx F) Water 4. Direction and guidance for regulatory agencies when establishing water quality criteria come from risk assessments and in accordance with the CCME	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				the point of compliance; however, BHPB, within **Section 2 Comment/Response Table Tracking Number 109**, acknowledges that water quality criteria will be reviewed with subsequent water license renewals. INAC-WRD's position was that "current Effluent Quality Criteria (EQCs) in existing water licenses is not acceptable for assessing pit water quality" and that "INAC- WRD expects water quality in the pit lakes would be of better quality than the outflow of the LLCF" (see **Section 2 Comment/Response Table Tracking Number 109**). Closure plans for pit lakes, along with contingency plans (and Adaptive Management plans), if lake water quality is not acceptable for discharge, are tied to effluent discharge criteria. Understanding that discharge criteria are established by the WLWB, what specific research is needed to provide confidence in selecting discharge criteria so that values are appropriate for pit lakes at closure?	guidelines and protocols.			
120 (279)	LKDFN – 20	Appendix F. Table 43. Open Pits	Water 4	With regards to contingency and Adaptive Management plans, BHPB "agrees that an Adaptive Management Plan would be necessary at closure" (see **Section 2 Comment/Response Table Tracking Number 285 or Section 2 Comment/Response Table Tracking Number 158**), and informs that an Adaptive Management Plan has been submitted to WLWB for approval. Note that the submitted Adaptive Management Plan is for the EKATI Watershed and is not focused on mine closure activities. Does BHBP agree that an Adaptive Management Plan with focus on mine closure criteria, contingencies, triggers and thresholds are not included in the recently submitted Watershed Adaptive Management Plan? If not, why not? Does BHBP agree that a report that focuses on mine closure criteria, contingencies, triggers and thresholds would provide clarity to the proposed research, in addition to overall closure plans? Will research be planned to address these issues? If not, why not?	Please refer to ICRP Section 2 Comments Table Tracking # 285 with respect to Adaptive Management.	No Revision Proposed.		
121 (114)	DFO – 4	Appendix F, Table 43 Open Pits	Open Pits Water 4	Task 7 Pit Lake Fish Passage Design from the Terms of Reference for the Pit Lake Studies should be brought back into the reclamation research plan.	Task 7 of the October 2004 Terms of Reference for Sable, Pigeon and Beartooth Pit Lakes Studies was not part of the MV2001L2-0008 Water License requirement under Part I. # 1. Task 7 was originally for Sable, Pigeon and Beartooth, and not all the open pits. BHPB removed Task 7 from the Sable, Pigeon and Beartooth pit lake study after being informed by DFO in May 2006 that by constructing 'fish passage' into and through pit lakes BHPB would be responsible for construction of 'fish habitat'. Because BHPB had already compensated for 'fish habitat' loss in pit lakes the decision was made by the company to remove Task 7 and the construction of fish passage.	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
122 (82)	IEMA – 53	Appendix F, Table 43 Open Pits Wildlife 1	Research Objective	This objective will continue to be controversial until the Board makes a decision on the issue. IEMA does not agree with this objective. The fish barrier proposal from the company is not based on any publicly available research.	Acknowledged.	No Revision Proposed.		
123 (83)	IEMA – 54	Appendix F, Table 43 Open Pits Wildlife 1	Planned Research	The two tasks listed here do not describe the work that will be done, or when it will be done.	The tasks under Planned Research do outline the work to be done. Please refer to Table 1 Reclamation Research Plan Schedule for when the work will be completed.	No Revision Proposed.		
124 (119)	INAC – 17	Appendix F, Table 43 Open Pits	Wildlife 1	INAC-WRD supports DFO's position that fish barriers should be designed in such a way that they are easily removed if and when water quality criteria are met and DFO and others are satisfied the pits are safe for fish.	Please refer to Tracking # 125.	No Revision Proposed.		
125 (113)	DFO – 3	Appendix F, Table 43 Open Pits Wildlife 1	Fish Barriers	Fish barriers should be designed in such a way that they are easily removed if and when it is determined that the pit lakes and Cell E of the LLCF meet water quality criteria appropriate for the protection of aquatic life, including fish.	Agree	**Table 43 (Appx F) Wildlife 1** will be updated to state that fish barriers will be designed for easy removal.		
126 (139)	JW – 31	Appendix F. Table 43. Open Pits Wildlife 1	Research Objective	Research objective is fairly vague. Objective should be to develop feasible and appropriate methods for building fish barriers.	The objective should not be to develop methods for building, but to design fish barriers which can effectively prevent fish from traveling upstream or downstream into pit lakes, and which are easily removed if and when it is determined that the pit lakes and Cell E of the LLCF meet all regulatory obligations (Please refer also to Tracking # 125).	**Table 43 (Appx F) Wildlife 1** Research Objective will be updated to 'Design and test fish barriers for pit lakes that prevent fish from traveling into pit lakes via connecting streams, and which are easily removed after BHPB has satisfied all regulatory obligations.		
127 (140)	JW – 32	Appendix F. Table 43. Open Pits Wildlife 1	Planned Research	What types of fish barriers are currently being contemplated?	Please refer to Table 43 Wildlife 1 which has identified the research question as 'designing the type of fish barrier'. Fish barriers will be designed to prevent fish from traveling upstream or downstream into pit lakes, and which are easily removed if and when it is determined that the pit lakes and Cell E of the LLCF meet all regulatory obligations. (Please refer also to Tracking # 125 and 126).	No Revision Proposed.		
128 (120)	INAC – 18	Appendix F, Table 43 Open Pits	Wildlife 2	INAC-WRD has questions about the perimeter pit berms being proposed by BHP. Can BHP further explain the rationale for perimeter berms and expected design life of the berms? Are there any other options to restrict/mitigate wildlife accessing to the pits?	Please refer to Section 2 Comments Table Tracking # 42. Other options would be Inokhoks.	No Revision Proposed.		
129 (141)	JW – 33	Appendix F. Table 43. Open Pits Wildlife 2	Planned Research	What methods will be employed to test berm avoidance?	Acknowledged.	**Table 43 (Appx F) Wildlife 2** Planned Research will be updated to include methods for assessing berm effectiveness.		
130 (84)	IEMA – 55	Appendix F, Table 43 Open Pits Wildlife 2	Planned Research	It is not clear why any research or 'testing' is needed--why not adopt protocols already being applied elsewhere for this (e.g., Colomac)	BHPB has heard from the communities that the safety of wildlife near open pits is a key concern. To address this concern BHPB has identified the question on the ideal berm height which will affectively deter caribou. Learnings from other minesites will be included as part of this research.	No Revision Proposed.		

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131 (85)	IEMA – 56	Appendix F, Table 43 Open Pits Wildlife 2	Results From Completed Research	Why does BHPB not propose or currently monitor the functioning of the Misery pit berms now to assist with this area of uncertainty? Does BHPB propose any breaks in the pit berms to allow for easier wildlife and human access to the pit lakes upon completion of the filling? Are the current road berms one metre above a 3 m road bed for safety considerations and how does BHPB intend to deal with these areas at closure? There is some uncertainty regarding the caribou behaviour monitoring along roads as the consultants classification of deflections may not be accurate.	The pit berms are currently monitored at Misery Pit during the suspension of operations, as part of the WEMP. Inuit from the community of Kugluktuk also monitor this as part of the Caribou and Roads program. No issues have been raised by the community on the berm. Very few caribou are observed in the Misery area for the following reasons: Caribou move through the area fairly quickly during the spring migration, and do no spend time around the pit area. In summer when larger herds spend more time around the EKATI claim block, very few are observed at Misery mostly because this is not in the main migration corridor (which is more to the east and the Lac du Sauvage Narrows), and because of the ongoing site operations activities at Misery. It is expected that over time pit berms will slowly erode and wildlife will eventually gain access to pit lakes. Please refer to Section 6.6.4.9 of the ICRP for closure of roads, in particular road berms. BHPB will review monitoring of caribou behavior, which is currently part of the Wildlife Effects Monitoring Program, and the Caribou and Roads TK Studies. Should any changes be made to the monitoring the ICRP will be updated as required.	No Revision Proposed.		
132 (86)	IEMA – 57	Appendix F, Table 43 Open Pits Wildlife 3	Research Objective	Would this objective be better stated as to determine where and how to establish useable wildlife habitat and access to pit lakes?	Agree with first part of this suggestion. Please refer to Tracking # 131 regards caribou access to pit lakes.	**Table 43 (Appx F) Wildlife 3 Research Objective** will be changed to 'Determine where and how to establish useable wildlife habitat at pit lakes.'		
133 (87)	IEMA – 58	Appendix F, Table 43 Open Pits Wildlife 3	Planned Research 1	What is the benefit of doing this--can anything be done to change the opportunities? Raptors will presumably employ their own doubtlessly obscure criteria to decide if this habitat is useful. Is this anything more than a post-closure monitoring activity?	Should the Reclamation Objective for Wildlife 3 be changed to that in Tracking # 132, then Task 1 under Planned Research would be even more applicable. Raptor habitat (the example given) might be possible on step pit walls. Other wildlife would use the area, such as caribou and foxes. Habitat for these animals may include beach areas.	No Revision Proposed.		
134 (88)	IEMA – 59	Appendix F, Table 43 Open Pits Wildlife 3	Planned Research 2	Does this make sense as a closure research activity? What can be done about it if a raptor increase turns out to be the case? What is the limiting factor for raptor densities?	The concern over 'the link between increased raptor nesting habitat and the effect on passerines and other migratory birds was raised by ENR (Section 2 Tracking # 254).	No Revision Proposed.		
135 (89)	IEMA – 60	Appendix F, Table 43 Open Pits Wildlife 3	Planned Research 3	Ensure landscape around pit is safe for use - How? When?	Please refer to Table 1 Reclamation Research Plan Schedule for when this research will be completed.	**Table 43 (Appx F) Wildlife 3, Planned Research** will be updated to include how this research will be completed.		
136 (90)	IEMA – 61	Appendix F, Table 43 Open Pits	Planned Research 3	How is this to be researched? Surely this is a planning and design exercise, not a research one?	Please refer to Tracking # 135.	No Revision Proposed.		

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		Wildlife 3						
137 (91)	IEMA – 62	Appendix F, Table 43 Open Pits Wildlife 3	Research Completed (Raptors)	The 'particular research of raptor use' should be described--how is this being done?	Currently raptor use is monitored and reported during mining operations as part of the Wildlife Effects Monitoring Program. Since Task # 3 has only just been included as part of ENR's concern in Section 2, the methodology on how the research will be conducted has not yet been developed.	No Revision Proposed.		
138 (92)	IEMA – 63	Appendix F, Table 43 Open Pits Wildlife 3	Research Completed (Falcons)	What data exist to demonstrate that pit walls offer 'attractive nesting locations for falcons'? Can monitoring Misery pit now during temporary closure provide any useful data?	Data exist in the Wildlife Effects Monitoring Program reports. This has been identified under Application of Results and in the Research References.	No Revision Proposed.		
139 (93)	IEMA – 64	Appendix F, Table 43 Open Pits Wildlife 3	Results From Completed Research (Birds)	How are birds discouraged from using pit walls during operations? What is 'potential nesting activity' and how is it measured?	Please refer to the Wildlife Effects Monitoring Program for information on raptor nesting in open pits during mining operations.	**Table 43 (Appx F) Wildlife 3 Results from Completed Research** will be updated to ensure that 'potential nesting activity' is described as bird nests, either complete or under construction.		
140 (94)	IEMA – 65	Appendix F, Table 43 Open Pits Wildlife 3	Results From Completed Research (Productivity Rates)	Is this section talking about in-pit habitat or elsewhere?	Acknowledged.	**Table 43 (Appx F) Wildlife 3 Results from Completed Research** will be reviewed to ensure the results have been identified as either in-pit habitat or elsewhere.		
141 (95)	IEMA – 66	Appendix F, Table 43 Open Pits Wildlife 3	Results From Completed Research (Roads And Lapland Longspurs)	What is the relevance of this information to closure planning?	Lapland Longspurs are passerines, and have the potential to be impacted by an increased raptor population as noted under Planned Research. This research was originally conducted for a separate purpose, prior to the inclusion of Task 2 in this research, however data and results from this research will be useful.	No Revision Proposed.		
142 (97)	IEAM – 68	Appendix F, Table 43 Open Pits Wildlife 3	Application Of Results From Research (Nesting)	What data exist for 'establishing nests'? Perhaps more important is the success rate for egg-laying and fledging chicks—are there data for this?	All stages of raptor nesting are monitored (opportunistically during mining operations) – the success rates for raptors are reported in the annual WEMP report. Refer to the 2007 WEMP for details and data.	No Revision Proposed.		
143 (98)	IEMA – 69	Appendix F, Table 43 Open Pits Community 1	Research Objective	This item is community consultation, not a reclamation research activity--should be deleted from this table. Perhaps this objective might include how to make the pit lakes safe for future human use and travel (e.g. ice thickness in winter) and what specific Traditional Knowledge will be sought?	Community research should be included as part of mine closure, alongside research of the physical reclamation activities. BHPB is committed to engage regularly, openly and honestly with people affected by our operations, and take their views and concerns into account in our decision-making (BHPB's Sustainable Development Policy). The company will continue to research opportunities where communities can assist in reclamation design and activities.	No Revision Proposed.		
144 (99)	IEMA – 70	Appendix F, Table 43 Open Pits Community 1	Research Completed	Most, if not all, of this information not relevant to closure planning.	Please refer to Tracking # 143.	No Revision Proposed.		

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145 (100)	IEMA – 71	Appendix F, Table 43 Open Pits Community 1	Results From Completed Research	Nothing here on applicability of this information to closure planning. What 'ideas and suggestions from the communities' were used by BHPB to develop closure plans? Where are the data to show effectiveness of inokhok in diverting caribou?	Please refer to Tracking # 143.	No Revision Proposed.		
146 (101)	IEMA – 72	Appendix F, Table 43 Open Pits Community 1	Application Of Results From Research	There is nothing here which explains relevance to closure planning.	Please refer to Tracking # 143.	No Revision Proposed.		
147 (102)	IEMA – 73	Appendix F, Table 43 Open Pits Operations 1 & 2	Research Objective	The stated objective is largely an engineering or planning exercise. Is the real objective to reduce the overall footprint for the pipelines and does this require actual research?	The research planned for Objective 1has been identified as: determine source lakes, pipeline routing, timing of flooding, and infrastructure requirements. Research tasks for Objective 3 have been based on Working Group concerns in Section 2 Tracking # 126 and 137.	No Revision Proposed.		
148 (103)	IEMA – 74	Appendix F, Table 43 Open Pits Operations 3	Research Objective	The relationship to the Pit Lakes Studies Tasks should be spelled out here for pit filling with processed kimberlite.	Agree, there are linkages with Open Pits Water 4 Objective.	**Table 43 (Appx F) Operations 3** will be updated to ensure the linkage with Water 4 will be included.		
149 (104)	IEMA – 75	Appendix F, Table 43 Open Pits Operations 3	Planned Research 1	Why would tailings be thickened?	Thickening of tailings would be considered if this was necessary to ensure that reclaim water pumped from an open pit was sufficiently free of suspended sediment. An overly high concentration of suspended sediment in the reclaim water could affect the processing of kimberlite ore. This is not a concern in the LLCF because of adequate retention time and the intermediary dykes, which allow suspended sediment to settle. However, this could be a concern when considering PK deposition into an open pit if retention time were substantially shorter.	No Revision Proposed.		
150 (105)	IEMA – 76	Appendix F, Table 43 Open Pits Operations 3	Planned Research 2	Why is this relevant to closure? Do we not know settling rates from LLCF operation?	Please refer to Tracking # 149 for relevance. BHPB has information on settling rates in the LLCF, but this has not been studied in the context of open pits.	No Revision Proposed.		
151 (106)	IEMA – 77	Appendix F, Table 43 Open Pits Operations 3	Planned Research 3	These are engineering planning issues, not specifically reclamation research.	Please refer to Tracking # 149.	No Revision Proposed.		
152 (107)	IEMA – 78	Appendix F, Table 43 Open Pits Operations 3	Research Completed (Initial Research)	Where is this 'initial research' described?	The reference to this research has been provided at the end of the Research Completed section, and listed under Research References.	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
153 (108a)	IEMA – 79	Appendix F, Table 43 Open Pits Operations 3	Results From Completed Research	Two studies have been indicated--do these have nothing relevant to closure in the way of conclusions?	Not at this time.	No Revision Proposed.		
154 (108b)	IEMA – 80	Appendix F, Table 43 Open Pits Operations 3	Research References	This document should be made available.	The referenced document was a conceptual study, for the purposes of informing the company on whether to move to a pre-feasibility study. As noted, this document is for internal operating purposes.	No Revision Proposed.		
155 (121)	INAC – 19	Appendix F, Table 43 Open Pits	Operations 3	BHP has conducted some initial research on directing Processed Kimberlite (PK) into the pits to reduce the overall depth and pumping requirements. INAC-WRD notes that directing PK into the pits is not brought forward as an option in the ICRP but BHP will continue to research this as an option. When will this research begin and how long will it take? We note as per the mine plan as early as 2010 a pit will become available for closure?	This research has already begun, as noted in Operations 3. Please refer to Table 1 Reclamation Research Plan Schedule where research for backfilling PK into the Beartooth pit would be completed by end 2009.	No Revision Proposed.		
156 (109)	IEMA – 81	Appendix F Operations 4	Research Objective	The research objective here is not clear. Is this research intended to ensure that water levels and quality is maintained?	The purpose of the question is to determine the type and location of engineered plugs in the underground mines. This work will assist in the deciding whether or not to flood Panda prior to completion of Koala Underground operations.	**Table 43 (Appx F) Operations 4** BHPB will remove this from the Reclamation Research Plan and include it as part of a section on Engineering Design Questions in Section 6.1 of the ICRP Vol 1.		
157 (110)	IEMA – 82	Appendix F, Table 43 Open Pits Operations 4	Research Completed	The whole purpose of this table to describe what research is being done, or contemplated. This statement is not helpful.	Acknowledged.	Please refer to Tracking # 156.		
158 (122)	INAC – 20	Appendix F, Table 43 Open Pits	Operations 4	BHP has indicated that research on engineered plugs in the UG mines is ongoing but has not been completed. When will the research be completed and what type of research other than feasibility will be conducted?	Please refer to Table 1 Reclamation Research Plan Schedule where research for installing plugs in the Panda/Koala Underground would be completed prior to 2020. The feasibility study will determine whether or not it is safe to construct plugs and place water or PK in Panda, while operations continue in Koala U/G.	No Revision Proposed.		
159 (142)	JW – 34	Appendix F. Table 43. Open Pits Operations 2	Planned Research	Are alternate energy sources considered in the research for energy requirements?	Acknowledged.	**Table 43 (Appx F) Operations 2**, Planned Research will be updated to include BHPB's ongoing research on alternative energy sources.		
160	JW – 35	Appendix	Planned	Research concept vague. What is being assessed	Acknowledged.	**Table 43 (Appx F)**		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
(143)		F. Table 43. Open Pits Operations 4	Research	here?		**Operations 4** BHPB will remove this from the Reclamation Research Plan and include it as part of a section on Engineering Design Questions in Section 6.1 of the ICRP Vol 1.		
Appendix F: RECLAMATION RESEARCH PLAN - Table 44: Underground Mines								
161 (144)	IEMA – 83	Appendix F, Table 44 U/G Mines	General	The uncertainties around Table 22 closure criteria for Land 1 and 2, and Health and Safety 1 'no significant slumping or subsidence' has not been addressed in the proposed research	Agree	**Table 44 (Appx F)** Will be updated to include the uncertainties around surface stability.		
162 (145)	IEMA – 84	Appendix F, Table 44 U/G Mines Water 1	Planned Research 1	What does 'examining the contribution' of saline water to LLCF mean? Is this new work, or work already completed? What is the relevance to closure planning?	Extensive efforts have gone into predicting and modelling the contribution of saline water from the underground workings to the LLCF. A number of studies have addressed different aspects of this issue have been completed and more studies will be undertaken as part of the Pit Lakes closure studies currently in progress. Work completed has been discussed in Results from Completed Research and referenced appropriately. The relevance to closure has been addressed in the Research Objective.	**Table 44 (Appx) Water 1** Planned Research Task 1 will be updated ensure that the contribution of saline water to the LLCF is discussed in the context of the Underground Mines.		
163 (146)	IEMA – 85	Appendix F U/G Mines Water 1	Research Completed	This states all relevant data have been analyzed. Is there more 'research' or data collection that needs to be done to meet the objective? If so, it should be described in detail.	Agree	**Table 44 (Appx F) Water 1** will be updated to ensure that the Planned Research identifies the link between this research and the Pit Lakes Studies, and the data needs for to meet the objective.		
164 (147)	IEMA – 86	Appendix F U/G Mines Water 1	Application of Results from Research (modeling)	But the results from 2005 and 2007 should also inform this version of the ICRP.	The results from 2005 were used to inform the Research Completed and will be used in the Pit Lakes Studies. Any research results completed after the delivery of the 2007 ICRP (the ICRP was delivered to the WLWB January 2007) will be used in the next update of the ICRP. If BHPB is to be requested to continuously update the ICRP with information developed after the plan has been submitted to the WLWB this sets the process of review into continuous update and review, and no resolution towards approval of the ICRP.	No Revision Proposed.		
165 (148)	INAC – 21	Appendix F, Table 44 U/G Mines	Water 1	-INAC-WRD notes that the results from earlier research states that the Ion exchange mechanisms have been suggested as a possible cause. An SRK report confirmed that ion exchange is the likely cause of the low pH and elevated aluminum. Since the cause of the pH depression is understood, what mitigation measures are going to be implemented to stop the aluminum non-compliance of Seep-018B/019? -INAC-WRD has raised concerns about SEEP-018/019 for the past years as total aluminum is higher than discharge criteria. Is BHP conducting research as to why the toe berms are not working in this area? What	As discussed in the report, the mechanism causing aluminum leaching is pH depression, which originates from displacement of protons from organic matter by cations leaching from the waste rock. This is a finite process which should slowly decrease with time as the exchange capacity of the soils is consumed. Except for seasonal variations, aluminum concentrations are expected to decrease as pH recovers. The implementation of measures other than collection and treatment if non-compliance is observed is not considered necessary given the expected trend.	**Table 44 (Appx F) Water 1** will be updated with the 2005 Klohn Crippen report.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				options are being considered to deal with this seepage (i.e. containment, pumping to the LLCF, etc.)? -BHP indicates that increasing trends in underground inflow rates since 2003 with large temporary inflows of groundwater. Also, current trends indicate that the salinity of mine water from the UG workings will increase in the future. Has BHP done any hydrogeological modelling of groundwater inflows given these noted increases above? Have they made any predictions on how the groundwater may influence the WQ of the LLCF with time? What are the expected groundwater inflow rates once UG operations are near complete (i.e. maximum amount of inflow)?	The discussion of SEEP-018/019, seepage from the toe of the Panda/Koala rock pile, is not relevant to the reclamation research plan described in Table 44, Water 1. The issues raised in the review comment are addressed and provided to the WLWB in the Waste Rock Storage Area Seepage Monitoring Reports and other associated reports. In contrast, the Table 44, Water 1 study addresses the implications of deep connate groundwater for the end pit lakes. BHP Billiton wishes to correct the review comment however which incorrectly states that SEEP018/019 exceeds discharge criteria for aluminum. SEEP108-019 does not, and has not, exceeded the water licence EQC for aluminum or any other parameter. A hydrogeological modelling study was completed for Koala Underground by Klohn Crippen Consultants Ltd. in 2005. However, predicting groundwater flow in subsurface geology characterized intercepted by fractures and fault zones is notoriously difficult. Hydrological conductivities typically span two to three orders of magnitude and the interconnectedness of fault and fracture zones is highly complex. At EKATI, a considerable quantity of surface water report to the underground workings during the open water season through surface connections and fault structures. This further complicates the task of predicting groundwater flow and associated loads. BHP Billiton is currently monitoring groundwater flow and produces monthly reports on underground mine water flows and associated loadings with a special focus on nitrogen species and chloride. Efforts to link trends in flows and loadings to specific events such as interception of fault zones or precipitation events are currently underway. Future predictions of groundwater flow will be based on the empirical data currently being collected.			
166 (149)	JW – 36	Appendix F, U/G Mines Water 1	Research Objective	It would seem that this research is an on-going assessment, or that the data collection for this research should have already begun. When will these studies begin? How long is the duration? Will there be pilot studies?	Ground water contribution studies commenced in 2005 with the collection of data as described. Table 1 Reclamation Research Plan Schedule shows that the research is continuous. Koala underground operations will continue to 2020. Should other scenarios or operational projects potentially affect long term water quality in pit lakes (for example the use of Beartooth pit as a repository for underground mine water from Koala), these scenarios will be included as part of the pit lake studies water quality modeling.	No Revision Proposed.		
167 (150)	JW – 37	Appendix F, Table 44, U/G Mines Water 1	Planned Research	1. Suggest change examine contribution to quantify and describe the characteristics and loadings? 2. What is the meant by “model” how underground saline water?	1. Agree to wording change. The characteristics and loadings are included as part of this task. 2. The “model” referred to is the water balance and water quality model. The underground saline water will be included as a source in the water balance and water quality model.	**Table 44 (Appx F) Water 1** Planned Research Task 1 will be updated to ‘Quantify’ in place of ‘Examine’.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
168 (151)	JW – 38	Appendix F, Table 44, U/G Mines Water 1	Results from Completed Research	Were the temporary inflows due to pressure releases associated with the fracture zones? What is the level of uncertainty in the predictions of pit water quality and loadings at the end of mine and in the future? What were maximum and mean concentrations of ammonia and petroleum hydrocarbons?	Yes, the temporary releases were associated with fracture zones. Uncertainties associated with pit water quality and loadings will be quantified as part of the Pit Lakes studies. In the underground mine water: Ammonia-N concentrations: mean = 28.4 mg/L, max = 108.0 mg/L Extractable hydrocarbons (C10 to 30): median = 3.2 mg/L, mean = 29.1mg/L, max = 275 mg/L (outlier).	No Revision Proposed.		
169 (280)	LKDFN – 21	Appendix F, Table 44, U/G Mines	Water 1	Research into the groundwater and salinity contributions from underground mines to pit lakes is proposed. The results of the research will be used to assist in researching pit water quality (see Open Pit research Water 4). a. Section 2 Comment/Response Table Tracking Number 154 and 156 raise issues with monitoring and certainty in the research completed. From BHBP's response to Section 2 Comment/Response Table Tracking Number 154, it is understood that since the underground mine is connected to the open pit, water quality monitoring will consist of monitoring pit lakes. Clarification is requested as to whether groundwater and salinity contributions to pit lakes will be measured without dilution and mixing in pit lake waters. If groundwater and salinity measurements are not isolated from pit lake waters, how will groundwater volumes and salinity concentrations be determined? b. A short term test (14 days duration) relative to pit flooding times has been completed as part of the research program. Will additional short term tests be conducted to assess groundwater and salinity contributions? Will groundwater and salinity contributions be assessed during pit filling and compared with predictions? c. Groundwater discharge to open pits contains constituents other than salinity that could impact pit lake water quality. Are water quality parameters other than salinity being measured as part of the research? If not, why not?	Please refer to the Terms of Reference for Sable, Pigeon and Beartooth Pit Lake Studies, 2004 Sections 3.2.4 and 3.4. which discuss groundwater inputs. Water quality monitoring in pit lakes will be assessed against predictive modeling.	**Table 44 (Appx F) Water 1** Planned Research will be reviewed to ensure that appropriate parameters from ground water are measured in the context of their contribution to pit lake water quality.		
Appendix F: RECLAMATION RESEARCH PLAN – Table 45: Waste Rock Storage Areas								
170 (152)	IEMA – 87	Appendix F, Table 45, WRSA	General	The uncertainties round Table 23 Land 15 where there are no specific closure criteria outlined for 'no significant thermokarst erosion or subsidence' has not been addressed in the proposed research.	Agree	**Table 45 (Appx F)** Will be updated to include the uncertainties around stability of quarry sites in the WRSA.		
171 (153)	IEMA – 88	Appendix F, Table 45, WRSA Land 1	Planned Research	The following sub-sections seem to indicate that the relevant research (except for on-going monitoring) is essentially completed. Is there additional research to be done at this point? Have all uncertainties been addressed?	Table 1. Reclamation Research Plan Schedule provides the timeframe for Table 45 (Appx F) Land 1 research. It indicates that research will continue to 2017. This the time when most of the WRSA's at EKATI will be no longer be active with mining operations (with the exception of the Panda/Koala WRSA for capping the LLCF).	No Revision Proposed.		
172	LKDFN –	Appendix	Land 1	The rate and permanence of permafrost in the WRSAs	Please refer to the two EBA reports in the Land 1	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
(281)	22	F, Table 45, WRSA		is currently being researched. Without knowing the methods of measurement, measurement parameters, frequency, and location, it is difficult to determine if the proposed measurements are adequate for the research purposes. a. A model to predict permafrost growth and maintenance over the long term is proposed. Presumably, details of the model and select input parameters are provided in the referenced documents. Does BHPB agree that in addition to referencing a technical report, a summary of assumed input parameters and any data gaps that may be required to calibrate and validate the numerical model would provide additional clarity and further understanding into if the proposed research is adequate to achieve its objective? If so, when and what method is best appropriate to present this information for review? If not, why not? b. Is the model selected to complete thermal modeling able to predict convective cooling processes? Is there reliance on convective cooling of WRSA components that is not part of an active research program? If so, what are these components?	Research References which provide more detail on 'methods of measurement, measurement parameters, frequency, and location'. Please refer to Sections 6.3.3.4 and 8.8.2 for more discussion on long term WRSA permafrost trends. BHBP is agreed that updates to the predictive modeling should be completed as more data comes available and more information is available on long term climate change predictions. The information from this would be included in successive updates of the ICRP. Please refer to the EBA report Thermal Evaluation of Waste Rock Piles EKATI Diamond Mine, NT. 2006. listed under Table 45 (Appx F) Land 1 for discussion on convective modeling.			
173 (154)	IEMA – 89	Appendix F, Table 45, WRSA Land 2	Planned Research	This section should omit research already completed, and focus on describing what uncertainties remain and what work will be undertaken to address the uncertainties.	Unless otherwise directed by the WLWB BHPB will continue to include results/lessons learned from research completed. Because vegetation research is usually lengthy and relies to a large extent on natural processes (many of which are unknown in the tundra environment) this type of research will be ongoing throughout the term of the mining operation. In addition topsoil has not yet been salvaged from future pits (Pigeon and Sable) and should not be precluded from research. Table 1 Reclamation Research Plan Schedule provides the timeframe for Table 45 (Appx F) Land 2 research. Research continues until 2020 and over which time salvaged topsoil will require stabilization and will be progressively used for reclamation projects.	No Revision Proposed.		
174 (155)	IEMA – 90	Appendix F, Table 45, WRSA Land 2	Application Of Results From Research	This section appears to indicate that there should be a focus on revegetation of camp pads and laydown areas yet no specific work is identified (e.g. % coverage, cover type or species).		**Table 45 (Appx F) Land 2** will be updated to reference research on rock pad stabilization using vegetation. Reference will be to Table 48 (Appx F) Land 1.		
175 (167)	INAC – 22	Appendix F – Table 45	Land 2	INAC-WRD is concerned that BHP does not have a % success rate component as part of the revegetation studies/research. This would be both useful and necessary if BHP wishes to use revegetation percentage as measurable closure criteria for the site.	Please refer to Table 45 (Appx F) Land 2, 4th task under Planned Research.	No Revision Proposed.		
176 (169)	JW – 39	Appendix F, Table 45, WRSA	Research Objective	The closure objectives for the Waste Rock Storage Areas include mitigation of significant adverse environmental effects to identify valued ecosystem components and a consideration of the relevant	Please refer to Tracking # 60.	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
		Land 2		expectations of stakeholders for post closure land use, including biodiversity, sustainable development and respect of traditional values. The criteria for the vegetation on these areas are that disturbed sites have been enhanced to encourage natural recovery of vegetation and that vegetation assemblages have been identified and functional.				
177 (170)	JW – 40	Appendix F, Table 45, WRSA Land 2	Planned Research	The research described focuses on the success of a range of species established on two cover materials, lake sediment and glacial till. The results presented did not indicate the number of species that may be successful nor was there any discussion of results on cover or growth of these species. Planned research item (#5 – Assess the appropriate percentage of vegetation cover that would provide stabilization of topsoil and lake sediment storage piles) may address the lack of cover criteria for reclamation success on these areas in the future.	The research is directed at the 2 cover materials 1) topsoil and 2) lake sediment/glacial till. Lake sediments and glacial till have been mixed together. Agree, this research task (# 4) has not been completed.	No Revision Proposed.		
178 (171)	JW – 41	Appendix F, Table 45, WRSA Land 2	Reclamation Schedule	Decommissioning and closure times for waste rock storage areas range from one to two years. This may be adequate time for the physical preparation of these areas and initial revegetation, but does not allow time for monitoring the success of the revegetation. The Closure Monitoring Program Frequency Table does not include monitoring of revegetation as a program item.	Topsoil and lake sediments will be used progressively for reclamation, and will be stabilized to ensure these materials have reduced erosion during this period. Once reclamation work is completed, all or part of these materials will remain, and may require some form of stabilization. Research to create a stabilizing vegetation cover would have been ongoing through operations (refer to Table 1 Reclamation Research Plan Schedule). The Reclamation Research Plan Schedule does not include the monitoring period for reclamation, but only monitoring for research.	No Revision Proposed.		
179 (156)	IEMA – 91	Appendix F, Table 45, WRSA Water 1	Planned Research 1	Hasn't this been achieved? If not, describe what yet needs to be done, and when.		**Table 45 (Appx F) Water 1** will be removed from the Reclamation Research Plan, as this uncertainty will be removed during operations.		
180 (157)	IEMA – 92	Appendix F, Table 45, WRSA Water 1	Planned Research 2	Do not current seepage data tell us what to expect? Why does modeling have to be conducted, and how would it inform closure planning?	For the most part, current seepage water quality is a good indicator of long term water quality following closure. There are some exceptions that will need to be considered including depletion effects as rock components (*e.g.,* sulphur) and residual explosives are leached, and the effect of leaching of buffering capacity for schist rocks (*e.g.,* Misery, Pigeon).The modeling will indicate whether any additional measures are needed to ensure water chemistry is acceptable.	Please refer to Tracking # 179.		
181 (158)	IEMA – 93	Appendix F, Table 45, WRSA Water 1	Research Completed (Ion Exchange)	This mechanism is identified as a potential cause for the problematic seepages but no further research is identified	Acknowledged.	Please refer to Tracking # 179 and 180.		
182 (172)	JW – 42	Appendix F, Table 45, Table 45,	Planned research	"Model" for seepage water quality is vague. How will it be modeled? Over what time frame? Suggest adding the following: Describe (mechanism) and quantify causes for	Please refer to Tracking # 180. The primary influence on water quality for waste rock at EKATI is weathering of silicate minerals by contact with meteoric water. These effects are likely to continue with	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
		WRSA Water 1		seepage formation. Evaluate potential causes for pH depressions in Seep 18/19 and risk of others.	little change over the long term. Shorter term (probably decades) effects will be due to oxidation and depletion of small amounts of sulphide minerals which will influence sulphate concentrations and the potential for generation of acidity (latter at Misery and Pigeon only). Leaching of explosives residues will only last as long as the expected quantity of residues. The effect observed at SEEP 018/019, if it occurs, would be expected to be nearly immediate and then decreasing as exchange capacity is depleted.			
183 (173)	JW – 43	Appendix F, Table 45, WRSA Water 1	Results from Completed Research	What is meant by “most seeps”? …more than 50%? How many are non-compliant?	Please refer to the annual seepage monitoring reports for detailed reporting on this question. Non-compliance is rare because few seeps drain to the receiving environment, and even for these non-compliance is also rare.	No Revision Proposed.		
184 (282)	LKDFN – 23	Appendix F, Table 45, WRSA	Water 1	Methods to control seepage from WRSA during mine closure are a proposed research. Planned research into the effectiveness of toe berms in WRSA is one method to control seepage. Are there other methods being research? Of the methods to control seepage that are not being researched are there opportunities to research their performance? If not, why not?	Research on permafrost growth into WRSA’s is also ongoing. Please also refer to the annual seepage reports referenced under Water 1 which are ongoing through operations. At this time there is no additional research planned to control seepage.	Please refer to Tracking # 180.		
185 (283)	LKDFN – 24	Appendix F, Table 45, WRSA	Water 1	A model for seepage water quality at closure is proposed as a planned research. The model may need to predict water movement within the WRSA, as well as, solute transport and rock-water chemical interactions. What model will be used to predict seepage water quality?		Please refer to Tracking # 180.		
186 (284)	LKDFN – 25	Appendix F, Table 45, WRSA	Water 1	From Section 2 Comment/Response Table Tracking Number 212, it is understood that “no data have been collected specifically within the WRSA” and that seepage data and analysis is based on data compiled in annual seepage reports. Water quality measurements from seeps and sumps outside of the WRSA provide an averaged response of water quality from water that has passed through the WRSA; it does not provide a detailed understanding of the processes and mechanisms responsible for changes in water quality within the WRSA or travel time within the WRSA. Will additional research be complete to assess water quality changes within the WRSA and how it changes with time? If not, why not?	At this time there is no additional planned research for assessing water quality changes in the WRSA. The WRSAs at EKATI do not have ARD and temperature monitoring of the piles indicates that permafrost is growing into the piles and providing chemical stability. Please refer to ICRP Vol 1. Section 6.3.2.3.	Please refer to Tracking # 180.		
187 (285)	LKDFN – 26	Appendix F, Table 45, WRSA	Water 1	Details of the numerical model were limited within the ICRP. a. Does BHPB agree that in addition to referencing a technical report, a summary of assumed input parameters and any data gaps that may be required to calibrate and validate the numerical model would provide additional clarity and further understanding into if the proposed research is adequate to achieve its objective? If so, when and what method is best appropriate to present this information for review? If	BHBP is agreed that updates to the predictive modeling should be completed as more data comes available and more information is available on long term climate change predictions. The information from this would be included in successive updates of the ICRP.	Please refer to Tracking # 180.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				not, why not? b. Does BHPB agree that a summary comparison of data gaps between model input requirements and measured values would provide clarity into assessing the appropriateness of the research? if so, when and what method is best appropriate to present this information for review? If not, why not?				
188 (286)	LKDFN – 27	Appendix F, Table 45, WRSA	Water 1	**From Section 2 Comment/Response Table Tracking Number 231**, TNAC-WRD raised questions about the type of research arid monitoring being completed to characterize freezing of different material types and the impact of freezing on water quality. BHPB does not specifically state if any active research is being completed to assess these particular issues. Clarification is required. If no research is proposed, can BHPB please provide rational why?	BHPB's response to the referenced Section 2 comment was: Coarse rejects are typically deposited at higher moisture contents than waste rock. The high water contents mean that the latent heat that must be liberated to freeze the coarse rejects is orders of magnitude higher than it is in the waste rock. Therefore, it takes considerably more cold to overcome the zero curtain effect and actually freeze the material as compared to waste rock. Freeze concentration is well-known effect that leads to increased concentrations in water. This was noted as possible effect responsible for elevated concentrations of sulphate, magnesium and calcium in the CKRSA waters (Reference 2001 Seepage Report). BHPB's does not believe that research is required at this time. Results from monitoring indicate the materials in the WRSA are freezing in place, and some materials are freezing at different rates.	No Revision Proposed.		
189 (287)	LKDFN – 28	Appendix F, Table 45, WRSA	Water 1	From Section 2 Comment/Response Table Tracking Number 239, TNAC-WRD commented that triggers for seepage water quality during closure, and associated actions, should be detailed. BHPB references an adaptive management plan to clarify these items. Is there any research that is required to appropriately select triggers and thresholds for seepage water quality? Are these values known?	Please refer to ICRP Section 2 Comments Table Tracking # 285 with respect to Adaptive Management. Any research requirements associated with the triggers in the Adaptive Management will be identified when this plan is developed, and included in updates of the ICRP.	No Revision Proposed.		
190 (159)	IEMA – 94	Appendix F Wildlife 1	Planned Research 1	When? How would we use the data?	Table 1. Reclamation Research Plan Schedule shows that is scheduled for each WRSA. For example the Panda/Koala WRSA access ramps design should be completed by 2009 with the completion of the Beartooth Open Pit.	**Table 45 (Appx F) Wildlife 1** Research Objective will be updated to state "Determine location, number, dimensions and slope of access ramps on WRSA's that will be used by wildlife (namely caribou during post calving and summer migration periods). **Planned Research** will also include a reference to Community 1 where BHPB will ensure the Aboriginal Communities participate in the design and location of WRSA access ramps.		
191	IEMA – 95	Appendix	Planned	Why would it not be possible? How would we set up	Please refer to Section 2 Tracking # 177 regards use of	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
(160)		F Table 45, WRSA, Wildlife 1	Research 2	the monitoring program to deliver data needed to design the access ramps?	Misery for monitoring. A monitoring plan has been set as a task under Planned Research. This task has not been completed at this time.			
192 (161)	IEMA – 96	Appendix F, Table 45, WRSA Wildlife 1	Research Completed (ramp #'s)	Where did this number come from? One of the stated research objectives is to identify this number, but we already have it. What is the basis for this number? BHPB does not propose any monitoring of the Misery pit during temporary closure, which could yield results helpful for future design.	Research Completed states that access ramp numbers have been 'proposed', the final number has not been finalized. The number was proposed from discussions between Mine Operations Planning and Environment Dept, and is currently based on the presence of access haul roads, areas where the perimeters of the WRSA adjoin sloping tundra areas, and even distribution of ramps around the piles. Please refer to ICRP Section 2 Comments Table Tracking # 120 and 177.	Please refer to proposed revision in Tracking # 190.		
193 (168)	INAC – 23	Appendix F – Table 45, Table 45, WRSA	Wildlife 1	Why isn't BHP utilizing both the recent and potential ongoing opportunities to monitor and research caribou use of the haul ramp, particularly as this is a proposed closure option for the Waste Rock Piles?	BHPB monitors caribou movement around the EKATI minesite for the primary purpose of ensuring that caribou are safe from injury from mobile equipment, waste materials and infrastructure. Use of haul roads is included in this monitoring. The use of haul roads on WRSA as part of the research has not been included because BHPB, for obvious wildlife safety reasons, would prefer to deter wildlife from these areas while they remain active.	No Revision Proposed.		
194 (162)	IEMA – 97	Appendix F, Table 45, WRSA Community 1	Planned Research 1	What does 'regularly update' mean? Is there a schedule or protocol for doing this? How does an update contribute to research?	Regularly is proposed as annual – similarly to annual visits to communities related to the Environmental Agreement. The IEMA has omitted to include BHPB's full task as identified in Table 45 (Appx F) Community 1 Planned Research which states 'Regularly update 'and discuss' with communities closure planning for the WRSAs. Findings from discussion with communities would be identified as part of the research for this objective.	**Table 45 (Appx F) Community 1** Planned Research will be updated to provide a more definitive update schedule.		
195 (163)	IEMA – 98	Appendix F, Table 45, WRSA Community 1	Planned Research 2	What does 'seek opportunities' mean? BHPB needs to prepare a community consultation process to give this objective any credence.	'Seek opportunities' means to look for ways, methods, projects and timing when communities can assist with closure planning. BHPB agrees that a consultation process is important. However, the company has not yet defined the process for this consultation.	No Revision Proposed.		
196 (164)	IEMA – 99	Appendix F, Table 45, WRSA Community 1	Research Completed	So is that the end of it?	Please refer to Tracking # 195.	No Revision Proposed.		
197 (165)	IEMA – 100	Appendix F, Table 45, WRSA Community 1	Results From Research Completed	So what happened to this request? How does it inform research objective?	As stated under 'Results from Completed Research' the communities requested input on the 'location, number, dimensions and slope of access ramps' on WRSAs. BHPB wants to ensure that communities continue to participate in closure planning, and one of the outcomes of the last 2-3 years of ICRP development was to identify ways in which communities can participate. This Research Objective is specific to community involvement.	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
198 (166)	IEMA – 101	Appendix F, Table 45, WRSA Community 1	Application of Results From Completed Research	Good 'intentions' are not really helpful to understanding what research will be carried out—need details on how this will be done.	Please refer to Tracking # 195.	No Revision Proposed.		
Appendix F: RECLAMATION RESEARCH PLAN – Table 46: Processed Kimberlite Containment Areas								
199 (174)	IEMA – 102	Appendix F, Table 46, PKCA Land 1	Planned Research	The information in the following sub-sections makes it sound like this work is already completed. If there are any remaining uncertainties that need to be investigated, then that work should be described here. Otherwise this material does not have to be here.	Please refer to Tracking # 38 with respect to remaining uncertainties, and # 173 with respect to completed research.	Please refer to Tracking # 38.		
200 (175)	IEMA – 103	Appendix F, Table 46, PKCA Land 1	Results From Research Completed	There is mention of the need to assess porewater water quality in terms of overall LLCF water quality but no specific research is identified or described.	Agree	**Table 46 (Appx F) Land 1** will be updated to ensure that the tasks under Planned Research include incorporation of pore water expulsion water quality results and make reference to the water quality research in Water 1 (Table 46).		
201 (209)	INAC – 24	Appendix F, Table 46, PKCA	Land 1	- Research Completed b) states that field measurements including temperature and water samples at depth were initiated in 2001. When will the available information be provided as the need for this information was highlighted in the Section 3 working group meeting and BHP committed to provide this as soon as they could. -Research Completed c) refers to a doctoral thesis that was originally designed to study the LLCF, but was subsequently changed to study the effect of climate, snow cover, and vegetation on peatlands across the Slave Province. It is unclear how a peatland study is relevant to the closure of the LLCF given the very different substrate properties. -This topic was raised at the Section 3 working group meeting and BHP stated that work is currently being done on the LLCF by Carleton University (refer to Section 3 transcript pages 45 and 46). This is clearly not the case. - Research Reference iii) notes a Thesis Proposal – Permafrost Aggradation and Pore-water Expulsion in Saturated Fine Tailings. The associated description refers to the peatland studies being conducted across the Slave Province. It is clear that the description does not match the reference. This should be clarified. -BHP's response to Tracking Number 27 for Section 3 refers to Table 46 and how it will be updated. The most recent copy of Table 46 provides only a summary of the work conducted and does not provide any details. INAC-WRD was also asked to refer to report EKATI Diamond Mine Quality of Pore Water Extracted from Cell B. As we have stated in the past (refer to Section	The EBA Report ii) under Research References will be provided to the Working Group by May 30/08. The initial purpose of Carleton University research was to develop an understanding of the rate of freezing of PK in Cell B of the LLCF. The project was to form the PhD thesis. A drilling program to install thermistors to collect data from deeper in the tailings (April 2004) could not be completed, and in summer 2005 the sites in the tailings surface were abandoned when the facility was required for other purposes. The research was then necessarily refocused to concentrate on a regional study of permafrost temperatures, comparing conditions in peatlands near Yellowknife with disturbed and undisturbed sites at the abandoned Colomac Mine, and with conditions in undisturbed ground at EKATI. This PhD thesis will provide the first regional assessment of permafrost temperatures for the Slave Province. At Ekati, conditions in undisturbed ground will be compared with the data collected from the LLCF to estimate the difference in ground thermal regime between these surfaces. The data collected in Cell B will provide a boundary condition required to estimate the rate of freezing in the PK stored there. The title of the research cited in Research References iii) was the original proposal put forward by Carleton University. The University has changed the research but not the title of the research. BHPB will ensure that the update research is reflected in the title.	**Table 46 (Appx F) Land 1** will be updated to include the parallels of the peatland research with the LLCF. **Research Reference iii)** will be updated to the a more applicable title.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				3 working group transcript page 31) this report refers only to porewater quality within the active layer and therefore does not address the question of sub-surface porewater quality.	Please refer to Table 46 (Appx F) Water 1 where the research objective is to determine the long term LLCF water quality. BHPB has provided a summary of the research completed by Andrew Rollo which included a study of the water chemistry below the surface of the LLCF. Reference has also been provided to Andrew Rollo's Thesis. If INAC does not have copy of this thesis BHPB is willing to provide.			
202 (220)	JW – 44	Appendix F, Table 46, PKCA Land 1	Results from research completed	How are thermistors distributed and where are they located in the LLCF? Are there plans to add more as the LLCF increases in size and stabilizes? How has the initial concept of permafrost formation (from the 1995 EIS) been modified 12 years later (with data and observations)?	Several ground temperature cables (GTC) have been installed in the LLCF as part of various investigation programs. Three GTCs have been installed in Cell B (two in the former Nancy Lake footprint and one in the former Long Lake footprint) and one in Cell C. The data collected from the GTCs show a general cooling and eventual freeze back of the processed kimberlite and underlying lakebed material. This is consistent with the permafrost development expected in the 1995 EIS. As cells in LLCF are filled and reclaimed ground temperature cables should be installed to monitor freeze back of the processed kimberlite and underlying native materials.			
203 (289)	LKDFN – 30	Appendix F, Table 46, PKCA	Land 1	The evolution of permafrost establishment in LLCF is to be researched. One of the planned research activities is to estimate the expected time-scale of permafrost growth. What level of detail is this estimate to achieve?	Discussion on the level of detail for the estimate of expected time-scale of permafrost growth is provided in ICRP Vol 1. Section 8.8.2.	No Revision Proposed.		
204 (290)	LKDFN – 31	Appendix F, Table 46, PKCA	Land 1	The monitoring of permafrost growth is proposed; however the location of monitoring points and frequency of monitoring are not provided. Without specific details the appropriateness of the research to satisfy the objectives cannot be determined. When and what method is best appropriate to present this information for review?	BHPB has agreed to provide the WLWB the EBA report Processed Kimberlite Deposition Investigation, Long Lake Containment Facility, 2002. This report contains information on monitoring points.	**Section 6.4 of the ICRP Vol 1** will be updated to provide discussion on permafrost growth in the LLCF. This will include the ongoing monitoring, what is known to date of permafrost growth in the LLCF and locations of monitoring sites.		
205 (291)	LKDFN – 32	Appendix F, Table 46, PKCA	Land 1	The overall research objective is to include how permafrost growth will affect water quality in LLCF; however, there is no planned research in monitoring water quality. Refinement of the planned research to match the research objective is needed, or additional detail is needed to identify, how this objective will be achieved.	Water quality monitoring is ongoing through mining operations as part of the Water License requirement. Results from the monitoring are provided in the Annual Report for the Water Licenses and Environmental Agreement. Data from the water quality monitoring are also used in modeling the long term water quality of the LLCF. Permafrost research is linked with pore water expulsion, which is identified in Table 46 (Appx F) Water 1. Permafrost growth is also important in the long term physical stability of the facility.	No Revision Proposed.		
206 (292)	LKDFN – 33	Appendix F, Table 46, PKCA	Land 1	No details of methods and quantifiable criteria to assess permafrost impacts on vegetation cover, or effect of vegetation on frozen PK establishment were provided. Does BHBP agree that quantifiable criteria to assess impacts and effects should be included in the research program? If not, why not?	Agree. Please refer to Tracking # 201.	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
207 (176)	IEMA – 104	Appendix F, Table 46, PKCA Land 2	Planned Research	It is not clear what research yet needs to be done. Please clarify, and then describe how and when the needed work will be undertaken. No specific work on trafficability is proposed.	Please refer to Tracking # 38 with respect to remaining uncertainties. The research tasks have been outlined in Table 46 (Appx F) Land 1 under Planned Research. The schedule for the reclamation has been provided in Table 1 Reclamation Research Plan Schedule. Specific research on trafficability has not been proposed. The results from the weathering research in Land 2 will help inform mine planners and equipment operators on the timing (eg summer vs winter), and type of equipment used for reclamation activities.	No Revision Proposed.		
208 (177)	IEMA – 105	Appendix F, Table 46, PKCA Land 2	Research Completed (kimberlite weathering)	Does this description imply that all research has been completed and that we have sufficient information on the chemical and physical characteristics of kimberlite as pertains to revegetation?	The research is ongoing. Please refer to Tracking # 38 with respect to remaining uncertainties.	No Revision Proposed.		
209 (178)	IEMA – 106	Appendix F, Table 46, PKCA Land 2	Application of Results From Research	If the results are not applicable to closure planning, then why is this whole section provided here? What does the research done to date tell us about the timing of revegetation, the species that should be used, or the % coverage that should be maintained?	Please refer to Tracking # 173 with respect to inclusion of research completed. The research task 3 related to PK weathering effect on vegetation has not yet been completed.	Please refer to Tracking # 65 with respect to N/A.		
210	INAC – 25	Appendix F, Table 46, PKCA	Land 2	Is BHP continuing research on weathering processes on PK over time? Will they be investigating the potential concerns brought forward regarding vegetation growth, erosion, wind dispersion and downstream sediment loads in the long term? When will this research take place and what is its completion date?	BHPB is continuing this research. Research includes effects on vegetation (the third task under Planned Research). Results from the monitoring of physical and chemical changes will be expanded, if required into erosional effects and downstream water quality. Please refer to Table 1 Reclamation Research Plan Schedule – research is ongoing throughout the operations period of the LLCF. This will be necessary as new pipes come on line.	No Revision Proposed.		
211 (293)	LKDFN – 34	Appendix F, Table 46, PKCA	Land 2	Research into the long term weathering of PK is proposed; however, no current specific field or lab research has been completed. Weathering of PK is a time dependent process and dependent on various environmental factors. Monitoring of weathering would generally require testing a regular time intervals and perhaps with depth within the PK deposit. Changes in pore water chemistry and PK material should be evaluated as part of the research the findings would be of use to achieving WATER I research plans. Without a description of the methods, frequency, and location of testing, it is impossible to comment if the research finding will yield acceptable results, Does BHP agree that findings from this research study are important for predicting LLCF waters and determining effects on vegetation growth? If so, commencement of research should occur in a timely manner. What is the timeframe for initiation of this component of the research?	Table 46 (Appx F) Land 2 Research Completed outlines the research completed to date. Table 1 Reclamation Research Plan Schedule provides the schedule for this research. Table 46. also notes that 'no specific field or lab research has been completed' at this time. BHPB agrees with the suggestion made by the LKDFN regards this research are valid and will take this into account when planning this research. Please refer to the tasks under the Planned Research for Land 2 which include review of physical and chemical properties, and monitoring.	**Table 46 (Appx F) Land 2** Planned Research will be updated to include monitoring of pore water chemistry as part of the PK weathering research.		
212 (179)	IEMA – 107	Appendix F, Table 46, PKCA Land 3	Planned Research	Provide methodology and details of the pilot study--it is not helpful to simply state that one is going to be done. Each of the 3 sub-tasks requires a detailed description of how and when it will be conducted, and why this is	Please refer to ICRP Section 3 Comments Table Tracking # 8 for previous response to IMEA on the Pilot Study.	Refer to ICRP Section 3 Comments Table Tracking # 8.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				important for closure planning.				
213 (211)	INAC – 26	Appendix F, Table 46, PKCA	Land 3	When will BHP be commencing research on rock placement on tailings as part of closure? How long will the research take? Will the research be completed prior to the Phase 1 Pond closure?	Please refer to Table 1 Reclamation Research Plan Schedule where research for rock placement is scheduled to start 2016. The research for rock placement on the LLCF will be completed prior to Phase 1. Some of the learnings may be used from the Phase 1 reclamation. However the 2 facilities have different physical conditions. The Phase 1 is a much shallower containment area, will not have a remaining ponded area and the kimberlite will be completely encapsulated with waste rock or erosion resistant material.	No Revision Proposed.		
214 (180)	IEMA – 108	Appendix F, Table 46, PKCA Land 4	Planned Research	The sub-sections 'research completed' and 'research results' below indicates the research that has already been conducted. What are the remaining unknowns that need research so that they can be properly identified here? The recently submitted 2007 revegetation research report by Harvey Martens seems to indicate that revegetation is best done quickly to avoid salt build up in the PK. How will BHPB use this information?	Please refer to Tracking # 38 with respect to remaining uncertainties. The results from the 2007 Harvey Martens report will be included in the next update of the ICRP.	No Revision Proposed.		
215 (181)	IEMA – 109	Appendix F, Table 46, PKCA Land 4	Application of Results From Research	Why are the results to date being applied to another pilot project, instead of actual reclamation? What is the intent of the pilot study? The pilot study needs to be described. What are the unknowns being researched? How will the research be completed in time for closure activities?	BHPB is unsure of the IEMA's reference to 'another ' pilot project. Only one pilot project has been proposed for the LLCF. Please refer to ICRP Section 3 Comments Table Tracking # 8 for previous response to IMEA on the Pilot Study.	**Table 46 (Appx F) Land 4** will have a reference included for Section 6.4.7.		
216 (212)	INAC – 27	Appendix F, Table 46, PKCA	Land 4	When will BHP complete this research (pilot study) on revegetation of the LLCF? What is the expected duration of the pilot study? What is the alternative if the results of the pilot study are not favourable?	Please refer to Table 1 Reclamation Research Plan Schedule. It is expected that research on vegetation types will continue through to the end of operations. Processed kimberlite will be discharged to the LLCF until 2020. Vegetation research on processed kimberlite was initiated in 1999, will continue with a Pilot Study in approx 2013, and continue after this as revegetation work is expanded into the lower cells of the LLCF and with the changing chemistries and physical makeup of the processed kimberlite from new pipes. The pilot study will assess plant species, planting methods, rock placement, safety for wildlife (including trafficability and metals uptake). Alternatives to the Land 4 would be research on other types of vegetation.	**Table 1 Reclamation Research Plan Schedule** will be corrected for PKCA Land 4 to indicate that research will continue to 2020.		
217 (182)	IEMA – 110	Appendix F, Table 46, PKCA Land 5	Planned Research	So how are the 2 tasks identified below to be carried out? And when? Again, the 2 following sub-sections seem to indicate that much has been done already--what more remains to be done??	Please refer to Tracking # 38 with respect to remaining uncertainties, and Tracking # 65 for N/A clarification. Please also refer to ICRP Section 3 Comments Table Tracking # 8 for BHPB's response on the timing of this work.	**Table 46 (Appx F) Land 5** will be updated to state that the research identified will be part of the proposed Pilot Study.		
218 (183)	IEMA – 111	Appendix F, Table 46, PKCA	Results From Completed	So which of these, if any, are relevant to closure planning?	Acknowledged.	**Table 46 (Appx F) Land 5** will be updated to state that the results from this early		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
		Land 5	Research			research will be assist in the proposed Pilot Study.		
219 (184)	IEMA – 112	Appendix F, Table 46, PKCA Land 5	Application of Results From Research (Plant Cover)	The word 'could' here suggests uncertainty--if so, what research should be conducted to eliminate this?	BHPB agrees that uncertainty remains. The next sentence in this section states that the results will be used in the next step of the research process.....	No Revision Proposed.		
220 (185)	IEMA – 113	Appendix F, Table 46, PKCA Land 5	Application of Results From Research (Pilot Study)	So what is this 'larger pilot study'? What are the issues being researched? How will it be conducted? Can it be completed in time to be useful in closure planning? The purpose of this table is to describe this study.	Please refer to ICRP Section 3 Comments Table Tracking # 8 for previous response to IMEA on the Pilot Study.	No Revision Proposed.		
221 (213)	INAC – 28	Appendix F, Table 46, PKCA	Land 5	-Again, when will BHP complete this research (pilot study) on revegetation of the LLCF? What is the expected duration of the pilot study? What is the alternative if the results of the pilot study are not favourable? -Results from completed research states that native grass cultivars can be successfully established in the mid-slope portion of the LLCF. The possibility of the cultivars escaping into the surrounding environment should be considered.	Please refer to Tracking # 216. The duration of the Pilot Study is unknown at this time. As mentioned, results from completed research indicate that native grass cultivars can be successfully established in the mid-slope portion of the LLCF. Based on these findings BHPB has proposed that the mid slope would be a combination of rock and vegetation cover. Should these results not be repeatable, a final alternative would be complete rock cover. However, this is unlikely based on findings to date. Please refer to Table 46 (Appx F) Land 4 Planned Research inclusion of risk assessment of native cultivars.	No Revision Proposed.		
222 (186)	IEMA – 114	Appendix F, Table 46, PKCA Land 6	Research Objective	Isn't it important to know the answer to this before you conclude which plant species are appropriate for planting and for seed collection? Yet BHPB already has a seed collection program under way--what if the selected species are not suitable from a 'palatability' perspective? Are we looking for something that grazers can eat safely, or be deterred from eating? The 'planned research' tells us nothing about what is going to be done, or when it will be done.	The first step would be to determine if the plant species will actually grow in processed kimberlite, before we can tell if they will be grazed. The Planned Research section will be updated when this information is available.	No Revision Proposed.		
223 (214)	INAC – 30	Appendix F, Table 46, PKCA	Land 6	When will research on grazing impacts on the LLCF take place? How long will they take place and when will the results be known? Is this expected to be part of the pilot study mentioned above? Wouldn't the contaminant uptake by the plants and the potential transfer of contaminants to the grazers be part of this study?	Please refer to Table 1 Reclamation Research Plan Schedule. Please refer to ICRP Section 3 Comments Table, Tracking # 39 for BHPB's response to research on grazers.	No Revision Proposed.		
224 (221)	JW – 45	Appendix F, Table 46, PKCA Land 2, 3, 4, 5 & 6	Research Objectives	The closure objectives for the Processed Kimberlite Containment Areas include mitigation of significant adverse environmental effects to identified Valued Ecosystem Components and a consideration of the relevant expectations of stakeholders for post closure land use, including biodiversity, sustainable development and respect of traditional values and ensure long-term care and maintenance is not required. The criteria for the revegetation on these areas include: • the disturbed sites have been enhanced to encourage natural recovery of vegetation; • indigenous vegetation is used for rehabilitation;	Please refer to Tracking # 60.	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				and • vegetation assemblages have been identified and functional.				
225 (222)	JW – 46	Appendix F, Table 46, PKCA Land 2, 3, 4, 5 & 6	Planned research and Research completed (kimberlite weathering)	The three closure criteria relating to the objective for sites not to require long term care and maintenance are: o Demonstrated capacity of vegetation to reproduce o Demonstrated vegetation recovery after disturbance (fire, grazing) o Vegetative cover which requires no maintenance These closure objectives are not directly addressed in the research programs described in Appendix F. The research programs that are described are discussed below: The research proposed to identify physical and chemical changes in processed kimberlite and the effects on vegetation establishment and long term maintenance has not been conducted. Some inferences have been drawn from field observations and they may have significant implications for erosion effects. Weathering studies could be completed either in the laboratory/greenhouse or at site to address this issue. Research to determine the method of rock placement on processed kimberlite has been proposed but not conducted due to the on-going activity on these facilities. A relatively large number of species appear to successfully establish in processed kimberlite material but no results were provided on cover, growth, reproduction or long term sustainability of these species and therefore does not address the closure criteria for the long-term care and maintenance objective. The results of the soil amendment research are not clearly presented. It appears that a peat amendment improved plant growth during the second and third growing seasons but not subsequently. However, the amendment is concluded to provide more favourable conditions for plant growth in the long term, especially in drought years. Further larger scale trials are proposed but are not linked to the closure objectives and criteria. Grazing effects on revegetation is proposed to be studied in the future, existing trials are fenced to remove this impact. This impact will be assessed in the proposed larger scale trials and will be necessary to	Please refer to Tracking # 60. BHPB will be assessing the possibility of conducting some weathering research in a laboratory/greenhouse as part of the research on PK weathering. Rock placement will be included as part of the Pilot Study on the LLCF. Please refer to Tracking # 215.	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				address the closure criteria of vegetation recovery after disturbance.				
226 (223)	JW – 47	Appendix F, Table 46, PKCA Land 2, 3, 4, 5 & 6	Reclamation Schedule	The initiation of the weathering research is not indicated in the Reclamation schedule. The initiation of the rock placement research is not indicated in the Reclamation schedule, but is unlikely to occur before 2013 when the LLCF Cell B Pilot Study Area is estimated to be completed. A pilot study of revegetation in the LLCF is proposed but a date was not provided, presumably after 2013. It is not clear whether these dates and resultant timeframes are adequate to ensure study results can be incorporated when closure occurs.	Please refer to Tracking # 210 and 213 with respect to initiation of research.	No Revision Proposed.		
227 (187)	IEMA – 115	Appendix F, Table 46, PKCA Water 1	Planned Research	The two sub-sections following this one suggest that much of this is already known. This section needs to identify what research YET needs to be done, and how it will be done.	Please refer to Tracking # 38 with respect to remaining uncertainties.	No Revision Proposed.		
228 (188)	IEMA – 116	Appendix F, Table 46, PKCA Water 1	Application Of Results From Research (Water Quality Modeling)	Why is this information not available for THIS ICRP? It is now 4 years since the last data were collected--a very good reason should be provided as to why this info is not included here.	A recent report on water quality was submitted to the WLWB (Long Lake Containment Facility Water Quality Prediction Model Version 1.0) in March of 2008. The cut off for inclusion of data and reports was January 2007.	No Revision Proposed.		
229 (189)	IEMA – 117	Appendix F, Table 46, PKCA Water 1	Application Of Results From Research (salt at surface of kimberlite)	So how does this conclusion fit with implementing a 'pilot study' at the conclusion of tailings deposition?	Acknowledged.	**Table 46 (Appx F) Water 1** Application of Results from Research will be updated to include reference to how vegetation would be planted early in the Pilot Study, outlined in Section 6.4.7.		
230 (224)	JW – 48	Appendix F, Table 46, PKCA Water 1	Research Objective	Suggest change to: Predict the seasonal and annual variations and stability in the long term LLCF water quality.	Suggest that this be identified in one of the tasks under Planned Research.	**Table 46 (Appx F) Water 1** Planned Research Task 6 will be updated to 'Model long term water quality, based on trends during operations and seasonal and annual variations.		
231 (225)	JW – 49	Appendix F, Table 46, PKCA Water 1	Planned Research	1. What data and approach will be used? 2. "Research contributions" is vague; be more specific. 3. "Understand how" is vague; what water quality and plant cover aspects will actually be researched? 4. What is the expected frequency of monitoring? How will pore water expulsion be monitored? 6 How will long term water quality be modeled?	Preliminary modeling of the LLCF water quality at closure was completed by Rescan in 2006 as part of the update of the ICRP (Please refer to Section 8.6 of the ICRP Vol 1). The detail research plan on how this modeling work will continue has not been determined at this time.	**Table 46 (Appx F) Water 1** Planned Research Updates will include reference to Section 8.6.		
232 (226)	JW – 50	Appendix F, Table 46, PKCA Water 1	Research Completed	a. Does vertical structure mean "stratigraphy or layering? b. Where in LLCF (throughout or specific location/zone) did the mass balance model predict concentrations of water quality	a. "Vertical Structure" refers to the soil / processed kimberlite stratigraphy. b. Water quality modeling was recently completed by Rescan. The results from this modeling will be provided in the next update of the ICRP.			

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				parameters? What period of record was the model based on?				
233 (294)	LKDFN – 35	Appendix F, Table 46, PKCA	Water 1	A multi-faceted research plan to determine the long-term LLCF water quality is being conducted. The planned research is focussed on the development of a water balance and water quality model, along with measuring select behaviours that impact water quality within the LLCF. BHBP is currently in the process of completing a LLCF model to predict water balance and water quality (referenced in recently submitted Watershed Adaptive Management Plan). Presumably it is this model that will be amended to predict LLCF water balance and quality at closure, Even if this isn't the case, this LLCF model could provide valuable insight into information and data gaps that impact closure water predictions. Information and data gaps could include model assumptions, input parameters, and reaction rates, which were not based on measured or site specific characteristics. Does BHPB agree that any identified data gaps could be incorporated into the closure research program to aid in more accurate predictions of water balance and quality? Does BHPB agree that a summary comparison of data gaps between model input requirements and required measured values, to predict closure water quantity and quality, would provide clarity into assessing the appropriateness of the research? If so, when and what method is best appropriate to present this information for review? If not, why not?	BHPB agrees that ongoing modeling of water quality is necessary to refine the model, and to update the model from changes to inputs from mining operations, or natural changes. As data gaps are identified they will be included with successive updates. Updates on the modeling (such as the recent LLCF Water Quality Prediction Model) will be provided in future updates of the ICRP. Results from modeling will be summarized in the Research Plan, and reports will be referenced accordingly.	No Revision Proposed.		
234 (295)	LKDFN – 36	Appendix F, Table 46, PKCA	Water 1	The LLCF numerical model for closure will likely need to consider water volume and quality inputs and outputs and changes in water quantity and quality in LLCF. There are many processes that contribute to changes in water quality within LLCF: two examples include: planned research aims to identify the impact of water quality and quantity resulting from the contribution of EFFK to the LLCF: and the pore water expulsion from the processed kimberlite. Presumably, important processes that contribute to water quality changes within LLCF will be included in the LLCF numerical model. Will model calibration be based primarily on matching model prediction to measured water quality measured at discharge point from LLCF? Note that the measured water quality at the discharge point would represent. Averaged values resulting from the processes and. mechanisms responsible for changes in water quality within the L.LCF and does not provide a detailed understanding of the processes and mechanisms responsible for changes within the LLCF.	Please refer to ICRP Vol 1 Section 8.6.2 where the model parameters have been listed as: • Climate conditions, • Flow paths through and/or over Dyke C, • Hydraulic conductivity for seepage flow through the PK beaches, • Water management of excess water in Cell E, and • Chemical loadings associated with leaching from WRSA and seepage through the PK beaches.	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
235 (296)	LKDFN – 37	Appendix F, Table 46, PKCA	Water 1	From **Section 3 Comment/Response Table Tracking Number 71**, BHBP states that the method of monitoring pore water expulsion will be a combination of field monitoring and water quality modeling. The LLCF water quality model can be used, along with surface water quality data, to esthni2te the total loads of solutes that reports to the LLCF and PK porewater". A model fitting exercise to match predicted to measure water quality would then be required. Commonly, fitting exercises require a calibrated model and conditions where only one or known measured changes occur. Given the complexity of processes that occur within the LLCF. Does BHBP believe that pore water expulsion can be isolated from other processes? Does BI-IBP believe that the model predictions will be sufficiently accurate and detailed to predict this behaviour? Should the planned research into monitoring porewater expulsion from processed kimberlites include an assessment of the model limitations to predict this behaviour?	BHBP has stated in ICRP Section 3 Comments Table Tracking # 71 that: The method for monitoring pore water expulsion will be a combination of field monitoring and water quality modeling. The LLCF water quality model can be used, along with surface water quality data, to estimate the total loads of solutes that reports to the LLCF from PK pore water. Estimates of parameter loads that report from pore water to the surface water in the LLCF can be obtained by adjusting assumed pore water loads while fitting the results of the water quality model to observed concentrations in the LLCF post closure.	No Revision Proposed.		
236 (297)	LKDFN – 38	Appendix F, Table 46, PKCA	Water 1	Water quality within the Li.CF could impact planned closure activities, such as vegetation survival and surface ponds. Will the model be capable of' predicting water quality spatially (3D space) and temporally within L.LCF or only at the discharge point? Could BHBP provide some additional clarity if the numerical model intent is to predict water quality within the LLCF or only at the discharge point?	Water quality modeling will be used to predict water quality at the discharge point.	No Revision Proposed.		
237 (298)	LKDFN – 39	Appendix F, Table 46, PKCA	Water 1	Research into EFPK is to be conducted. From the **Section 3 Comment/Response Table Tracking Number 16**, the reviewer comments provide insight into uncertainties and long-term stability challenges associated with EFPK. Does BHPB agree that inclusion of a summary of known uncertainties and long-term stability challenges would provide clarity into assessing the completeness of the planned research?	Please refer to Tracking # 38 where BHPB has agreed to list uncertainties.	Please refer to Tracking # 38.		
238 (190)	IEMA – 118	Appendix F, Table 46, PKCA Water 2	Research Objective (volume of EFPK)	This is not research, but a simple engineering calculation that has already been done, has it not?	Determination of the projected volumes of EFPK, the potential affect on downstream water quality, and the depth of water that covers these fines need to be established. To date most of the research on EFPK volumes have been completed for the purpose of operations.	**Table 46 (Appx F) Water 2** BHPB will remove this from the Reclamation Research Plan and include it as part of a section on Engineering Design Questions in Section 6.4 of the ICRP Vol 1.		
239 (191)	IEMA – 119	Appendix F, Table 46, PKCA Water 2	Research Objective (Water Quality)	Has this question not already been answered through the WQ modeling work and ongoing WQ sampling? Is the ultimate fate of the EFPK not the real area of uncertainty that should be the focus of the research?	Water quality monitoring currently addresses the volume of EFPK expected in the LLCF. To ensure that the EFPK remains in the cells (C and D) and does not impact long term water quality in the LLCF BHPB will need to address the final elevation of EFPK in each of these cells and the expected clear water cap on top of these fines. As outlined in the 2007 WWPKMP and the 2007 ICRP the	Please refer to Tracking # 238.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
					EFPK will remain in the LLCF and is expected to settle into the ponded areas in Cells C and D. The ICRP does identify the option of backfilling the Beartooth pit with processed kimberlite (Section 6.1.6 Vol 1 of the ICRP), but outstanding questions must be addressed (Table 43 Appx F, Operations 3) before this option is put forward as a closure plan. At this time the closure plan for the Beartooth Pit is flooding with water from a source lake and for the LLCF to contain the processed kimberlite, including EFPK.			
240 (192)	IEMA – 120	Appendix F, Table 46, PKCA Water 2	Planned Research	No details provided on the work to be done.	Acknowledged.	Please refer to Tracking # 238.		
241 (193)	IEMA – 121	Appendix F, Table 46, PKCA Water 2	Results From Completed Research (option for lower cell area)	This begs a very serious question needing to addressed--are there other options? If so, they need to be evaluated explicitly.	Please refer to Tracking # 239.	Please refer to Tracking # 238.		
242 (194)	IEMA – 122	Appendix F, Table 46, PKCA Water 2	Results From Completed Research (Control Of Deposits)	So what research needs to be done to address these parameters?	Acknowledged.	Please refer to Tracking # 238.		
243 (195)	IEMA – 123	Appendix F, Table 46, PKCA Water 2	Results From Completed Research (Ph)	So what are the implications of all this information for closure planning?	Please refer to Tracking # 239.	Please refer to Tracking # 238.		
244 (196)	IEMA – 124	Appendix F, Table 46, PKCA Water 2	Application of Results From Research (Research)	This needs to be described. The preceding sub-section indicates some serious challenges for closure--exactly what studies are being carried out to address these?	Please refer to Tracking # 239.	Please refer to Tracking # 238.		
245 (197)	IEMA – 125	Appendix F, Table 46, PKCA Water 2	Application of Results From Research (Updates)	Not helpful. The issues currently existing regarding this topic should be identified, along with the research needed to address them.	Acknowledged.	Please refer to Tracking # 238.		
246 (227)	JW – 51	Appendix F, Table 46, PKCA Water 2	Research Objective	What is Ekati's working definition of "extra fine" processed kimberlite?	Properties for extra fine processed kimberlite are outlined in BHP Billiton's Waste Water and Processed Kimberlite Management Plan, Section 3.2. A definition of EFPK is also provided in Appendix A of the ICRP.	No Revision Proposed.		
247 (228)	JW – 52	Appendix F, Table 46, PKCA Water 2	Planned Research	How does the planned research predict or examine future water quality (in reference to the research objective)?	In the existing LLCF water quality model the EFPK and FPK were not considered separately. Loadings of water quality parameters were calculated based on the total tonnage of tailings produced (EFPK + FPK) and the loadings estimates were refined during the model calibration. The modelling work completed to date has been focused on predicting concentrations of chloride and	Please refer to Tracking # 238.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
					nitrate in the LLCF, which are the parameters that are most likely to be of future concern. The uncertainties associated with predicting chloride and nitrate loadings from EFPK and FPK, respectively, were small compared to uncertainties associated with other inputs (*e.g.,* loading associated with underground mine water). The physical storage of EFPK in the LLCF is the main issues in terms of managing and predicting water quality for the facility. The presence of EFPK may require the construction of additional storage capacity in the LLCF and it could affect the timing and placement of processed kimberlite in Cell D. The associated effects on the water and loadings balance will likely affect the future/predicted concentrations of certain water quality parameters. Going forward, the potential water quality effects associated with the placement of EFPK in the LLCF will be reevaluated as the model is updated for operational use. The potential effects on the water balance will be revisited. At this point, there is no indication that parameter loadings associated with the EFPK or FPK are likely to be of concern during operation or closure of the LLCF. However, the load balance in the model will be updated to reflect the management strategies for the EFPK should concerns arise.			
248 (229)	JW – 53	Appendix F, Table 46, PKCA Water 2	Results From Completed Research	What is the risk threshold value of 180 mg/L based on? Chlorine levels are predicted to exceed 180 mg/L. What are predicted chlorine concentrations over time? Will there be an aquatic habitat response or change in response to the water going from high Ca (likely hard water) to high Na (likely soft water)?	For the derivation of the 180 mg/L threshold, refer to EVS. 2004. *EKATI Diamond Mine, NWT: Tier I Ecological Risk Assessment for Chloride*. Prepared for BHP Billiton Diamonds Inc. by EVS Environment Consultants Ltd. April 2004 Predictions of chloride concentrations over time have been documented in a recent report by to Rescan that looked at Prediction modeling for the LLCF water quality. Information from this report will be included in the next update of the ICRP. BHP Billiton is presently undertaking studies to determine the relationship between hardness and chloride toxicity.	BHPB will include the reference to the EVS Report in the ICRP. Please refer to Tracking # 238.		
249 (299)	LKDFN – 40	Appendix F, Table 46, PKCA	Water 2	The deposition of EFPK in the LLCF can affect long-term water quality. Reagents and flocculent additions could be used to increase settleability of EFPK. The current water licence does not specify water quality discharge criteria that limit toxicity that could occur with the discharge of any settling agent chemicals to the receiving environment. Is there planned research into the fate of settling agent chemicals within the LLCF?	No, there is no identified research planned for settling agents.	No Revision Proposed.		
250 (215)	INAC – 31	Appendix F, Table 46, PKCA	Water 1 and 2	What are the timelines established for the additional modeling of Water Quality and Extra Fine Processed Kimberlite in the LLCF?	Please refer to Table 1 Reclamation Research Plan Schedule.	No Revision Proposed.		
251	INAC – 32	Appendix F, Table 46, PKCA	Water 3	INAC-WRD is uncertain as to why the LLCF dyke weir locations are a research objective but there is not application of the results of the research? Is this only a monitoring requirement? If not, how will the weir		Please refer to Tracking # 255.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
				locations be determined at closure?				
252 (230)	JW – 54	Appendix F, Table 46, PKCA Water 3	Research Objective	What would be the result of poorly placed weirs?	Weir elevations will be designed to reduce water backup behind dykes while maintaining adequate cover over extra fine processed kimberlite. Weirs placed too high may lead to water back up into adjacent watersheds whereas weirs placed too low may expose processed kimberlite.	Please refer to Tracking # 255.		
253 (231)	JW – 55	Appendix F, Table 46, PKCA Water 3	Planned Research	What is the expected size and type of weirs? How will the water levels database be used to design the weirs (in the absence of flow data)?	Weirs have been identified as water control structures in the LLCF; however a design of these structures as not been completed. Water level data will be used in conjunction with pumping records (to and from the LLCF) to assess the natural runoff into the facility.	Please refer to Tracking # 255.		
254 (232)	JW – 56	Appendix F, Table 46, PKCA Water 3	Results for Completed Research	How are water levels regulated today to ensure certain levels?	Please refer to Class A Water License MV2003L2-0013 Part F Section 8 for water license requirements for maintenance of freeboard for dykes and dams.	Please refer to Tracking # 255.		
255 (198)	IEMA – 126	Appendix F, Table 46, PKCA Water 3	Planned Research	It is not clear how monitoring water levels will determine weir locations. Is the intention to determine 'elevations' rather than 'locations'? If so, surely the data and modeling exist now to do this simple engineering exercise.	Please refer to Tracking # 252 and 253.	**Table 46 (Appx F) Water 3** BHPB will remove this from the Reclamation Research Plan and include it as part of a section on Engineering Design Questions in Section 6.4 of the ICRP Vol 1. The above section will state that elevations for weir placement will be determined, not locations.		
256 (199)	IEMA – 127	Appendix F, PKCA Water 3	Results From Completed Research	Not clear why the data cited are presented here--what is the implication of all this for closure? What 'research' needs to be conducted, if any?	Acknowledged.	Please refer to Tracking # 255.		
257 (200)	IEMA – 128	Appendix F, Table 46, PKCA Water 3	Application of Results From Research	If results are 'n/a', then why is this item here?	Acknowledged.	Please refer to Tracking # 65 and 255.		
258 (201)	IEMA – 129	Appendix F, Table 46, PKCA Wildlife 1	Research Objective	Objective is not clear--are we trying to provide 'safe access' to all parts of the LLCF? What is being researched--the configuration of placement, the type or depth of rock, the method of emplacement, or...? Why is this a 'research' task as opposed to a 'planning' task? What exactly is the problem being researched? Have there been attempts to find the likely caribou crossings of the LLCF by monitoring tracks through the LLCF?	The objective is to create a rock cover on the LLCF that ensures public and wildlife safety. The Planned Research for this will be a Pilot Study. A description of the Pilot Study will be provided in Section 6.4.7. However, specific details on the research for rock placement are not available at this time.	No Revision Proposed.		
259 (202)	IEMA – 130	Appendix F, Table 46, PKCA Wildlife 1	Planned Research	Hard to see how either research or progressive reclamation can be carried out at the time the cell is ready for closure. We should be in final reclamation mode at this time, not beginning to study how we will place rock.	Acknowledged.	No Revision Proposed.		
260	INAC – 33	Appendix	Wildlife 1	When will BHP complete this research on revegetation	Please refer to Tracking # 216 and 221 for BHPB's	In **Table 1 Reclamation**		

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(216)		F – Table 46		of the LLCF? Will it be part of the planned pilot study? What is the expected duration of the pilot study? What is the alternative if the results of the pilot study are not favourable?	response for completion of revegetation. Please refer to ICRP Section 3 Comments Table, Tracking # 39 for discussion wildlife studies as part of the Pilot Study.	**Research Plan Schedule Wildlife 1** BHPB has proposed completion of Wildlife 1 research by 2013. This research will be commenced in 2013 but will likely take a more than a year to complete. This schedule for this research will be updated to 2015 for completion.		
261 (233)	JW – 57	Appendix F, Table 46, PKCA Wildlife 1	Research Objective	Concept is vague. Does it refer to spacing, thickness and cover material?	Fish barrier design, including design parameters are undetermined at this time.	No Revision Proposed.		
262 (234)	JW – 58	Appendix F, Table 46, PKCA Wildlife 1	Planned Research	This concept is vague. What will the pilot test study be? When will this research be conducted? How many years will be necessary to ensure objectives are met?	Please refer to Tracking # 258. Please refer to Table 58 (Appx G) (delivered to the WLWB October 19/07). The table outlines the time period over which the closure objective will be monitored to ensure the criteria has been met.	**Table 46 (Appx F) Wildlife 1** will be updated to ensure that reference is made to the Pilot Study Section proposed in ICRP Section 3 Comments Table Tracking # 8,		
263 (203)	IEMA – 131	Appendix F, Table 46, PKCA Wildlife 2	Planned Research	These tasks are important, but they should be completed by now. How are these studies going to be conducted, and when? It is not clear that BHPB has even identified at this point what species of plants are going to be used--this issue, currently proposed as research, needs to be answered in conjunction with the issue posed here.	As stated in Application of Results from Research a Risk Assessment for metal uptake was underway and had not yet been completed by January 2007 when the ICRP was submitted to the WLWB. Future research on metal uptake will be based on the findings from the Rescan risk assessment.	No Revision Proposed.		
264 (204)	IEMA – 132	Appendix F, Table 46, PKCA Wildlife 2	Results From Completed Research	The results below would seem to indicate that no further research is required on the toxicity issue. Why then is BHPB doing more studies? This needs explanation. The recently submitted metal uptake study dated January 2006 does not seem to have been considered in this section of the table.	Please refer to Tracking # 38 with respect to remaining uncertainties and Tracking # 65 for N/A. Please refer to Tracking # 263 with respect to ongoing research reporting.	No Revision Proposed.		
265 (205)	IEMA – 133	Appendix F, Table 46, PKCA Wildlife 2	Application of Results From Research	Not acceptable. The results from the conducted research can still be included in the finalized version of this ICRP.	The cutoff date for additional reporting and results from research was January 2007.	No Revision Proposed.		
266 (217)	INAC – 34	Appendix F, Table 46, PKCA	Wildlife 2	When will the results of RESCAN's Risk Assessment on metals uptake by wildlife be completed? Are there any plans for additional research on this matter?	The risk assessment report was delivered to INAC and the WLWB March 5, 2008. Please refer to ICRP Section 3 Comments Table Tracking # 8 for discussion on the Pilot Study.	No Revision Proposed.		
267 (218)	INAC – 35	Appendix F, Table 46, PKCA	Wildlife 3	INAC-WRD supports DFO's position that fish barriers should be designed in such a way that they are easily removed if and when water quality criteria are met and DFO and others are satisfied the pits are safe for fish.	Repeat of Tracking # 124.	No Revision Proposed.		
268 (206)	IEMA – 134	Appendix F, Table 46, PKCA Wildlife 3	Research Objective	This option is not yet approved. Alternatives to the fish barrier option exist, and should be evaluated for the Board's consideration.	Acknowledged.	No Revision Proposed.		
269 (207)	IEMA – 135	Appendix F, Table	Planned Research	No information is provided on how, where or when this 'research' will be conducted.	Details on the research plan are not available at this time. Please refer to Table 1 Reclamation Research Plan	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
		46, PKCA Wildlife 3			Schedule for the time frame for this research.			
270 (235)	JW – 59	Appendix F, Table 46, PKCA Wildlife 3	Research Objective	What fish species will be excluded? When will the research be conducted? What is the duration of the study? Are there specific designs being contemplated at this time?	Fish barriers will be designed to exclude fish. Initial research on fish barriers will begin with closure of Beartooth in 2009. However fish barriers for the LLCF will not be required until 2020 with the closure of the LLCF (Please refer to Table 1 Reclamation Research Plan Schedule). The fish barrier design research for pit lakes will contribute to the LLCF research, in which case the duration of the LLCF fish barrier research will be minimal, if required at all. Fish barrier design, including design parameters are undetermined at this time.	No Revision Proposed.		
271 (208)	IEMA – 136	Appendix F, Table 46, PKCA Operations 1	Planned Research	No specific research is identified.	Acknowledged.	**Table 46 (Appx F) Operations 1** BHPB will remove this from the Reclamation Research Plan and include it as part of a section on Engineering Design Questions in Section 6.4 of the ICRP Vol 1.		
272 (219)	INAC – 36	Appendix F, Table 46, PKCA	Operations 1	Why hasn't BHP conducted any research on the "Design internal drainage channels"? What is the associated timeline for this research? How will these internal channels effect pit lake stability and mixing? When does BHP expect the results of this research?	The updated design for the LLCF was included in the WWPKMP and approved by the WLWB in September 2006. The updated 2007 ICRP includes a closure plan for the facility, based on the approved WWPKMP. Preliminary designs for the channels has been provided in Figure 16 and 17 (Appx D). The internal drainage channels will not be associated with effects on pit lake stability and mixing. BHPB will construct the internal drainage channels prior to completion of PK deposition into Cells B and C.	Please refer to Tracking # 271.		
273 (236)	JW – 60	Appendix F, Table 46, PKCA Operations 1	Planned Research	What is meant by early in the LLCF closure? (within a year? just after closure?)	The LLCF is planned to close in 2020 with the cessation of mining operations. However sections of the facility will come available prior to 2020. An exact date when internal drainage channels will be constructed is unknown at this time. The design and locations will be dependent on approvals of how the facility will be reclaimed. The schedule for the reclamation research is provided in Table 1 Reclamation Research Plan Schedule.	No Revision Proposed.		
274 (288)	LKDFN – 29	Appendix F, Table 46, PKCA	General	LLCF has been identified as a potential water source for filling the pits. True research proposed for examining LLCF water quality, permafrost development, vegetation stability, cover design, weathering of PK, and deposition strategy for EFPK, etc. do not consider removal of LLCF waters. Does BTIBP agree that removal of LLCF waters could impact processes occurring within the LLCF and therefore closure activities? Should additional research be completed to examine the impacts of using LLCF waters to fill pits? This is currently not a planned research activity.	A number of closure options have been discussed for closure of mine components. BHPB does not agree that all proposed options necessary become research projects. Preliminary assessments (infrastructure needs, water quality, volumes of water required etc) will be completed to assess if this option is feasible and any identified uncertainties will be addressed. At this time BHPB does not intend to create research projects for all possible sources for water withdrawal.	No Revision Proposed.		
275	IEMA	LLCF		How much flexibility is there to finish filling the north	Filling the top end of Cell B continues to be our priority.	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
(301)	(Email sent April 30/08)			end of Cell B as soon as possible to facilitate the earliest possible start to large scale revegetation studies? My apologies if you have already answered this question elsewhere.	The road and pipeline were constructed last fall/winter and are operational. The increased distance means that our pumping system can not deliver 100% of the PK to the upstream end of Cell B all of the time. We are working on ways to make sure that this is optimized. We are currently targeting to deliver 70% of the PK stream to the upstream end of Cell B on a consistent basis. That portion of the PK stream that is not delivered to the upstream end of Cell B is deposited at a shorter outlet location. We very much want to complete the upstream area of Cell B as quickly as we can so that it is available for reclamation research. This continues to be the operating plan. A realistic timeframe for this area to be available for reclamation research is in the order of 3-4 years.			
Appendix F: RECLAMATION RESEARCH PLAN – Table 47: Dams, Dykes and Channels								
276 (237)	IEMA – 137	Appendix F, Table 47, Dams, Dykes and Channels.	General	Table 25 uncertainties around specific closure criteria for Land 1 and 2 'no significant slumping, subsidence or erosion' have not been addressed in the proposed research.	Agree	**Table 47 (Appx F)** will be updated to include the uncertainties around surface stability.		
277 (238)	IEMA – 138	Appendix F, Table 47, Dams, Dykes and Channels. Land 1	Planned Research	The specific research to be undertaken should be described.	Specific research has been identified under Planned Research.	No Revision Proposed.		
278 (243)	JW - 61	Appendix F, Table 47, Dams, Dykes and Channels. Land 1	Research Objective	The closure objectives for the Dams, Dykes and Channels includes mitigation of significant adverse environmental effects to identified Valued Ecosystem Components and a consideration of the relevant expectations of stakeholders for post closure land use, including biodiversity, sustainable development and respect of traditional values and ensure long-term care and maintenance is not required. The criteria for revegetation of these areas include: • the disturbed sites have been enhanced to encourage natural recovery if vegetation; • indigenous vegetation is used for rehabilitation; and • vegetation assemblages have been identified and functional.	Please refer to Tracking # 60.	No Revision Proposed.		
279 (244)	JW – 62	Appendix F, Table	Planned Research	The research described focuses on identification and sourcing of native plants, development of seed	Acknowledged.	No Revision Proposed.		

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		47, Dams, Dykes and Channels. Land 1		collection protocols and plant growth and maintenance. The research reported to date has focused on investigation of plant establishment and colonization of a relatively limited number of species on diversion channels. Three species have been identified a successful in these channels but we do not know if the reclamation objectives require the establishment of a broader range of species for biodiversity or land uses. It does not appear that any research has been completed on larger structures such as dams or dykes. There is an absence of any data on how the three successful plant species will perform on these structures. The listed planned research items (4, 5 and 6) identify appropriate percentage cover for surface stabilization to assist with refinement of closure criteria may address these issues in the future but this is not clearly identified.				
280 (245)	JW – 63	Appendix F, Table 47, Dams, Dykes and Channels. Land 1	Reclamation Schedule	Decommissioning and closure time for dams, dykes and channels is limited to one year in duration. This may be adequate time for the physical preparation of these areas and initial revegetation (i.e. seeding and or planting), but does not allow time for monitoring the success of the revegetation. The Closure Monitoring Program Frequency Table does not include monitoring of revegetation as a program item.	Table 59 (Appx G) includes the monitoring period for vegetation on Dams, Dykes and Channels.	No Revision Proposed.		
281 (239)	IEMA – 139	Appendix F, Table 47, Dams, Dykes and Channels. Water 1	Research Completed	There does not seem to be any research done to date. When will this be started and completed? There does not appear to be any specific research proposed to determine the maintenance requirements for the PDC relating to snow, ice and debris removal.	Please refer to Table 1 Reclamation Research Plan Schedule where the research is due to be completed in 2018. A date for commencement of research has not been determined at this time. Water quality monitoring of the King Pond Settling Facility is conducted during mining operations within the AEMP, and reported annually. The results from this research will be incorporated into the research design. The PDC maintenance requirements are part of the mining operations. Any uncertainties on long term operations of the facility would be included as an engineering design question. Please refer to Sections 6.5.3.2 and 6.5.4.2 in the ICRP Vol 1 for further discussion related to design of the PDC for closure.	No Revision Proposed.		
282 (241)	INAC – 37	Appendix F, Table 47, Dams, Dykes and Channels.	Water 1	When will BHP conduct the research on sediment materials characteristics and the water quality of the King Pond Settling Facility? When will the research be completed? Will this research be expedited if no further work is planned for the Misery site?	Table 1 Reclamation Research Plan Schedule provides the schedule for the research. Should there be a significant change in the timing of pit or underground completion, this will be reflected updates of the ICRP.	No Revision Proposed.		
283 (246)	JW – 64	Appendix F Water 1	Planned Research	"…characterization of the sediments" is vague. For example: What types of sampling and analysis will be conducted (i.e. chemical and physical)? When will this research be completed? What is the anticipated duration of these studies?	BHPB does state that a research plan is not in place at this time. Please refer to Tracking # 281 with respect to schedule of research.	No Revision Proposed.		
284	LKDFN –	Appendix	Water 1	Research into sediment characterization in King Pond	The directive for sediment removal comes from the	No Revision Proposed.		

Tracking #	Comment ID	ICRP Section	Topic	Review Comment	BHP Billiton Response	BHP Billiton Proposed Revision	Resolved ? (yes or no)	Action Item (if applicable)
(300)	41	F, Table 47, Dams, Dykes and Channels		Settling Facility is proposed. Part of the planned research is to establish if sediments are to be removed. Dos BHPB agree that quantifiable criteria should be developed as part of the research program to determine if sediments should be removed, and if removed, methods to measure associated risks should be researched? If not, why not?	Fisheries Authorization SC00028, to 'Remove sediments accumulated within King Pond that degrade the quality of or interfere with the enhancement of fish habitat'. Quantifiable volumes of sediment to be removed (if any) would be established with DFO after the Planned Research in Table 47 (Appx F) Water 1 has been completed.			
285 (240)	IEMA – 140	Appendix F, Table 47, Dams, Dykes and Channels. Wildlife 1	Planned Research	The need for a research plan for the King Pond Settling Facility is identified but there are no details or timelines provided.	BHPB does state that a research plan is not in place at this time. Table 1 Reclamation Research Plan Schedule provides the schedule for the research.	No Revision Proposed.		
286 (242)	INAC – 38	Appendix F, Table 47, Dams, Dykes and Channels.	Wildlife 1	When will BHP conduct the over-wintering fish habitat research for the King Pond Settling Facility? Will this research be expedited if no further work is planned for the Misery site?	Please refer to similar response in Tracking # 282. Should there be a significant change in the timing of pit or underground completion, this will be reflected updates of the ICRP.	No Revision Proposed.		
287 (247)	JW – 65	Appendix F, Table 47, Dams, Dykes and Channels. Wildlife 1	Planned Research	2. Is "functional" meant by "appropriate"?		**Table 47 (Appx F) Wildlife 1** Planned Research will be updated to replace 'appropriate' with 'functional'.		
288 (248)	JW – 66	Appendix F, Table 47, Dams, Dykes and Channels. Wildlife 1	Research Completed	When will the research be completed? What is the timing/duration of the research based on?	Please refer to Tracking # 281 with respect to schedule of research.	No Revision Proposed.		
289 (249)	JW – 67	Appendix F, Table 47, Dams, Dykes and Channels. Wildlife 2	Research Objective	What are the limitations to the design? (i.e., width, length, sinuosity, gradient, etc…)	Table 47 (Appx F) Wildlife 2 Planned Research has identified a research task as 'design a migration corridor'. This task is planned research, and not completed at this time.	No Revision Proposed.		
290 (250)	JW – 68	Appendix F, Table 47, Dams, Dykes and Channels.	Planned Research	Will the PDC design be directly transferrable? Are there any other relevant designs (from northern/arctic examples)?	BHPB has noted that the PDC is an example where the fish habitat and fish passage work is transferable. Other relevant designs have not been assessed at this time.	No Revision Proposed.		

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		Wildlife 2						
Appendix F RECLAMATION RESEARCH PLAN – Table 48: Buildings and Infrastructure								
291 (251)	IEMA – 141	Appendix F, Table 48, Buildings and Infrastructure.	General	Table 26 uncertainties around specific closure criteria for Land 8 and 9 'no significant slumping, subsidence or erosion' have not been addressed in the proposed research.	Agree	**Table 48 (Appx F)** will be updated to include the uncertainties around surface stability.		
292 (254)	JW – 69	Appendix F, Table 48, Buildings and Infrastructure. Lands 1, 2	Planned Research	The research proposed to identify what areas will require stabilization work and what physical work will be required to assist vegetation colonization (Land 1). Research has been undertaken on Culvert Camp and the Paul Lake and Tercon laydowns. Monitoring results reported for these areas is only qualitative in nature. More quantitative results would clarify the degree of stabilization that might be required. Results for the Culvert Camp Pad indicated that soil properties on the pad were generally poor for plant growth, that native plant cultivars had established and little colonization occurred. Some differences in species diversity were noted between the Tercon and Paul Lake laydowns while some establishment of native grass cultivars and colonization by two species were noted for the gravel pad for the Tercon laydown. It has been hypothesized that diversity of species is expected to increase at these sites as soil conditions ameliorate through chemical or biological process but no research is proposed in this section to verify this assumption. In 2006, a research project was initiated to test the use of lake sediment as an amendment for laydown and camp roads. This research is to assess plant growth response to materials, reassess the concept of pocket placement of growth materials, further evaluate plant cultivation techniques most effective in establishing plant growth and revaluate methods of creating surface conditions which will benefit plant establishment. Details regarding the location, duration or methods that will be used to complete this study are not provided.	Please refer to the ABR and Harvey Martens (HMA) reports under Research References for more detailed quantitative results. The research on lake sediments and laydown areas was initiated in 2006, and the proposed research outline is provided under Application of Results. Further work completed in 2007 will be included in the future update of the ICRP.	**Table 48 (Appx F) Land 2** Planned Research, Task 3 will be expanded to include research on species diversity.		
293 (255)	JW – 70	Appendix F, Table 48, Buildings and Infrastructure. Lands 1, 2	Reclamation Schedule	Decommissioning and closure time for buildings and infrastructure is limited to one year in duration. This may be adequate time for the physical preparation of these areas and initial revegetation (i.e. seeding and or planting), but does not allow time for monitoring the success of the revegetation. The Closure Monitoring Program Frequency Table does not include specific monitoring of revegetation as a program item.	Please refer to Table 60 (Appx G) for vegetation monitoring for this mine component.	No Revision Proposed.		
294 (252)	IEMA – 142	Appendix F, Table 48, Buildings	Planned Research	The specific details of this research should be outlined.	Details for the research have been outlined in the 4 tasks under Planned Research.	No Revision Proposed.		

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		and Infrastructure. Land 2						
295 (253)	IEMA – 143	Appendix F, Table 48, Buildings and Infrastructure. Operations 1	Planned Research	When will the demolition related research begin and be completed?	BHPB intends to commence this work in the next year (2009), to assist with refinement of the closure cost estimate. Please refer to Table 1 Reclamation Research Plan Schedule for estimated completion time.	No Revision Proposed.		
296 (256)	INAC – 39	Appendix F, Table 48, Buildings and Infrastructure.	Operations 1	When will BHP conduct the research on demolition and encapsulation of material either in the WRSA, UG or Open Pits? INAC-WRD notes that most WRSAs are currently close to final elevations and that the effects of placing demolition material in the UG or in Open Pits on water quality are not known at this time. If this is to be truly considered as part of final closure the research, planning and scheduling of operations is extremely critical to the success of this option.	Please refer to Tracking # 295 for timing of this research. Hazardous materials will not be landfilled, but shipped offsite (refer to Section 6.6.4.1). Only inert material will be landfilled (either in the WRSA, open pits or underground) at closure. However, BHPB agrees that Planned Research should also identified any potential for long term water quality issues related to demolition material, if placed in open pits or underground mines.	**Table 48 (Appx F) Operations 1** Planned Research will be updated to include a 3rd task which will assess water quality in pit lakes which would hold demolition material.		
Appendix G: POST CLOSURE MONITORING								
297 (257)	ENR – 4	Appendix G	Post Closure Monitoring	<u>Air Quality</u> With respect to air quality closure monitoring the Plan notes fugitive dust monitoring will be conducted for a period of 5 years at two locations TSP 2 (Grizzly Lake, and TSP 3 (Cell B LLCF). ENR is encouraged by recent improvements in consultation with respect to air quality and emissions management at EKATI and is willing to continue to work with BHPB to improve monitoring and reporting. ENR expects the outcome of these discussions will be reflected in the proposed fugitive dust closure monitoring. <u>Geotechnical Inspections</u> Closure monitoring with respect to geotechnical inspections are proposed for a period of 5 years. Due to the importance of these inspections with respect to slope stability, significant erosion, subsidence, slope failures, and surface instability for all mine components, ENR recommends that the duration of monitoring be increased to 10 years. <u>Wildlife</u> Open Pits, Dam, Dykes and Channels, and the PKCA wildlife closure monitoring consists of the following parameters being examined; wildlife habitat, movement, safety, abundance, mortalities, incidents, breeding, distribution, density, diversity, however, for Buildings and the WRSA the parameters examined are limited to wildlife movement and safety. It is important that consistency be maintained throughout all mine components; therefore, ENR requests that rationale be provided for the distinction between components. Wildlife closure monitoring for the Open Pits and WRSA	BHPB agrees that geotechnical inspections should be increased to 10 years. Please refer to ICRP Section 2 Comments Table, Tracking # 252 with respect to the Wildlife Monitoring.	**Monitoring Frequency Tables 55-60 (Appx G)** will be updated so that Geotechnical Monitoring is for 10 years.		

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				is proposed for 5 years, while the PKCA, Dam, Dykes and Channels, Buildings will carry out closure monitoring for a period of 10 years. The same comment applies with respect to consistency being maintained throughout all mine components; therefore, ENR requests that rationale be provided for the distinction between components.				
298 (258)	JW – 71	Appendix G	Post Closure Monitoring	The Closure Monitoring Tables discuss biological monitoring with respect to wildlife but do not mention monitoring of vegetation with the exception of monitoring on the Processed Kimberlite Containment Areas and Buildings and Infrastructure Areas. The Revegetation Monitoring Program (RMP) was not included in this review.	Vegetation monitoring has been included in all the Monitoring Tables 55 through 60, with the exeption of Table 56 for Underground Mines. The monitoring has been identifed as 'Vegetation and Inspection'.	No Revision Proposed.		
299 (259)	JW – 72	Appendix G	General Comments	In general, the information provided in Appendix F does not indicate how the research being conducted and proposed at the EKATI Mine will address the closure objectives and criteria as provided in the 2007 Interim Closure Reclamation Plan. The Reclamation Research Summary included for each of the mine facility areas does not provide information on study duration or methods that will be employed. In addition, there does not appear to be sufficient time included in the Closure Monitoring Program Frequency tables to monitor for revegetation for those facilities where monitoring of vegetation is proposed.	Acknowledged.	No Revision Proposed.		
General Comments								
300 (260)	LKDFN – 1		General	In general, proposed research objectives and planned research was developed and presented at a conceptual level of detail. In many instances there was minimal: a. Details of the proposed methods; b. Details of monitoring frequency and location; c. Rational for proposed research in relation to closure activities, plans, and design; d. Quantifiable end goals to achieve the objectives; and, e. Detailed timelines for initiation and completion of specific planned research (with the exception of the general timelines provided in 1CRP document which span years).	Acknowledged.	No Revision Proposed.		
301 (261)	LKDFN – 2		General	It is understood that it was BHPB's intended to include closure activities and research to a conceptual level in this version of the ICRP; however, without additional information into the research activities, it is difficult to assess: a. The appropriateness of the research in relation to closure activities; b. if the planned activities will encompass and gain information or data that fully supports closure plans; and, c. If the planned activities will be completed in sufficient time to be considered in design and plans beyond the conceptual level. These concerns were also iterated by	Acknowledged.	No Revision Proposed.		

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				other reviewers within Section 2 and 3 in relation to closure activities.				
302 (262)	LKDFN – 3		General	There should be opportunity to provide review comments for planned research beyond the conceptual level, and before submission of next version of the ICRP to address the previously mentioned issues/comments. The current status of the reclamation research plan does not provide sufficient detail to endorse or support the research activities. The specific review comments provide details to where additional information is needed.	Acknowledged.	No Revision Proposed.		