



Independent Environmental Monitoring Agency

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May 14th, 2004

Melody J. McLeod, Chair
Mackenzie Valley Land and Water Board
7th Floor - 4910 50th Avenue
Yellowknife, NT X1A 2P6

Robert Overvold
Regional Director General
Department of Indian Affairs and Northern Development
P.O. Box 1500
Yellowknife, NT, X1A 2R3

Dear Ms. McLeod and Mr. Overvold:

Re: BHP Billiton's 2004 *Abandonment & Reclamation Plan*, Ekati Mine

The Independent Environmental Monitoring Agency has reviewed the July 2003 *Interim Abandonment & Reclamation Plan (revised April, 2004)* for the Ekati mine recently submitted to the MVLWB for approval under the terms of the mine's two operating water licences. As the *Plan* also requires approval by the Minister under the terms of the *Environmental Agreement*, we have also addressed these comments to DIAND.

Our main finding is that the 2004 *Plan* should not be approved until the deficiencies identified hereunder have been properly addressed by the company. The main reason for this recommendation is the proposed pit lake flooding by diverting upper Koala watershed flows is not a demonstrably viable concept and, in our view, viable concepts for all components of mine closure must be demonstrated before approval to commence a project is given. We note that the currently approved 2000 *Plan*, which proposes pit lake flooding by natural processes, appears to satisfy this criterion.

Despite BHP Billiton having revised the July 2003 *Plan*, and having issued a *Response Document* indicating how it addressed last year's deficiencies, most of the comments we made in our October 1, 2003, letter to MVLWB are still valid. A more substantive attempt is needed to get this *Plan* into an acceptable and useable form.

We provide more detailed comments in the attachment to this letter. However, we would like to highlight here several key deficiencies of the 2004 *Plan*.

1. Most importantly, the 2004 *Plan* confirms that flooding of the pits, through diverting upper Koala water flows, is the company's proposed reclamation approach. This is a significant change from the project assessed under the 1995 *EIS*, and its impacts on the downstream Koala hydrologic and ecologic

regimes have not been assessed. Despite our recommendation last year that this be done, the new *Plan* does not provide the answers. This means that we cannot know at this time whether this concept is viable. Additionally, the company is conducting further research to determine if recreated pit lakes will be ecologically viable and what the cost implications of the proposed option might be. Again, it is not clear that this option will be, or can be, effectively pursued in the future.

2. The current *Plan* does not provide reclamation measures for existing liabilities that are readily implemented. In our October 2003 letter we stressed the need for the *Interim A&R Plan* to be an “implementable” document, at least for those portions of the mine as currently developed. We understand the difference between a final closure plan and an interim closure plan, and our concept is consistent with the description laid out for interim phase plans in the 1990 *Guidelines for Abandonment & Restoration Planning for Mines in the Northwest Territories*. We believe that somewhere between “conceptually viable” and “engineering design” lies the requisite level of detail required for an interim closure plan. The point is highlighted in the concern about premature shutdown. In this unlikely event, and with the level of detail provided in the *Plan*, mine managers would not be able to efficiently put in place the decommissioning and restoration measures needed for either short or long-term closure.
3. The lack of specific details in the 2004 *A&R Plan* is hard to reconcile given the very detailed information obviously utilized in the *Komex Liability Estimate* to obtain precise cost figures for reclamation of each component at the mine site. These two documents should, in future, be transparently harmonized so that the same level of detail is consistently presented. The level of detail presented in the *Komex* document for the reclamation of individual mine components would more than adequately meet the need for detail in the *Interim A&R Plan*.
4. As noted in our October 2003 letter, *Water Licence N7L2-1616* competently sets out in Part K the necessary and desirable components, and the framework, for what the *A&R Plan* should contain. In our view, Part K requirements 1[a] to [m] are still largely not provided to any useful level of detail, despite BHPB’s *Response Document* stating that this information has been provided. The *Plan* would be greatly improved if the company adopted this framework, and substantive thought invested into providing the specific information requested, in a level of detail sufficient to assist the Board and regulators to properly understand the proposed program.
5. Part K also calls for the submission of a *Restoration Research Plan* (Item 4). BHPB has confirmed that such a document was never submitted. Item 6 provides for the MVLWB to request from the proponent at any time an update of the plans prepared under Part K, which includes the *Restoration Research Plan*. IEMA recommends that the Board exercise this option at the earliest opportunity, and call for such an update to be submitted for the Board’s approval prior to approving the next *Interim A&R Plan*. This document and the *A&R Plan* also need to be “harmonized”, such that content of one is consistent with the other, and that the results of work undertaken as part of the

restoration research program inform the development of reclamation measures prescribed in the *A&R Plan*.

The 1996 report of the EARP Panel for the NWT Diamonds Project stated that an *A&R Plan* should ‘not be finalized until after the mine has been operating for a period of time.’ We support the view expressed by Board staff at the May 11, 2004, workshop on the Plan that, “While the Plan is approved as an interim plan, it must function as a well thought-out plan to provide direction in the event of a sudden premature mine closure.” For the following reasons, we believe that it is time for a firm and detailed *Interim A&R Plan* to be in place:

- some parts of the project are already shutdown
- much of the project is already constructed and its ultimate configuration known with some reasonable precision
- closure of the project is now several years earlier than originally predicted
- much research has been conducted pertaining to reclamation measures
- the amount of the security deposit is based on detailed closure plans, implying that such details are available.

We note for the Board that, as a means of assisting BHPB in improving its closure plans, we have offered to meet with company representatives to spend the necessary time to work through many of the concerns identified to date. The company has agreed to this, and this meeting is tentatively arranged for the beginning of June.

Finally, we observe that both submission of material under Part K to the Board, and subsequent review of material by the Board, is not uniformly subject to a timely process, nor the recipient of a thorough review. The Board should give some consideration how to make this process more efficient, and how to ensure that its requested deliverables receive a thorough and timely review once submitted.

Sincerely,

-ORIGINAL SIGNED BY-

William A. Ross
Chairperson

Cc. Society Members

Attachments:

1. Detailed Comments by IEMA on April 2004 *Interim Abandonment and Reclamation Plan* for the Ekati Mine

Attachment to letter to Melody McLeod (MVLWB) and Bob Overvold (DIAND) from the Independent Environmental Monitoring Agency, May 14th, 2004

**Detailed Comments by IEMA on April
2004 Interim Abandonment &
Reclamation Plan for the Ekati Mine**

Water Licence Requirements

Part K of the *Water Licence* sets out the requirements for the *A&R Plan*. Specific comments are provided for the following items.

Item [a] calls for “specific abandonment and restoration objectives for each mine component...”. Specific objectives for each mine component have still not been provided in the *2004 Plan*, nor does the *Response Document* properly address this deficiency. In our view, a clear statement of specific objectives for each reclamation mine unit is a necessary precursor to identifying the appropriate reclamation measures that will be required.

Item [b] calls for “a description of the measures required, or actions to be taken, to achieve the objectives stated in the Board’s Guidelines and Part K, Item 1[a]...”. Action items for various mine components have been provided, but not in relation to any specified reclamation objectives. It is therefore not possible to determine whether the actions outlined in the *Plan* will achieve the necessary reclamation objectives at the end of the day.

Item [c] calls for “a detailed description, including maps and other visual representations, of the pre-disturbance conditions for each site, accompanied by a detailed description of the final desired landscape, with emphasis on the restoration of stream banks and surface drainage over the restored units.” Very few detailed descriptions of pre-disturbance and post-closure landscapes are presented. A prominent example is the lack of detail surrounding the reclamation plans for the Koala drainage through the mined zone. No plans or cross-sections illustrating the post-closure conditions of the Koala drainage (including reclaimed Panda channel) are provided. What will the shoreline conditions, including exposed banks and interconnecting channels, of the flooded pit lakes look like? What will be the exposure of mined surfaces following flooding and reclamation? Will any revegetation of shoreline areas be carried out? Will the flooded lakes have shorelines that are below the original lake surfaces? If so, what will happen to the exposed original shorelines? What lengths of the original streams will be restored? What fish habitat restoration will be done in Koala streams? What measures will be taken if pit lake water quality is unsuited for discharge into lower Koala watershed?

BHPB’s *Response Document* states that this previously noted deficiency has been addressed by “providing a better description of the ecosystem units and pre-development air photos of the sites where mining operations presently occur.” These changes do not satisfy this requirement. The air photos are at too high an elevation and too small a scale to be helpful in reclamation planning (topography, drainage, vegetation cover, etc. are

indiscernible), and enhancing the ecosystem unit characterizations does not address the point.

Item (d) requires “a comprehensive assessment of materials suitability, including geochemical and physical characterization and availability for restoration needs, with attention to top-dressing materials, including maps where appropriate showing sources and stockpile locations of all borrow materials.” This requirement has not been satisfied. Detailed maps of the storage locations are not provided, although some of them are inadequately illustrated on small-scale photos of the site. Topsoils have not been properly characterized. The storage described for some topsoils suggests that their availability for reclamation is not assured. There is no indication of what volumes are currently or ultimately available, or what the topsoil requirements for closure and progressive reclamation are. Without detailed plans for topsoil dressing, these questions cannot be answered.

Item (e) requires “a description of the process to be employed for progressive reclamation, plus details of restoration scheduling and procedures for coordinating restoration activities with the overall mining sequence and materials balance.” Table 7 identifies scheduling for main closure activities for the current mine plan, but there is no information on the procedures to be used for coordinating reclamation work with the mining sequence as it may change over time, nor the process to be employed for progressive reclamation.

Item (f) requires a description of any post-closure water treatment that may be required. This subject is not discussed in the 2004 *Plan*. The *Response Document* refers us to Sec.3.3.7.1 for an answer to this previously raised issue, but this section describes current water treatment activities, not post-closure ones. The post-closure situation will be different than the existing operation, since currently the LLCF is used to capture poor quality water. If the coarse kimberlite rejects stockpile continues to generate acid drainage following closure, or the Panda waste rock dump continues to discharge acidic seepage, what measures will be taken to deal with this water? At this point, LLCF will be part of the receiving environment and cannot be used to deposit poor quality mine drainage. The *Plan* is silent on such issues.

Item (g) requires a description of how the potential for post-closure groundwater contamination will be assessed and monitored during the term of the Licence. The *Plan* does not contain information about this issue. The *Response Document* tells us that “ground water monitoring is presently conducted as part of the seepage monitoring from waste rock areas”, and that the seepage survey reports provide additional information on seepage. With respect, this response does not address the information requested in Item (g).

Item (h) requests a “detailed description of proposed revegetation plans, incorporating a description of how initial vegetation cover will promote successional development on reclaimed landscape units, what the expected progression and time-frame will be, and how it will be compatible with local ecosystem characteristics.” This requirement is not provided in the *Plan*. The *Response Document*, curiously, states (p.10) only that this information is “part of completion criteria”, meaning presumably that it will show up at the end of 2005 when the completion criteria are submitted. The detailed description and

scheduling of revegetation activities asked for in this item are not synonymous with completion criteria.

Item (i) calls for an identification of the research needs for restoration. Significant research has been conducted at Ekati, and the results of much of this have been summarized in the 2004 *Plan*. However, an assessment of what remains to be done in terms of reclamation research is missing, and would be needed to meet this requirement. What are the remaining questions that have to be answered in order to finalize reclamation plans for the site? Are the on-going research activities addressing these issues? When will the research be completed?

Item (j) calls for detailed information about the monitoring that will be required for recording the progress of mining activities in relation to on-going restoration needs. This item appears entirely unaddressed; there is no mention of such a monitoring program in the *A&R Plan*. The *Response Document* refers us to Table 11, which is a description of current monitoring undertaken at the site. It is silent about the monitoring program called for in this item.

Item (k) calls for details about closure activities that will be undertaken in the event of a temporary or premature shutdown. No detailed measures are described. We discuss this further below.

Item (l) calls for an explanation of how aesthetic concerns will play a role in restoration. The *Plan* is silent on this issue.

Item (m) calls for the qualifications, status and authority of those individuals who will be responsible for, and who will conduct, restoration activities. The *Plan* is silent on this topic. The *Response Document* indicates (p.10) that “reclamation work is conducted with the assistance of qualified Engineering consultants and BHPB Engineering staff.” This statement does not provide the information requested.

Item 4 requests that the company submit a *Restoration Research Plan* that includes:

- An update of research to date
- A discussion of how the results may inform restoration planning
- Details of further research that will be undertaken to satisfy research needs identified in Item 2(i) above
- A description of a process to ensure that restoration procedures will be ecologically appropriate, viable and achievable
- A description of how the research will address objectives dealing with the creation of viable wildlife habitat
- A description of how metal uptake in revegetated plant communities will be monitored
- A schedule of anticipated research expenditures on an annual basis
- A description of a QA/QC protocols for conducting research and how research progress will be monitored.

Except for the first item (updates of restoration research done to date) and third item (details of further research), few of the remaining information requirements appear to have been provided, either in a *Restoration Research Plan* or in the *A&R Plan*. Future restoration research which is listed in Sec.7.5 is not presented as part of a coordinated program of scheduled research activities. It is not clear that all the research being undertaken is addressing the needs of specific reclamation objectives as called for by the *Water Licence*.

Requirements of the Environmental Agreement

The *Environmental Agreement* calls for the *A&R Plan* to be submitted to the Minister for his review and approval (Article VIII, Item 1(a)). It is not clear that the Minister has approved any of the previous *A&R Plans*, including the one currently in effect. The approval of closure plans for the Ekati mine is, next to on-going site inspections and enforcement, perhaps the most important exercise for the Crown to undertake in relation to this project, since it alone establishes the physical and geochemical regime at the site which will determine what happens at the site for generations to come. At this stage of the mine life, given the operating experience and research conducted to date, the bar for approval should be set high. In its present form, the new *Plan* fails the test.

We noted last year that the preparation of the *A&R Plan* is required, under the *Environmental Agreement*, to be done in “consultation and cooperation” with several stakeholders, and that this has not happened. The *Response Document* states that the *Plan* is provided to stakeholders for review and comment prior to its submission to the MVLWB, and that other meetings (e.g. IACT, RWED, communities) are used to present information on reclamation. While an opportunity to comment on a draft document is appreciated, this is not a substitute for a proper consultation process which presumably would allow input from the key players, at an early stage, in the overall design of the document and the identification of viable alternatives for closure strategies.

Description of the Site

A generally adequate narrative description of the site and current mining operations is provided in chapters 2 and 3 of the *Plan*, but useful visual representations at appropriate scales are lacking.

Some high-elevation photos are provided for several reclamation units and it is stated that, “images of site conditions prior to disturbance by mining operations are important references for reclamation” (Sec 2.6) It is not clear how these photos are to be used, particularly when the *Plan* notes that the key factors for referencing original site conditions are topography, biophysical landscape and hydrology—none of which are readily discernible in the photos provided. Larger-scale topographic maps and cross-sections for each of the Reclamation Units are essential in understanding how reclaimed landscapes will approximate (or not) the original site conditions.

Insufficient information relating to biological conditions is provided. Instead, the reader is referred to “the detailed and comprehensive overview reports of biological aspects of the six original lakes prior to mining.”(Sec 2.6.1.3)

Reclamation Strategy

RECLAMATION OBJECTIVES

The 2004 *A&R Plan* still lacks concrete reclamation objectives for each landscape reclamation unit. Sec.1.2 identifies 4 items as “specific objectives”:

1. to re-establish stable landforms;
2. to protect the water resources in the local area;
3. to facilitate natural recovery of areas affected by mining; and
4. to re-establish productive use of the land (Aboriginal and wildlife).

With respect, these may be goals for reclamation, but they are not objectives. Objectives are specific measurable endpoints which, once achieved, imply that the goals have been met. As an example, for #2 above, a specific objective to meet the stated goal would be “to ensure that all water resources meet CCME guidelines.”

BHPB’s *Response Document* states (p.7), “BHPB will reclaim the minesite to a condition that is inhabited by the ecosystems of nearly the same composition as those prior to mining. And will endeavour to create a productive landscape that is similar to that of pre-mining.” These are worthy goals, but then no details of how this will be achieved (for instance, what ecosystem types will be re-established in what locations) are presented. Plans outlined for many components (e.g., waste rock dumps) do not appear to be designed to achieve these goals.

PIT LAKES

The proposed reclamation of the pit lakes presents a major problem for the timely approval of the 2004 *A&R Plan*. Although “further discussions will be required with the Department of Fisheries and Oceans,” the *Plan* confirms that active flooding, as opposed to natural infilling, of the pits will be the reclamation strategy for the pit lakes. It is noted that infilling with kimberlite tailings may be an option for some pits if the mine plan allows. Beartooth pit is scheduled for completion by mid-2013, but the *Plan* indicates (Table 7) that reclamation of the underground workings will take us to 2014. It is not realistic to believe that this pit will be available for any significant deposition of tailings.

The *Response Document* is more equivocal on what option will be adopted for reclaiming the pit lakes. It notes (p.1) that three options (natural filling, pumped filling, PK deposition) have been proposed by BHPB and, further, that an environmental study (including a risk assessment and cost feasibility) of the three options will need to be conducted “before flooding commences.” This suggests that three options, or some combinations of them, are still on the table. BHPB needs to resolve this ambiguity sooner rather than later, and a proper environmental assessment of all plausible options

should be conducted at the earliest opportunity. This assessment should be used to assist in making a decision about the appropriate alternative, not be left until after the decision.

As previously noted in our October 2003 response, diversion of upper Koala waterflow into Panda and Koala pits is a substantive change from the project assessed in the 1995 *EIS*, and is likely to have significant ecological implications downstream. The potential environmental effects of this have not been assessed, and must be before this *Plan* can be approved.

Source water for the Koala and Panda pits is to include large diversions of water from the LLCF. Given that concentrations of 12 water quality parameters in cell E have already risen above baseline conditions, and two are expected to exceed CCME guidelines at some point in the future, water from this source may not be of sufficient quality to divert into the receiving environment. No contingency plans for sourcing water have been presented.

The *Plan* notes that Panda pit will be flooded first, with the flooding of Koala to follow once Panda overflows (Sec.5.3.2). Given that these pits are hydraulically connected at depth, they are likely to fill contemporaneously, not sequentially. Given also that Koala pit rim is at a lower elevation than Panda, it will fill first and then discharge to Kodiak Lake before Panda overtops. At this point, Panda will presumably stop filling. While it is indicated that a channel will be re-established between the two pits, there are no details as to what this will look like, or what elevation the channel will need to be excavated to. More detail needs to be presented on what the final landscape here will look like, and what work needs to be undertaken to get there.

The *Response Document* provides new information about the possibility of using bulkheads to seal Panda underground from Koala underground at closure, and states that Panda pit filling will be delayed until Panda underground mining is completed. This is scheduled for 2012, which provides a 2-year lead over Beartooth pit as a possibility for tailings disposal. This option is not identified, and warrants an assessment.

LONG LAKE CONTAINMENT FACILITY

Progressive reclamation of cell B is proposed for 2004 field season. The new *Plan* states that cell D will not be reclaimed since tailings deposition will be below the water surface. This is a departure from previous plans which did not provide for a water-covered tailings surface in Long Lake, but for drained tailings and re-established drainage channels through vegetated waste-rock covers. If dyke C is breached as indicated (Sec.5.7.1.1), it is not apparent how tailings stored in cell C will be prevented from moving downslope into cell D. No details about residual water quality, aquatic impacts, dyke stability and function, are provided.

The *Plan* notes that “experimental work to confirm predicted sedimentation and consolidation behaviour” is continuing in Cell B, and that this will allow for “optimization of the cover design and placement techniques for all the cells.”(Sec.5.5.2) There is no description of what work is being undertaken in cell B, nor how it is expected to inform reclamation activities. The work described appears to be consistent with the

tailings characterization work originally called for in Part H, Item 1 of the existing licence.

The original plan to cover the tailings cells with a vegetated, 2 metre rock cover has been replaced with a plan to directly revegetate the tailings, at least for Cell B. This decision has been based on research which has provided answers to the kind of soil amendment required and how to establish an initial plant cover. The issue of developing a permanent adaptive native cover for the revegetated sites has not been resolved. If native vegetation cannot successfully populate the tailings cells, then the decision to move to a directly vegetated cover appears to be premature. Revegetation success in Cell B is proposed to be monitored, but the details of the monitoring program including, especially, thresholds indicating success, are not provided. Many questions concerning the feasibility of the conceptual-level revegetation plans have been left to the results of future research. If more specific application of research results is not possible at this time, then an explicit schedule of research that needs to be done in the future should be outlined, with key decision points identified.

A more appropriate approach to designing reclamation plans for LLCF may be to identify potential options, and then consult with stakeholders, including the aboriginal groups, prior to deciding on a specific strategy. For the closure of the beached tailings at the Colomac, for example, the Dogribs decided against a directly vegetated cover because of concerns about caribou digesting contaminated tailings, and opted for a waste rock cover instead. The proposal to directly vegetate tailings will need to be supported by a thorough analysis that direct access to tailings or the plant cover by caribou will not pose a risk. The risk assessment recently conducted by Golder Associates for the Long Lake tailings was not sufficiently robust to resolve this issue.

LAKE SEDIMENTS

Lake sediments and glacial till, originally stored for use as amendment material for mine reclamation, have now appear to have been effectively incorporated into the waste rock dumps and are no longer available for mine reclamation purposes (Sec.5.6.4). The apparent decision to not conserve lake sediments as a potential source of reclamation material has not been supported by any analysis.

The *Response Document* (p.9) notes that the company “does not have a final goal for volume of material to be salvaged.” Despite a requirement by the *Water Licence*, there is no systematic description of the various lake sediments storage units, nor estimates of the volumes available. No plans are presented as to how these will be used in particular reclamation units, or even whether they will be accessible when needed.

TOPSOIL

The *Plan* states that “BHPB recognizes that topsoil is the most valuable amendment material at Ekati for reclamation use and every effort is made to salvage it.”

Accordingly, topsoil has been collected at several sites and stored for reclamation purposes. The deposits are identified (Sec.5.6.5) as follows:

- Koala Topsoil Storage Area (no volumes identified);

- Misery Topsoil Storage Area (no volumes identified);
- Fox Topsoil Storage Area (95,000 tonnes);
- soil from Beartooth Pit deposited on Panda waste rock dump (no volumes identified; recoverability unclear)

Sec.5.6.5 discusses the role of topsoil in the reclamation plan. Here it is stated, “Even though efforts will be made to salvage organic matter when technically feasible, it is highly unlikely that a sufficient volume will be stored to reclaim the amount of land that will be disturbed from mining activity.”(*emphasis added*) Maybe, but why no inventory of what volumes are available (now and potentially), and why no inventory of what landscape reclamation units (as opposed to all disturbed sites) might appropriately benefit from a topsoil amendment during reclamation? How important a priority is it to stockpile topsoil? What does “technically feasible” mean? What are the thresholds for determining feasibility that operators and managers need to be aware of when removing topsoil for mining activities?

This section states further that, “the feasibility of combining organic soil with other amendments (e.g., lake sediment) may also be explored, to allow this valuable resource to be used over a larger area.”(*emphasis added*). This is all too vague, with no apparent commitment to resolve potential issues with topsoil use in future reclamation, even though its potential benefits are acknowledged by the company and it is being stockpiled.

SEWAGE SLUDGE

The *Plan* notes that sewage sludge could be used as a fertilizer for stored topsoil and lake sediments, and that this material “would then be a valuable source of amendment or ground cover for future reclaimed sites.”(Sec.5.6.8). Unfortunately, the burial of stored lake sediments now render this “valuable source” useless.

PANDA DIVERSION

Less information about the closure of this facility is presented than in the last *Plan*. Other than removal of the three culverts, no reclamation or decommissioning plans are proposed for the PDC. Rather, the *Plan* states that “future discussions with the Dept of Fisheries & Oceans and other stakeholders will determine the final reclamation requirements...”.

SETTLING PONDS (KING POND & TWO ROCK LAKE)

Plans for reclamation are vague. Ponds are to be breached, drainage to be re-established, and “excess water will be dealt with as part of the re-establishment of drainage channels.” There are no details as to how this will be done. It is not clear what will happen to the deposited sediments in the facilities. How will erosion of sediment be prevented? It appears as if revegetation of the ponds may be considered, since the *Plan* states that “revegetation efforts will depend on the physical characteristics of the substrate material”, but no details are provided nor any plan of how and when this decision will be made.

ROADS

The proposal not to scarify longer haul roads (such as Fox, Sable and Misery roads) because they will be needed post-closure for monitoring and reclamation work is not acceptable. At that time, road use will likely be restricted to small vehicles, and will require much less width of use than the current mine haul equipment. Scarification of these roads would likely greatly assist in the re-establishment of plant communities over more than 2/3 of the haul road width.

Some revegetation of old roads (Fox Portal, Old Camp) has been observed, but good monitoring results and reclamation schedules are not presented. Limited monitoring at replanted sites along the Old Camp road revealed “low amounts of plant cover” in 2002. It is not stated whether scarification was used at these sites. It is recommended that a detailed progressive reclamation plan for such roads be prepared and implemented at the earliest possible time.

At a meeting in February, 2004, concerning the *A&R Plan*, BHPB stated that Old Camp would be used as a case study to determine closure objectives, criteria and liability estimates. The new *Plan* does not suggest that this is happening.

WASTE MATERIALS

Sec.5.6.7 of the *Plan* proposes to dispose of the “vast majority of buildings and equipment” in the landfill site. Like many other proposed reclamation measures, this ideally should be presented as one option out of several potential ones, and be the subject of consultation with the aboriginal groups.

Reclamation Criteria

There is no change to Sec. 6.1 which deals with reclamation criteria. We noted in our review of the July 2003 *A&R Plan* that “no specific closure criteria have been presented.”

The new *Plan* provides no further description of progress in developing closure criteria, even though BHPB started this work in 2001. Three years later the *Plan* is proposing that, “definitive reclamation criteria and an accepted methodology of measuring and identifying completed reclamation at disturbed sites be developed before full commencement of progressive reclamation and eventual closure” of the mine.

The 2004 *Plan* notes, as did the previous version, that the work on this issue “will expand to include review of a draft literature review on criteria used by industry and government” elsewhere. While it is unclear as to what a “review of a draft literature review” is, there is no indication that such a review has yet informed the development of mine closure plans at Ekati.

In its *Response Document*, the company notes that the outline presented “will be used as a basis on which more detailed criteria will be developed. The company intends to expand on this outline with the development of specific criteria for closure. A first draft

of “completion criteria targets” is to be circulated to stakeholders for comments at the end of June, 2005, with a final report to be submitted to the MVLWB by end of 2005.

The 2004 *Plan* notes that the DIAND 2002 *Mine Site Reclamation Policy* does not provide specific closure criteria for achieving the broad “objective” set out by the 1994 *Whitehorse Mining Initiative* of “returning mine sites and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities.” The absence of DIAND-defined criteria, however, should not be used as an excuse not to adopt the broad goal for all reclamation work at Ekati. Current plans for waste rock dumps do not propose to meet this goal.

The new *Plan* does not meet the DIAND and NWT Water board guidelines for having a closure plan that will address premature shutdown scenarios. This comes back to a previously emphasized point, which is that for developed components of the project, specific and implementable closure plans must be in place so that appropriate and timely action can be taken by managers in the event of a premature shutdown. The current *Plan* does not have implementable provisions for mine closure.

The *Plan* notes that three stages of reclamation are identified as being “used” at Ekati. The last—“completion criteria conformance”—is described as “monitoring for establishment of sustainable habitats”. Since most reclamation units do not have a stated habitat sustainability objective for closure, the applicability of this concept to reclamation planning is not clear.

The new *Plan* identifies four “site conditions” for which completion criteria can be considered: a] physical stability; b] chemical stability; c] biological stability; d] climatic and geographic stability. The distinction between “conditions” and “goals”, which these seem also to be, is not clear. We have the following comments on this outline:

1. Physical Stability

One of the requirements identified for this site condition is that all physical structures “continue to perform the function for which they were designed.” This appears to be nonsensical in terms of reclamation objectives for open pits, dams and dykes, sedimentation ponds, underground openings, tailings ponds, and most of the other mine structures. This needs clarification.

2. Chemical Stability

Chemical stability at the site is acknowledged as an important post-closure site condition. However, the requirements listed in Table 10 fall short of what is required in terms of targets for closure. Identified requirements such as “effluent quality requirements as required by the *Water Licence*” is an unacceptable target for pit lake water quality. This is because the *Water Licence* specifies limits for only a few parameters, and sets the levels for the end-of-pipe discharge, not for the receiving environment, which the pit lakes will become. The correct targets for all site water quality should be defined for all water quality parameters on a priority and site-specific basis, as follows:

- non-degradation (i.e. as close to background as possible); or if these are not achievable,

- best available technology, when such technology can surpass CCME guidelines; or, if these are not achievable,
- CCME guidelines.

3. Biological Stability

The notion of “stability” as applied to biological or, more properly, ecological, processes at the site is misdirected. We recommend that the concept of “viability” be used instead. Biological processes are not stable, but are in a state of dynamic equilibrium driven by genetic and environmental forces, and can change dramatically over time. The concept of what is needed here is better captured by the “viable and self-sustaining ecosystems” wording of the *Whitehorse Mining Initiative*.

4. Climatic and Geographic Stability

This condition as a requirement for reclaimed landscapes is confusing and somewhat incongruous with the others. Climate and geography are factors which clearly influence how reclamation will be carried out, and how effective it will be in the long-term. But these are not goals for reclamation in the same sense of the first three listed. Is it a reclamation goal to achieve climatic and geographic stability at the site? The company should give some consideration to replacing this condition with “long-term land use” goal, as is conventionally done in other mine closure plans.

Revegetation

No plans for how revegetation is to be carried out for the various reclamation units are provided. The *Plan* mentions only that an inventory of seeds of native species collected at the site has been done, that steps have been taken to discourage the introduction of exotic species to the site, and that native grass cultivars are used for “providing initial ground cover on disturbed sites.”

Current Reclamation

Table 12 lists “reclamation work areas” which are currently part of progressive reclamation at the site. The following components are questionable progressive reclamation activities:

- Panda Diversion Channel, which is the subject of fish habitat creation during mine operations, will be filled in at closure, rendering any reclamation work done in the interim pointless;
- till/sediment storages areas are noted to be fertilized and seeded with grass, yet these ultimately will be either covered by waste rock dumps, or will be transported and used as top-dressing at other locations. Seeding these in the stockpiled situation does not contribute to progressive reclamation;
- the same situation holds for topsoil storage areas.

Since there are no closure criteria specified for the sites on this list, it is not possible to determine when reclamation will have been successfully achieved.

Premature Shutdown

The plans for premature closure (Chapt.10) are not acceptable. This chapter provides almost no detail about what will happen, and confuses temporary and long-term shutdowns with premature closure, the latter situation being an unplanned but permanent closure of the site. The *Plan* needs to address what would happen to current conditions at the mine in the event that a premature closure took place. As for temporary and long-term shutdowns, the *Plan* begs the question as to how long these conditions will last before a permanent shutdown becomes a reality. What measures need to be taken at what points following a temporary shutdown to adequately protect the environment? What are the triggers for action? At what point during a temporary shutdown, for example, would it become necessary to ensure that protective covers were properly installed for the biotite schist components of the Misery waste rock dump, or that drainage should be re-established through the Koala and Panda pit zones?

Reclamation Research

Our October 2003 general comment pertaining to reclamation research summaries still holds for the new *Plan*. There is sufficient information about what research has been conducted to date, but far too little information about how the research results will be used in reclamation planning. Specific details about how the research will inform closure of the site is a fundamental requirement of the *A&R Plan*, but have not generally been provided to date. Comments are provided below for two of the specific components described as research activities in the *Plan*.

LAKE SEDIMENTS/TILL

Sec.7.2 of the 2004 *Plan* notes that “soil amendments are important substrate materials in reclamation because they condition the soil and improve the success of vegetation colonization, seeded plant establishment and sustainability.” Research conducted by the company has concluded that:

- sediments are low in nutrients but could be used as an amendment for reclamation at various sites when augmented with organics and/or fertilizers;
- usefulness of sediment and till as a soil amendment remains an uncertainty; poor physical characteristics have “slowed the progress in determining the final reclamation purpose of this material.”
- this material may still prove useful as fines for reclamation of camp pads and some sections of waste rock storage areas.

Even though a decision on how best to use lake sediments has not been reached, this material is currently being used for non-reclamation purposes (waste rock dump construction), or incorporated within waste rock dumps. No data have been provided to identify what quantities of sediments are available, or will be available should their use as reclamation amendments be prescribed.

Until the necessary research is completed, and reclamation plans for sediments resolved, inventories of present and future quantities of sediments should be on-going, and steps

taken to ensure their integrity in storage so that they are useable and accessible if and when required for reclamation.

ESKER SANDS

The discussion (Sec.7.2.3) on the use of esker sands in reclamation is confusing. It is not clear whether this material has use as a reclamation material for disturbed sites, or whether the eskers themselves will need reclamation work. No assessment is provided as to the quantities of this material ultimately available, or needing reclamation.