

**Independent Environmental Monitoring Agency
75th Meeting of the Board of Directors
Yellowknife, NWT
September 12-13, 2011
Summary of Discussion**

Revised: November 7, 2011

Directors

Bill Ross
Tim Byers
Laura Johnston
Jaida Ohokannoak
Audrey Enge (Sept. 13th)
Tony Pearce (by phone Sept. 13th)

Guests

Kathy Racher, Wek'èezhìi Land and Water Board (WLWB)
Ryan Fequet, WLWB
Brett Wheler, WLWB
Eric Denholm, BHP Billiton (BHPB)
Helen Butler, BHPB
Charity Clarkin, BHPB
Bruce Hanna, Department of Fisheries and Oceans (DFO)
Lisa Lowman, Environment Canada (EC)

Staff

Kevin O'Reilly, Executive Director
Monica Krieger, Communications and Environmental Specialist

AGENCY BUSINESS

➤ **Information Updates**

Bill – Attended Environmental Agreement Implementation meeting June 17th, water licence renewal meeting July 27th, technical sessions on Long Lake Containment Facility (LLCF) July 28th, and follow-up conference call August 29th with Jack Caldwell and BHPB on extra-fine processed kimberlite (EFPK) crust formation.

Jaida – Reviewed correspondence and financial matters, edited Annual Report plain language chapters, and worked on communications plan.

Tim – Reviewed correspondence, edited Annual Report plain language chapters, participated in July 26th conference call with Bill Tonn and Rescan team re: Panda Diversion Channel grayling monitoring, and participated by phone in July 27th water licence renewal meeting.

Laura – Reviewed correspondence, worked on communications plan, and conveyed initial thoughts on mixing zone research.

Audrey – Attended Arctic Ungulate conference in Yellowknife August 22-25th, and reviewed correspondence.

Kevin – Attended June 17th Environmental Agreement implementation meeting, completed audit (final version has been sent to Society Members and is in Annual Report), completed Monica's performance evaluation, and provided information to Kitikmeot Inuit Association re: processed kimberlite toxicity (staff were responding to a windblown spill off the Jericho tailings pond). Participated in August 29th conference call re: EFPK crust formation in LLCF, meeting with Bruce Hanna (DFO) and Eric Denholm (BHPB) July 15th re: drainage from upper pond into PDC, and Arctic Ungulate Conference (Kim circulated notes). Completed letters on nitrate issue to BHPB, adaptive management plan guidelines to WLWB, and comments on BHPB 2010 Environmental Agreement Annual Report to DIAND. Completed Agency Annual Report and made preparations for meeting in Whati, which has been postponed until the new year due to scheduling and accommodations issues.

Monica – Completed and circulated minutes for June 6th Inter-Agency Coordinating Team meeting, June 14-16th Agency Board meeting, June 17th Environmental Agreement Implementation meeting, and July 27th water licence renewal meeting as well as spring Ekati Monitor newsletter. Made initial contacts for community visit to Whati. Completed final edits for Annual Report. Attended Arctic Ungulate conference August 22nd-25th and Time Management course August 11th. Worked on Resource Centre section of website and overview of documents in office library.

➤ **Financial Report**

Jaida reviewed the 2011-12 Year-to-Date Expenditures and Variance Report. All spending appears to be on track. Board meeting expenses are less than budgeted because not all Directors have been able to attend all meetings. The Board meeting and community visit to Whati could still occur this year, likely in February or March 2012.

➤ **Annual General Meeting and Environmental Workshop Planning**

Directors and staff discussed plans for an environmental workshop on December 8th and the Agency's Annual General Meeting (AGM) on December 9th.

It was suggested that Traditional Knowledge (TK) become the workshop focus. BHPB's new TK Advisor Charles Klengenberg could present the Ekati TK Strategy and discuss the community site visits. Community representatives could present results from TK projects BHPB is funding.

BHPB will also be carrying out some TK work related to the ICRP and perhaps Helen Butler and Charles Klengenberg could co-present on this topic.

Society members will want to hear from the Agency as well, not just presentations on other people's work. Directors could present a retrospective on what the Agency has done to advance this topic, such as hosting TK workshops, Annual Report recommendations, and letters to BHPB. Suggestions could also be offered for the next eight years of operation plus during closure. Motion activated cameras, locations of ramps on and off waste rock piles, and other ideas were suggested to BHPB during the time when Misery was shut down.

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| Action Item #1 Kevin to approach Charles Klengenberg and community representatives for initial feedback on whether they would be interested in participating in a TK-focused environmental workshop. |
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The AGM is planned for December 9th (half day), followed by lunch and an optional afternoon session for Aboriginal Society members discussion. A regular Board meeting will be held December 7th.

➤ **WLWB Conformity Review of Wastewater and Processed Kimberlite Management Plan (WPKMP)**

The Agency wrote a letter to the WLWB in January 2011 expressing concerns about the conformity check of the WPKMP, and a response was issued in May 2011 as a WLWB staff report. The substance of the Agency's specific comments on the plan was not addressed. There was simply agreement to fix up the process to make it a more transparent in the future. At a minimum, the WLWB could have directed BHPB to consider the Agency's comments in the next revision. Directors agreed no further action will be taken at this time.

➤ **Long Lake Containment Facility (LLCF) Deposition Plan Review**

Bill and Tony attended the July 28th technical meeting to review the deposition plan for processed kimberlite (PK) in the LLCF and circulated notes. BHPB hosted the meeting and presentations were given by Robertson Geoconsultants, who have been involved with LLCF design from the start. The purpose was to review results of recent LLCF investigations and determine how best to operate the facility during the remaining years of operation. Representatives from WLWB, Environment Canada, Aboriginal Affairs and Northern Development Canada (AANDC), Department of Fisheries and Oceans, and Łutsel K'e Dene First Nation also attended.

Cell A has about 3-4 years of capacity left for PK deposition, and cell B is basically full. Jack Caldwell (Robertson Geoconsultants) presented results of cone penetration tests, which measure the pressure needed to drive a cone into soils or tailings and therefore the strength of the materials. An unexpected result is that there is a "crust" of extra-fine processed kimberlite (EFPK) between 5-6 metres below the surface. It lies on top of a much more fluid mixture of water and EFPK.

Keith McLean (BHPB) presented various options for how and where to deposit the anticipated 35 million m³ of PK which will be generated from now until the end of mine operations in 2018. More space will be needed if the mine plan changes and additional kimberlite pipes are developed. BHPB's recommended plan is to continue depositing PK into cell A North, cell B West, and cell C North. As well, BHPB recommends that PK be placed in Beartooth pit starting in summer 2012, the west part of cell C in 2013 (including raising Dike C), the south part of cell A in 2013-14, and the east part of cell C in 2014-15. This plan defers the use of cell D which is desirable for closure (provides an additional safety measure for water quality). BHPB will revise the Wastewater and Processed Kimberlite Management Plan to reflect this preferred option. It will be submitted to the WLWB along with the full technical report on cone testing.

Directors and staff discussed AANDC's concerns regarding the use of Beartooth pit. It was noted that even with the use of Beartooth, only 34 million m³ of PK storage capacity will be available. The additional one million m³ may have to go into cell D, which is what everyone was trying to avoid. Beartooth already has questionable water quality and it is unclear whether meromixis will occur (layers that do not mix together). AANDC is concerned that more risk to water quality is being introduced by using Beartooth, especially when it does not avoid the use of cell D and gives a relatively small gain in capacity.

Directors noted that when BHPB proposed using Beartooth as a sump (and WLWB later approved it), the Agency's position was that putting PK into the pit as early as possible would be a better use. With careful monitoring, there were opportunities to see how things proceeded with implications for closure. If other pipes are developed and more capacity is needed, it would be known by then whether this option was sound. The plans for Beartooth are fairly conservative with about 30 m of clean water at the top.

Starting PK deposition in Beartooth now would provide greater time for consolidation of the tailings prior to flooding, which may have some advantages for water quality. Using Beartooth is also easier to start with logistically as only pipeline is needed, versus the other options which require building roads and infrastructure. BHPB may also be able to find other options for the last million m³ of PK.

A follow-up conference call was held on August 29th with Jack Caldwell to clarify how the EFPK crust layer is forming. Bill, Kevin and Monica participated as well as Eric Denholm and Keith McLean (BHPB). Jack explained that the freeze-thaw mechanism is the major contributor to solidifying EFPK and is similar to examples seen in the oil sands. In winter, water freezes to about 2 m depth in the LLCF, and salts are extruded (pushed out) as it freezes its way down. The crust of semi-consolidated EFPK is just below the 2 m mark (i.e. below the solid surface of

the ice), and has a cone penetration pressure of about 7 kilopascals. This is the consistency of "lemon pie", so not solid but firm enough that wave action will not re-suspend it.

The crust itself is 0.3-0.5 m thick, and below it is unfrozen water with EFPK suspended. Jack noted that the Suncor oil sands facility is dealing with the same kinds of very fine tailings, and has demonstrated that the freeze-thaw mechanism contributes to better tailings management. For the LLCF, Jack recommends lowering the water as much as possible in the winter, especially in cell C, to get more consolidation of EFPK closer to the bottom.

The mechanism does not occur under ice per se but rather at the interface of ice and EFPK, otherwise there is too much of a dilution factor. At closure, the LLCF could be drawn down so it freezes in the center, slowly increase the water level to freeze the next bench, and repeat the process. In this way you could cap (crust) all the EFPK. This may be seen only now because EFPK has built up and there is less depth of water. These questions will need to be answered in the reclamation research.

The Agency will have further discussions with AANDC and prepare comments after BHPB submits the revised WPKMP.

➤ **Air Quality**

BHPB distributed the revised 2008 Air Quality Monitoring Program (AQMP) report, but it was unclear where changes were made or that they were in response to the independent review by SENES Consultants (commissioned by the Agency). Jamie Steele (BHPB) later e-mailed the Agency a table with these details, but it is not included with the distributed report. The Agency sent this table to Dave Fox and Aileen Stevens (GNWT) but there has been no further discussion.

Directors agreed that a review of this revised 2008 AQMP is not necessary since the next report (2011) will likely be released before March 31, 2012. Methodological issues can be checked at that time using the revisions table, but it seems that BHPB did address many of the snow sampling concerns and made improvements. Following receipt of the 2011 report, the Agency will determine whether another independent review is required.

➤ **Grizzly Bear Monitoring**

At the last Agency meeting, there was discussion about bringing together the diamond mines, monitoring agencies, and GNWT to discuss grizzly bear monitoring protocols. Kim Poole has had informal conversations with Keith McLean (BHPB) and Rescan about this and they seemed to be interested. Kim suggested waiting until early 2012 when Mathieu Dumond (Government of Nunavut regional biologist)'s research results would be available.

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| Action Item #2 Kevin to send e-mail to interested parties suggesting an early 2012 meeting on grizzly bear monitoring. |
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➤ **2011 International Mine Closure Conference**

Kevin, Monica and Tony are registered to attend this conference from September 19-21 in Lake Louise, Alberta. Kevin and Monica will also participate in short courses on pit lake design, water management, risk assessment, and cover system design on September 17-18.

➤ **Revegetation Sustainability Criteria Contract**

Kevin provided an update on the contract with David Walker which specified the work was to be completed by March 31, 2011. In April he said the report would be late, but no work has been submitted to date and there has been no response to several recent e-mails. The contract was for \$5000. No monies were advanced but the funding was carried forward into the 2011-12 fiscal

year, with the expectation it would be expensed in the first quarter. Therefore, there will be \$5000 less for outside contracts next year.

The Board of Directors approve termination of the contract with David Walker for failure to produce the work requested.

Moved by Tim Byers. Seconded by Jaida Ohokannoak. Carried unanimously.

Directors discussed how to proceed with the other report submitted by Dave Polster on this topic. The report is very general with little site-specific content but has some interesting concepts. The Directors agreed that the report should be made available to Society members and posted to the Agency's website.

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| Action Item #3 Kevin to send e-mail to Society members saying that the report was commissioned and is available for review. Monica to post report on website. |
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➤ **BHPB 2010 Annual Report**

The Agency submitted comments to Aboriginal Affairs and Northern Development Canada (AANDC) in September 2011 stating that the report was satisfactory but suggesting some improvements. AANDC has not yet released its official response.

➤ **Agency Annual Report 2010-11**

The Annual Report (technical and plain language version, and a summary brochure) is now completed and printed. Mail out of hard copies will be completed by the end of the week.

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| Action Item #4 Monica to post electronic versions on the website and send e-mail notifications. |
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➤ **Ekati Traditional Knowledge (TK) Strategy**

This document was distributed by Charles Klengenber (BHPB) in August, and Kevin forwarded it to Directors. It was agreed that having a formal written strategy with clear commitments is a definite improvement. No further action is required.

➤ **13th Arctic Ungulate Conference, August 22-26 (Yellowknife)**

Kevin, Monica, Kim and Audrey attended this conference. There was a discussion about the research by Natasha Thorpe in Kugluktuk on how development affects caribou. The results suggest that caribou born into a landscape with high levels of development may be more habituated to the disturbances than older caribou.

➤ **Fay Bay Spill Monitoring Report Response Letter**

The Agency sent a letter to BHPB in January 2011, expressing concerns that impacts of the processed kimberlite spill on fish habitat in Fay Bay were not adequately considered. BHPB responded in August 2011 with information from Rescan, stating it was unlikely that lake cisco were affected by this event. Tim said that work done on cisco in the Northwest Territories would have been more relevant than the work they quote from Ontario, and the majority of the response is citation of literature. As well, the issue remains that the fish study was kept to only two species and a proper fish community evaluation for the whole lake was not done. Given the life history and habits of the fish present, cisco is the only species that could have been affected in terms of where and when the spill occurred. The response does not deny that cisco are fall spawners or that the spill could have covered the eggs, but it maintains the spill was over such a small area it was not of concern.

Action Item #5 Tim to review new 2010 Fay Bay Monitoring Program report and speak with Bruce Hanna (DFO). If a further response is needed, research other studies which would be relevant.

➤ **Website, Timeline and Resource Library**

Monica described further updates to the main website, in particular work on the “Resource Centre” page. This section will have main documents related to Ekati including the original 1995 Environmental Impact Statement, panel review and hearing transcripts, *Environmental Agreement*, Ekati licenses and permits, general information on types of environmental monitoring programs and closure planning at Ekati, and a list of acronyms and glossary of technical terms. She noted that for licenses and permits in particular, it is difficult to find things on the WLWB website. The Agency website should not duplicate all the information that is on the WLWB website, but could have some of the main documents (e.g. water license, wildlife research permit, closure plan, etc.) with a link to the WLWB website and notes on where to find other information.

Organization of photos is a key task which must be completed before any further work can realistically be undertaken, as the timeline was designed to be a primarily visual tool. Monica is registered to take a Microsoft Access course in October, which will be used to set up a database for the photos.

Directors and staff discussed the possibility of a summer student to perform some of these tasks. There may be some background knowledge required in order for the student to work independently without requiring constant clarification on correctness of entries.

Monica added the paper documents must also be organized if the Agency’s resource library is to be truly available and user-friendly. However, it will be difficult to work on this a few hours at a time in between other duties, and would also benefit from a short-term student position dedicated to this task.

Action Item #6 Monica to set up database for Agency photos following completion of Microsoft Access training.

Action Item #7 Staff and Directors to research options for summer students, co-op students and/or interns.

Action Item #8 Staff to request that Outcrop provide statistics and user profiles for the timeline website since its launch on March 31, 2011.

➤ **Agency Communications Plan**

Monica presented the final draft of the Communications Plan, which has undergone several revisions and edits over the past year based on suggestions from Directors. It now includes a Background section which incorporates information from the background paper and notes this is also available from the Agency. The plan will be a public document, available in the office and on the website.

The Board of Directors approve the Agency Communications Plan as written (to be named Version 1.0). The plan is to be reviewed annually and updated as required with new initiatives.

Moved by Laura Johnston. Seconded by Jaida Ohokannoak. Carried unanimously.

Action Item #9 Monica to post the approved Communications Plan to website.

Monica presented the tables on implementation and evaluation of the Communications Plan. These will be internal working documents which are regularly reviewed and updated as required.

Directors made a number of suggestions for changes to both the Implementation Table and Evaluation Table.

Action Item #10 Monica to finalize and date implementation tables with suggested improvements.

Directors and staff discussed how to present the plan to Society members, including asking for opinions on preferred communications options. Jaida suggested sending an e-mail and discussing it at the AGM. In particular, new communications ideas should be presented for opinions. Directors should identify a few key priorities to discuss at the AGM and would likely include organizing the photos, updated Agency poster, executive summary of Annual Report in Aboriginal languages, fact sheets on specific topics, community visits, and perhaps a video presentation about the Agency.

Action Item #11 Staff to prepare PowerPoint presentation for December AGM, outlining several key communications initiatives for discussion by Society members.

Action Item #12 Staff to create updated text and photos for new Agency poster. Mock-up to be ready for presentation at December AGM, on screen and/or printed on large format plain paper. Any suggestions from Society members to be incorporated prior to final printing.

MEETING WITH ERIC DENHOLM, HELEN BUTLER AND CHARITY CLARKIN (BHPB)

Nitrates in LLCF Discharge

The Agency discussed its May 17, 2010 letter to BHPB expressing concern over use of the Ideal Performance Standard (IPS) of 4.7 mg/L nitrate as an effluent discharge criterion for the Long Lake Containment Facility (LLCF) at Ekati. A follow-up letter was also written (July 11, 2011) noting BHPB's lack of response as well as a new draft water quality guideline for nitrate of 3.6 mg/L released in February 2011 by the Canadian Council of Ministers of the Environment (CCME). The CCME document also recommends implementation of the Protection Clause (using the lower data point of 3.16 mg/L as the criterion) for watersheds where lake trout occur and are considered an important component of the ecosystem.

Eric discussed results of BHPB's tests in the Long Lake Containment Facility (LLCF). Phosphate fertilizer was added to cell D to stimulate growth of phytoplankton, which consume nitrate and would therefore lower nitrate levels in the LLCF. The summer of 2009 saw encouraging results with a 19% reduction. The process was repeated in summer 2010 but was less successful. This summer seems to be better and results are being watched carefully. The latest discharges in August were around 3.7-3.8 mg/L nitrate, and BHPB has been managing water flows and rates to stay below 4.0 mg/L. Discharge out of cell E occurred throughout the summer and will continue until early October.

Eric noted that the draft CCME guideline was circulated for review and comment, but an official updated guideline has not yet been issued. He presented some notes summarizing BHPB's position that the IPS of 4.7 mg/L (derived by Environment Canada in 2008) is the most recent guideline available to use, and BHPB's actual discharge is being maintained at less than 4.0 mg/L. He emphasized that BHPB is doing additional work on developing a site-specific water quality objective (WQO) for nitrate. Specifically, Rescan is looking at the relationship between toxicity and water hardness. Tests have been conducted on fathead minnow and *Ceriodaphnia* to add to the standard tests on rainbow trout. Additional tests on lake trout were attempted this summer, but British Columbia has new and very strict guidelines on fish importation (concerns

about invasive species). In order to send lake trout eggs to the lab in BC, a permit is required from Department of Fisheries and Oceans (DFO) which takes about a year to obtain. BHPB hopes to have a technical report on this work by March 2012. If CCME publishes 3.6 mg/L as the official updated guideline prior to this date, BHPB will use it instead of the IPS. Water levels in the LLCF are being managed well, and the goal is to get two ponds pumped down so that a full year's emergency storage capacity is available.

Kevin noted that on page 17 of the Agency's 2010-11 Annual Report, the chart shows nitrate levels in Leslie and Moose Lakes as above CCME guidelines, so the issue is not just in the discharge. The data used for this chart is taken from BHPB's Aquatic Effects Monitoring Program (AEMP) annual report, as well as Agency analysis of raw data in the Appendices (e.g. selenium was well above CCME but did not appear in Rescan's text). Eric clarified that the CCME guideline used in the report is 2.9 mg/L which is the current interim guideline, not the draft, so it does appear as an exceedance. BHPB recognizes that Leslie and Moose are lakes of concern as they are subject to the effluent quality with no chance for dilution. A site-specific WQO for nitrate that everyone agrees on could be developed, as is now under way for molybdenum.

The Agency asked whether this information would be formalized into an official response letter from BHPB. Eric replied this will happen, but the company wanted to have this initial discussion with the Agency first. It was agreed that the Agency should review the information provided by BHPB and provide any further feedback following the meeting.

Pigeon Stream Diversion

Charity presented BHPB's new concept for the Pigeon Stream Diversion, which would involve construction of a temporary (~10 years) diversion channel around the future Pigeon open pit instead of the original plan for a permanent structure. Both plans provide for safe water flow and fish movement around the pit in the summer (fish are not present in winter).

The main advantage of the new plan is that no permanent structure means no long-term risks or maintenance requirements. It also re-establishes the natural flow path by allowing Pigeon Stream to flow back into Pigeon pit lake at closure. As well, the temporary structure would be less complicated and less expensive to build. It would also reduce the total disturbed footprint. However, since the channel would be closer to the edge of the pit, special management of blasting in summer may be required to prevent negative effects on fish from blast vibrations.

The Department of Fisheries and Oceans (DFO) No Net Loss Policy also requires BHPB to compensate for lost habitat in the Pigeon Stream. The new option would require BHPB and DFO to agree on an alternate site for compensation, as previously the permanent diversion channel was to serve this purpose.

Helen added that at closure the temporary channel could become part of the beach zone of the pit lake, and a flow-through stream would be created (Pigeon stream flowing into Pigeon pit lake and out to Fay Bay). The permanent structure would not have had the top inflow stream connected at closure, and the pit lake would therefore only collect a very small amount of runoff.

Eric noted that a solid engineering design does exist for constructing the permanent channel, which involves over-excavating and backfilling with fine-grained crushed rock. The channel would be seated in ice-rich glacial till and not bedrock, so there is always a risk of settlement and sedimentation. This could create an ongoing problem after closure in terms of fish use of the channel. The temporary channel option means no perpetual care structure and a reduced footprint.

Bill noted that during operations, this diversion would be much closer to blasting activities and could create a greater impact on fish (from both vibrations and nitrate residue). This issue is to be addressed by BHPB but the Agency is interested in further details. The Agency could also be

involved in selecting a new location for the fish habitat compensation project, although officially the agreement would be between DFO and BHPB.

Eric said there is greater transmission of vibrations in glacial till, so modified blasting practices or locations may be required at certain times of the year. BHPB acknowledges there is a heightened risk of both contaminants (dust and nitrate) and blast vibrations, but feels it is manageable. Charity added that the construction plan schedule is the same for both options. The diversion would be built this winter but not connected, and freshet would be allowed to come through for one year with a collection pond at the end. The following winter it would be connected to the stream, and the next spring water would flow through the diversion channel. The plan is to have it completed and flowing through in spring 2013, after which pre-stripping of Pigeon would start.

Eric noted that the permanent diversion would require a lot of loose dusty fill materials, which will wash off in rain events. The temporary channel design is far less risk as flushing occurs through a plastic or metal liner or flume. Laura noted there is also an increased safety risk for workers in the pit by having a creek of water so close to the edge. Eric replied this has been discussed with the Health and Safety team and the issues are manageable. Helen added that if distance becomes a problem, they may have to cut back further on the littoral zone, and berms and additional containment measures are planned to address safety issues.

Eric said this is still not a fully formulated plan and further discussions are planned with DFO and the Wek'èezhìi Land and Water Board (WLWB). However, the company sees a lot of benefits with this option and feels the downsides are operational issues that can be managed. Kevin asked whether the risk assessment would be summarized and distributed. Eric replied that it would be an internal process, but the company will circulate details on design and layout and summarize the decision-making process. EBA Engineering would complete the final design if this option is chosen. He added that construction of the permanent channel is scheduled to begin in January 2012, so a decision is required quickly. The Agency offered qualified support for this approach.

Air Quality and Incinerator

The Agency asked about the status of the new incinerator at Ekati, following the recommendation in the Agency's 2010-11 Annual Report. Eric said that the mechanical and electrical work should be completed by the end of the year. Regular progress reports from engineers on site were submitted every two weeks all summer. Work was completed on the fuel delivery system and tank stand, emission scrubber system, and other components. There will be a training stage for employees as well as stack testing, so commissioning might take a few months before it is running routinely. The August 18th report shows a high percentage of work completed in relation to targets. Aileen Stevens (GNWT-ENR) has also expressed an interest in seeing the unit once it is operational.

Kevin asked whether the Environment Canada batch waste incineration guidelines will be used. Eric replied there will be operating procedures, likely on an hourly level of detail, but a discussion on those guidelines has not occurred yet. Kevin suggested that the Waste Management Plan would need to be updated once the incinerator is operational, as the last version the Agency has is dated 2000. Eric agreed this would prompt an update to the plan, and would note this to Keith McLean.

Water Licence Renewal 2013

Charity said that since meeting with the Agency on July 27th, BHPB also met with all the regulators including Aboriginal Affairs and Northern Development Canada (AANDC), Government of the Northwest Territories Environment and Natural Resources (GNWT-ENR), Environment Canada, DFO, and the WLWB. Points raised were similar to the Agency's including term of the licence and effluent quality criteria (EQC), particularly for nitrate and chloride. BHPB plans to

have a more detailed meeting or workshop sometime before Christmas, and is on target to submit the renewal application to the WLWB in early 2012.

Tim asked for clarification on the additional work mentioned in the water licence regarding discharge from Two Rock Lake into Horseshoe Lake. Charity replied that Sable pit is still on the list of reserves as a potential operation so will be kept in the water licence, but BHPB will not be initiating any additional technical work until such time as Sable becomes economically feasible. Eric added that the work included developing an EQC for nickel before discharge was allowed to Horseshoe, as well as circulation water modelling. There has been no further work on the road to Sable.

Interim Closure and Reclamation Plan (ICRP)

Helen confirmed that the revised ICRP has been submitted to the WLWB. Printed copies will be delivered following the WLWB staff's conformity check, which should take about two weeks. A conformity table is included to track changes from the previous version.

2012 Environmental Impact Report (EIR) Workshop

The Agency asked for an update on this workshop, which was supposed to be scheduled for fall 2011. Eric said that Keith McLean is continuing to plan for the workshop, including some preliminary discussions with Rescan, but no dates have been suggested yet.

Traditional Knowledge (TK)

Eric said that Charles Klengenber (BHPB TK Advisor) is hosting Yellowknives Dene First Nation members on site this week, and North Slave Métis Alliance is scheduled later this month. Tłı̄ch̄ communities were busy all summer but are trying to schedule for October. Charles is attempting to coordinate site visits to coincide with major activities on site (e.g. moving grizzly hair snagging posts).

BHPB is funding a project in Łutsel K'e to translate, transcribe and digitize old audio and video tapes. The contract became a "test case" for new and very rigorous requirements from BHPB Corporate. The company has signed onto United Kingdom legislation as the highest standard to protect the company against charges of corruption and bribery, which is a huge issue internationally. Contracts must now be very specific in terms of who needs to review documentation and who provides approval. BHPB is finalizing a funding agreement with Tłı̄ch̄ Government for a similar project. There is now a Tłı̄ch̄ working group (John B. Zoe and others) that is the main contact for all issues related to mining companies. BHPB is supporting these types of projects for the preservation and collection of TK, as well as those focused on Ekati-based collection of TK.

The Ekati TK Strategy was distributed recently, and Helen noted that Charles is focusing on closure and how to bring TK into those discussions. BHPB staff have also met with a group at AANDC to share ideas on this and other initiatives to involve communities.

MEETING WITH BRUCE HANNA (DEPARTMENT OF FISHERIES AND OCEANS)

Ekati Water Licence Renewal and Mixing Zones

DFO met with BHPB regarding the water licence renewal and raised similar issues as did the Agency. Bruce discussed DFO's position on the concept of mixing zones, the area in a waterbody downstream of the discharge where the effluent plume is diluted by the receiving water. Since mixing zones have higher levels of substances that could be deleterious (harmful) to fish and fish habitat, they could require an authorization under the *Fisheries Act*. However, no section of the *Act* deals specifically with mixing zones. Bruce has discussed the issue with Julie Dahl (DFO), who is trying to get clear direction from Ottawa on an official position.

The only other Canadian guidelines which might apply to mixing zones are the *Metal Mining Effluent Regulations (MMERs)*, but these do not apply to diamond mines. Developing separate regulations for diamond mines is the preferred approach. This work seemed to be a higher priority with De Beers' Gahcho Kué project moving ahead but the government appears to have shelved work on separate regulations for diamond mines for now.

The only example of use of a mixing zone at Ekati is in relation to Sable, which is not currently in the mine plan. Bruce sent the Agency a document on mixing zone guidance from the Alaska Department of Environmental Conservation which could have some useful ideas.

Panda Diversion Channel (PDC) Monitoring

Bruce provided an update on the close-out monitoring program for the PDC and work on site by Bill Tonn and others. Benthics data analysis should be complete by October, and the final report from Dillon Consulting is due by March 2012. The team looked at initial reference streams as well as Panda now, compared to the beginning, and will provide recommendations which can be applied to other projects.

Tim said that from the conference calls where he participated, it seemed the focus of Tonn's team was more on the success of fisheries habitat creation in stream (based on the benthic community and other factors) and less on the physiological survivability of grayling fry. Bruce replied that the study objectives do include this aspect, and the health of the benthic community will obviously impact fish health (food source).

Bill questioned whether the PDC would be deemed a success as long as vegetation and food sources are available and fry are present, even if the fry don't survive until the next year. Bruce replied that it does seem similar now to Vulture and other reference streams, and as habitat improves and more food sources are available, it seems logical there will be more fish and higher survival rates. They are hoping more certainty will come when as tagged fish start returning, which is why the program is expanding beyond the 10 years.

Tim added that Tonn's review (commissioned by the Agency) of the 10-year PDC monitoring report expressed concern over the low amount of riparian vegetation compared to reference streams. However, the PDC has large boulders which may take the place of vegetation for cover purposes. Bruce agreed and said that a few more features can also be added (e.g. in the canyon section) before shutting down the program. He also noted BHPB's work this year on stabilizing the PDC walls to reduce siltation events. Tim said that during extremely cloudy events with high suspended solids, fingerlings and fry seem to be fine after it dissipates. Bruce agreed that fry will still go through even in those conditions. Bill said the Agency has been more concerned about sediments burying some of the vegetation and removing some of the food that sustains these fry.

Toxicity Testing

Bruce sent the Agency draft results of toxicity testing on northern fish species being conducted by University of Guelph. Tim added that preliminary results were also presented at the Grayling Symposium he attended recently in Grande Prairie, AB. Grayling appear to be much more sensitive to chlorides and other contaminants than the usual test species of rainbow trout. Kevin asked whether chronic toxicity can be hypothesized based on acute toxicity test results like this study. Bruce undertook to check on this but noted that the toxicity testing results will be published and useable well before the BHPB water licence renewal.

Pigeon Stream Diversion Channel

Bruce discussed DFO's opinion on the new option for a temporary Pigeon stream diversion channel. Alternative compensation for fisheries habitat will have to be defined, but there are some clear advantages with the new option.

Bill said the Agency has not expressed any major objections to the new option, provided that DFO is satisfied with proper compensation. The Agency will recommend that it be carried out on

site, not placing money into a compensation fund. The company will also need to deal with the effects of blasting if the diverted stream is closer to the pit, but it seems confident this can be done. A summary of the risk assessment will be made available if this option is pursued. Bruce said that DFO did some work with Diavik on the blasting issue, and with some mitigation for timing it could probably be done (e.g. should not be done in spring when fish are in Exeter Lake due to vibrations and instantaneous pressure changes).

Laura asked whether the creation of fish habitat in the pit after it closes would be considered compensation. Bruce replied that DFO would not be averse to doing this. It could be considered spawning habitat that is on site and nearby, meeting the priorities of the No Net Loss policy. The original plan for the permanent diversion channel (with additional features) was the agreed upon compensation. Creation of a littoral zone in the pit lake would be the minimum requirement.

Laura suggested there is a real advantage to having the stream go through the pit at closure so it is not dependent only on runoff and precipitation.

MEETING WITH KATHY RACHER, RYAN FEQUET, AND BRETT WHELER WEK'ÈEZHÌI LAND AND WATER BOARD (WLWB)

Ekati Water Licence Renewal

WLWB staff have been tracking items which will need clarification in the new licence (e.g. road watering vs. chemical dust suppressants) and what requires Board approval. Kathy noted that the new *Water and Effluent Quality Management Policy* (for all Land and Water Boards in the Mackenzie Valley) is being applied to both new and renewal applications received after the effective date of March 31, 2011. For Ekati, this means that submission of the renewal application will trigger a complete review of the effluent quality criteria (EQC). The Mackenzie Valley Land and Water Board (MVLWB) has contracted Don Hart (Ecometrix) to review the EQCs for De Beers' Snap Lake renewal application. It is not known at this time who the WLWB may retain for expert advice on the EQC for Ekati.

Laura questioned why the review of Ekati EQCs has to wait until the actual application is submitted. Kathy replied that the Snap Lake review will have some very useful information, so the Board wants this to be available for the Ekati consultant. Budget considerations are also an issue.

Bill noted that the current licence has conditional requirements for Sable (i.e. work to be done before Sable would be developed) which includes mixing zone and dispersion modelling to set EQCs. Kathy said the Board will review conditions but that section likely won't change much. Another of the Mackenzie Valley technical working groups is looking at mixing zone guidelines, including United States Environmental Protection Agency and CCME information with changes for our jurisdiction. This will be circulated as a draft by December.

Kathy said the review of EQCs is not limited to what is currently in the licence. It is focused on monitoring results and new EQCs may be added if required. Bill noted that nitrate concentrations downstream of the LLCF are an issue at Ekati, and the Agency will likely suggest that an EQC for nitrate be added to the licence. Others may include molybdenum and chloride. Kathy said that chloride and nitrate are issues at Snap Lake as well. EQCs are also based on technology (source control and treatment) and what the company can do to better manage water quality. The Boards are reviewing preliminary results of toxicity testing on northern fish.

Interim Closure and Reclamation Plan (ICRP)

Ryan said that BHPB submitted the revised ICRP at the end of August. The internal staff conformity check and recommendations will be presented to the Board at the mid-October meeting, and a Board decision can be expected shortly after.

Kevin asked about the reclamation liability estimate process. Ryan said that AANDC's position has been to wait until the ICRP is approved and then start discussions. The Board decision on the revised ICRP in October will provide further direction on financial security.

Draft Closure Guidelines

The Agency is preparing comments on the draft *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories*, distributed by AANDC and the Mackenzie Valley Boards in August. Ryan said the deadline for comments is September 30th, and it is hoped that changes will be incorporated and the final version presented for approval at the November MVLWB Meeting.

Adaptive Management Plan Guidelines

Kathy discussed the WLWB response (September 12, 2011) to the Agency's letter (July 19, 2011) expressing concern about the lack of progress on BHPB's Adaptive Management Plan required under the water licence. She said that existing legislation and policies already permit any party to suggest changes to a water licence and present evidence to the Board for consideration. The Board has reviewed comments received in December 2010 on its draft Guidelines for Adaptive Management, but the Guidelines have not been finalized. There is no precedent in Canada for how an adaptive management plan fits into mine regulation. The Board plans to release a discussion paper this fall.

Kathy noted that De Beers is also required to produce an adaptive management plan for Snap Lake, and the MVLWB is trying to incorporate concepts that were in the draft guidelines into that renewed water licence. She added that the Boards themselves need to have adaptive management discussions internally. Every three to five years, licences and monitoring data should be reviewed even if there is no renewal or changes to terms and conditions. This provides an opportunity for the Boards to learn from what they're doing. All the monitoring data produced by the mines is not being used effectively. If there was a regular process of reviewing licences more frequently.

The Boards have also been working hard to integrate the environmental assessment (EA) process more into the licensing phase. Bill noted the critical importance of scoping in the EA to focus on things which will influence or affect the decision. This should be the guiding principle for the adaptive management plan guidelines as well. Kathy agreed the EA boards need to know what happens after their process is finished, including better use of the monitoring data.

Kevin commended the WLWB and MVLWB for practising adaptive management themselves. The consistency standards working groups have meant learning from each other, and developing guidance based on lessons learned from licensing and monitoring (e.g. applying lessons learned from the Ekati ICRP to Diavik and Snap Lake). He also asked whether staffing levels for the Boards are sufficient (compared to the National Energy Board which has a staff of hundreds), and what kind of capacity is needed to really look at monitoring results. For example, the Surveillance Network Program (SNP) results are reviewed by the inspectors but not really anyone else on a regular basis. Kathy responded it is frustrating that the Boards ask companies for all these results, but maybe some of them are not necessary or we are not using them well enough.

Bill agreed that trends, changes and exceedances should be the focus. An example at Ekati was the first licence renewal just after work started underground. The Aquatic Effects Monitoring Program (AEMP) was measuring 10 variables and sampling for 25 or 30. When results were reviewed, it was clear many variables increased when underground work began. To the credit of the company, it released this information in the middle of the licence renewal and discussed options, even though these were unexpected results.

Laura asked whether adaptive management will become part of the standard procedures working group, and when a final product can be expected. It has been almost three years since BHPB submitted its plan. If the working group is not going to get a final product out soon, perhaps an

interim solution should be required for BHPB. The company has said BHPB is waiting for Board guidelines before it submits anything else. EQCs are still set even if all the information is not available, and perhaps some type of adaptive management plan should be required as well, even if it is imperfect.

Kathy responded that for De Beers, the Board is trying to incorporate concepts that are in the draft guidelines (e.g. tiered thresholds) directly into the licence. This would mean a separate adaptive management plan would not necessarily be required if needed elements are in the appropriate places. What the Boards want from companies has to be written into the licence directly, and this can be done regardless of whether the guidelines are finalized or not. Ryan agreed that if no guidelines are agreed upon and enforceable by the time of Ekati's water licence renewal, items will just be added to licence conditions, and this might be the preferred option anyway. There might end up being just a standard list of conditions that go into AEMP sections.

Laura suggested that perhaps the Agency should focus on elements such as setting thresholds and times for planning and action, and try to incorporate those into licence terms and conditions rather than waiting for the adaptive management plan. The licence needs to be explicit on tiered thresholds and reporting requirements when thresholds are reached.

Kevin asked whether terms and conditions would include a requirement for BHPB to identify thresholds for planning, action purposes, or specific contaminants. These would be submitted to the Board for approval within a certain timeframe. Kathy replied that thresholds should be in the AEMP design, knowing what you're trying to achieve. This is already submitted to the Board for review and approval, but there would also be reporting requirements that would be a separate item in the licence. For example, when a low threshold is reached, send this report and provide this information, or describe the mitigation measures the company will implement. These things are also more enforceable if they are written as terms and conditions of the licence.

Ryan said that a risk assessment workshop is tentatively being scheduled for the end of October. He also asked that the Agency consider whether there needs to be a separate water licence for closure.

MEETING WITH LISA LOWMAN (ENVIRONMENT CANADA)

Lisa introduced herself as the new Environment Canada (EC) contact for the Ekati file. Anne Wilson is still half-time on northern files, but is now based out of the Edmonton office. Lisa's expertise is contaminated sites and her position is not replacing Anne. Bill said Anne has been involved with the Ekati project since it started so her expertise is very valuable, and the Agency is pleased she is still involved.

Water Licence Renewal and Mixing Zones

Lisa discussed EC's position on mixing zones, the legal consequences of being able to apply those, and how the responsibility for enforcement is split between EC and DFO. She said that the Sable pit development at Ekati may require a mixing zone. EQCs could be exceeded within the zone but not outside of it. An authorization under the *Fisheries Act* may still be required.

Lisa said "deleterious" is typically defined through LC₅₀ acute lethality and toxicity tests, but she was recently on assignment in the Pacific region and there may be other ways to define it. She is having discussions with Bruce Hanna (DFO) to gather some ideas. Laura said it is unclear whether the water licence or Section 36 of the *Fisheries Act* takes precedence.

Lisa said mixing zones are effectively allowed under the Metal Mining Effluent Regulations (MMERs) and the equivalent ones for the pulp and paper industry. From EC's perspective, there must be no acute toxicity at end of pipe and chronic toxicity in the receiving environment must be minimized. Best available treatment technology is also considered. The important issues are which sensitive species would be compromised, and what the loadings are beyond the mixing

zone. Predictions may be necessary for maximum discharge concentrations over the duration of the licence and maximum extent of loadings.

Dioxins and Furans in Kodiak Lake

The Agency asked about EC's study which found dioxins and furans in Kodiak Lake sediments, and whether any follow-up studies were planned to see if the contaminants were showing up in fish. Lisa said that body burdens of contaminants like dioxins and furans may not show up in population level changes that can be detected by the AEMP. Since the source of the dioxins and furans is still an issue (because the new incinerator is still not operating), she thought a repeat of sediment monitoring in 3-5 years would be a good idea and tissue analysis from fish could also be analyzed. Tim noted the company does fish tissue studies every five years for a suite of metals, but organochlorines are not included. 2012 is the next scheduled year for these studies, so body burdens for dioxins and furans could be suggested. Bill said this was recommended to BHPB in the past, but the company determined it was too expensive (about \$1000 per fish) so EC did it instead. The company could sample some fish from Kodiak and some from a control lake, and the cost would not be unreasonable. Laura suggested the company could do samples from Kodiak to start, and take additional samples from reference lakes only if something significant was found. Tim said the company does archive zooplankton and benthos samples but is not sure about fish tissue samples. Bill thought that detection limits could be an issue.

Anne's presentation at the Agency's air quality workshop last year indicated the dioxin levels in Kodiak Lake sediments exceeded the CCME Sediment Quality Guidelines. The Agency questioned whether this deserved some follow up action from EC. There have been discussions about whether air emissions should be considered part of the water licence, since the incinerator is having an impact on water quality. Aboriginal Society members expressed clear concerns, and getting the new incinerator operational was a recommendation in this year's Agency Annual Report. Lisa said that Dave Fox (EC) feels there is little advantage in trying to get emissions limits into a water licence. However, it could be emphasized as part of the waste management plan and perhaps stack testing of the incinerator could be a licence condition. The link has clearly been shown that contaminants released into the air from the incinerator are ending up in Kodiak Lake. Lisa noted that if the new incinerator comes online soon, none of this may be necessary.

Diamond Mine Effluent Regulations

Lisa explained there is a group at EC headquarters in Ottawa that oversees the MMERs and the discussion over similar regulations for diamond mines. The issue has resurfaced because of De Beers' Gahcho Kué project moving ahead, but the discussion is shelved at this point.

FOLLOW-UP DISCUSSION OF ITEMS FROM VISITOR MEETINGS

➤ Pigeon Stream Diversion

The Agency is not opposed to BHPB's proposal for a temporary diversion channel instead of a permanent one, provided that DFO is satisfied the provisions of its No Net Loss policy are met through a compensation plan. The Agency would also want to see BHPB's plans for managing any effects on fish in the stream for the six to ten years Pigeon pit will be in operation, specifically from blasting vibrations and/or deposition of blasting materials. The advantages outlined with the new plans are clearly favourable for closure, including no permanent structures built in permafrost that will be difficult to manage. The pit lake with Pigeon stream flowing into it will allow fish passage and likely improve water quality.

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| Action Item #13 Kevin to e-mail Eric Denholm (cc. Bruce Hanna, DFO) that the Agency has no major objections to the temporary diversion channel concept. Indicate expectation that further information will be made available to the Agency and others if this option is pursued. Also request that BHPB make the results of its internal risk assessment available for review. |
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➤ **Regulation of Closure and Reclamation**

Directors and staff discussed whether a separate closure water licence is required. If the ICRP is in place and being implemented, would a separate closure licence be required in addition to an operational licence and how would it be different? It is already in the licence that EQCs during operations will not necessarily be the same during closure. However, there could be a 25-year licence that goes through production and closure, with the understanding that the Board could reopen discussions on EQCs at any time if warranted. The WLWB would need to be proactive about monitoring results coming in and changing criteria as necessary to improve licences while in place. Having that internal adaptive management system could mean a separate closure water licence is not needed. The resolution agreement states the Agency budget requirements during the closure phase will be reassessed.

➤ **Nitrate Management and Other Topics**

Directors and staff discussed BHPB's response to the nitrate issue. It is encouraging BHPB is managing the LLCF so nitrate levels are less than 4.0 mg/L and additional tests are being conducted on fathead minnow and *Ceriodaphnia*. However, the Agency had questioned how BHPB was applying the precautionary principle, which Eric's response does not address.

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| Action Item #14 Kevin to e-mail Eric Denholm recommending that BHPB release the information on the use of IPS for nitrate as a response to the Agency's letters on this topic. It will be suggested to BHPB that the paragraph on statistics is not helpful and BHPB should also address how it used the precautionary principle. |
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➤ **Mixing Zones**

The process for considering mixing zones would be to look at potential habitat loss within the proposed zone. This is clear from the Alaska paper that habitat considerations (spawning grounds, rearing areas, and other activities organisms undertake in that zone) will influence what is permitted. As well, the discussion would involve how much chronic effect is acceptable within the zone. The Alaska paper is interesting in that mixing zones are only considered after the effluent is treated, whereas BHPB is proposing no treatment. Alaska has a higher standard in regulations, but this may be related to protection of salmon spawning and rearing areas, and for Ekati it would be less complicated.

Mixing zones at Ekati could be largely academic if it is only in regards to Horseshoe Lake, which will not be an issue if Sable pit does not go ahead. However, Leslie Lake is also in essence a mixing zone because it receives effluent directly from the LLCF. The key is that there needs to be a regulatory limit for nitrate and perhaps molybdenum and chloride. The water licence puts restrictions on the quality of water that can be discharged, so the objective is being met. The licence criteria apply to the discharge water, not the receiving environment. For Leslie Lake, end of pipe and the end of the mixing zone are essentially the same thing because there is very little inflow to Leslie other than from the LLCF and very little dilution. There may be options for treatment, storage and discharge that BHPB could try.

The Agency will need to see the WLWB review of EQCs for Ekati and any additional information the company provides before further discussion can take place. The ongoing work for DFO on toxicity of contaminants for northern fish species will also likely be of some interest.

OTHER BUSINESS

➤ **Future Board Meetings**

The dates of future Agency Board meetings and other activities were agreed upon as follows:

September 17-21, 2011 International Mine Closure Conference, Lake Louise
Kevin, Monica and Tony are registered to attend.

December 7-9, 2011 Agency Board Meeting, Environmental Workshop and AGM
Also try to hold Christmas open house during this time (contact EMAB and SLEMA).

March 2012 Possible Board meeting and community visit to Whatì



**Summary of Discussion Approved by
Jaida Ohokannoak, Secretary Treasurer.**