

***Independent Environmental Monitoring Agency
35th Meeting of the Board of Directors
Yellowknife, Northwest Territories
August 24th to 26th, 2003
Summary of Discussion***

Directors

Red Pedersen	Tim Byers
Bill Ross	Tony Pearse
François Messier	Pete McCart
Dave Osmond	

Staff

Carole Mills	Sean Kollee
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The meeting was called to order by the chairperson at 10:00 am on Sunday August 24th, 2003. Dave Osmond was welcomed as the new appointee of the North Slave Metis Alliance, replacing Bob Turner. Pete McCart announced that the AGM would be his last meeting. [Subsequent to the Board meeting, Chair Red Pedersen announced that he would also be resigning his appointment to the Agency following the AGM in October or the appointment of a new nominee from the Kitikmeot Inuit Association.] Tony Pearse mentioned he would be absent for part of one day to attend the signing ceremony for the Dogrib land claims agreement in Rae.

Information Updates:

Red updated the Agency on events in Nunavut as well as notification of an EMAB funded water quality workshop in Kugluktuk during September of 2003. Red's 50th anniversary of arriving in Kugluktuk had been celebrated during the summer.

François' involvement with Agency has related mostly to Agency finances. He reviewed recent correspondence on wildlife issues including the removal of one male grizzly from the Lac de Gras area due to recurring problems of the animal visiting Diavik and the winter road camp. This constitutes a major loss to the local population. Two thirds of its home range is within the diamond mine area.

Tony has been busy with the annual report, and visited the four Dogrib communities in early June to update them on events at Ekati.

Tim discussed the Snap Lake decision report by the MVEIRB. Some of the recommendations by the MVEIRB relate to Agency business such as undertaking an analysis of the role of environmental agreements by government, forming a regional monitoring agency and establishing protocols for cumulative effects. He visited a BHPB owned uranium mine reclamation site in Ontario near Elliot Lake. The site featured revegetation ongoing since 1971. A meromictic lake was created at 1500 mg/L TDS; a chemocline exists at a depth of 15 metres. Freshwater should pass over the denser high

water that is high in TDS, depending on thermal density as well. He discussed Ekati exploration and possible expansion with the Yellowknives Dene at a recent consultation meeting in Yellowknife.

Pete mentioned his efforts with the independent review of the AEMP. He analyzed problems with nitrate and ammonia in the Diavik project for EMAB and came up with information with general relevance to all diamond mines. Increased nitrate and un-ionized ammonia in the vicinity of spawning grounds of fish species such as trout is a concern.

Bill contributed to the annual report preparation, Fox permitting correspondence sent to the MVLWB, AEMP third party review, and is currently assisting in organizing the 2004 IAIA meeting. He delivered the Agency presentation at the Ottawa Environment Canada workshop on sustainable development in the diamond-mining sector. He also mentioned, based on a discussion with BHPB staff, that Lynx Lake, a lake sampled this year by BHPB, contains the potential for 6-8 months worth of ore. He noted that BHPB might be re-doing air quality modeling based on his informal discussion with BHPB.

Dave was surprised by the volume of Agency correspondence. He is more familiar with the Diavik project due to his involvement with the environmental assessment of it, and has an Ekati site visit planned following this meeting. He views the expansion of Ekati as important to Lac de Gras and future development within it as increasingly likely to modify the watershed.

Carole has been busy with completing the annual report, and working on the Fox permitting issues and the AEMP third party review. She and Tim met in Lutsel K'e with the Wildlife, Lands and Environment Committee. One elder was concerned about the culvert, and the effect of the mine on 'sik siks' (arctic ground squirrels). Another elder was concerned about the Misery Land Treatment project especially potential effects on permafrost and snow buildup. She has discussed the AGM date with all Aboriginal Society members except the Yellowknives Dene. Another consultation initiative is to look at what their needs are from the Agency for the BHPB water licence renewal process. She discussed BHPB's changing personnel and responsibilities. She mentioned her invitation as a role model with the Canadian Council for Human Resources in the Environment Industry (CCHREI). She did not attend many of the Aboriginal assemblies due to their agendas not containing technical issues. Staff intends to complete two site visits during the first week of September. The Agency has been invited to the WKSS AGM. A group of Peruvian Ministers may be visiting the Agency in September to discuss the formation of regional mining agencies decentralized from the national capital.

AGENCY DISCUSSIONS (Board and Staff only)

Review of Agency Annual Report Status

Carole discussed the status of both versions of the Annual report, and the new policy of purchasing photos from the photographer unless the photos are part of a CD publicly

distributed by BHPB. She also mentioned that the Agency investment in a digital camera has been very successful in reducing photo-purchasing costs.

Environment Canada Workshop on Sustainable Development in the Diamond Mining Sector – June 2003, Ottawa

Bill attended the conference with Carole and he delivered the Agency presentation. Senior BHPB staff and representatives from Tlicho, Lutsel K'e and Yellowknives also attended. He commented that Golder did a good job preparing the report on the environmental consequences of diamond mining. Bill identified an Agency suspicion that wolves may use the mine infrastructure to hunt caribou. Participants at the conference appreciated the Agency presentation and were very interested in learning more about the Agency.

Karsten Liber (researcher involved in studying kimberlite toxicity from the University of Saskatchewan) attended the workshop. Dr. Bill Price from CANMET (an NRCAN mining research agency) delivered a presentation and has a great deal of expertise on mine closure criteria and acid rock drainage.

Bill felt that Environment Canada (EC) was unresponsive to the needs of northern stakeholders in two ways when preparing for the conference. First, it did not ask Aboriginal representatives to deliver presentations, but this was rectified the second day. Second, the Mackenzie Valley Boards and EMAB were not in attendance. He felt the driving force of the conference was the exploration in Canada for diamonds. Carole's impression of the sustainable development component of the EC workshop was that it was weak, and greater focus was on the economic benefits of mining.

BHPB Nitrate Toxicity Study

In response to an earlier recommendation of ours that the subject of nitrate toxicity be investigated, BHPB has submitted terms of reference for such a study for our review and comment. Coincidentally, Diavik has applied to the Mackenzie Valley Land and Water Board to amend its water licence with respect to its ammonia discharge limits. Director Pete McCart has reviewed this application for EMAB, and updated the IEMA board on his findings. An issue of environmental concern for Ekati is the deposition of nitrogen compounds (blasting residues) to the aquatic receiving environment in the form of nitrate, nitrite, and ammonia being discharged from the tailings impoundment. It is the un-ionized component of ammonia that is most harmful.

Diavik wants to change the limits for ammonia in its water licence, from total ammonia to un-ionized ammonia as the fraction that should be regulated. This would increase the loading of total nitrogen to the lake, since total ammonia discharges would now be unregulated. The balance between the un-ionized and ionized forms of ammonia is pH and temperature dependent—as these increase the proportion of un-ionized ammonia. Diavik argues that low pH and low temperatures found in Lac de Gras would not let this happen. But this would also mean that larger concentrations of all nitrogen compounds could result in the lake, which could have environmental impacts on fish.

A key potential impact would be on developing fish (i.e., fish between the egg and adult stages). Appendix 1 (attached to these minutes) presents a more detailed description of the issue. In summary, Pete commented that nitrate likely has differing toxicity to local fish species depending on the amount of absorptive surface area on the fish exposed to the pollutant. The alevin was determined to be ten times as sensitive as the egg or fry.

Directors discussed how to respond to BHPB on the subject of the company's proposed nitrate toxicity study. During upcoming meetings with DFO and BHPB, Directors agreed that the Agency should offer advice on how to improve the study. The Agency may also recommend a joint industry and government initiative to investigate toxicity of nitrogen species, as it recommended to DFO in 2002.

Action Item #1 – Offer advice to BHPB during its attendance at the Agency meeting, and draft this advice in a letter to be copied to DFO containing the following recommendations;

- Use Ekati water in the tests;
- Conduct a literature review;
- Use a light regime that corresponds better with that at Ekati;
- Use a larger number of fish eggs to provide a statistically valid sample size;
- Conduct a 96-hour toxicity test for each of the three early life stages of fish (egg, alevin and fry) to determine relative toxicity of nitrate.

AEMP 3rd Party Review

Carole updated the directors on the current activities of the steering committee for the independent review of BHPB's Aquatic Effects Monitoring Program. The committee met via conference call on a number of occasions in order to create terms of reference (ToR). Carole met briefly with BHPB contact Ian Goodwin to discuss the project. Ian assigned Chris Hanks to the project. An early draft of the TOR was sent to BHPB, which then responded by refuting the need for the review. This response appeared inconsistent with the earlier position taken by the company.

The Agency then met with DFO, EC and BHPB to refine the ToR. Weaknesses in the AEMP were highlighted such as outlier data removal, and tracking mercury in fish over the years. BHPB was not inclined to participate in this review, and defended its last year's review of the AEMP. The rest of the committee maintained there was a need to have the statistical methods used in the AEMP subjected to a third party review, since none of the agencies or IEMA had the expertise or resources to do this alone. BHPB eventually agreed to work towards the narrowing of the scope of the review. EC agreed to do a review of the ToR, and produce the next draft.

Directors then discussed the main reasons for the AEMP review initiative. As a result of the 2002 AEMP re-evaluation process led by BHPB, it raised questions in the minds of the participants about other kinds of analysis that BHPB's AEMP does not address. Outside expertise on these issues could be helpful. EC, DIAND, DFO, and the Agency all supported this idea. DIAND also didn't participate in the earlier BHPB review of the

AEMP since it could not obtain raw data from the company, and believed that an independent review was the only way of verifying the monitoring program. The Agency chair mentioned that BHPB called him on August 13th, 2003 at home to discuss the need for this review. His response was that this issue would be discussed at the upcoming Agency board meeting in detail.

Directors mentioned that the independent review is a multi-party initiative, first proposed by DIAND. A discussion about funding the review ensued.

Decision: Directors authorized cost sharing of the contract amount up to \$10K with the other participants.

Directors then discussed details of the AEMP review such as data outlier issues, data availability (raw vs. QA/QC'd data) and how to acquire independent suggestions on how data could best be used for adaptive management at Ekati. What parameters should be reviewed was complex because a number of parameters are interrelated, i.e. ammonia, pH and temperature (the un-ionized ratio of ammonia increases with temperature and pH). Mercury in fish and sediment unfortunately has only been sampled twice during mine operations so the data set is not as strong. Directors mentioned that others would be involved in selecting parameters and there is a need to have a focused list to minimize costs. The parameters were narrowed to:

- Mercury, due to relevance to ecosystem and consumers;
- The nitrogen family, nitrate in summer and winter (because pH and temp are required for ammonia if it was to be selected as a parameter for the review); and
- Zooplankton, an assumption for total dissolved solids (TDS) and conductivity trends needs to be developed.

Including TDS as a parameter was not considered to be effective because it may lack the ecological relevance of the others. The benefit of TDS is the relationship to potential impacts to zooplankton and the availability of a reliable data set. Don Macdonald is currently reviewing the copper risk assessment conducted by BHPB and the Agency will consider whether copper should be included.

Directors discussed the next steps for the project; to refine the ToR, have another steering committee meeting, and deliver a data request at the same time to BHPB as the ToR is released. The issue of the Agency managing the funds in order to streamline the government sourcing procedures was considered. The Agency bylaws permit the Agency to accept money from others for these purposes. It was stressed that the management of the project should be via the steering committee, rather than the Agency.

Action Item #2 – Staff revise the ToR for the AEMP third party review, host another steering committee meeting and deliver the data request to BHPB when appropriate.

BHPB water licence renewal process

BHPB's original Class A water licence (N7L2-1616) for Koala, Panda and Misery pipes expires at the end of 2004. The application process for renewal of this licence has been initiated, and the company intends to submit this to the Mackenzie Valley Land and Water Board by the end of 2003, allowing one year for the review and public comment of the application.

Staff provided the following technical issues and comparisons between the newer Sable, Pigeon and Beartooth licence MV2001L2-008 (referred to as "008") and the original licence N7L2-1616 (referred to as "1616") as follows:

Definitions: 008 has a much more extensive definitions section than 1616

Progressive Reclamation: 008 has greater detail on progressive reclamation than 1616

Licence Harmonization: BHPB may request a long licence term for 1616, beyond 2009. This raises the issue of harmonization of the two BHPB Class A licences. When 1616 is renewed in 2004, a 5-year term would synchronize it with the Sable, Pigeon and Beartooth licence (issued in 2002), which expires in 2009. Both licenses could then be harmonized or integrated at that time. Communities may be in favour of this in order to decrease the amount of confusion and effort to review multiple licences.

Cumulative impacts: will need to be considered in the new licence process because the expansion is no longer the first project in the area.

Conditional Licences: The subject of the MVLWB issuing conditional licences and allowing mining activities to proceed prior to approval of management plans was discussed. The issue is that mining sometimes proceeds without clarity about the specifics of how environmental management will be conducted. Operational plans submitted subsequently require review and approval by the MVLWB, and this is not always forthcoming in a timely manner. To keep its development schedule, the company may adopt the new plan without waiting for approval.

IBA Renegotiation: Directors noted that BHPB should expect requests to renegotiate the IBAs with the communities. This is not Agency business as it does not fall within our mandate. However, these negotiations could affect the Agency if our Aboriginal Society members are disinclined to discuss technical issues related to the water licence due to their relationship with BHPB being degraded because of a disagreement concerning IBA renegotiation.

Licence Parameters:

- 1616 does not include the following parameters which are included in 008: cadmium, chromium, lead, zinc, nitrites, phosphorus and turbidity
- Molybdenum – is not in the licences but high concentrations are noted in kimberlite
- Copper – 008 reduces the effluent limit by a factor of five from 1616
- TDS – not regulated in the licences. TDS is a likely cause of zooplankton complications.
- Phosphorous – very low levels found at Ekati
- Zinc – 1616 should add zinc, at the same level as 008
- Turbidity – 1616 should add turbidity, at the same level as 008
- Nitrate – some regulation may be necessary

Assisting Aboriginal Members

The Directors considered ways in which we might help the communities in the license renewal process. Hosting a workshop for Aboriginal Members, or other ways of discussing technical details with them, were discussed. It was noted that hosting a workshop would involve a large amount of effort between now and October, and the Agency has no clear sign yet that our members are requesting our assistance in this process. An information package could be more effective. The Directors agreed to wait and see what BHPB produces in order to see what role we might play.

The Directors acknowledged that an update from BHPB on its consultation process with the communities for the licence renewal would be beneficial.

Reports Requiring Review

Abandonment and Reclamation

Carole introduced BHPB's latest *Abandonment and Reclamation Plan*, a requirement of the *Class A water licence* and *Environmental Agreement*. The latest update is still considered interim, it includes both Class A water licences. BHPB has addressed social reclamation (planning for the loss of local income due to potential layoffs and other localized social effects when the mine closes) along with environmental reclamation. Carole mentioned that BHPB continues to consult minimally with the Agency when preparing management plans. The Agency has given BHPB advice concerning closure plans for the Panda diversion channel, tailings facility, and pit infilling. Road closure issues were also discussed, in terms of what the road should look like, scarification, and "do nothing" options. A key concept for road closure is making them caribou friendly.

Directors discussed their early impressions of the new *A&R Plan*. The BHPB policy towards road reclamation appeared unacceptable. Pit infilling will have consequences to fish that require further research, as would revegetation of the tailings facility, rather than covering it with rock. Directors felt that the angle of repose of waste rock should not be allowed as a permanent resting angle for the edges of pads, roads or other mine infrastructure involving rock deposited on the tundra. The exception to this would be for the waste rock pile because this angle is too steep to allow free movement of caribou. Directors also noted the absence of plans to smooth and contour the edges of the airstrip.

Action Item #3 – Staff to discuss a delay in due date with the MVLWB for review of <i>Abandonment and Reclamation Plan</i> , and draft a letter containing recommendations to the MVWLB.
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BHPB Impact 2003 Report

An initial review by the staff determined that BHPB had incorporated negative effects of the project and mitigation measures into the report; therefore the report appears to be credible and well done. Directors noted that our response should include a note of commendation on the table of adaptive management strategies and the overall quality of the document.

Action Item #4 – Staff draft letter to BHPB regarding Impact 2003 report
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comprehensiveness and quality.

Traditional Knowledge (TK) issues, EMAB and Regional Monitoring

The Diavik EMAB TK panel draft terms of reference was discussed, as well as a letter from EMAB supporting the creation of a TK panel.

EMAB has decided to form a TK panel for the Diavik project exclusively. Initially the panel would have been open to requests to work on other projects if necessary. In its letter to DIAND, EMAB stated that it is DIAND's role to create the regional monitoring agency under which a regional TK panel could be formed.

Fox Pit Development Issues

Carole briefed the directors on Fox wastewater disposal issues. Staff and regulators had noted that although Fox mining was authorized by the MVLWB, BHPB had yet to apply to change the discharge location for Fox minewater from the previously approved cell C to Cell D, as requested by MVLWB. Mine water had been discharged to cell D without approval.

There was a meeting held at the MVLWB in July of 2003 with the regulators and BHPB, and the issue of mine water placement was discussed. BHPB's analysis of the Fox Lake and sump water showed the water in the sump was of better quality for a majority of parameters than the remnant water in Fox Lake. This rationale aided the inspector's decision not to issue a stop work order. The Agency wrote to the MVLWB objecting to the use of cell D, the lack of approval of the Fox *Waste Rock Management Plan*, and BHPB's activities prior to approval of the management plans. MVLWB responded that the company could begin operations without approval of management plans. The MVLWB later approved the revised Fox *Waste Rock Management Plan* and asked BHPB to meet with the MVLWB to discuss its actions. BHPB never did submit an application to change the discharge location, and has since initiated construction of a pipe to cell C. A risk assessment is being conducted by Rescan to determine possible environmental effects of the discharge location change to cell D.

The Directors observed that the filtering capacity of dike C should not be circumvented unnecessarily, and it would be more conservative to discharge mine water higher up the tailings pond. Another problem is that Cell D's filter is blinding off prematurely and not allowing enough water to flow through. The filter is intended to withhold suspended material and allow water to drain. There is concern that by moving mine water to cell C it will reduce the holding capacity of the entire system.

Inspection Reports

Carole briefed the directors on BHPB's responses to DIAND's inspections. Improving the effectiveness and safety of the landfarm has been an issue. The Directors suggested periodic drainage and better overall management to be important improvements. The enforcement of water licence conditions by DIAND and MVLWB was also discussed. The trigger for agency involvement is when events potentially lead to environmental consequences. The directors discussed whether the Agency should be suggesting

improvements to communication arrangements between the enforcement bodies and the company. No decision was made.

Meeting with DFO (Julie Dahl and Elaine Blais)

BHPB's Nitrate Toxicity Study

The BHPB-initiated nitrate toxicity study was raised with DFO, which had not been notified about it. Directors noted that eggs, alevins and fry should be tested separately. Statistical advice and a recommendation to BHPB on water selection to improve the study were discussed. The need to improve on the early work of Kincheloe *et al* was discussed. The potential increase of nitrate in lakes in winter was also mentioned as important to the quality of fish habitat.

Action item #5 – Staff distribute comments on the BHPB nitrate toxicity study to DFO along with BHPB.

Closure of the Panda diversion channel

The Directors mentioned that the 5-year synthesis study on the diversion channel has yet to be distributed by BHPB. BHPB plans to block off the channel during abandonment of the mine. Directors inquired to DFO about the fish habitat compensation issue. DFO replied that it is unsure if BHPB has demonstrated that the channel currently is compensating for the original lost habitat and that BHPB will have to compensate for the loss of the channel regardless. BHPB may believe that re-establishing streams between infilled pits will account for much of the original habitat.

Another issue is the effect on the downstream watershed during pit infilling, since there may be zero discharge out of the Koala watershed for nine years. Moose Lake relies on recharge from both ends of the watershed (Long Lake impoundment and Kodiak Lake) and this has implications to the fish habitat in the lake when upstream pits are being filled. DFO is interested in conserving the lower portions of the channel that are functioning well. Directors hoped that DFO would comment on the *Interim Abandonment and Reclamation Plan* and DFO agreed this was necessary.

Fox Waste Rock Pile Seep into Martine Lake

DFO described BHPB's plan of action to ensure no more sediment enters Martine Lake. Directors inquired about the environmental impact of the event and about the working relationship between BHPB and DFO. A fair amount of rock flour has collected behind a recently placed silt curtain. A lot of the sediment had settled out just beyond the toe of the waste rock pile and some entered Martine Lake. Visual observations suggested indeterminate harm to Martine, as the material appeared to be very fine in nature. The toe berm was not constructed as planned. DFO questioned BHPB's practice of placing waste rock in an area where the toe berm had yet to be constructed. DFO mentioned that it continued to work with BHPB even during the trial, with exceptions such as the stream habitat encroachment at the Nero-Nema Bridge. There was recognition on both sides that communications were a problem but is improving.

AEMP 3rd Party Review

Directors discussed the desirability of an independent review of the AEMP, as well as funding required for the review and asked DFO to consider contributing to the work. DFO questioned the Agency rationale for another AEMP review. The independent review is not so much a review of the AEMP itself but of the statistical methods used in the AEMP to verify that they are capable of detecting significant environmental changes. There might be alternate ways to analyze the data, for example, other approaches than BACI. After BHPB led the 2002 re-evaluation of the AEMP some questions were triggered about mercury levels in fish and potential zooplankton declines that the AEMP was not recognizing or dealing with properly.

The independent review would be a focused analysis of a few parameters. The goal is not to double-check what BHPB has done but to see if other analytical methods can be better used to detect impacts. The project would be a joint initiative with other regulatory agencies such as EC and DIAND. DFO mentioned BHPB's inclination to look at single year effects, rather than effects over multiple years. Its frequent use of qualifiers such as 'somewhat' or 'slightly' significant has led to difficulties of interpretation. DFO agreed that these problems have not been fully addressed by the BHPB-led review. Directors mentioned that screened data would be used for the review.

DFO questioned whether the ultimate objective of the study is to adjust the AEMP. Directors stated that the objective is to better understand the data and analytic methods, and gain greater clarity about how BHPB identifies significant impacts. The ToR should be clear that changes should be made to the AEMP only if they are intellectually justifiable, as with any BHPB environmental management plan. Regulatory agencies need to verify that the methods used in the AEMP can properly identify ecosystem effects.

Frequency of deposits required by DFO

Directors asked if DFO routinely requests a security deposit in connection with a fisheries authorization. DFO replied that, where substantial compensation works are to be completed well into the future, DFO is likely to request security. For smaller, more imminent works DFO may also ask for a security deposit depending on its confidence in the proponent. Mine closure is an area where DFO would request security because the finances of the company are less certain after the ore body has been depleted. For Sable, Pigeon and Beartooth, the deposit pertains to those activities relating to compensating works, engineering and monitoring. DIAND, for comparison, has physical and chemical stability as its reclamation objectives, not restoring productivity of the aquatic system. The closure criteria for a land lease or water licence are different and DFO cannot access the security deposit of another regulator. A letter of irrevocable line of credit is the preferred means to DFO for security deposits to be held.

Lake Fish-out studies

The Directors requested an update on any progress that has been made on analyzing the data generated from the fishout studies and on working with the Canadian Wildlife Service to adjust the study methodology to reduce impacts of by-catch.

DFO mentioned that fishout studies for Beartooth are due soon. The data arrive in PDF format rather than as a data file. Money has been committed from BHPB and Diavik to complete the studies. DFO has found that far more fish were in the lakes than had been anticipated.

DFO stated that the termination criteria for fishouts require a 24-hour period where no fish are caught. The nets are then pulled for 48 hrs and then reset. The previous criterion for stopping the work was three days of netting without catching any fish. If a fish was caught nets would then need to be reset for two days. This was causing increased by-catch of loons and leading to greater chance of encountering poor weather conditions.

Fish habitat compensation fund

This year DFO evaluated three projects forwarded to it by the Department of Public Works in a complex bidding process. The proposals were evaluated and one was successful, with costs currently being negotiated. The proposal is unlikely to be initiated until next year, due to delays and lack of attendance by some parties at important meetings. From the original batch of approvals, the Prelude Lake project is complete and the Stark Lake fieldwork has undergone its second year, with the report from the second project yet to arrive. One third of the fund is likely unallocated according to DFO.

Meeting with BHPB (Ian Goodwin, Jane Howe, Chris Hanks and Jim Millard)

Ian thanked the Agency for accommodating BHPB's busy schedule, and announced John Witteman's resignation from BHPB and the appointment of Chris to John's former position for an interim period. Ian's department has been re-named (official notification of the name change will be sent by BHPB).

BHPB provided an update on current operations at the mine, new construction and other recent activities.

Current Operations

- Panda open pit mining is complete and the pit is undergoing a feasibility study for underground mining. Excavation of a conveyor portal is underway.
- Fox Lake and mine water are being pumped to cell C of the LLCF. Stripping waste rock began in August 2002. Ore recovery is scheduled to begin about 100 m below surface. First kimberlite encountered is expected to be largely waste. 2006 is a key date to expose ore to ensure the process plant can operate. The change from 2010 ore recovery to 2006 for Fox pit has occurred for a variety of reasons, loss of the Leslie pit being most critical.
- Beartooth Lake dewatering was completed late July 2003. Waste rock stripping began in July 2003, ore recovery is expected in 2004.
- Misery mining commenced in 2000. BHPB is currently operating a day shift only and blending 1000 tonnes of Misery ore per day through the process plant. BHPB is experimenting with a new machine to extract ore at the bottom of the pit to turn the ore into slurry that would be sent to the process plant. It is a series of wheels and cutting blades that can greatly reduce the need to remove waste rock and may

be able to operate from a barge. It might avoid the need for sending kimberlite to the primary crusher.

New construction

- Centralized dewatering line in preparation for continued underground mining
- Fox dewatering line to cell C of the LLCF
- Misery land treatment of mine water is delayed due to the contractor
- Bearclaw jetty pipeline is complete

Recent activities

- BHPB has received ISO 14001 registration
- Elders from Kugluktuk and the Yellowknives Dene visited the site to identify caribou deterrents, and have advised the use of inuksuit fences (a line of inukshuk) to direct caribou around the waste rock piles.
- Elders from Yellowknives, and Dogrib Treaty 11 visited archaeological sites
- On the Fox mine water issue, BHPB will be moving water to cell C, and all parties are aware of the need for flexibility to balance water volumes within the LLCF.
- BHPB concurred with the Agency's previous recommendation that air quality models should be redone.
- Community consultation: BHPB has been in four communities; others cancelled at the last minute.
- Yellowknives Dene visited the site on a water licence renewal tour. The IACT group is scheduled for its annual visit

BHPB Comments on the Agency-led Traditional Knowledge Workshop

BHPB noted that the Agency sent letters to DIAND Minister Nault and RWED Minister Antoine prior to issuing a report on the proceedings of the workshop. BHPB has viewed the correspondence but had no comment prepared for discussion with the Agency.

Lowering the water level in Cell D of the LLCF

BHPB suggested that the dyke in cell D of its LLCF is functioning properly although the filtration rate is not fast enough and water may need to be pumped over the dyke bypassing the filter material. BHPB monitors water levels in cell C, D and E daily to examine the performance of the dyke D filter. Currently a 1.5m differential between the water levels of cells D and E exists and cell D must be lowered. Waiting for designed filtration through the dike may be too slow. Hence BHPB has introduced the idea of pumping water over the dike from cell D to E in order to accommodate next year's freshet. BHPB promised the Agency correspondence on the issue, but felt that if the water quality is similar in both cells it is not an environmental issue.

The Directors queried BHPB's claims that the filter dyke is working properly. BHPB mentioned that dyke D is in its first year of operation with the filter and it has yet to be proven how effective it is. BHPB noted it would be pumping through December from cell E to Leslie Lake. It will make a decision whether to pump water from cell D to E shortly. Low water levels in cell E could endanger water quality if suspended solids rise

from sediments within the basin. Since the flow rate through the dyke is determined by dyke material and head differential, it is to BHPB's advantage to keep cell E as low as possible. The Directors requested the Agency be copied on any activity involving pumping from cell D to E.

BHPB mentioned that Fox water contributed 0.65 metres to the cell D hydraulic head this year and that filter dykes, once clogged, cannot be cleaned. The plugging agent will likely be fine kimberlite. The tailings will plug the dyke towards the end of the life of the cell. A culvert or some similar structure is then necessary to allow water to flow in a controlled manner. BHPB noted that if the dyke were to clog sooner than anticipated it would not use more coagulant.

Directors discussed with BHPB the potential adverse effect on the downstream water bodies of continued discharge from the Long Lake facility. Any pumping of cell E water into Leslie Lake will be water that doesn't enter the lake under natural conditions. This is a concern for both the timing and magnitude of flows into Leslie Lake. For this reason it is important to sample the water during the winter. It is also likely that water could flow from Leslie Lake to Moose Lake during the winter, another unnatural situation. BHPB replied that it has a spring under-ice monitoring plan scheduled to occur in late winter. BHPB agreed to pass this Agency concern onto Rescan, its consultant.

Plans recently submitted by BHPB

BHPB mentioned a large number of plans has recently been submitted to the MVLWB, including updated predictions of water quality in Long Lake facility, *Abandonment and Restoration plan*, *Misery Land Treatment Monitoring program*, *Waste Water and Processed Kimberlite management plan*, *Air Quality monitoring program*, *Desperation-Carrie Compensation plan*, *Spill and Contingency plan*, *Beartooth Waste Rock and Ore Storage management plan*, and the *Fox Waste Rock and Ore Storage management plan*.

Activities in process by BHPB

BHPB mentioned the large number of activities in process such as the:

Water Licence renewal	Misery Land Treatment project construction
Ammonium nitrate storage improvements	AEMP and special effects projects
Drilling at Pigeon pipe	Fish studies
Draining Lookout Pond	Panda Underground ore conveyance portal construction
Exploration diamond drilling	Operation Zero Harm – mine safety program
Energy Smart and water conservation program	Thesis on interactions within the LLCF
GHG absorption by processed kimberlite research	Four community visits
Writing a tour itinerary booklet	Site tours by MVLWB and IACT
Plain English Annual Report preparation	Long Lake risk assessment
Nitrate Toxicity Study	Zinc Risk Assessment

Caribou Vegetation Risk Assessment	Chloride Effluent Quality Requirements
Caribou Trail Formation through the Pigeon Culvert analysis	Wolves use of mine infrastructure for hunting

Upcoming activities at Ekati

Upcoming activities at Ekati include seepage monitoring, old camp reclamation, report preparation, technical workshops and developing a “blueprint for change” (business improvement). By 2006, BHPB will have 6-7 kimberlites in production and increased operational complexity. Aboriginal advisors are developing a strategy for caribou diversion.

Agency led discussion of Nitrate toxicity

Directors discussed the BHPB nitrate toxicity study and suggested the improvements mentioned earlier in the minutes. Directors mentioned they appreciate the fact that BHPB is undertaking the study on nitrate toxicity. BHPB agreed to come up with enhancements to the project if possible. Allison Armstrong is leading the study and she may contact Agency for more specifics.

AEMP Independent Review

Directors mentioned that the AEMP independent review is a combined effort of many parties including DIAND, Environment Canada, potentially DFO and the Agency.

BHPB remarked that its AEMP review was a large effort and consultative aspects of the initiative were included in the final report. BHPB has reviewed the ToR and found some duplication with the review. It will highlight repetitious activities to the Agency within the next few days.

Chris Hanks mentioned that Peter McCart’s concern regarding mercury reporting could be addressed outside of an AEMP review. Pete summarized his concerns about how BHPB reports its data. These concerns have arisen since the BHPB-led review of the AEMP. The Directors mentioned that during the AEMP re-evaluation process, BHPB took the data and analysis as a given and worked towards other modifications and efficiencies in the program itself. The stakeholders would like a way of verifying if the methodologies are reliable. BHPB replied that it welcomes the Agency’s comments and critiques and will address specific issues with the AEMP but mercury is particularly difficult to investigate. It suggested that looking at the sediment data might be useful but that data outlier removal procedures were already addressed, as was trend analysis. BHPB felt that the annual November AEMP pre-workshop is another opportunity to address these issues outside of a second AEMP review. Directors mentioned that participants at the previous AEMP review meeting had favourably discussed an independent review of aspects of the AEMP and the review process itself has triggered new ideas and concerns about how well the existing AEMP identifies changes to the environment, exactly what it was intended to do. BHPB also made an offer for access of electronic data at that time.

BHPB described the format of the data to be distributed. Any bolded value will have an attached qualifier. No data will be hidden or removed from the data set; the key is what is used in the analysis.

BHPB reiterated that it does not want replication to occur. The Directors responded that the nature of the project includes some replication by outside experts. The intent of the project is to provide advice on how to better extract information from the data that could assist all parties. BHPB agreed to send comments on the next TOR draft.

Water Licence Renewal

Directors asked BHPB if changes to the mine plan are going to be included in its water licence renewal application. BHPB replied that its original approval accounted and allowed for mine expansion. A contractor has been hired by BHPB to look at the EIS concept vs. the actual mine built under the water licence, a new BHPB undertaking. SRK will be evaluating the QA/QC for key SNP stations and conducting basic trend analysis over the life of the water licence over the last seven years. It will attempt to answer the questions contained in the renewal application regarding long-term water quality trends. Another consultant will be evaluating all reports sent in as part of the water licence as an internal means of measuring BHPB's performance.

Directors asked what parts of the renewed licence BHPB expects to be different than the current licence. BHPB replied that it expects new parameters to be licensed, as well as effluent limit changes for other parameters. BHPB is looking to see if it will be able to meet the new licence (MV2001L-008) criteria. BHPB's application will contain short answers to the routine questions and links to extensive data and research for more complex issues. A zinc risk analysis is an example of BHPB's own initiative to determine if it can meet criteria based on water licence limits for Sable, Pigeon and Beartooth. The MVLWB criteria can be below levels provided by CCME guidelines and above background in the Horseshoe watershed.

BHPB's understanding of MVLWB's water licence renewal process is that it will be similar to the Canadian Tungsten mine process for dates and timelines for specific actions, requests for information and responses from BHPB, and a public hearing. A BHPB concern is that that process did not account for changes and new concerns between the information requests and the hearing. New issues were raised at the hearing and caused great difficulty with the MVLWB hearing process. A new round of information requests has been included to ensure all concerns are raised and addressed at the beginning. The MVLWB is conscious that all concerns should be dealt with proactively to avoid late issues.

AGENCY ADMINISTRATIVE ISSUES:

Minutes from 34th Board of Directors Meeting:

François moved the minutes be approved for the 34th Agency Board Meeting.

Finance

François mentioned that he expects by the end of August that 27% of the Agency budget will be spent.

The Agency Annual General Meeting (dates and schedule of events)

Proposed Schedule of Events During the Agency AGM

- Presentation of annual report
- Presentation of financial matters

The date for the AGM was determined to be Tuesday October 28th, 2003, preceded and followed by the 36th Agency Board Meeting (Sunday October 26th – Wednesday morning October 29th).

The meeting was adjourned on Tuesday, August 26th at 12:00 pm.

Minutes approved by:

-ORIGINAL SIGNED BY-

François Messier,
Secretary-Treasurer

Appendix 1: Pete McCart Presentation on Fish Biology, delivered to the 35th Meeting of the Independent Environmental Monitoring Agency, August 24th to 26th, 2003.

Pete distributed a paper containing drawings of the various early life stages of salmonid fish (available by request to the Agency). The alevin has a large yoke sac that is covered in blood vessels and is able to absorb oxygen and other nutrients through its body. In earlier life stages, the circumference of the egg controls the absorptive surface area. At the fry stage when the mouth is open, the fish has almost fully developed gills to absorb nutrients such as oxygen. Studies have been completed to examine the relative susceptibility of early stages of fish to the un-ionized (harmful) component of ammonia. The alevin was determined to be ten times as sensitive as the egg or fry. Apparently un-ionized ammonia reduces that ability of the fish to take in and excrete water, and the fish becomes waterlogged. Once this osmotic balance is affected, the fish it must use energy to pump out water. This energy is now unavailable for other purposes such as growth. Tundra lakes are exceptionally dilute water bodies, which worsens this effect.

Pre-eyed egg – fertilized, transparent, embryo is developing inside the egg.

Eyed egg – large dark object seen through the wall of the membrane. Initially the eyed part is very small relative to the size of the yoke. At the later stage it is much larger. Oxygen has to come in and wastes removed through the membrane of the egg.

Alevin – or larva. Still has a large yoke sac, covered in blood vessels, able to absorb oxygen and other products through their body and a very large surface available to absorb material from the environment. This includes water, oxygen and likely harmful nitrogen products. In some cases the eggs become deprived of oxygen. Most salmonids would hatch prematurely to allow more absorption of oxygen in this scenario.

Fry – mouth open, gills mostly developed, absorbed most of the yoke.

Un-ionized ammonia – Calamari et al., did studies of the relative susceptibility of eggs, alevins and fry of rainbow trout to nitrate. An alevin was ten times as sensitive as an egg or fry, probably closely related to surface to volume ratio. Fry can only absorb through mouth and gill surfaces. Mode of operation seems to be related to effects on their ability to take in and excrete water. Un-ionized ammonia apparently reduces the ability of fish to excrete water (if the fish is poisoned with nitrates) and it becomes waterlogged.

Un-ionized Ammonia and Osmotic balance - Sprague has commented that fish that live in extremely dilute waters (TDS 8 mg/L), with relatively high concentration of salt in their body compared to the water body, have an osmotic problem. Energy is used to pump water out and this is energy that is not available for other use such as growth. Alevin have a high surface area and internal salt content and have to work hard to pump water out when living in dilute water and therefore the affect of un-ionized ammonia is probably much greater than on eggs and fry. You cannot just look at the toxicity of un-ionized ammonia to fish; you have to duplicate the test for all stages of their life history

for local species in local conditions. It is the salmonid fish that tend to be most sensitive, char, whitefish, trout, etc. The most sensitive salmonid is the mountain whitefish, the fish found in the bow river in Alberta for example. One of the most common white fish is round whitefish that is closely related. If you discharge un-ionized ammonia into lakes, all of the compounds are higher in the winter; the species of concern are fall spawners. The higher the pH and temperature the higher fraction of un-ionized ammonia. Currently a low pH and temperature exist in Lac de Gras. At Diavik, the un-ionized portion would be lower because of the cold and pH than in southern locations, which is why it is interested in seeing the un-ionized allowance raised for the mine. However, pH's are rising downstream of the mine at BHPB. Diavik has models for higher pH and temperature. At those levels it feels the un-ionized portion will remain below toxic levels at the dilution point.

The difference between ionized and un-ionized ammonia - Ammonium is ionized, ammonia is un-ionized. The fraction of ammonia goes to ammonium depends on the pH and temperature. Part of the discharge is ionized. It will go to nitrate most often. Mainly ammonium is being discharged from the mine. There is a chart that explains this question. An increase in temperature of 5 Celsius and an increase of pH of .5 from 7.5 to 8.0 result in an increase from ½ mg/l to 2.6 mg/l of un-ionized ammonia, a fivefold increase giving a fixed output of ammonia. Diavik's licence regulates total ammonia, 2 mg/L; it wants to change this to the un-ionized fraction with a new limit.

Ammonium toxicity – Ammonium may have some toxicity of its own; other potential toxins can influence it. The small fish that live in the gravel for 8 months or so are unable to move. For fish developing on the wall of the dyke (a likely spawning area), cadmium may be available; ammonium nitrate discharged to the dyke from dust is another potential pollutant. It is unknown how much of that settles on the outside of the dyke. During the winter it will stay on the ice. Particulate matter will contain un-ionized and ionized ammonia. *Kincheloe et al.* discusses the toxicity of nitrate to fish eggs in two laboratories and continues through to the fry stage.

Fish egg mortality – Some deaths occur naturally during this period. Of those that survive the egg stage, some die as alevins and some die as fry to provide a total mortality rate. One of the flaws in the original *Kincheloe et al.* experiment is it assumed the alevins were no more sensitive or susceptible as the eggs were. The most sensitive individuals may have been killed off at the egg stage prior to becoming alevins.

BHPB's study of nitrate toxicity - The work that BHPB wants to do on nitrate is a repeat of *Kincheloe et al.*'s work. The Agency wants to ensure they avoid the problem of experimental design. They should study the toxicity of nitrate to each stage of the fish development, not starting from eggs and passing through the entire life cycle, a 96-hour test. 30 eggs was not considered enough for a mortality test by Directors, 100 + was recommended.