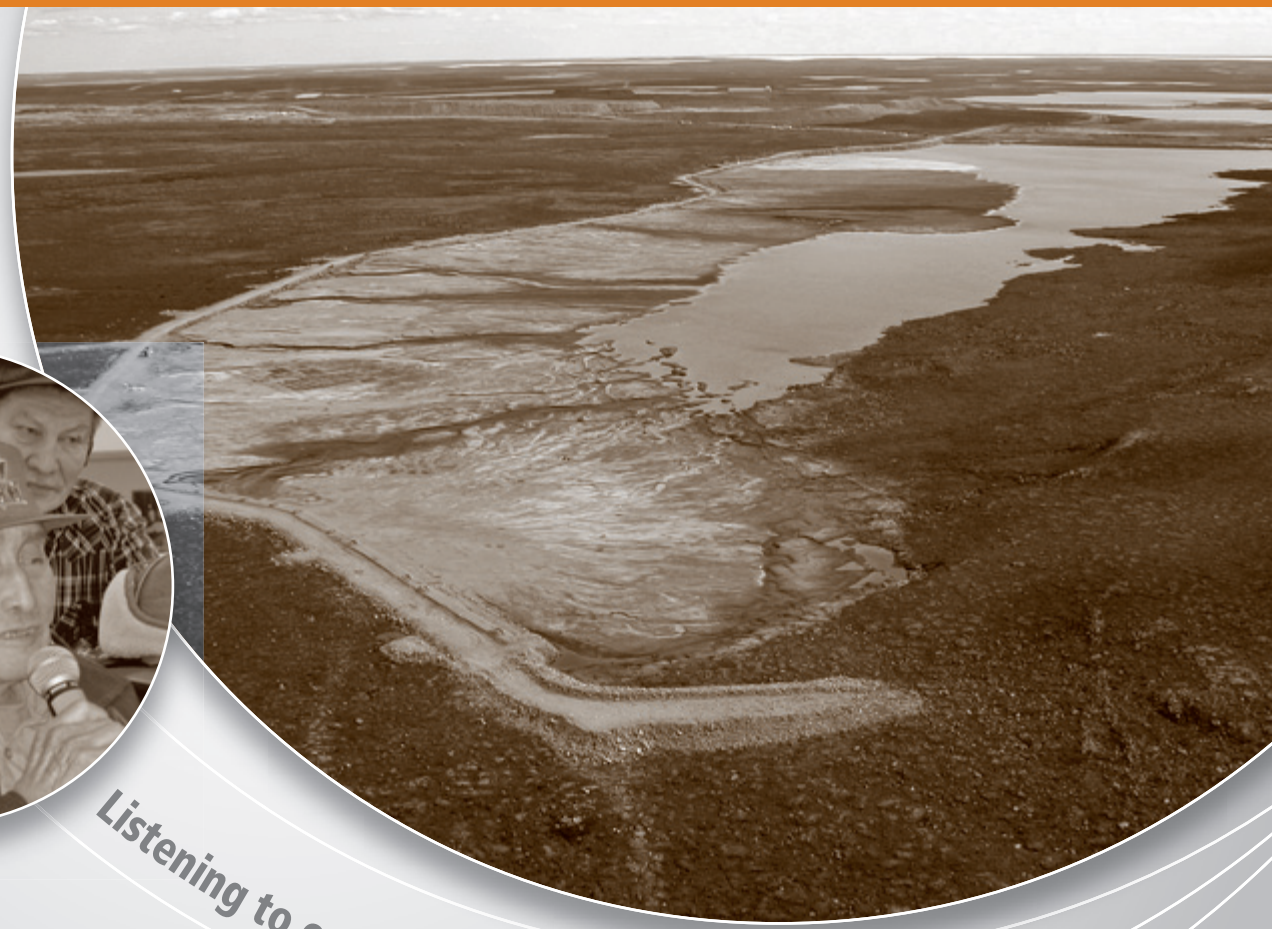
TECHNICAL ANNUAL REPORT 2004-2005

Independent Environmental Monitoring Agency



Listening to our members, meeting our mandate

A PUBLIC WATCHDOG FOR ENVIRONMENTAL MANAGEMENT AT EKATI DIAMOND MINE™

Recommendations

Reclamation and Closure

1. BHPB should develop a workable closure plan, within one year, with closure objectives and preferred options for the mine components leading to specific closure criteria.
2. Decisions should be made about closure of mine components based on information from the corresponding studies in the forthcoming Abandonment and *Reclamation* research plan.
3. BHPB should use a collaborative consultation process to assist in developing its next closure plan, similar to the process used for improving the operation of the Long Lake Containment Facility.

Traditional Knowledge

4. BHPB should enable greater participation of Aboriginal Peoples in the design and delivery of monitoring programs at Ekati.

Communications and Consultation

5. BHPB should adopt a more collaborative approach to the review and design of reports, programs, projects and risk assessments.

Regional Monitoring and Cumulative Effects

6. DIAND, GNWT, GNU and BHPB should be involved in regional caribou monitoring of the Bathurst Caribou herd.

Assessment of Regulators

7. There is a need for greater clarity on the issue of water quality and the definition of receiving environment that could take the form of guidelines from the MVLWB. Building of internal technical capacity may assist with this initiative.

Message from the Chairperson

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Regulators

DFO - Department of Fisheries and Oceans

DIAND - Department of Indian Affairs and Northern Development

EC - Environment Canada

ENR - GNWT's Environment and Natural Resources (previously known as RWED or Resources, Wildlife and Economic Development)

GNU - Government of Nunavut

GNWT - Government of the Northwest Territories

MVLWB - Mackenzie Valley Land and Water Board

It is with pleasure that I present to you the technical version of the 2004-05 annual report of the Independent Environmental Monitoring Agency. The report summarises the Agency's activities and offers recommendations for BHP Billiton and for the regulators so that the good environmental performance observed at the mine can continue.

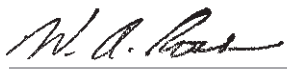
Changes in the last year involved our manager, Carole Mills, leaving us to return to the Government of Canada. We thank her for her many valued contributions and welcome Kevin O'Reilly as our new manager. We also welcome Dr. Anne Naeth as a new director and Jaida Ohokannoak as our new treasurer.

Environmental performance at the Ekati Diamond Mine™ continues to be good. Future good performance relies on effective monitoring programs today. We continue to promote such practices, especially when they involve obtaining information needed for effective mine management and collaborative review. Thus, we were pleased with the review of the Long Lake Containment Facility (LLCF) operation carried out by BHPB.

Our major focus now is on *reclamation* and closure of the mine. While this is over a decade away, it is important to plan for an environmentally sound closure now to avoid future problems. Our efforts this past year have been primarily directed at *reclamation* and closure, licence renewal, the LLCF review and regional effects of the mine (and other developments) on caribou.

Our efforts to increase community input have been extremely valuable this past year. We held a board meeting in Kugluktuk at the invitation of KIA. The evening open house was well attended (over 30 persons lasting about three hours) and demonstrated significant interest in Ekati and its environment. The Aboriginal participation in our environmental workshop resulted in wise advice regarding caribou monitoring, something we greatly appreciate.

The Agency has had difficulties with BHPB because, in our view, it has attempted to interfere with the Agency's independence and has denied funding in part because of how we meet our mandate. At the time of writing this report, we and the company are for the first time, meeting with the Governments of Canada and the NWT regarding our work plan and budget. We believe the *Environmental Agreement* and an independent environmental monitoring agency is a sound approach to environmental management in the North and we will make every effort to work collaboratively with our Society members to make this approach work as well in the future as it has in the past.



William A. Ross, Chairperson
March 31, 2005

Agency Activities

In 2004 the Agency engaged in a similar volume of work as in prior years with expanded efforts in some areas, as detailed later in this section. While the bulk of the Agency work relates primarily to the review and analysis of BHPB environmental management plans and reports and consulting with our Aboriginal members, there are some additional ongoing and intermittent core Agency activities. Core activities of the Agency include meetings of the Board of Directors, an annual general meeting, our annual report and site visit, and individual director visits to the communities. Additional core activities worthy of note in 2004 include the Agency intervention in the Ekati licence renewal process, and the board meeting that took place in Kugluktuk, Nunavut followed by a community open house.

Examples of Management Plans, Reports and Documents or Correspondence the Agency Received, Reviewed and Sent in 2004

From	Documents Received
BHPB	62 (includes general written correspondence, monitoring program and regulatory reports submitted to regulators and water licence related correspondence)
Total pieces of incoming correspondence all parties filed on Agency registry	221
GNWT Department of Environment and Natural Resources	6
Department of Fisheries and Oceans	32
Department of Indian Affairs and Northern Development	24 (letters, inspection reports etc.)
Environment Canada	5
Mackenzie Valley Land and Water Board	47
Agency Aboriginal Society members	15
IEMA outgoing	31 (six board of director meeting summaries, three IACT meeting summaries, 22 letters related to Agency mandate)

In addition to the core Agency budget, we again relied on partner participation and funding to host or participate in major events. In 2004 three key activities involved partner funding:

- **The Reclamation and Closure Workshop, sponsored by DIAND.** The Agency hosted and delivered the workshop along with a steering committee made up of DIAND, BHPB and Agency staff and consultants. The workshop provided all parties with an opportunity to learn about and explore mine *reclamation* terminology and to discuss the closure options for various *reclamation* units such as pits, *tailings* ponds and roads.
- **The Long Lake Containment Facility (LLCF) review process.** This evaluation of *tailings* management was undertaken by BHPB. Three Agency directors and staff participated in a collaborative process to learn about management of the LLCF, review possible scenarios for improving the management of *processed kimberlite* and a series of workshops to rank and evaluate options.
- **The Ekati Environmental Workshop.** Supported financially by DIAND, the Agency hosted the event to review the results of BHPB's 2004 environmental

Elder at the reclamation and closure workshop.

monitoring programs with an audience largely made up of our Aboriginal Society members and government representatives. Various regulators also participated (Department of Fisheries and Oceans, Environment Canada, Territorial Government and the MVLWB).

Last year we reported that we would attempt to improve upon our provision of technical advice to BHPB. Our efforts at this were often sidetracked by diverging opinions on the mandate of the Agency and resolving budget related matters. For a good part of 2004-5, the company was preoccupied with the water licensing of Ekati. Even so, the Agency was able to engage the company in detailed discussion on wildlife, aquatics and closure and we plan to continue in this role. We received positive feedback from our Aboriginal Society members at times throughout the year related to the quality of information we provide and for our annual report.

Agency Mandate	To Meet its Mandate in 2004 the Agency
✓ Review, report and make recommendations on BHPB and government reports and plans.	• Reviewed and provided comments on *reclamation* and closure, waste rock seepage, wastewater and *processed kimberlite* management, water licence renewal and aquatic effects monitoring.
✓ Make recommendations on the integration of Traditional Knowledge (TK) and experience of Aboriginal Peoples into environmental plans and programs.	• Expanded efforts at community consultation with our Aboriginal members led to new recommendations to BHPB and the regulators in 2004.
✓ Participate as an intervenor in regulatory processes.	• Intervened at the public hearing for the renewal of the Ekati water licence.
✓ Provide an accessible public repository of all environmental information relevant to the project.	• Maintained a web site which contains copies of reference documents, Agency technical review documents, board meeting summaries, records of incoming and outgoing correspondence, slide presentations and digital photographs. • Maintained and updated a resource centre of relevant correspondence and reports.
✓ Provide ways of distributing information to Aboriginal Peoples and the general public.	• Hosted the Ekati Environmental Workshop in March 2005. • Hosted a board meeting and open house in Kugluktuk, Nunavut in August 2004. • Responded positively to invitations to Agency directors to consult directly with communities. • Hosted our annual general meeting and prepared a plain language and technical annual report.
✓ Provide an effective means to bring to BHPB and governments the concerns of Aboriginal Peoples and the general public.	• Provided a forum for Aboriginal member concerns to be shared with BHPB at the Agency annual general meeting and at other events. • Forwarded recommendations from the Ekati Environmental Workshop to BHPB and the regulators.

Agency Recommendations from 2003-2004:

BHPB and Regulator Responses

As we go to press, we have not received a written response from BHPB or GNWT to the recommendations from our last year's annual report. The information below summarizes the responses of those to whom we made formal recommendations.

Wildlife Effects Monitoring Program


PAIGE BURT

1. **Last year's Recommendation:** BHPB should consult with RWED in order to re-design the wolverine monitoring program based on hair samples and DNA-based identification of wolverine individuals.

   BHPB's Actions: BHPB has agreed to undertake the new wolverine-monitoring program in cooperation with GNWT.

2. **Last year's Recommendation:** The monitoring of land breeding birds should be done every other year rather than every year.

   BHPB's Actions: BHPB acknowledged that monitoring of birds is not a priority but will continue with the monitoring program unchanged.

Risk to Wildlife from Exposure to Processed Kimberlite

3. **Last year's Recommendation:** BHPB should undertake a new assessment of risks to wildlife from exposure to *processed kimberlite*.

   BHPB's Actions: The Agency understands that BHPB may be considering the completion of a new risk assessment.

Reclamation and Closure

4. **Last year's Recommendation:** BHPB should produce a first draft of Ekati-specific closure criteria within one year. The next step should be for the company, government and other affected parties to meet in order to finalize closure criteria for Ekati.

   BHPB's Actions: BHPB has not formally responded but it has publicly indicated that closure planning is now a priority given its own internal corporate policies.

   DIAND's Response: DIAND is committed to developing *reclamation* completion criteria guidelines for mining in the NWT and consulting all parties in finalizing this work.

5. **Last year's Recommendation:** The principles for *progressive reclamation* security should be incorporated into the water licence when the licence is considered for renewal later in 2004.

   MVLWB's Actions: The MVLWB is still in the process of finalizing a new water licence for Ekati.

Traditional Knowledge

6. Last year's Recommendation: BHPB should make more explicit efforts to incorporate the use of TK into monitoring, *reclamation* and other mine operations and report on its usage in these activities.

BHPB's Actions: The Agency is not aware of any significant changes in the use of TK by BHPB in environmental management at Ekati.

DIAND's Response: Suggested development of an action plan by government, companies and affected parties with a steering committee. DIAND has indicated that BHPB should document how TK is being used in environmental management at Ekati and include this in its annual report.

Regional Monitoring and Cumulative Effects

7. Last year's Recommendation: BHPB, DIAND, RWED and others should initiate discussions on how to monitor the regional cumulative impacts on the Bathurst Caribou heard.

BHPB's Response: There has been no response from BHPB on this.

DIAND's Response: DIAND is involved in the Bathurst Caribou Management Plan working group which developed a draft plan now out for review.

GNWT's Actions: GNWT has not responded formally but has developed a draft Bathurst Caribou Management Plan with monitoring programs that will assist in better managing *cumulative effects*.

Environmental Workshops

8. Last year's Recommendation: BHPB should reinstate its annual environmental workshops in February of each year.

BHPB's Response: BHPB plans to host a workshop every three years in conjunction with its environmental impact report, and to present its results annually in each community.

DIAND's Response: The workshops were not a regulated requirement. DIAND supports the Agency in delivering workshops for the communities and government.

9. Last year's Recommendation: The MVLWB should add a provision to the renewed water licence ensuring that annual reviews of environmental monitoring programs are undertaken by BHPB in a collaborative, collective process with the affected parties.

MVLWB's Actions: The MVLWB is still finalizing a new water licence for Ekati.

Wildlife Effects Monitoring Program

In 2004, BHPB completed the 8th year of wildlife monitoring at Ekati. The Wildlife Effects Monitoring Program (WEMP) focuses on species of greatest concerns, namely caribou, grizzly bear, wolverine, wolf, land breeding birds, and falcons. BHPB also monitors losses of habitats, compliance with waste disposal regulations, and any wildlife mortalities observed during monitoring activities. Wildlife impacts are mitigated on an on-going basis through wildlife awareness programs, right-of-way of wildlife on roads, low speed limits for vehicles, and waste management protocols to avoid wildlife attraction.

In the past year, BHPB initiated new studies or data collections that would guide environmental management and mine *reclamation*. These studies included wildlife use of reclaimed areas, the influences of dust suppressant on wildlife, caribou response when they came into contact with haul roads, and weather data to predict level of insect harassment on caribou. In addition, BHPB made a special effort to report regional data on caribou, grizzly bears, and wolves, in collaboration with government agencies in the NWT.

Wildlife monitoring involved a balance of scientific and Traditional Knowledge (TK). The work included aerial surveys, ground surveys, behavioural observations, use of traditional methods to deflect

DEAN CLIFF/GNWT

Caribou from Bathurst herd

caribou away from high-risk areas, and systematic reporting of wildlife sightings and mortalities. BHPB used this information to quantify effects of mining activities on wildlife species and their habitats, and to manage negative impacts on wildlife.

BHPB's Findings

Total habitat losses at Ekati since 1997 now represent 19.7 km^2 of land (e.g., about twice the land for Yellowknife). Waste management practices at Ekati continue to improve with reduced wildlife attractants misdirected at landfills. In the past year, there were no reported mortalities or injuries due to vehicle or aircraft collisions for the species of greatest concerns. Seven caribou mortalities were reported on or near the mine footprint. Six of these mortalities were associated with signs of predation. No mortalities of caribou were associated with mine pits or waste *kimberlite* containment areas.

The numbers of caribou that migrate through the mine site increased moderately in 2004. Caribou abundance during spring migration was lower than in previous years. A western shift of caribou distribution in autumn and winter seems to explain reduced caribou numbers in the vicinity of Ekati during the northern migration in spring. No marked effects of mine infrastructure or mining activities on caribou distribution or behaviour were documented through the WEMP. Roads and associated traffic seem to influence caribou crossings. In particular, caribou more readily crossed roads with low vehicle traffic and with lower edges (i.e., low banks on road sidings).

Data on grizzly bears, wolverines, and wolves show that these species of concern continue to be widely distributed around the mine. Reproduction of young for these three carnivore species were documented in 2004. Based of reported sightings, wolverines were regularly observed close to mine infrastructure despite stringent waste management practices.

Land birds nesting in the vicinity of Ekati show high resilience to mine activities. Bird abundance and species diversity in areas close to the mine were generally comparable to areas quite distant from the mine. This lack of mine influence, except for bird displacement due to habitat losses, is consistent with past years of monitoring. Falcons and other raptors continue to nest around the mine. Raptors used pit walls as suitable nesting habitat.

Agency's Assessment

The Agency views the 2004 WEMP as effective and of good quality. BHPB reported the results of its WEMP with great detail, self-critique, solid technical analyses, and clarity. The reporting of regional data on key wildlife species is viewed as an important improvement. The production of a plain language summary is of great value for local communities and the general public. We think that BHPB sets an excellent standard for reports on wildlife monitoring.

The Agency believes that, on balance, Ekati Mine creates only minor and small-scale influences on wildlife. Habitat losses are important residual impacts that cannot be mitigated during mining activities. The relatively large scale of the mine footprint will require substantive investment of BHPB to effectively reclaim mine areas. The construction of new roads should take into consideration the findings that caribou crossings are influenced by the height of the banks. We suggest that BHPB specifically evaluates the effect of "banks with lower slopes" and "banks constructed from mine-run rocks" on caribou crossings.

The Agency continues to support BHPB in harmonizing its wildlife monitoring activities with that of other mines in the region, especially for wildlife species with large spatial requirements. We would welcome some summary statements in the WEMP report with regard to the observations of local people visiting the mine site. Finally, the Agency supports BHPB's participation in a regional wolverine monitoring program based on DNA information.


JIRI HERMANN/BHP BILLITON DIAMONDS INC.

Grizzly near Ekati


DEAN CLUFF/GNWT

Wolverine after release from trap


DEAN CLUFF/GNWT

Wolverine being released from trap

Aquatic Effects Monitoring Program

BHPB's Aquatic Effects Monitoring Program (AEMP) is a requirement under its Class "A" water licence and the *Environmental Agreement*. It is designed to detect any changes that the project has on aquatic ecosystems in the Koala and King-Cujo watersheds to enable effective environmental management.

The AEMP measures various physical, chemical and biological features of aquatic ecosystems which serve as indicators of change. Where appropriate, follow-up actions are to be taken by BHPB to minimize or correct any adverse effects that have been identified.

In addition to the monitoring program, BHPB is required to control water effluent quality and volumes at a number of regulated stations specified by its water licence. There were no measurements above licence limits for regulated water quality parameters in 2004.

Outline of Studies

The monitoring frequency is every year for water quality, hydrology, *limnology*, lake *benthos*, stream *benthos*, every three years for sediment quality and every five years, for fish communities. BHPB monitors *phytoplankton* and *zooplankton* annually in August (see Figure 1).

Arctic grayling prior to release back into the Panda Diversion Channel

2004 was the seventh year of post-baseline data collection within the Koala drainage and the fourth year of post-baseline monitoring within the King-Cujo to Lac du Sauvage drainage at the Misery site. Monitoring also occurs within three reference lakes and outflow streams.

Winter sampling under ice (lakes only) occurred in April after discharge had ceased.

Winter dissolved oxygen concentrations were measured monthly (except Kodiak and Cujo lakes which were measured weekly). Open water sampling occurred during July, August and September, after discharge had resumed. Sampling of streams included water quality, stream *benthos*, and stream flow.

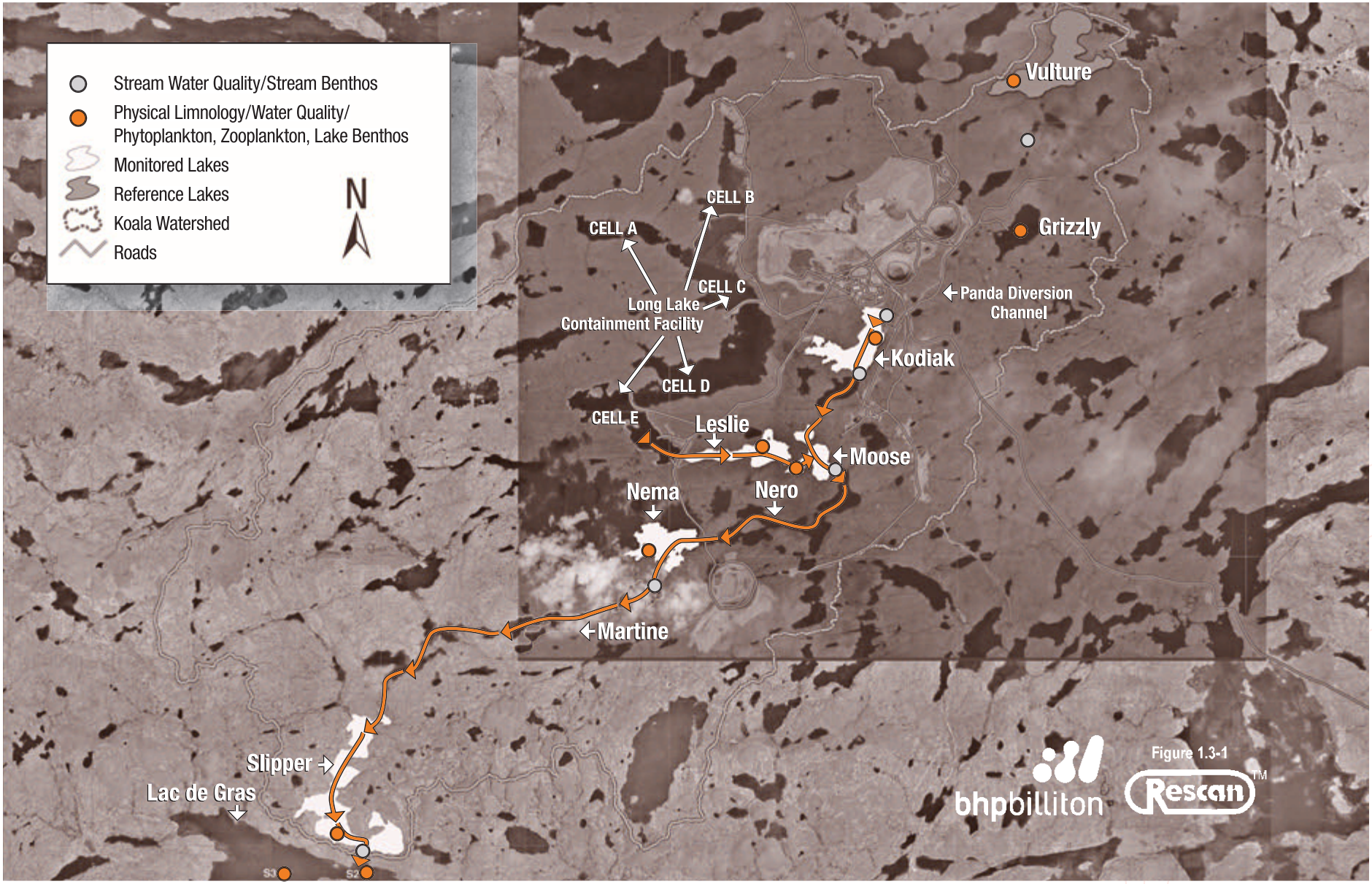
Inputs to the Aquatic Receiving Environment

Processed kimberlite, treated sewage and *pit water* are discharged into the upper cells (cell B and C) of the Long Lake Containment Facility (LLCF). Water released from the LLCF enters the receiving environment of the Koala watershed through Leslie Lake, flowing downstream through Moose Lake, and eventually entering Lac de Gras.

Water was pumped from cell E to Leslie Lake in October 2003 to the end of March 2004 and again from July to September in 2004.

Due to a shutdown of mining at Misery, water was discharged into Cujo Lake for only 3 months in 2004 (July – September).

Figure 1: Aquatic Effects Monitoring Program — Lake and Stream Sampling Locations, 2004



BHPB's Results in 2004

An improvement to the previous AEMP reports is the expanded reporting of the winter water chemistry results.

Koala Watershed:

The following water quality changes were noteworthy:

- Total Dissolved Solids (salts) increased in all monitored lakes between LLCF and Lac de Gras (eight times greater than baseline in Moose Lake and three times greater in Slipper Lake).
- Potassium increased in all monitored lakes between LLCF and Lac de Gras.
- *Ammonia* shows an increase in 2004 over previous years and is well above baseline. BHPB believes contamination of samples before their arrival at the lab may be the reason for the elevated *ammonia* measurements.
- Winter levels of *nitrates* are approaching *CCME* guidelines of 2.9 mg/L in Leslie and Moose Lakes.
- Copper levels in Kodiak Lake are no longer above *CCME* guidelines and have been declining every year since peak concentrations in 1999.
- Molybdenum is still increasing in all downstream lakes to Lac de Gras. If the historic rate of increase continues, it will reach *CCME* guidelines in two years or less in Leslie and Moose Lakes.

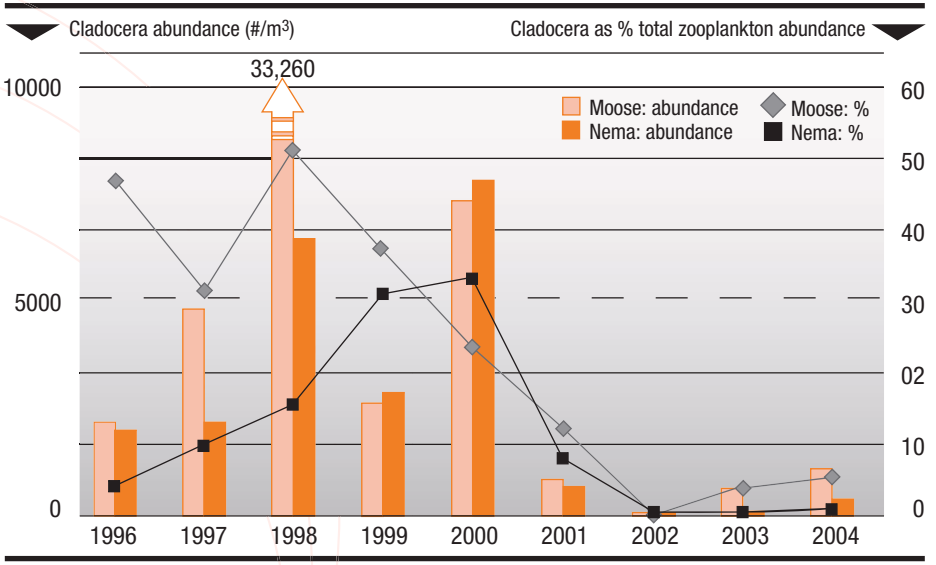
Overall, six water quality variables were elevated above baseline as far downstream as Slipper Lake in 2004, an increase from five in 2003 (*nitrate* added to the list in 2004). In lakes immediately downstream of the LLCF, nitrite and copper are no longer elevated (see Table 1).

Depending upon precipitation, time-of-travel of the discharge and flushing rates of the lakes in the Koala watershed, concentrations in downstream waters may not show the expected gradual or continuous reduction with progress downstream and into Lac de Gras. This may explain some such results noted in the 2004 sampling program. It would be helpful if BHPB attempted to model these flow and concentration variables using a few selected conservative parameters to see if such results could be explained.

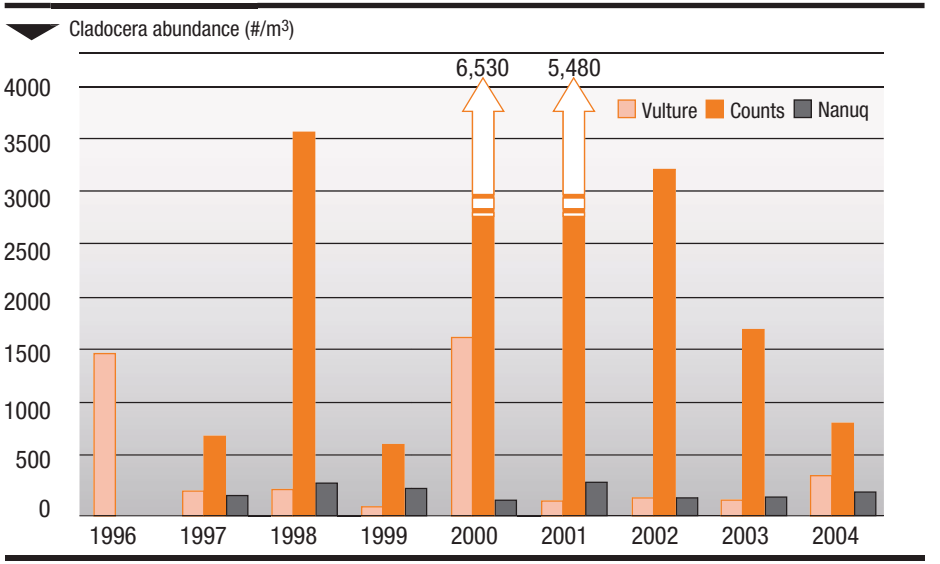
Arsenic, a regulated parameter, has been measured but not evaluated in 2003 (Koala watershed) and 2004 (both Koala and Cujo watersheds). BHPB's AEMP Re-evaluation and Refinement Report of 2003 states that arsenic "will continue to be evaluated in future years (the King Pond Settling Facility may be a potential source of arsenic to downstream water bodies)". Also, in a February 2004 letter to stakeholders, BHPB stated that "There are no changes proposed for the AEMP...in 2004." The 2004 AEMP report does not state why arsenic is no

Figure 2: Evaluating Possible Effects on Zooplankton

Cladocera Abundance in Moose and Nema Lakes



Cladocera Abundance in Reference Lakes



longer being evaluated, even though levels in Cujo Lake are the same as last year and well above those of reference lakes, though not above baseline.

The abundance of *cladocera*, a crustacean zooplankter, has dropped below levels found in Moose and Nema lakes prior to mining, in terms of both absolute numbers and as a percentage of total *zooplankton* abundance (see Figure 2). Only one reference lake, (Counts Lake in 2004) showed this same drop in *cladocera*. This caused a shift in the diet of round

Table 1: Mining Effects on Water Quality Flowing Through the Koala and King – Cujo Watersheds

	Parameters elevated in Koala watershed: Long Lake Containment Facility ➡ Lac de Gras					Parameters elevated in Cujo watershed: King Pond ➡ Lac du Sauvage	
Parameters monitored	Leslie	Moose	Nema	Slipper	Lac de Gras	Cujo	Lac du Sauvage
PH	▲	▲	▲	▲	▲	▲	
Sulphate	▲	▲	▲	▲	▲	▲	▲
Potassium	▲	▲	▲	▲	no baseline	▲	▲
Total Dissolved Solids	▲	▲	▲	▲		▲	▲
Total Ammonia	✳	✳				▲	▲
Nitrate	▲	▲	▲	▲	▲	▲	
Nitrite							
Ortho-Phosphate							
Total Phosphorus							
• Aluminum							
• Arsenic							
• Copper						▲	▲
• Molybdenum	▲	▲	▲	▲			
• Nickel	▲	✳					
• Zinc							▲

▲ Levels elevated above baseline ✳ Elevated in winter only

➡ Flow from effluent source to ultimate receiving lake in watershed

Bearclaw Water Drawdown:

At the beginning of last summer water was pumped from Bearclaw Lake to Panda Lake in order to prevent a freshet overflow into Beartooth Pit. The pump, which was supposed to be on an automatic setting, was accidentally left on 'manual', resulting in the Bearclaw lake level being drawn down about one half metre below the natural level. This resulted in a number of juvenile burbot deaths, and exposed approximately 16,000 m^2 (1.6 hectares) of shoreline fish habitat. An investigation by DFO resulted in an official warning of a violation under the Fisheries Act. BHPB is currently studying the effects of the incident on the Bearclaw aquatic environment.

Special Studies:

1. Acute and chronic *toxicity* of nitrate to early life stages of lake whitefish and lake trout

A study of *nitrate toxicity* was commissioned by BHPB, on our recommendation, to test earlier studies which had shown reduced embryo survival at very low *nitrate* concentrations (1 to 5 mg/L) for several species of salmon.

In October, 2003, eggs and milt were collected from lake whitefish of Great Slave Lake and from lake trout of Lake Simcoe, Ontario, since trout from Great Slave Lake had laid their eggs too early for use in its study.

BHPB's study showed that swim-up *fry* were the most sensitive stage (compared to embryos and alevins) for both species, and lake whitefish were more sensitive than lake trout in acute effects. Sublethal effects such as delayed development and reduced body weight were seen in lake trout at *nitrate* concentrations of 6.25 mg/L. The results of this study show that the current *CCME* guideline of 2.93 mg/L for *nitrate* is indeed protective of the early life stages of fish in the lakes affected by the Ekati Mine

2. Tier 1 ecological risk assessment for Chloride

The results of an ecological risk assessment for chloride in water bodies at Ekati were released in 2004. Even though present concentrations are well below guidelines [average of 1.8 mg/L in Moose Lake compared to 150-230 mg/L (U.S.A and Canadian water quality guidelines)] for the protection of aquatic life, the study was completed in anticipation of potential increases to approximately 150 mg/L during the life of the mine.

The risk assessment which relied on data up to 2002 recommended separate safe levels for seepage water (1369 mg/L) and for lakes and streams (180 mg/L). In British Columbia, the level calculated to protect aquatic life is 150 mg/L, based, in part, on the common presence of a sensitive zooplankter, Ceriodaphnia, in BC's lakes and streams. Up to the year 2002, Ceriodaphnia had not been recorded in the Koala watershed. In 2003, Ceriodaphnia was found in Moose Lake, so the level regarded as suitable for the protection of aquatic life in Ekati lakes and streams should be reduced to 150 mg/L to protect this species and conform with the BC guideline.


Agency directors at the water licence public hearing

whitefish and lake trout in Moose Lake in 2002. Despite a 99% reduction in *cladoceran* numbers in Moose Lake from 5474/m^3 (1996) to 39/m^3 (2002), *cladocera* in trout stomachs declined by only 25%. Regardless of this drop there was no evidence to suggest this change in diet had adversely affected the fish. Fish will be sampled again in 2007.

Cujo Watershed:

Winter copper concentrations have risen above the *CCME* guideline in Cujo Lake. Oxygen levels in winter also reached anoxic conditions at mid-depth. BHPB was concerned about this and increased the frequency of oxygen monitoring to every three days from the usual two-week interval. In order to help bring oxygen levels back to normal, snow cover was removed from over 13 hectares of ice in late January to increase oxygen production. Clearing snow off ice allows greater light penetration to promote *phytoplankton* growth, which gives off oxygen in the water. The company also installed aerators in the lake.

Water Licence Process

Date	Event
December 12, 2003	BHPB submits application for renewal of its water licence.
March 10, 2004	Deadline for reviewer comment on the BHPB water licence application.
March 24, 2004	Deadline for reviewer comment on the BHPB water licence application (extended). BHPB distributes a letter to MVLWB suggesting minor edits and clarification to the water licence.
May 18, 2004	Deadline for submission of interventions for water licence renewal public hearing.
June 29, 2004	Deadline for submitting water licence hearing presentations.
July 6-7, 2004	Water Licence public hearing.
October 22, 2004	MVLWB distributes draft water licence for reviewer comment.
November 5, 2004	BHPB distributes letter to MVLWB containing notification it has requested a licence extension from the DIAND Minister and comments on the draft water licence.
November 22, 2004	60 day renewal of water licence issued by DIAND Minister.
November 26, 2004	Second draft of the water licence distributed by MVLWB.
December 3, 2004	BHPB comments on its view that it cannot operate in compliance with the second draft of the water licence and suggests the former water licence receive a two-year extension to provide opportunity for improvement of the draft licence.
January 20, 2005	MVLWB cancels public hearing for extension of water licence.
February 2, 2005	DIAND Minister approves a water licence renewal for one year.
March 4, 2005	MVLWB distributes letter on the completion process for the original application.
May 28, 2005	MVLWB distributes third draft of the water licence.

Agency's Assessment

BHPB should explain to stakeholders why arsenic is no longer being evaluated for the Koala and Cujo watersheds. It should also revisit its risk assessment of chloride in water bodies at Ekati, with a view to considering a permissible level of 150 mg/L rather than the 180 mg/L recommended in its report. According to BHPB's own assessment of Canadian guidelines, 150 mg/L would provide greater certainty of protection of the most sensitive aquatic life in Moose Lake. We also suggest that *cladoceran* abundance in affected lakes and its effects on fish continue to be monitored in coming years.

The Agency is pleased to see the proactive manner in which BHPB had notified stakeholders of unexpected problems at the mine (increasing concentrations of water chemistry variables at LLCF outflow, declining oxygen levels in Cujo Lake and unintentional Bearclaw Lake water draw down). In the LLCF case, it is encouraging to see the company had taken steps to determine the cause well before concentrations could reach a level of concern. Also, BHPB should be commended for taking action to mitigate the decline in winter oxygen level in Cujo Lake, as well as for commissioning the useful study of *nitrate toxicity* in northern fish.

Water Licence Renewal

On July 7, 2004, the Agency delivered a presentation at the MVLWB's public hearing on the renewal of water licence (N7L2-1616). We made the following recommendations for the new licence:

- the licence should require application of the Precautionary Principle in all environmental management activities at Ekati;
- expand the list of regulated contaminants of concern listed in the original licence to include those listed in Sable-Pigeon-Beartooth licence;
- the effluent criteria for the new licence should be based on achieving adequate protection of the downstream aquatic ecosystem;
- the term of the licence should last only until 2009 when the Sable-Pigeon-Beartooth water licence expires, and then both licences should be harmonized into one;
- the licence should require board approval of completed reports when submitted;
- the licence should require annual collaborative reviews of monitoring programs with the affected parties in order to facilitate adaptive environmental management at the mine;
- the licence should require integration of snow and air quality survey results into the AEMP; and
- the licence should require BHPB to establish *reclamation* criteria, and should provide for enforceable *progressive reclamation*.

At press time, the renewed licence had not been issued, and the old licence had been extended for one year to allow the board more time to review the host of issues brought forward by intervenors. A new licence is expected by early summer.

A component of the renewed licence that the MVLWB is considering is a proposal from Environment Canada to have several contaminants of concern added to the licence effluent list as monitored but not regulated substances. The idea is that thresholds would be set for these substances which would trigger mitigation by the company when exceeded, but would not put the company out of regulatory compliance.

The Agency wrote to the board opposing such a two-tiered approach to water quality protection on the grounds that uncertainty of outcome would be increased since the contingency and mitigation plans were not known, significant lag times between detection of an effect and corrective action could occur, and that the move away from legal controls to a results-based system of environmental protection was not likely to be supported by our Aboriginal members.

Also under consideration is establishing a mixing zone, which would extend some distance downstream from the LLCF discharge point. Water downstream of this zone would have to meet criteria for water quality protection (i.e. within background concentrations or below *CCME* guidelines). The Agency recommended to the board that any mixing zone area be set as small as practical.

JIRI HERMANN/BHP BILLITON DIAMONDS INC.

Stream monitoring at Ekati

Independent Third Party Review of the Aquatic Effects Monitoring Program

A steering committee made up of representatives from IEMA, DIAND, DFO and EC was tasked with overseeing the design and implementation of an independent review of the AEMP by a consultant. The purpose was to determine if the AEMP at Ekati is effective in:

- identifying changes in the lake and stream environments downstream of the LLCF by looking at three variables selected by the steering committee (copper, *nitrates* and *zooplankton*); and
- determining if those changes were caused by the Ekati Mine.

This review made the following key findings:

- BHPB has a good, comprehensive AEMP. BHPB has done a lot of analysis on many variables. Especially noteworthy is the intensity of monitoring of plankton and benthic organisms.
- A similar effort is needed on seeking correlations between water quality changes and effects on aquatic life. Statistical treatments such as multivariate analysis can determine which components of water quality may have the most effect on aquatic organisms. BHPB may benefit from the results of this analysis as it may help to streamline future monitoring down to fewer essential elements that seem to have the most impact on aquatic life.
- Rationale for discarding outliers and suspect data should be explained.
- Pseudo-replication: sub-samples (taken from one site in a lake) are more similar to each other than replicate samples (from different sites in a lake) would be. Mistakenly considering sub-samples as replicates causes the apparent amount of information (degrees of freedom) present to be overstated and the criteria (critical values) used to make decisions are unsuitable. Without proper replication, BACI analysis (used by RESCAN to determine significant changes) is inappropriate.
- Gradient Analysis: identifies whether there is an increasing or decreasing gradient in concentration of chemicals as water flows down the Koala watershed from the LLCF to Lac de Gras. A gradient that is demonstrated and evaluated statistically would (a) eliminate the need for sampling replication and (b) add evidence to demonstrate the mine's effect on downstream water quality and aquatic communities.