A PUBLIC WATCHDOG FOR ENVIRONMENTAL MANAGEMENT AT EKATI DIAMOND MINE™

Independent Environmental Monitoring Agency

Technical Annual Report 2003-2004

INDEPENDENT ENVIRONMENTAL MONITORING AGENCY • TECHNICAL ANNUAL REPORT 2003-2004

Wildlife

1. 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.

2. The monitoring of land breeding birds should be done every other year rather than every year.

Risk to Wildlife from Exposure to Processed Kimberlite

3. BHPB should undertake a new assessment of effects on wildlife from exposure to processed *kimberlite* based on the comments from RWED and IEMA.

Abandonment and Reclamation

4. 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.

5. The principles for *progressive reclamation* security should be incorporated into the water licence when the licence is considered for renewal later in 2004.

Traditional Knowledge

6. 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.

Regional Monitoring and Cumulative Effects

7. BHPB, DIAND, RWED and others should initiate discussions on how to monitor the regional cumulative impacts on the Bathurst caribou.

Environmental Workshops

8. BHPB should reinstate its annual environmental workshops in February of each year.

9. 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.

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Regulators

DFO
Department of Fisheries and Oceans

DIAND
Department of Indian Affairs and Northern Development

EC
Environment Canada

GNWT
Government of the Northwest Territories

IACT
Inter-agency Coordinating Team

MVLWB
Mackenzie Valley Land and Water Board

RWED
GNWT's Department of Resources, Wildlife and Economic Development

* Italicized words are defined more fully in the Glossary on page 41.

Message From the Chairperson

I am pleased to present to you the Annual Report of the Independent Environmental Monitoring Agency. As in recent years, we have produced the reports in both plain English and as a technical report. Our recommendations, developed more fully in the technical report, are also in the plain English summary.

Last fall, there was a major change in the Agency as three directors stepped down: Red Pedersen, Peter McCart and Bob Turner. I take this opportunity to thank them, especially Red and Peter, who were directors from the very creation of the Agency in 1997, for their extremely valuable contributions to the Agency and to good environmental management at Ekati™ Diamond Mine. I welcome two new directors to the Agency, Dave Osmond and Jaida Ohokannoak.

The Ekati mine has continued to enjoy good environmental performance, achieved through the effective use of adaptive environmental management. The key to having this good performance persist is vigilance based on collaborative review of the findings of environmental monitoring programs. Three matters the Agency spent time on during the past year are the licence renewal application, the revisions to the Interim Abandonment and *Reclamation** Plan, and concerns about regional (cumulative) impacts on caribou.

We also spent a good deal of time working on Ekati issues with the communities, as is documented elsewhere in this report. This reflects direction we have been given and we wish to continue to improve in this area. Please contact us if you have comments on the mine's activities or how the mine is monitored or if you would like us to visit your community. Our contact information is on the back cover of this publication.

We look forward to another year of good monitoring and environmental performance at the mine.

William A. Ross
Chairperson
March 31, 2004

Agency Activities

We have increased our efforts in community consultation over the last year and have been more successful, particularly through hosting an Aboriginal caucus meeting (funded by DIAND) to gather a cohesive view from our Aboriginal members on how the Ekati mine should be monitored in the context of regional monitoring. Directors have also responded positively to frequent invitations to visit communities.

One of our biggest achievements in the past year was hosting the Ekati Environmental Management Plan and Monitoring Program workshop. At this event the Agency Directors provided a synopsis of environmental monitoring results at Ekati in 2003 and a review of the effectiveness of the management programs in preventing impacts to the environment. Our Aboriginal members formally thanked us for our efforts and the quality of the information we presented. We note that our Annual Report from 2002-03, particularly the plain English summary, was referred to regularly by our members throughout the workshop.

Annual Agency site visit, 2004

Provision of technical advice to regulators and the company is a key element of Agency effectiveness in enabling adaptive environmental management. We have received positive comments from various regulators as to the value and quality of Agency technical advice. Though our technical advice to regulators was appreciated in 2003, we believe it was less so by BHP Billiton (BHPB), and we will endeavor to improve upon this in 2004.

Our reputation in the field of environmental impact assessment follow-up has led to national and international attention and repeated requests for sharing of our experience in monitoring Ekati. This has come from a diverse collection of individuals and groups; government, Aboriginal and academic. We attempt to respond to these requests as best we can, within our mandate as the watchdog for Ekati, and we plan to continue in this role.

Examples of Management Plans, Reports and major documents and correspondence the Agency received, reviewed and sent in 2003

From BHPB	27 monitoring program and regulatory reports
From DFO	19 pieces in registry
From EC	9 pieces in registry
From MVLWB	19 pieces in registry
From DIAND (inspection reports)	14 separate water licence inspections
RWED	13 pieces in registry
DIAND (other)	12
Total pieces of correspondence in Agency public registry in 2003 from all parties	250
Total pieces of official Agency outgoing correspondence in 2003	18
Other Agency outgoing correspondence (board meeting summaries, IACT summaries, etc.)	5 board meeting notes, 8 IACT notes

INDEPENDENT ENVIRONMENTAL MONITORING AGENCY • TECHNICAL ANNUAL REPORT 2003-2004

	Agency Mandate	To meet its mandate in 2003 the Agency
✓	Review, report and make recommendations on BHPB and government reports and plans	• Reviewed and provided comments on air quality monitoring, waste rock seepage, Fox mine permitting and wastewater, the Wastewater and Processed *Kimberlite* Management Plan, *nitrate toxicity* research, abandonment and *reclamation*, water licence renewal and the Aquatic Effects Monitoring Program.
✓	Make recommendations on the integration of traditional knowledge and experience of Aboriginal Peoples into environmental plans and programs	• Forwarded relevant recommendations from Aboriginal caucus meeting to BHPB.
✓	Participate as in intervener in regulatory processes	• Prepared an intervention related to the renewal of Ekati water licence.
✓	Provide an accessible public repository of all environmental information relevant to the project	• Maintained a website which contains copies of reference documents, Agency technical review documents, Board Meeting summaries, records of incoming correspondence and digital photographs. • Maintained and updated a resource centre of relevant correspondence and reports.
✓	Provide ways of distributing information to Aboriginal Peoples and the public	• Hosted the Ekati Environmental Management Plan and Monitoring Program workshop. • Responded to numerous requests from the public, industry, government and academia for information and documents. • Provided summaries of key documents and submissions to our Aboriginal members. • Responded positively to invitations to Agency Directors to consult directly with communities. • Hosted an annual general meeting. • Prepared a plain English summary and a technical Annual Report.
✓	Provide an effective means to bring to BHPB and governments the concerns of Aboriginal Peoples and the general public	• Commented on BHPB's consultation and communication activities related to the 2003 Ekati environmental workshop. • Consulted with Aboriginal members on Agency submissions. • Forwarded recommendations from the Ekati Environmental Management Plan and Monitoring Program workshop to BHPB and the regulators. • Forwarded recommendations from Aboriginal caucus meeting to BHPB and regulators.

Agency Recommendations from 2002-2003:
BHPB and Regulator Responses

Traditional Knowledge, Consultation and Communications

1. **Last year's Recommendation.** BHPB, the Government of Canada and the Government of the NWT should support the concept of a regional traditional knowledge (TK) panel, as recommended by the Aboriginal representatives at the TK workshop co-hosted by the Agency.

BHPB's Response. BHPB will work with interested Aboriginal groups to undertake TK studies that have direct site-specific benefits or enhance community capacity to respond to mining related issues. As this recommendation has also been sent to the DIAND Minister for consideration, BHPB prefers not to comment further.

GNWT's Response. The GNWT recognizes the value of TK and believes this would be best pursued at a regional level.

Government of Canada's Response. Once a regional monitoring function is established, a panel to provide TK expertise could be considered.

Minimizing Terrestrial and Aquatic Impacts

2. **Last year's Recommendation.** BHPB should adopt a more balanced design for haul roads and stream crossings in its attempt to minimize impacts on both aquatic and terrestrial environments. Regulators who approve haul roads and stream crossings should also ensure that a balanced assessment has been done, and that impacts to aquatic and terrestrial environments are minimized.

BHPB's Response. BHPB generally agrees and will continue to balance the potential for impacts to both aquatic and terrestrial ecosystems where possible, but states it may not be possible or reasonable to minimize impacts to both environments.

Wildlife Effects Monitoring Program

ROB GAU/RWEDGNWT

3. **Last year's Recommendation.** RWED, in partnership with the Nunavut Department of Sustainable Development, should publicly report the number of wolverines harvested in the North Slave and West Kitikmeot regions in order to determine the number of wolverines removed from the wildlife study area.

RWED's Response. RWED reported the number of wolverines harvested in the North Slave Region. No response was received from the Nunavut Department of Sustainable Development.

4. **Last year's Recommendation.** DFO, in consultation with the Canadian Wildlife Service (CWS), should consider revisions to the criteria used to conduct *fishout* studies to reduce the potential for *by-catch* of birds.

DFO and CWS's Response. DFO will work with the CWS to review and revise its protocol where appropriate for fish transfers and *fishout* studies. CWS supports the intent of this recommendation and meetings have been initiated between DFO and CWS. Resolution of the *by-catch* problem may not lie with criteria revisions but with the company implementing mitigation measures.

Aquatic Effects Monitoring Program

5. **Last year's Recommendation.** DFO should conduct studies to further assess the potential *toxicity* of *nitrate* to local fish species.

BHPB, DFO and EC's Response. BHBP agrees with this recommendation and has commenced a preliminary study to evaluate *nitrate toxicity*. DFO and EC will review the BHPB study.

Air Quality

6. **Last year's Recommendation.** We recommend that a new air dispersion modeling analysis be conducted by BHPB, and be used as the basis for future air quality monitoring work, including the siting of sampling stations.

BHPB's Response. BHPB agrees and will implement this recommendation and will consider a new Air Quality Monitoring Program, if warranted.

Waste Rock Management

7. **Last year's Recommendation.** BHPB should assess the long term (i.e. post closure) implications of poor quality seepage from the coarse *kimberlite* storage area.

BHPB's Response. BHPB will develop an effective post closure monitoring design and other measures will be developed. BHPB has developed techniques to enhance cooling within the pile and improve operational performance of the coarse *kimberlite* waste rock storage area.

Reclamation

JBH HERMANN/BHP BILLITON DIAMONDS INC.

8. **Last year's Recommendation.** BHPB should continue to explore the uptake by grazing animals of metals in plants being considered for revegetation of processed *kimberlite*.

BHPB's Response. BHPB agrees and has completed an ecological risk assessment on the potential for effects to wildlife.

Our Response. We appreciate that BHPB carried out this study but have advised BHPB that this ecological risk assessment needs to be conducted again based on substantial weaknesses identified by RWED and ourselves.

9. **Last year's Recommendation.** BHPB should improve its reporting of the type and amount of materials stored in waste landfills.

BHPB's Response. BHPB disagrees with this recommendation because it is not required to report the type or quantity of material entering the landfills. Only non-hazardous wastes are placed in the approved landfills.

Our Response. Aboriginal communities continue to raise this as a concern and BHPB should make every effort to address those concerns.

10. **Last year's Recommendation.** BHPB should conduct an analysis of its spill records to determine the reasons and trends for spills as a means of improving its operating and management practices.

BHPB's Response. BHPB agrees and will implement this recommendation.

Wildlife

The wildlife species of concern at Ekati are caribou, grizzly bears, wolverines, wolves, land breeding birds and falcons. BHPB conducts a Wildlife Effects Monitoring Program to quantify the effects of its mining activities on these wildlife species and their habitats. The data are used not only to understand the effects but also to help the company adapt its management of mining activities to reduce negative impacts.

Wildlife impacts are mitigated through wildlife awareness training, giving right-of-way to wildlife on roads, low speed limits for vehicles, road closures when caribou numbers are high, responsible waste management practices and effective communication protocols for wildlife sightings. BHPB also manages the development of mine infrastructure in a way that limits direct habitat losses and sources of disturbance to wildlife.

In 2003, BHPB completed its 7th year of wildlife monitoring. This work included extensive aerial surveys, ground surveys, behaviour observations and landfill checks to monitor wildlife. BHPB also quantified losses of habitats either due to mine infrastructure or disturbances.

Analysis of Contaminants in Wildlife

Our Aboriginal members have expressed concerns that caribou that die or are killed around Ekati may have high levels of contaminants. They requested that BHPB sample dead animals discovered around Ekati and that RWED use such opportunities to sample wildlife to monitor for contaminant levels. We believe that a good way to address this concern would be through the implementation of a core management action in the draft Bathurst Caribou Management Plan, which requires an assessment of the levels and trends of environmental contaminants such as heavy metals in caribou every five years.

BHPB's Findings in 2003

Few wildlife signs were observed at the landfills of the main camp or at Misery camp. Further, no wolverines or grizzly bears were killed or relocated due to the company's activities, indicating that waste management practices continue to improve at the mine. We note that there was one accidental grizzly bear death during RWED's research activities.

BHPB estimated that habitat for caribou around the mine decreased by 8-9% due to building, roads, airstrips, and associated disturbances. Caribou were present at the mine in relatively low numbers from May through October 2003. Aerial surveys suggested that caribou were not displaced from mine infrastructure. Caribou observations from the ground indicated that females with young tend to feed less when close to the mine. Six caribou deaths were observed close to the mine; wolves were associated with at least four of these caribou mortalities.

Grizzly bears, wolves and wolverines continue to be widely distributed around the mine. Observations of dens and young suggest that these species reproduced successfully within the claim block. BHPB assessed habitat losses for grizzly bears to be 2-3% of habitat around the mine. The monitoring of wolverines based on snow track surveys has limitations as it only reveals presence or absence; it does not allow a good assessment of wolverine numbers within the claim block.

The monitoring of land birds nesting in the claim block indicated that the mine creates minor disturbances to breeding birds. The

effects seem to be limited to habitat losses due to the mine infrastructure. In 2003, ten nests of falcons were monitored. Only one nest produced young falcons. However, data collected over the past nine years reveals large year-to-year variation in reproduction for falcons in the Lac de Gras area.

Agency's Assessment

The Agency views the 2003 Wildlife Effects Monitoring Program as of good quality and meaningful within a context of effect assessment and management. The Agency is impressed by the quality of the wildlife annual report in terms of presentation, ease of understanding and technical analyses. Finally, the Agency continues to encourage BHPB to discuss openly in its report the emerging problems for wildlife within the claim block. For example, there is indication that wolves use roads and rock piles to capture caribou, yet BHPB does not acknowledge such a plausible interaction.

PHOTO: ROBERT MUDERS, GNWT

Wolverine DNA sampling station near Daring Lake, NWT

The number of caribou observed around the mine in 2003 was the lowest yet reported. This finding is puzzling to the Agency. There is a possibility that caribou are migrating around the mine site in a different way due to the presence of roads, buildings, pits and associated disturbances and that such displacement of caribou happens on a scale much larger than the area used for wildlife monitoring by BHPB. The Agency believes that more extensive monitoring of caribou over the entire range is warranted as mine development increases in the Slave Geological Province.

A refinement of monitoring work for wolverines may be possible in the coming year. New research by RWED indicates that wolverine monitoring based on hair sampling and DNA analyses would allow the assessment of wolverine abundance in the proximity of the mine.

A representative from the Canadian Wildlife Service suggested that the monitoring of breeding birds could be reduced from every year to every other year because this provides enough information. We agree.

The small number of food wastes identified during surveys of Ekati landfills suggests that waste management practices have been successful in reducing attraction of animals to the mine.

PHOTO/IMAGE: BURT, BATHURST INLET LODGE

Recommendations

1. 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.

2. The monitoring of land breeding birds should be done every other year rather than every year.

Risk to Wildlife from Exposure to Processed Kimberlite

BHPB has proposed direct revegetation of large areas of processed *kimberlite*. Research has shown that revegetating the processed *kimberlite* is feasible but the vegetation is attractive to herbivores. This attraction raises concerns that wildlife may be exposed to contaminants (metals) from eating processed *kimberlite* or plants growing on processed *kimberlite*. Aboriginal Peoples have expressed concerns about the impact this could have on caribou and people who eat the caribou.

Last year we recommended that BHPB should investigate the uptake of metals by wildlife grazing on plants growing on processed *kimberlite*. In response, BHPB conducted a risk assessment, which examined the potential concentration of six metals in wildlife (muskoxen, caribou, grizzly bears, wolverine, wolves, hare and ptarmigan). The six metals (chromium, cobalt, manganese, molybdenum, nickel and strontium) were selected because they were at higher concentrations in the processed *kimberlite* than in three reference areas.

The risk assessment considered the following factors:

- concentration of metals in soils, plants and water in the LLCF;
- amount of intake by wildlife of soil, plants and water;
- amount of time the wildlife spends in the area;
- amount of meat a human would eat; and
- amount of metals that would be in the meat.

The risk assessment concluded that "there is a high degree of certainty that risks have not been underestimated and that all wildlife would be safe from exposure to metals from the LLCF."[1]

Agency's Assessment:

Both IEMA and RWED have concerns about the risk assessment, its assumptions and protocol.

1. Several metals of potential concern were not evaluated but should be, including:

- magnesium because concentrations in *kimberlite* are higher than levels observed for the Colomac Mine *tailings*, which cause mild diarrhea in caribou;
- barium and selenium because their concentrations in *kimberlite* approach *CCME* guidelines for soil;
- aluminum because it appears to be concentrating in plant cover in the *reclamation* study plots;

2. Several assumptions used to estimate the exposure of caribou to the metals were not conservative or realistic, including:

- estimated daily food intake by caribou was too low; and
- soil intake was underestimated because caribou are attracted to calcium and sodium content and will likely consume dirt when eating the vegetation roots.

3. We suggest that geese be added as a species of concern when modelling the risk to humans because of its importance in northern diets.

While the risk assessment offers the right approach, it did not increase our level of comfort or certainty about the potential impacts on wildlife and humans. A peer review of the assumptions and estimates used in the risk assessment would have provided a more accurate assessment.

Recommendation

3. BHPB should undertake a new assessment of effects on wildlife from exposure to processed *kimberlite* based on the comments from RWED and IEMA.

White fronted geese at Ekati

[1] *Golder Associates Inc. Assessment of the Potential for Effects on Wildlife from Exposure to Processed Kimberlite at the Ekati Diamond Mine. Submitted to BHP Billiton Diamonds Inc 2004.*

Aquatic Effects

BHPB's Aquatic Effects Monitoring Program (AEMP) is a requirement under its Class 'A' Water Licences 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 in order to enable effective environmental management. Significant effects are identified first, by comparing pre-construction baseline data with later post-development data; and second, by comparing data for potentially affected lakes and streams to data for reference water bodies (i.e. those presumably not affected by mine activities).

The AEMP measures various physical, chemical and biological features of aquatic ecosystems, which serve as indicators of change. Data are collected and evaluated to identify effects that may be caused by the mine. If appropriate, follow-up actions are taken by BHPB to minimize or correct any identified adverse effects.

BHPB's Activities in 2003

The current monitoring frequency for water quality, hydrology, *limnology*, lake benthos, stream benthos, (every year), sediment quality (every 3 years), and fish communities (every 5 years) will be maintained. BHPB monitors *phytoplankton* and *zooplankton* annually in August.

One new lake, Leslie Lake (immediately downstream of the LLCF), was added to the AEMP for 2003. As well, the lower Panda Diversion Channel (PDC) and the Long Lake Containment Facility (LLCF) outlet to Leslie Lake were added to the Koala stream analysis.

The year 2003 was the sixth year of post-baseline data collection within the Koala drainage and the third year of post-baseline monitoring within the King-Cujo drainage at the Misery site and in Lac du Sauvage. Monitoring also occurs within three reference lakes and outflow streams.

AEMP sampling of water quality parameters, *limnology* and *phytoplankton* was done in lakes and streams during the open water season in July, August and September (Figure 1). Beginning in 2003, the *zooplankton* and *benthic macroinvertebrates* sampling was restricted to August only, and *zooplankton* sampling began in Cells D and E of the Long Lake Containment Facility (LLCF). Winter sampling under ice (lakes only) included late-winter water quality samples in April, and winter dissolved oxygen concentrations monthly (except Kodiak and Cujo lakes, which were measured weekly). Open water sampling of streams included water quality, stream benthos, and stream flow.

Inputs to the Aquatic Receiving Environment

Processed kimberlite effluent, treated sewage and *pit water* are discharged into the upper cells (Cell B and C) of the LLCF. The exception to this routing was treated water from Fox Pit, which was discharged to Cell D for a short time in early 2003 before being diverted to Cell C. 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 approximately 22 km downstream from the LLCF. Cell E water was pumped to Leslie starting in July and continued throughout the open-water season and into the winter.

Besides Fox Pit water, the other new source of water input to Cell C was from Beartooth Lake. In preparation for mining Beartooth Pit, Beartooth Lake water was discharged to Cell C.

PHOTO: C PATTENDEN, MAINSTREAM AQUATICS LTD.

Lake trout

BHPB's Results in 2003

Koala Watershed

Elevated levels of five water quality parameters were found in the last lake in the Koala watershed, Slipper Lake (Table 1). These parameters were pH, sulphate, total dissolved solids (TDS), potassium and total molybdenum. Of these, only sulphate and molybdenum were detected at elevated levels in Lac de Gras (at the sample stations S1 and S2). Since 2000, pH, potassium and molybdenum have been increasing annually through the whole Koala watershed downstream of the LLCF. Levels are well below *CCME* guidelines. The LLCF is the probable source of these higher-than-baseline levels (the LLCF outflow also showed elevated levels of all these parameters). We believe that BHPB should investigate the source of molybdenum in the mine operation.

Sulphates were elevated in Lac de Gras station S2, being twice as high as baseline. But BHPB does not believe this was as a result of mining at Ekati because: (1) the difference compared to baseline was not statistically significant, and (2) sulphate was also elevated, to a higher degree, a little farther downstream in the lake (station S3).

King - Cujo Watershed

Mine activities at Misery appear to have created higher levels of eight water quality parameters in the downstream watershed (Table 1). Of these parameters, elevated levels of only sulphate and potassium reached the stream (Christine-Lac du Sauvage) emptying into Lac du Sauvage.

Grizzly Lake

Initially a reference lake, Grizzly was removed from the AEMP in 2000 due to concerns that it may be affected by air-borne dust from Panda Pit. The 2003 air quality monitoring has determined that increasing *nitrate* levels in the lake were not likely caused by fugitive dust, as the *nitrate* concentrations returned to baseline levels in 2002. Waste rock in the building of the pump house jetty and the access road are now considered to be the point sources. As *nitrate* levels have risen again slightly in 2003, BHPB will endeavour to determine the source.

There has been a gradual increase in copper concentrations in Grizzly Lake from 1994 to 2003. Under ice cover, copper concentrations at mid-depth approached *CCME* guidelines in 2003 (*CCME* = 0.002 mg/L; Grizzly Lake = 0.0016 mg/L). BHPB believes the source to be leachate from waste rock around the perimeter, and/or "non-particle deposition" from the air. BHPB has committed to investigate the source of the copper loading to Grizzly. The company should pay special attention to this increasing trend in copper.

Kodiak Lake

Ammonia and *nitrate* concentrations in Kodiak Lake were lower in 2003 than in 2002. *Nitrate* concentrations in 2002 were the highest recorded in Kodiak Lake, which BHPB attributed to seepage from improperly stored *ammonia nitrate* on the western shore of Kodiak Lake. As the levels of both *ammonia* and *nitrates* decreased to below detection limits in 2003, the company's mitigation to reduce this nitrogen source to Kodiak Lake appears to be working. Effects of the *eutrophication* of Kodiak Lake in 1998 continue to dissipate as *phytoplankton* biomass remains well below 1998 levels, although it has risen above the 2000-2002 levels.

Water Licence Renewal

The main Ekati water licence, N7L2-1616, expires December 31st, 2004. At press time a public hearing has been set for July, 2004 to address the water licence renewal. The Agency intends to intervene in the renewal process. So far the Agency has suggested the following:

- Expand the range of regulated parameters listed in N7L2-1616 to include those specified in the Sable-Pigeon-Beartooth water licence, MV2001L2-0008;
- Re-examine effluent criteria based on downstream dilution and *CCME* levels;
- Establish *reclamation* criteria; and
- Harmonize both main water licences in the future.

Arctic grayling

GNWT/RNWED

Three metals (aluminum, copper and nickel) were elevated in Kodiak Lake. The source was the Panda Diversion Channel, as its outflow into Kodiak Lake contained levels of aluminum and copper that were above *CCME* guidelines. Copper concentrations in Kodiak have been elevated above baseline and reference lake values since 1998, but have been decreasing steadily every year since then. However, winter measurements for copper were above *CCME* guidelines. We do not feel that BHPB documented this properly in the AEMP report and should improve the reporting of winter water quality results, especially when they may have implications for the biota of affected lakes.

Leslie Lake

2003 marked the first year that the first lake downstream of the LLCF, Leslie Lake, was included in the AEMP (it was formerly scheduled for mining as an open pit). All parameters except orthophosphate, total phosphorus and *ammonia* were elevated above baseline in Leslie Lake.

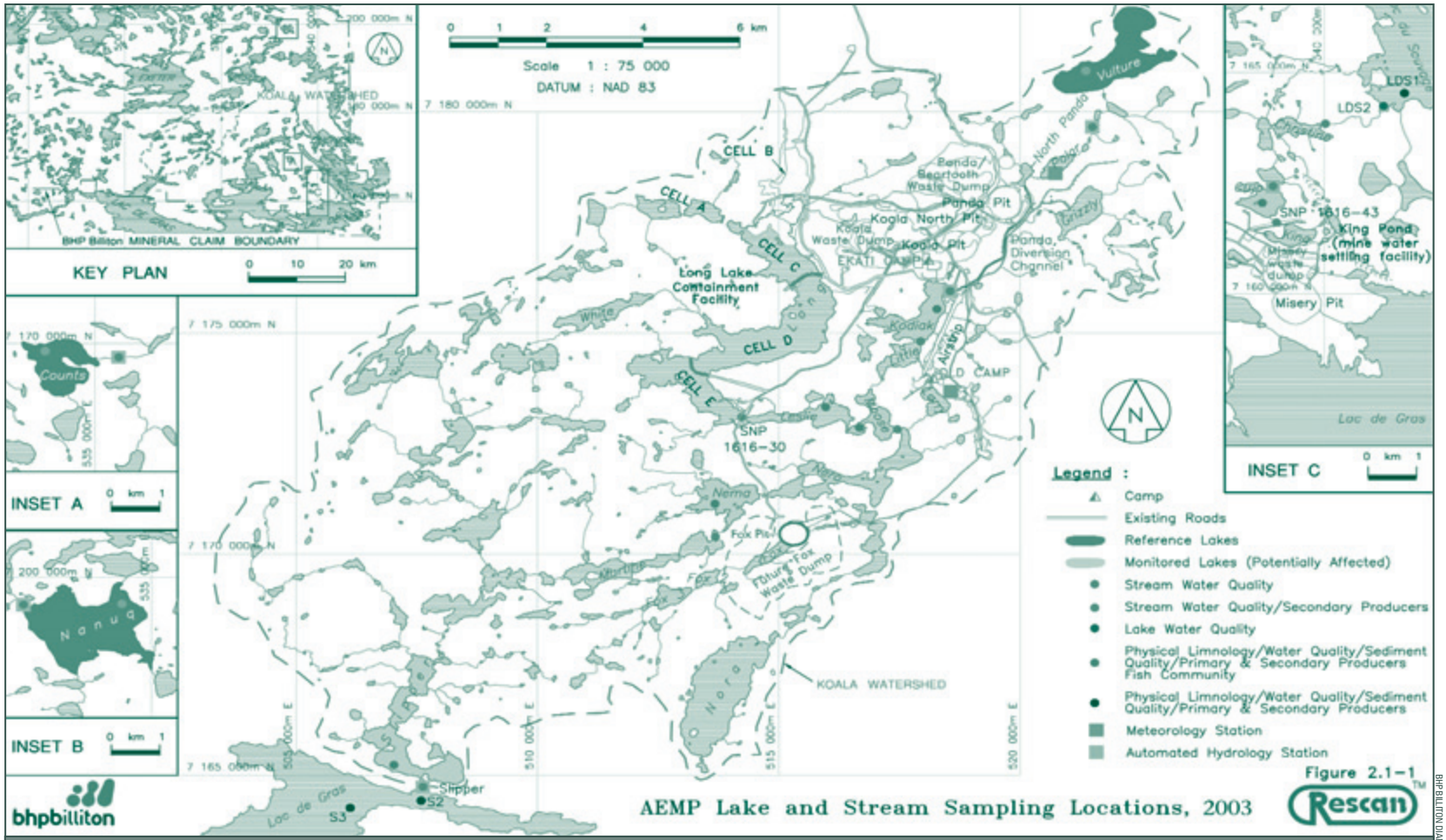


Figure 1. Aquatic Effects Monitoring Program—lake and stream sampling locations, 2003.

Moose Lake

Total dissolved solids continued to increase in 2003 in Moose Lake, now at levels that are five times above baseline. Moose Lake *phytoplankton* biomass increased in 2003 compared to previous years. Levels continued to be elevated above baseline as well as above biomass measured in the three reference lakes.

After a number of years of steady decline in *zooplankton* diversity in Moose Lake, the diversity indices increased in 2003 to levels slightly above the previous two years, and above those in all reference lakes. The pronounced, steady decline in abundance of *Cladocera* seen in previous years in Moose Lake did not continue in 2003. BHPB believes that this indicates a natural variability in year-to-year *Cladocera* abundance, not a mine-induced impact. However, the increase in relative abundance over 2002 was only marginal (4% of total *zooplankton* versus 0.3% in 2002 and approximately 30-50% during baseline). *Cladocera* abundance remains well below the baseline levels. Declines in *Cladocera* populations of lakes would have some effect on fish. *Cladocera* are an important prey item for round whitefish and to a lesser extent for lake trout. The whitefish of not only Moose Lake, but in all three control lakes (Vulture, Nanuk and Counts) as well as Cell E, have been found to rely heavily on *Cladocera* for food.

Table 1. Mining effects on water quality flowing through the Koala and King - Cujo watersheds.

	Koala Watershed			King – Cujo Watershed	
Parameters Monitored	Leslie, Moose and Kodiak	Slipper	Lac de Gras	Cujo	Lac du Sauvage
PH	▲ —	▲	—	▲	—
Sulphate	▲ —	▲	▲	▲	▲
Potassium	▲ —	▲	no baseline	▲	▲
Total Dissolved Solids (TDS)	▲ —	▲	—	▲	—
Total *Ammonia*	— —	—	—	—	—
Nitrate	▲ ▼	—	—	▲	—
Nitrite	▲ ▼	—	—	—	—
Ortho-Phosphate	— —	—	—	—	—
Total Phosphorus	— —	—	—	—	—
Total Aluminum	— —	—	—	—	—
Total Arsenic	— —	—	—	—	—
Total Copper	▲ —	—	—	▲	—
Total Molybdenum	▲ —	▲	▲	▲	—
Total Nickel	▲ —	—	—	▲	—
Total Zinc	— —	—	—	—	—

▲ = Elevated above baseline ▼ = Decreasing yearly in Moose Lake since 2001
— = No significant change from baseline

Slipper Lake

Of the 14 chemical parameters reviewed and reported in the 2003 report, five (pH, sulphate, total dissolved solids, potassium and molybdenum) were found to be "slightly elevated" in Slipper Lake as a result of project activities. Levels are well below applicable *CCME* Water Quality Guidelines.

Cujo Lake

The increase in *ammonia* levels in Cujo Lake outflow stream observed in 2002 did not continue in 2003, dropping to near baseline levels. However, *nitrates* are approaching *CCME* guidelines in winter (2.3 mg/L vs. *CCME* of 2.93). Winter-dissolved oxygen concentrations had been steadily declining in Cujo Lake since the baseline year of 2000 but have returned to safe levels. The likely cause of the decline was the high *phosphorous* loadings from King Pond, which resulted in high *phytoplankton* and *zooplankton* biomass in Cujo Lake and thus a greater than normal biological decay. Arsenic continues to be elevated in Cujo Lake. It is present in greater concentrations than in all reference lakes, but is still well below Canadian water quality guidelines.

Surveillance Network Program (SNP)

In addition to the aquatic effects monitoring program, BHPB is required to control water effluent quality and volumes at a number of regulated stations (SNP) specified by its water licence. There were no measurements above licence limits for regulated water quality parameters in 2003. Historically, from a total of nearly six thousand water quality measurements, less than 0.2% of samples taken over five years exceeded water licence limits at the outlet of the LLCF.

Additional Studies Upcoming in 2004

BHPB has committed to monitoring Little Lake, last studied in 1998, under the AEMP in 2004 and every third year after that. This will include *limnology*, water quality, *phytoplankton* and *zooplankton*. The results will be used to determine the scope of future monitoring.

We look forward to receiving the results of the *nitrate toxicity* study commissioned by BHPB. Its results may inform our thinking on the possible effects of high *nitrate* levels on the only life stages of fish in affected lakes.

Agency's Assessment

Mining activities continue to change water quality and the aquatic environment in both Koala and King-Cujo watersheds. However, effects so far have not been serious nor caused measurable harm to aquatic life.

Kodiak Lake

Third-Party Review of the 2002 AEMP

An independent review of statistical methods used by BHPB's consultants to determine aquatic impacts in surface waters downstream from the Long Lake Containment Facility (LLCF) was commissioned in 2004. A Steering Committee composed of Fisheries and Oceans Canada, Environment Canada, Department of Indian and Northern Affairs Canada and IEMA is overseeing the project. The review is limited to Aquatic Effects Monitoring Program (AEMP) data collected from 1994 to 2002 for three environmental quality variables: copper, *nitrate* and *zooplankton*. These variables are of interest owing to apparent changes noted over the years, potential *toxicity* and the integrity of the database.

While the final review was not completed at the time of writing, early indications are that although there is an extensive database, alternative analytical approaches would enhance the AEMP's ability to determine mine-related effects.

Special Effects Monitoring Program

Panda Diversion Channel (PDC)

In order to mine the Panda and Koala *kimberlite* pipes, a 3.4 km long trench was constructed to divert incoming water from lakes located upstream in the watershed around Panda and Koala Pits. Construction of the channel was completed in 1997. Fish habitat structures were subsequently installed in the channel to compensate for stream habitat lost during construction of the mine.

2003 is the sixth consecutive year that fish habitat within the channel has been monitored. An improvement to the 2003 program included comparing biological measurements of arctic grayling using the PDC to those from two reference streams, Pigeon and Polar-Vulture.

Arctic grayling continue to use the channel for spawning, rearing, forage, nursery and migration between Kodiak and Grizzly/North Panda Lakes. A total of 764 fish, of which 95% (730) were grayling, passed through the PDC fish box. Grayling using the PDC ranged in age from three to eight years of age, averaging six years.

Arctic grayling sampling

PHOTO C. PATTENDEN, MAINSTREAM AQUATICS LTD.

Grayling *fry* emerged in early July and began migrating out of the PDC by mid-July. The migratory peak occurred at the end of July, with >95% moving into Kodiak Lake. *Fry* survival in the PDC was greater than, and their average condition was similar to, *fry* in Polar-Vulture.

Growth rate of *fry* in the PDC was within the range of the two reference streams.

In 2003, the number of grayling spawners (351) using the PDC was greater than those using reference streams, and may be approaching the carrying capacity of the PDC. As 2003 was a low-flow year, intermittent streams feeding into Kodiak Lake would likely have been unavailable, compelling all spawners to use the PDC. Forty (11%) of these spawners had been captured as spawners in the PDC within the three previous years. The female: male ratio of these repeat spawners was low (0.62) compared to the ratio of all spawners of known sex in the PDC. The lower proportion of females in the repeat spawner sample compared to all spawners in the PDC may be attributable to either: (a) the low sample size or, (b) female grayling spawners do not survive the rigours of spawning in the PDC as well as males, and thus may die more frequently after their first successful spawning in the PDC.

Fecundity (number of eggs produced per gram of body weight) of Kodiak Lake and PDC spawners was lower than that of grayling populations elsewhere in northwestern Canada, Montana and Washington State. Egg survival rate (5%) in the PDC was low, half that in the reference streams and may be attributable to one or a number of the following differences:

- Among studies in the time of sampling of spawners;
- Among populations in the size and age range of sampled spawners;
- Among populations in the quantity and quality of food needed for egg production (the PDC may not be providing as high a quantity and/or quality of food as other water bodies in the comparison);
- In geographical regions; all the other water bodies used in the comparison are situated below the treeline; and
- In weight-length relationships, since the *fecundity* estimates are based on body weight of the spawners.

Agency's Assessment

The channel continues to provide spawning and rearing fish habitat for arctic grayling at levels approaching those of the natural streams in the Ekati region. Not yet evident to us is the survival rate of grayling *fry* that over-winter in Kodiak Lake after rearing in the channel. BHPB has taken steps to collect this information by tagging a large number of 2003 grayling *fry* and we will view the results of this in the 2004 monitoring program.

Last year we highlighted the uncertainty related to the future of the channel. At press time there has been no conclusive detail provided from BHPB. The company is looking at several options, which range from maintaining the stream well into the future to abandoning the channel altogether. For discussion of pit closure issues, view the Agency chapter on Abandonment and *Reclamation*.

Wastewater and Processed Kimberlite Management

Ekati produces large volumes of finely ground *kimberlite tailings* in addition to wastewater, site drainage and sewage from the plant and other mine facilities. About 40% of the processed *kimberlite* is sufficiently coarse-grained to be deposited as rock waste within designated zones of the waste rock dumps. The rest of it is pumped as fine-grained slurry to the *tailings* pond, known as the Long Lake Containment Facility (LLCF).

This facility is a former chain of small lakes, now dammed at the lower end and subdivided internally by pervious dykes into four active cells. Since commencement of production in 1998, processed *kimberlite* has been deposited in the two uppermost cells (B and C), while the lower cells serve as clarifying ponds before water is discharged from the facility into the downstream Koala watershed. Cell A has not been used to date.

At the Misery site, located 29 km to the southeast, *mine water* from the pit is discharged into the King Pond sediment pond for settling and clarifying, prior to its discharge into Cujo Lake when effluent quality criteria are met for discharge to the receiving environment.

BHPB's Activities in 2003

Management of Long Lake Containment Facility

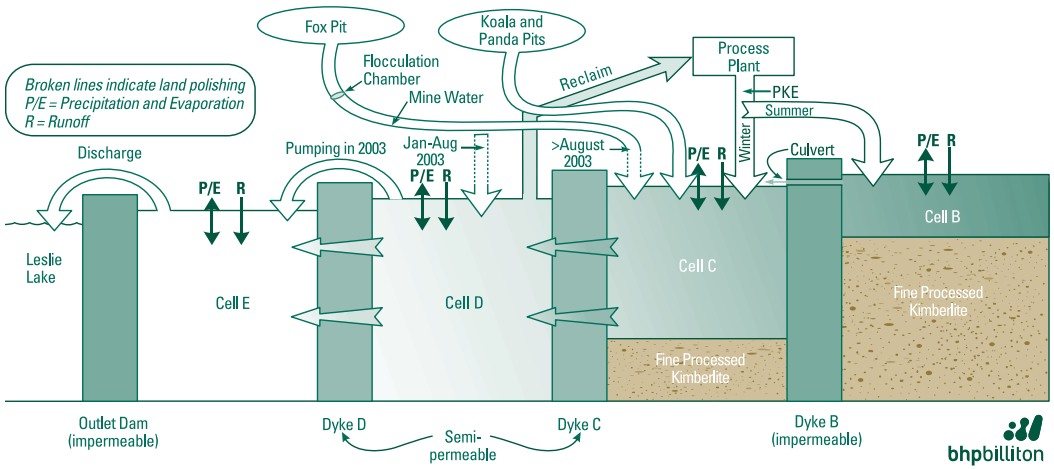
The Long Lake Containment Facility operated as planned during 2003, although the addition of *mine water* from Fox Pit development stimulated a round of regulatory procedural issues and resulted in further research about future water quality implications.

The facility is operated under an approved management plan called the Wastewater and Processed *Kimberlite* Management Plan (WPKMP). A revision of this, done largely to accommodate changes in the mine plan created by the additions of the Sable, Pigeon, Beartooth and Fox pipe developments, was submitted to the MVLWB in May of 2003. Reviewers' comments on this document resulted in the Board requesting more information. See www.monitoringagency.net for a copy of our comments. The updated plan was re-submitted in January 2004 and subsequently approved.

New Studies in Long Lake

BHPB conducted four new studies in Long Lake during 2003, which help us better understand what is happening within the containment facility and what might be expected in terms of future water quality discharged from Long Lake over the life of the mine. The studies included:

- a synthesis of all water quality and biological data for Long Lake;
- a fish survey in Cell E;
- predictions of water quality in Cell E over the mine life; and
- assessing the ecological risk of discharging Fox *mine water* into Cell D instead of Cell C.



Conceptual Model of Water Quality in Cells C and D of the LLCF

Figure 2: Schematic of the LLCF (from Risk Assessment of Fox Mine Water Discharge into the Long Lake Containment Facility, January 2004. Rescan Environmental Services)

Highlights of these studies include:

- Concentrations of most parameters (e.g., metals) decreased moving downstream within the Long Lake Containment Facility, and increased with depth in each cell;
- The biomass and density of *zooplankton* were greatest in the upper cells (stimulated by nutrient addition from the *tailings* discharge), while species diversity increased moving downstream;
- Fish surviving in Cell E showed weak recruitment (i.e. mostly adults with no young in the population);
- There is no significant difference to Cell E water quality if Fox *mine water* is pumped to Cell D as opposed to Cell C; and
- Two metals of environmental concern (arsenic and cadmium) are predicted to exceed *CCME* guidelines for aquatic life in Cell E for a few years toward the end of mine life.

Agency's Assessment

The Agency conducted a detailed review of both versions of the WPKMP and the related studies. We recommended to the Board that the revised WPKMP be approved. However, there were two important issues that we highlighted for further attention.

First, the modeling of future water quality trends in Long Lake revealed rising levels in some water quality parameters. Two of these (arsenic and cadmium) were predicted to peak above *CCME* guidelines for the protection of aquatic life sometime during the last few years of mine life. This would mean that water potentially harmful to aquatic life would be discharged into the downstream environment. No assessment of this had been done. This prompted us to recommend to BHPB that it undertake a study to determine the dilution capacity of the downstream Koala watershed and to determine whether future discharge from Long Lake might result in downstream water quality that exceeds the guidelines for protection of aquatic life.

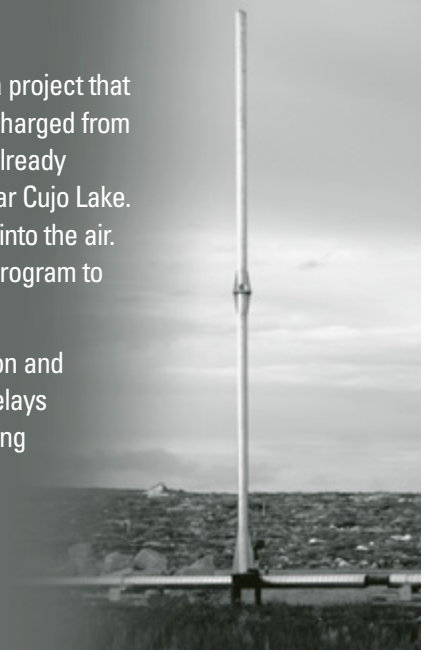
Second, BHPB had indicated that another revision to the WPKMP would be appearing within a year or so, since the company has started to investigate the potential for raising the level of deposited *tailings* in Long Lake upper cells by "stacking" the *tailings*. Such a strategy might enable the company to avoid any deposition of *tailings* into Cell D, thereby providing additional *polishing* capacity within the facility. This would be a significant departure from the approved management plan, raising a number of issues for us concerning long-term physical and chemical stability of the *tailings*. We reminded the Mackenzie Valley Land and Water Board (MVLWB) that several requirements set out in the original water licence related to field investigations of *tailings* behaviour had not been completed to date, and that the Board should take steps to ensure that it obtains this information at the earliest opportunity. We also requested from BHPB the terms of reference for the on-going investigations in Long Lake with respect to *tailings*.

Discharge of processed kimberlite to the LLCF

Misery Land Treatment Project

In 2003, BHPB received approval from the MVLWB to initiate a project that could help reduce the amount of *ammonia* in wastewater discharged from the Misery Pit facilities. The project proposes to spray water already permitted for discharge under the water licence, over land near Cujo Lake. This causes the *ammonia* dissolved in the water to evaporate into the air. Environment Canada and BHPB have designed a monitoring program to see how the environment might be affected by the project.

In 2003, baseline samples were collected for the soil, vegetation and small animals around Misery and Cujo. Shipping and set-up delays prevented the spraying component of the project from beginning in 2003. Over the winter, the towers were damaged and will need to be reconstructed if spraying is to begin in 2004.



Misery land treatment tower

Waste Rock and Seepage

BHPB's Activities in 2003

Some 56 million tonnes of waste rock were excavated at Ekati during 2003. The focus of mining has shifted from the Koala and Panda open pits towards the new Fox Pit and underground mining at Koala North and Panda. Misery Pit was closed for part of 2003 and BHPB plans on re-opening Misery in summer 2004. Waste rock produced includes till and lake bed sediments, granitic rock containing low concentrations of *sulphide* and metals and waste *kimberlite*.

BHPB conducts an extensive program of monitoring seepage from the waste rock dumps each summer, and submits an annual report on the results to the MVLWB.

Agency's Assessment

To assist us in better understanding the implications of the seepage survey results, we commissioned an independent expert review of the 2003 report.

The review determined that the seepage report "was well organized and well-written, successfully meeting its stated objectives of presenting the monitoring results". However, the review identified a number of issues that require further work:

- The 2003 seepage report does not discuss the management implications of the monitoring results;
- There is significant uncertainty regarding future performance of some of the wastes and the ability of present mitigation measures to achieve the post-closure environmental protection and *reclamation* objectives;
- Drainage from the coarse *kimberlite* rejects may present an environmental concern after mine closure;
- The cause of the acidity observed at some waste rock seeps is still uncertain;
- Tundra water may exacerbate potential acidity and *metal leaching* processes;
- The leaching of nickel from *kimberlite* and black clay may be a potential concern in the long-term; and
- Heat produced from *sulphide* oxidation in some of the dumps may interfere with the adopted strategy of relying on freezing of the waste rock material to prevent *acid rock drainage (ARD)*.

The review also recommended a number of actions for BHPB to deal with the above issues including:

- Expand the seepage study report to discuss management implications of the monitoring data such as past placement of waste rock and interaction with tundra water, the effectiveness of freezing as an *ARD* mitigation measure, and carry out a more complete characterization of *kimberlite mineralogy*;
- Demonstrate that drainage from the coarse *kimberlite* rejects can meet receiving environment objectives after mine closure; and
- Conduct additional studies to better understand the mechanisms of acid generation, and assess the potential for long-term nickel leaching.

The Agency concurred with the findings of the independent expert and submitted supporting comments to the MVLWB. In our view, there is still significant uncertainty about the long-term chemical stability of some waste rock types on site and about how well post-closure requirements for acceptable water quality can be met. We believe that BHPB should enhance its discussion of the results and its *geochemistry* work to narrow this uncertainty.

Air Quality

Air quality effects at Ekati can arise primarily through *emissions* generated by mine equipment and dust from traffic and blasting. Dust, in particular, has been a key area of concern for the Aboriginal Peoples since there is a potential for it to diminish the quality of the vegetation that caribou depend upon.

To understand air quality issues at Ekati, BHPB has designed an air quality monitoring program that estimates air *emissions* from mine infrastructure, models predictions of how these disperse with distance from the mine and measures suspended particulate matter (dust) through two high volume air samplers located at the site.

Last year we reported that this monitoring program needed substantive upgrading in order to produce a reliable picture of how mining may be affecting air quality at the mine site. The only reliable finding, in our view, was that overall levels of dust in the air have steadily increased from year to year at the two monitoring locations.

In our detailed review of the program we found that:

- insufficient data (including wind speed, direction, location of monitors and precipitation) were available to make an accurate determination about the effects of blasting on overall dust dispersion;
- the location of at least one of two air sampling stations violated siting guidelines, making the data less usable;
- the air dispersion model used to determine that air quality objectives were being met at the claim boundary was inadequate since it did not account for changes in dust levels as the wind plume moves outward, and it relied upon unverified assumptions; and
- BHPB's use of claim block boundaries as the point where air quality guidelines should be met should be reconsidered to match a more realistic zone of influence around the mine.

Our assessment last year led us to make one key recommendation—a new modeling analysis should be undertaken as a first step to redesigning the air quality monitoring program so that it will produce more reliable results in the future.

BHPB's Activities in 2003

BHPB agreed with our recommendation to redo the modeling analysis and this year began the project by developing terms of reference for the work and circulating these to regulatory reviewers and ourselves for comment.

Agency's Assessment

We appreciated the opportunity to review the terms of reference before the new work was undertaken and forwarded advice to the company about how to enhance the study to make it more reliable and more relevant to the concerns of our Aboriginal members. Our recommendations included:

- ensure that dust deposition, and not just dust transport, will be modeled so that vegetation impacts (the priority concern, in our view) can be assessed;
- ensure that the air dispersion model can handle *emissions* that vary through time, such as blasting and rock-hauling, so that predictions of dust will be more realistic;
- ensure that the model can deal with deposition of sulphates, *nitrates* and *ammonia*, with particular attention to the latter and its potential effects upon lichen; and
- collaborate on an on-going basis with the appropriate air quality specialists from both RWED and Environment Canada as the work continues.

BHPB is currently in receipt of these recommendations and we look forward to seeing the results of the remodelling work and subsequent changes, if necessary, in the air quality monitoring program for 2005. At our suggestion, the air quality monitoring work previously scheduled for 2004 has been delayed one year in order to accommodate the remodelling work that has been undertaken.

On a related matter, we received a recommendation from one of our Aboriginal members at our environmental monitoring workshop that BHPB should monitor the *kimberlite* dust blowing off the *tailings* impoundment this summer. We agree and have passed that recommendation on to the company. We look forward to reviewing the results.

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Abandonment and Reclamation

Preparing the mine for closure involves planning for closure, conducting research in order to do the planning well and the creation of an abandonment and *reclamation* (A&R) plan, which progresses from interim to final in steps, as the mine progresses to closure.

Reclamation research involves determining information needed to select the most effective option for closing each mine component. The *reclamation* research program must include specially directed studies for particular closure objectives that have been identified in planning.

"*Progressive reclamation*", reclaiming those parts of the mine that are completed during the main mining operation so that the total *reclamation* required at the end of mine life is thereby reduced, is also part of closure. *Progressive reclamation* of Ekati is required through both the company's water licences and the *Environmental Agreement*.

Another component of closure is the development and refining of an "interim" A&R plan. The A&R plan is the plan for closure, albeit one that can be changed when better information (e.g., from *reclamation* research) comes along.

This document is typically prepared prior to licensing in a conceptual form and revised regularly throughout the mine life as the mine plan, the outcomes of *reclamation* research and other matters change. The A&R plan describes how the mine will be shut down when mining is finished, what will happen to the waste materials, buildings and equipment, and in what condition the site will be reclaimed and permanently left at the end of the day. Near the end of the mine life, the interim plan, presumably increasing in detail and precision of specific measures to be undertaken for each mine component, becomes the "final" A&R plan.

The importance of having a detailed A&R plan is linked to the ability of regulators and the company to determine an appropriate amount of security deposit to be held in the event that the operator or the mine closes before *reclamation* can be completed. Without specific closure details, the amount of security cannot be properly determined.

Shoreline Reclamation at Fred's Channel

Principles for Progressive Reclamation and Closure Planning

In our view, the following principles ought to apply for *progressive reclamation* and closure planning in general, and for Ekati in particular:

1. Closure planning should not be left until the end of the project but should be fully integrated into the mine plan from the beginning so that *progressive reclamation* during operation can be maximized and any closure problems identified early in the project.
2. Specific *reclamation* objectives must be clearly identified for each mine *reclamation* unit. Without these, appropriate *reclamation* measures cannot be defined properly.

Reclamation at Ekati

3. Specific criteria for determining when the objectives are attained for each mine component must be provided. This is critical for determining when successful *reclamation* has been achieved. Without the criteria, progress in *reclamation*, including *progressive reclamation*, cannot be determined objectively.
4. Credit for any *reclamation* work undertaken should be granted the Licensee when distinct progress toward meeting identified criteria has been achieved, and not on the basis of expenditures made.
5. Annual updates of the outstanding *reclamation* liability should be made and security adjusted as necessary to reflect the work completed in any given year.
6. If *reclamation* efforts have been made on a particular *reclamation* activity but *reclamation* not achieved according to the criteria, a re-assessment of the outstanding liability for that unit should be undertaken with a corresponding adjustment to the security deposit to match the remaining liability.

Reclamation at Ekati

7. Prior to mine development, "conceptual level" plans are acceptable, although any concepts proposed should be known to be technically viable and environmentally sound as a condition of their acceptability. Once the mine has been operating for a number of years, a level of detail beyond "conceptual" but short of "engineering design" is required. Plans should be specific, clearly viable, and, for developed mine components, detailed to the point where they could be readily implemented in the event of premature closure.

BHPB's Activities in 2003

Research

A new study on streamside *reclamation* for the Long Lake Containment Facility (LLCF) was added to the research program in 2003. Five previously revegetated areas were evaluated by a consultant for BHPB, resulting in the following recommendations to BHPB:

- further study is required on site preparation techniques and their associated costs;
- training of equipment operators for *reclamation* site preparation is required;
- soil sampling of *reclamation* materials prior to seeding and fertilizing should become standard practice;
- *reclamation* performance standards or completion criteria should be determined and incorporated in standard operating procedures;
- a manual of seed collection techniques for selected species should be prepared;
- testing of indigenous seed viability is required to ensure adequate amounts of viable seeds are available; and
- a database for seed inventories is required.

Stream revegetation at Fred's Channel

Progressive Reclamation

No substantive *progressive reclamation* was undertaken in 2003. Some assessment of Old Camp to prepare for site remediation was undertaken and a sample of hydrocarbon-contaminated material was volatilized in the main plant to determine if this was an effective means of removal.

A&R Planning

The successful closure of the mine is a key concern of Aboriginal Peoples. Accordingly, the Interim A&R Plan should now be considered as perhaps the single most important environmental management plan for Ekati. Standards for judging its acceptability should be set at a relatively high level this far into the mine life.

Ekati is currently operating under a four-year old Interim A&R Plan. This document no longer reflects the current mine plan, and does not include *reclamation* plans for the three new pits (Sable, Pigeon, Beartooth) that were licensed in 2002.

A revised Interim A&R Plan was submitted to the MVLWB in July 2003. Additions included an updated mine plan, underground mining, social considerations, proposed changes to *reclamation* of pits and the *tailings* facility and the addition of *reclamation* measures related to Sable, Pigeon and Beartooth pits.

In October, following a detailed review of the revised Interim A&R Plan, we wrote to the Board recommending that it not be approved because it had a number of major deficiencies. (See www.monitoringagency.net for copy of this.) Our critique highlighted the following key concerns:

- many of the specific information requirements for the Interim A&R Plan as identified in the water licence had not been provided;
- insufficient detail had been provided on the measures proposed. At this stage of the mine life, the plan needed to have greater detail and clarity about the specific *reclamation* measures that would be undertaken;
- the new proposal to divert waters from other sources in order to flood the pits (as opposed to natural in-filling) had potentially significant and unassessed downstream impacts;
- closure of the Panda Diversion Channel was a departure from the previous plan, the implications of which had not been described;
- there were still no *reclamation* criteria identified for evaluating the success of *reclamation* undertaken; and
- direct revegetation of *kimberlite tailings* in the LLCF was a departure from the previous plan (revegetated waste rock cover), and the long-term viability of this strategy had not been assessed.

As a result of this submission, and those of other reviewers, the Board did not approve the Interim A&R Plan but directed the company to address the deficiencies.

In April of 2004, a new version of the Interim A&R Plan was again submitted to MVLWB. Our technical review of this document revealed that most of the key deficiencies we had identified previously had not been dealt with. We wrote again to the MVLWB in May of this year detailing the deficiencies, identifying our expectations of what the Interim A&R Plan

needed to do and recommending against its approval (See www.monitoringagency.net). As we go to press, submission of a revised A&R plan is on hold pending more work by BHPB.

Agency's Assessment

A wide range of definitions exists for *reclamation*-related terminology used by regulatory agencies and mining proponents. One of the first tasks is to come to agreement about suitable definitions for terms such as *reclamation*,restoration and rehabilitation.

Much work is yet needed to get the Interim A&R Plan into a state that reasonably reflects the on-going mining operation and outstanding *reclamation* needs. The process used by BHPB to date has not produced the required product and another approach might be needed.

Given that the mining operation will last only for a couple of decades or so, and that the mined-out site will be left forever, designing for closure is one of the most critical tasks that needs to be undertaken. Based on our principles of *progressive reclamation* (see text box) this is one area where BHPB needs to significantly improve its effort.

Part of the problem is likely the fact that the planning of mining operations is not done jointly with the *reclamation* specialists responsible for closure. Recent reorganization in BHPB will hopefully rectify the problem. Designing for closure implies, in our view, that mine planning occur in an integrated and concurrent manner with closure planning. Overall project planning should consider options that incorporate closure and *reclamation* considerations before selecting the preferred mine plan. If this does not happen, significant opportunities to optimize *reclamation* costs and achieve the alternatives with the least environmental risk for post-closure will be lost.

At this stage of the mine life, we believe that the plan should be based on viable (i.e. demonstrably workable) concepts, with closure options identified and evaluated so that reviewers can respond to these in an informed manner. We recognize the need for flexibility as the mine develops and changes occur (e.g., to the mine plan and in *reclamation* opportunities). However, this should not lead to lack of clarity and detail when describing mine closure measures. The necessary flexibility is provided through the regular review and upgrade provisions in the regulatory regime, not in ambiguity of the proposed measures.

As the mine life proceeds, the plan should evolve from conceptual plans through increasingly detailed and specific measures, before final discrete activities are selected. It should be an iterative process and one in which strategic involvement of the affected parties is accommodated.

As a start toward revamping this process, we have invited the company to meet with us to discuss the appropriate components and approaches required for an acceptable Interim A&R Plan at this stage in the mine life. This meeting has been scheduled for early June of 2004.

On the issue of closure criteria, we have been emphasizing the importance of having these in place for the past two years. We are not satisfied with the progress on this front. This is a joint responsibility of DIAND, BHPB and MVLWB. BHPB has indicated that it has started to work on this issue and DIAND is in the process of developing guidelines. We support these initiatives and, given its critical importance, recommend that the company produce a first draft of closure criteria within one year. Once this is done, a meeting should be organized with the company, regulators, government and affected parties to advance development of clear closure criteria.

Our final suggestion is to the MVLWB. The suggestion is geared to providing a greater incentive to the company to carry out *progressive reclamation*. Among the closure principles listed above, we identified the need (items 4-6 in the text box) to provide a way for the company to gain credit for *reclamation* work undertaken in any year and that such credit should be based on an evaluation of how much additional effort is required to meet the *reclamation* criteria. These principles should be incorporated into the water licence when it is considered for renewal at the end of 2004.

Recommendations

4. 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.

5. The principles for *progressive reclamation* security should be incorporated into the water licence when the licence is considered for renewal later in 2004.

Traditional Knowledge

Under the *Environmental Agreement*, BHPB, RWED and DIAND agreed to fully consider both traditional knowledge (TK) and other scientific information when dealing with environmental matters at Ekati.

BHPB's Activities in 2003

BHPB continues to support the Inuit Naonaiyaotit Traditional Knowledge Study, which documents traditional knowledge within the western Kitikmeot region. This project is expected to finish in 2004. In 2003, the company also worked with Dene and Inuit elders to determine how to divert caribou from mine infrastructure and to identify new archaeological sites within the claim block.

During the environmental workshop hosted by the Agency, community members advised BHPB that they were concerned about the lack of incorporation of TK in the design and implementation of BHPB's monitoring programs. Community members also recommended that BHPB conduct fish palatability studies. However, BHPB pointed out that such studies should not be done on small lakes because of the negative impact of the studies on small fish populations.

Consulting with elders

Agency's Assessment

BHPB continues to decline to provide written documentation of experiences gained from site visits of community members. Such documentation is necessary if BHPB is to engage in a transparent decision-making process regarding the use of TK at Ekati. Presently, one cannot determine what information is used, how it is used, what information is disregarded and why, and how the company deals with contradictory information. This is an issue the Agency has been highlighting for the past several years based on concerns we've heard from our Aboriginal members.

Neither BHPB nor the regulators have made much progress in considering TK fully with western science in the environmental monitoring, management or regulation of Ekati.

IEMA recognizes that challenges exist in collecting and using TK in combination with western science but we believe that more effort must be exerted, by all parties, to make progress on this.

Aside from community specific projects, BHPB should solicit TK collaboratively and concurrently using culturally respectful protocol. As a precursor to this, Aboriginal society members need to work closely together to provide specific direction to BHPB.

Recommendation

6. 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.

Regional Monitoring and Cumulative Effects

Regional Monitoring

Agency's Activities in 2003

In October 2003, BHPB wrote the signatories to the *Environmental Agreement* (BHPB, RWED, DIAND) asking that the clause covering a transition into a regional agency be invoked, and that the Environmental Monitoring Advisory Board (EMAB), the monitoring agency established to watch Diavik, replace IEMA. The rationale provided by BHPB was that a regional agency would allow for inclusion of all Aboriginal groups and address the issue of community capacity to deal with multiple agencies. BHPB recommended that such an agency not deal with issues of regional scientific research or *cumulative effects*.

Based on this request, we agreed to host an Aboriginal Caucus meeting, funded primarily by DIAND, to:

- provide an opportunity for Aboriginal Peoples to make progress in moving the monitoring and management of diamond mines from project-specific agencies to a larger, regional monitoring agency;

Participants at the Aboriginal Caucus workshop

- determine how they want diamond mines monitored and managed; and
- obtain advice from our Aboriginal members specific to how they want Ekati monitored and managed.

A working group created by DIAND to form a single regional monitoring agency developed a simplified model to cover regional monitoring and specific project oversight functions. This served as the starting point for discussions at the Aboriginal Caucus.

The Aboriginal Caucus produced a report: "An Open Door Exists and….We Need to Change and Improve from What We've Learned." The report summarizes guiding principles and key elements for a Regional Monitoring Agency (RMA), with highlights as follows:

- RMA should be representative, independent, have "teeth" and be more than advisory;
- RMA will address capacity issues by minimizing the number of monitoring agencies in the Slave Geological Province;
- RMA will include stronger commitments to capacity building in the communities and use of TK in its monitoring programs;
- RMA will monitor specific projects and not be responsible for federal *cumulative effects* initiatives;
- RMA will have excellent communications with Aboriginal Peoples;
- Northerners will make the decisions;
- RMA should rely on permanent and independent technical advice for traditional knowledge and western science; and
- Industry and government will advise the RMA, but not sit on the RMA.

Meetings of the Aboriginal Caucus have continued outside of IEMA, and have led to a further definition of principles for a Multi-Project Environmental Monitoring Agency. As we go to press, an *Environmental Agreement* has been negotiated for the Snap Lake project, which provides for an interim Monitoring Agency until the Multi-Project Environmental Monitoring Agency is implemented.

Recommendation

7. BHPB, DIAND, RWED and others should initiate discussions on how to monitor the regional cumulative impacts on the Bathurst caribou.

Cumulative Effects

Activities in 2003

In 2003, community members noted that the population of the Bathurst caribou herd appeared to have decreased dramatically from the previous year. This was reiterated by the results of RWED's June 2003 caribou survey, which indicated a loss of 50% of the herd since the 1980s. RWED believes that this could be due to many factors including changes in weather patterns, natural fluctuations, subsistence use, outfitter use, increased mining activities and increased use of the winter road. RWED is working with the communities to increase

monitoring of the herd and thus better determine the cause of the change in population.

During the environmental workshop hosted by the Agency, community members also expressed concerns about changes in the ranges of grizzly bears and wolverines. They believe that the animals are moving to newer places more frequently and would like this to be monitored.

Agency's Assessment

We were very pleased to host the first Aboriginal Caucus on forming a Regional Monitoring Agency. We agree that an RMA should help alleviate the pressures on communities by providing one agency for many similar projects and appreciate that it will take considerable planning to form such an Agency. We are pleased to see that the importance of establishing a permanent technical panel was recognized by the Aboriginal Caucus. We believe that a technical panel must have independence to make recommendations to all parties.

We believe that impacts originating from the Ekati claim block must be considered on a larger, regional scale, as such regional impacts may not be captured through monitoring programs specific to Ekati (Figure 3).

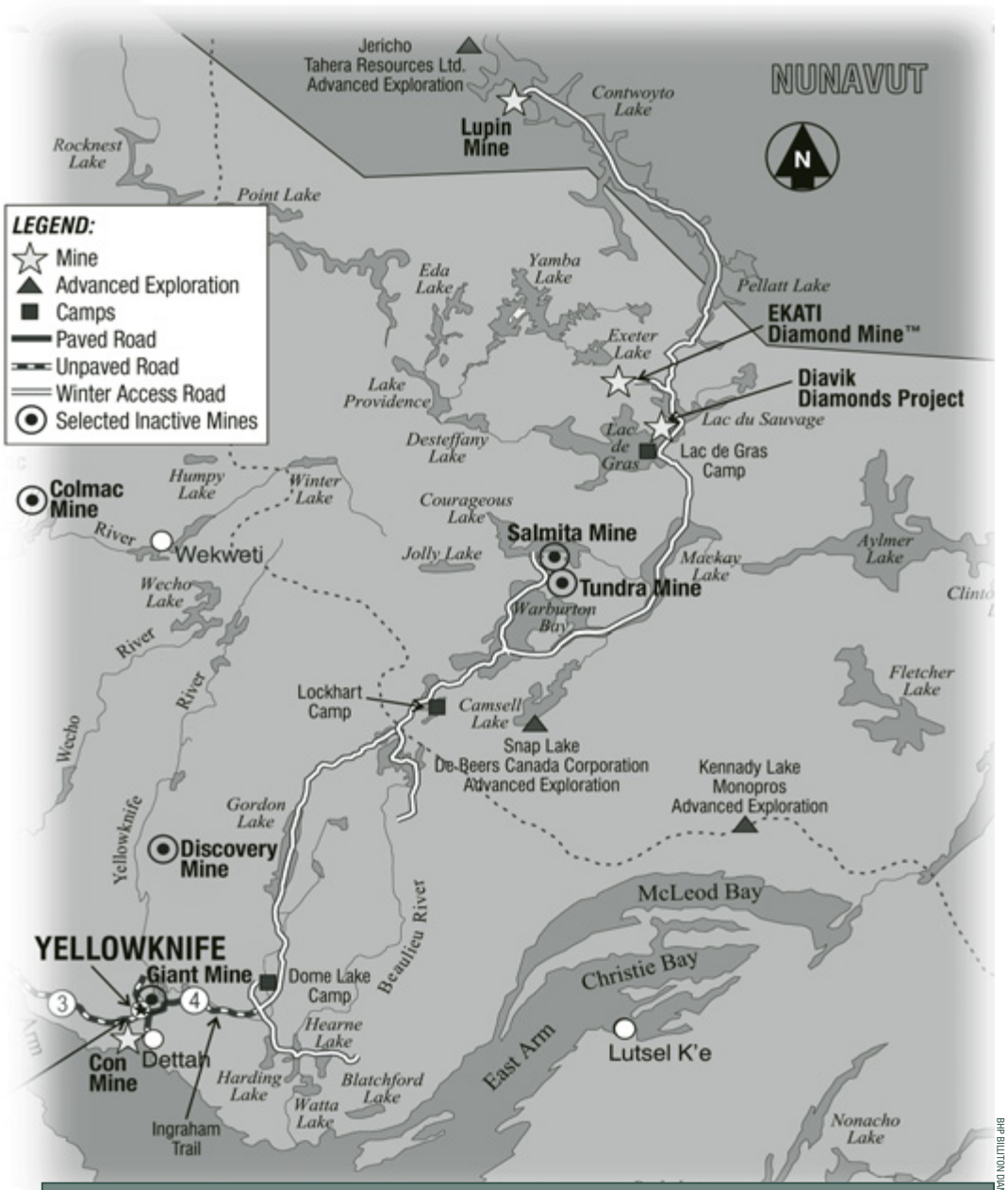


Figure 3. Development in the Slave Geological Province

Communications and Consultation

Two important elements of the *Environmental Agreement* concern BHPB's communication of environmental monitoring results and consultation with regulators and communities on monitoring programs and studies.

BHPB's Activities in 2003

BHPB continues to produce quality reports on its monitoring programs. Its Annual Report was well-written with helpful maps, photos and graphics. A plain English summary is provided at the front of the report.

In 2003, BHPB visited the communities of Gameti, Wha Ti, Dettah and Yellowknife to discuss its environmental monitoring programs. Community members and regulators visited the mine on various occasions throughout the year.

Working with the communities

During a meeting of Aboriginal members, one representative expressed concerns that communities were visiting the mine separately, thereby allowing BHPB to receive possibly conflicting rather than collective perspectives on areas of concern. We view this as troublesome since there is no transparent process on how community input is used and how differences are resolved by BHPB.

Community Concerns

Part of the Agency's mandate is to assist in the facilitation of effective participation of Aboriginal Peoples in the environmental management of Ekati. We note that in 2003 BHPB received criticism from most of the Aboriginal members on its consultation activities such as consultations related to water licence renewal and community visits. Of primary concern was BHPB's cancellation of its annual environmental workshops, an activity we considered to be an important contributor to adaptive environmental management at the mine. (See our chapter elsewhere on this specific issue.)

Community Visits

BHPB hosted meetings in Tli Cho (Dogrib) communities without the involvement of the Dogrib Treaty 11 Council (the Council).

Subsequently, the Council asked BHPB to coordinate its consultations, communications and submission of reports through the Council rather than directly with the communities. The Council and the Yellowknives Dene expressed concerns that BHPB included consultation activities in its water licence renewal application that were not considered consultation by the communities.

Report Timeliness

In 2003 BHPB produced many of its annual monitoring reports later than in previous years, preventing meaningful reviewer input from being incorporated into the monitoring programs for the 2004 season. For example, the delay in delivering the wildlife and aquatic effects monitoring reports meant that the planned environmental workshop to discuss the programs could not be held until late March. The company then stated that the comments were received too late to implement for the 2004 field season.

Another example of report delays affecting monitoring programs involves the air quality monitoring program. Last year the Agency recommended that, in preparation for sampling in 2004, BHPB redo its air quality monitoring models to help determine how to modify its sampling locations in time for the upcoming sampling season. The terms of reference for the remodelling exercise were distributed in late March 2004, too late to review, comment, revise and implement the study in time to collect snow and vegetation samples in 2004. This has delayed the program by one year.

INDEPENDENT ENVIRONMENTAL MONITORING AGENCY • TECHNICAL ANNUAL REPORT 2003-2004

Agency's Activities in 2003

The Agency has increased its communication and consultation activities with the communities. We hosted two workshops: an Aboriginal Caucus, consisting of participants from each of our Aboriginal society members to advance discussions on the formation of a regional monitoring agency; and an environmental workshop to review Ekati's environmental monitoring programs. Both are discussed further in following chapters. We also increased our visits to communities and our correspondence to our Aboriginal members. Given the busy schedules and priority issues facing most communities, our policy continues to be one that supports Agency visits to communities, but only when we are specifically invited for a purpose related to Ekati.

We have also heard from regulators that they appreciate the thorough technical review of Ekati related documents provided by the Agency. This is especially the case given the increasing budget restraints of many regulators.

Our role as a watchdog has been recognized outside of the north. We provided a presentation on the Agency to the national Workshop on Sustainable Development in the Diamond Sector, hosted by Environment Canada. At the request of those associated with a project being conducted for the Canadian International Development Agency, IEMA met with a delegation of regional political leaders from Peru who came to Yellowknife specifically to meet with us. We discussed the *Environmental Agreement*, the role of the Agency, how it was established and how it operates. The delegation was hopeful that a similar model could be adapted to mining operations in Peru.

Agency's Assessment

Communication is a difficult activity, particularly when communicating technical information in a cross-cultural environment. The challenge is complicated by the busy schedules of communities, regulators and the company. Effective communications and consultation require interaction between parties, up-front discussions on information needs, a willingness to address constructive criticism and to consult in a manner and time that is acceptable to the parties being consulted.

There is definite opportunity for BHPB to improve its communications with Aboriginal communities and the organizations directed to represent the communities. The Tli Cho have let BHPB know their expectations on how they want consultation conducted. The Agency encourages each Aboriginal group to define its consultation procedures and circulate this to BHPB and government agencies. We encourage BHPB to respect the consultation requests it receives and enter into more direct and timely dialogue with the contacts designated by the communities.

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

Responses to Agency Activities: Aboriginal, Government and International

"We continue to rely heavily on IEMA's comments and recommendations, especially in regards to the technical reports, and trust them to represent our interests well."

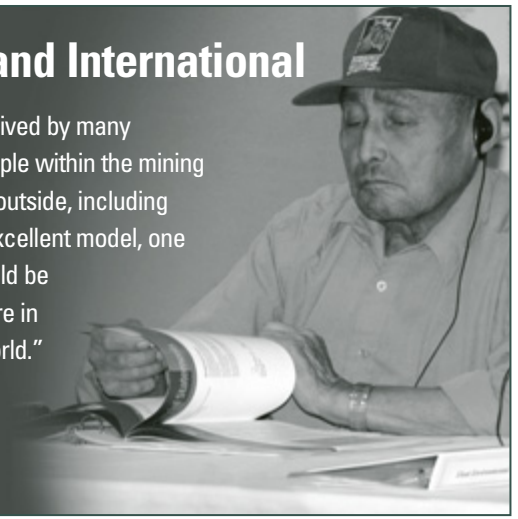
(Lutsel K'e Dene First Nation representative.)

"I read (IEMA's) letter on BHPB's Abandonment and *Reclamation* Plan and it is letters like this that make me appreciate that the agency is there….Although our review touched on some of the issues you discuss…we were not able to do as thorough analysis as you have done."

(DFO regulator)

"The IEMA is perceived by many knowledgeable people within the mining industry as well as outside, including CIDA, that it is an excellent model, one that could and should be replicated elsewhere in Canada and the World."

(Project Director, PERCAN)



Environmental Workshops

One of BHPB's most successful consultation efforts over the past few years has been the hosting of annual technical and community workshops to review its environmental monitoring programs. The workshop included representatives from Aboriginal communities, regulatory agencies, IEMA and BHPB. They provided a forum for collective, interactive review and feedback to BHPB about past results and recommended changes for the following year. They also provided the major opportunity for all stakeholders to talk directly with the consultants doing the monitoring work for BHPB.

Although the workshops were productive, the technical presentations were difficult to translate properly to Aboriginal participants. This led to frustration amongst participants and the potential for misunderstanding of information. In our annual report last year, we provided feedback to BHPB about how it could improve the community workshop.

Recommendations

8. BHPB should reinstate its annual environmental workshops in February of each year.

9. 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.

BHPB's Activities in 2003

In November 2003, BHPB decided to cancel the workshops. It had heard from community members that only 40% of the information was being translated properly due to the pace and technical content of the presentations. BHPB also indicated that internal budget constraints had contributed to its decision. The company suggested it would visit communities individually to present the information and gather input, and conduct the annual workshops every three years.

Response to Cancellation of Workshops

BHPB received criticism for its decision to cancel the workshops from the Dogrib Treaty 11 Council, the Kitikmeot Inuit Association and the Yellowknives Dene. They expressed disappointment about the loss of the workshops and offered suggestions to make them more effective. One in particular noted the importance of the workshops as a rare venue for collaborative review of the Ekati project. Most regulators indicated that BHPB's proposal to replace the technical workshops with paper submissions was satisfactory and some indicated that the community-based or public workshops should continue.

Agency's Response to Cancellation of Workshops

We expressed our surprise and disappointment with BHPB's decision to cancel the workshops. We indicated that this was a serious step backwards in achieving open dialogue and integrated regulatory and Aboriginal involvement in improving adaptive management of the mine. For these reasons we decided to host the workshop ourselves and encouraged BHPB to participate.

The Agency hosted the workshop "Review of Ekati's Environmental Monitoring Programs and Management Plans" March 16 – 17, 2004 in Yellowknife. The workshop and presentations were designed to provide technical material in an easily understandable format and to allow a substantial amount of discussion of results and programs. As follow-up to the workshop, we relayed to BHPB and all of our Society Members a summary of the recommendations, considerations and observations heard during the workshop.

Agency's Assessment

The workshop was well attended by representatives from each of our Aboriginal society members and the regulators. BHPB's presence was appreciated and the company was able to respond to most of the questions and concerns raised.

Workshop evaluation forms unanimously stated that the workshop and presentations were very informative, well presented and credible. We heard from one regulator that the workshop provided a good framework to link the many reports, studies and programs together. Feedback from our Aboriginal members indicated that they found our presentations easy to understand, but preferred that BHPB be responsible for presenting its own technical information, with its consultants, followed by an independent analysis by the Agency.

Assessment of Regulators

The Regulators and Our Mandate

The Agency serves as a public watchdog of BHPB's environmental performance at Ekati, the regulatory process and the implementation of the *Environmental Agreement*. This mandate includes monitoring the performance of the federal and territorial government agencies and the other organizations set up to provide regulatory instruments such as water licences that are key to the mine operation.

Agency's Assessment of the Regulators

Agencies that have a role in the conduct of environmental management at Ekati include:

- Department of Fisheries and Oceans (DFO)
- Department of Indian Affairs and Northern Development (DIAND)
- Environment Canada (EC)
- GNWT Department of Resources, Wildlife and Economic Development (RWED)
- Mackenzie Valley Land and Water Board (MVLWB)

In 2003 these agencies collectively contributed to effective environmental management of Ekati. Below are general comments related to the performance of each regulator.

Department of Fisheries and Oceans (DFO)

DFO participated regularly on the Inter-Agency Coordinating Team (IACT) and the AEMP Review Steering Committee and conducted technical reviews of monitoring programs and the water licence renewal. DFO also administers funds to compensate for fish habitat lost during the operations of Ekati. The Agency noted timely and quality reviews of Ekati monitoring programs and progress in the use of funds from BHPB for developing fish habitat.

Department of Indian Affairs and Northern Development (DIAND)

DIAND participated in IACT and the AEMP Review Steering Committee, and conducted some review of Ekati management plans and monitoring programs. DIAND provided updated security deposit estimates and displayed progress in the development of *reclamation* guidelines for mines. DIAND contributed funding for an independent review of the AEMP, which could contribute to increasing confidence in the ability of BHPB to detect changes in the aquatic environment. DIAND also delivered funds to allow Aboriginal involvement in developing principles for a future regional monitoring agency. At times the Agency noted a sporadic and uncoordinated approach to technical review from the various internal DIAND directorates involved in regulating Ekati. The Agency believes that the pace and

The Inter-Agency Coordinating Team (IACT) visiting Ekati

coordination of appointing a replacement Agency Director could have been improved.

The Agency notes that the high quality and rigorous inspections of Ekati ensures the site is operating at a high standard of environmental protection. The inspector worked with the company to ensure a timely response from the company in specific areas such as installing spill prevention devices, and provided valuable comments on the role of the inspector in enforcement of water licence conditions in the water licence renewal process.

Environment Canada (EC)

EC participated in IACT and the AEMP Review Steering Committee, and conducted technical review of monitoring programs and the water licence renewal. EC provided funding towards the third-party review of the AEMP, the results of which could improve aquatic monitoring programs in general. It also played an important role in developing the monitoring program for the Misery surplus water atomization program. The Agency noted high quality technical reviews were provided from EC as well as a valuable contribution towards improving the Ekati air quality monitoring program.

Government of the Northwest Territories – Resources, Wildlife and Economic Development (RWED)

RWED participated in IACT and reviewed specific BHPB monitoring programs and studies, including air quality, wildlife and special studies on wildlife. The Agency appreciates the presentation given by RWED during the workshop we hosted on the subjects of cumulative impacts on caribou and BHPB's risk assessment of effects on wildlife from exposure to processed *kimberlite*. The Agency notes RWED's substantive contribution towards improving monitoring programs especially related to increasing the effectiveness of BHPB's air quality program and its wolverine monitoring program. RWED continues to conduct innovative research on monitoring of wolverine using DNA from hair samples. However, its role was limited in the review of the Abandonment and *Reclamation* Plan. The pace and coordination of appointing a replacement Agency Director could be enhanced.

Mackenzie Valley Land and Water Board (MVLWB)

The MVLWB participated in IACT and Agency-hosted events, prepared Ekati regulatory instruments and coordinated stakeholder review of monitoring programs and BHPB technical reports. In 2003 the Agency noted that the interface with the MVLWB at Agency Board meetings has been productive. The MVLWB has attempted to improve the coordination of stakeholder technical review into BHPB's management plans. The in-house review of technical documents is not transparent to the Agency; the MVLWB tends to act as a clearinghouse of comments rather than providing sound technical review.

Approval of Fox Pit Activities

Fox Pit development activities, including the discharge of *mine water* into Cell D, had begun when we visited the site in June, 2003. It became apparent that these activities had not yet been formally approved by the MVLWB. It is important to note that these unapproved activities did not negatively affect the environment but are indicative of a review process that requires improvement. The handling of waste rock at Fox Pit is prescribed in the Waste Rock and Ore Storage Management Plan. Although the plan was submitted to the MVLWB in June 2002 and reviewed in November, it was not approved until August 2003. The deposition of *mine water* is covered under the Wastewater and Processed *Kimberlite* Management Plan (WWPKMP), which was due the Board in January 2003. The MVLWB, upon request from the company, extended the due date for submission of the plan to a date after which Fox Pit activities had begun, resulting in the company initiating activities that had not yet been approved. As a result, BHPB agreed to switch the deposition of *mine water* from Cell D to Cell C as specified in the approved plan, until the revised plan could be approved. This resulted in the construction of an additional pipeline to move the deposition of *mine water* from Cell D of the LLCF to Cell C.

Fox Pit - June 2003

Assessment of BHPB

The Ekati mine continues to enjoy good environmental performance, achieved through BHPB's effective use of adaptive environmental management practices. BHBP continues to meet the overwhelming majority of its obligations under its water licences, land leases, land use permits and the *Environmental Agreement*. While small changes have been noted in the environment around Ekati, so far the effects of those changes on wildlife, fish and water have been small.

Areas requiring improvement by BHPB relate primarily to consultation activities, its relationship with the Agency and the content of its Interim Abandonment and *Reclamation* Plan (see Communications and Consultation, and A&R sections of this report for more information). We congratulate BHPB on receiving ISO 14001 accreditation for its environmental management system.

BHPB's research on issues such as *nitrate toxicity* and revegetation is commendable and will help improve not only its environmental management but could also contribute to better environmental management in the North. BHPB remains responsive to input from regulators and the Agency. For example, when concerns were raised about water quality in the Long Lake Containment Facility, BHPB undertook various studies, including a risk assessment, to compare discharge locations for Fox Pit *mine water*, a study to look at contaminant levels in fish in Cell E and a trend analysis for downstream lakes.

A key to good performance by the mine is continued vigilance by regulators, BHPB, communities and the Agency. This is best done through the collaborative review of monitoring results, studies and programs. The annual environmental workshops have played a valuable role by providing a forum for interactive collaborative review. Their cancellation by BHPB was one of the biggest disappointments of last year.

The working relationship between BHPB and the Agency was sometimes strained over the last year. During our October meeting, we collaboratively discussed the upcoming workshops and we indicated that we thought our working relationship with the company was at its best. Immediately after the meeting, BHPB sent letters cancelling the workshops, asking that we be dissolved and a short time later asked us to reduce our budget. The budget reduction request is inconsistent with the *Environmental Agreement*.

We acknowledge that BHPB had to deal with internal pressures over the last year, such as an internal audit, a restructured business plan and new personnel, but we believe that during these times of significant change within BHPB, consultation with us and others is most important and can be particularly productive. During a March meeting, steps were taken by both sides to help improve our relationship. The company proposed that we spend more time together during Board meetings and that Directors and staff have more direct contact with field staff.

We look forward to a positive, productive working year ahead.

Financial Statements

March 31, 2004

Management's Report

The management of Independent Environmental Monitoring Agency is responsible for the integrity of the accompanying financial statements. The financial statements have been prepared by management in accordance with the accounting principles in the attached notes. The preparation of the financial statements necessarily includes some amounts which are based on best estimates and judgements of management.

To assist meeting its responsibility, management maintains accounting, budget and other internal controls. These controls provide reasonable assurance that transactions are appropriately authorized and accurately recorded, that assets are properly accounted for and safeguarded, in order that the integrity of the financial records is maintained.

The financial statements have been audited by the independent firm of Mackay LLP, Chartered accountants. Their report to the directors of Independent Environmental Monitoring Agency, stating the scope of their examination and opinion on the financial statements, follows.

Secretary-Treasurer
May 13, 2004

March 31, 2004

Auditors' Report

To the Directors of Independent Environmental Monitoring Agency

We have audited the statement of financial position of Independent Environmental Monitoring Agency as at March 31, 2004 and the statements of operations and changes in net assets and cash flows for the year then ended. These financial statements are the responsibility of the Agency's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In our opinion, these financial statements present fairly, in all material respects, the financial position of the Agency as at March 31, 2004, and the results of its operations and its cash flows for the year then ended in accordance with Canadian generally accepted accounting principles.

Mackay LLP

Yellowknife, Canada
May 13, 2004
Chartered Accountants

Statement of Operations and Changes in Net Assets

For the year ended March 31, 2004

	2004	2003
Revenues		
BHP Billiton Diamonds Inc.	**$ 518,600**	$ 511,350
Contributed services (note 6)	**27,491**	26,791
Interest income	**10,519**	3,377
DIAND contributions	**28,324**	-
Aquatic Effects Monitoring Program	**25,000**	-
	609,934	541,518
Expenditures		
Accounting and auditing fees	**7,378**	7,018
Advertising	**-**	2,491
Aquatic Effects Monitoring Program	**34,387**	-
Amortization	**4,287**	5,214
Board support		
- honorarium	**157,311**	177,819
- travel, meals and accommodation	**58,687**	80,389
Community consultation	**74,151**	69,010
Consultants	**5,468**	1,080
Contributed services		
- copying	**-**	873
- equipment lease	**3,262**	2,618
- office lease	**24,229**	23,300
DIAND contributions	**28,324**	-
Insurance	**3,368**	606
Office supplies	**4,177**	9,254
Postage and freight	**976**	1,835
Printing, design and communication	**43,132**	39,536
Professional development	**9,911**	-
Recruitment	-	2,725
Relocation	-	1,556
Telephone and fax	**6,872**	8,295
Wages and benefits	**155,602**	131,999
	621,522	565,618
Deficiency of revenues over expenditures before other item	**(11,588)**	(24,100)
Loss on disposal of capital assets	**(4,601)**	(2,149)
Deficiency of revenues over expenditures for the year	**(16,189)**	(26,249)
General Operating Fund, beginning of year	**42,027**	67,684
Transfer to investment in capital assets fund	**2,652**	592
General Operating Fund, end of year	**$ 28,490**	$ 42,027

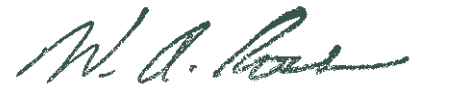
Statement of Financial Position

As at March 31, 2004

	2004	2003
Assets		
Current		
Cash	**$ 291,088**	$ 569,436
Contributions receivable	**27,970**	-
Prepaid expenses	**1,200**	1,155
	320,258	570,591
Capital assets (note 3)	**15,460**	18,112
	$ 335,718	$ 588,703
Liabilities		
Current		
Accounts payable and accrued liabilities	**$ 122,922**	$ 9,964
Deferred revenue (note 4)	**167,170**	518,600
Contributions repayable	**1,676**	-
	291,768	528,564
Net Assets		
Investment in capital assets (note 5)	**15,460**	18,112
General operating fund	**28,490**	42,027
	43,950	60,139
	$ 335,718	$ 588,703

Approved by the Board:

Director



Director

Statement of Cash Flows

For the year ended March 31, 2004

	2004	2003
Cash provided by (used for)		
Operating activities		
Deficiency of revenues over expenditures for the year	**$ (16,189)**	$ (26,249)
Items not affecting cash:		
Amortization	**4,287**	5,214
Loss on disposal of capital assets	**4,601**	2,149
	(7,301)	(18,886)
Change in non-cash working capital items		
Accounts receivable	**-**	2,519
Contributions receivable	**(27,970)**	-
Prepaid expenses	**(45)**	-
Accounts payable and accrued liabilities	**112,957**	(728)
Deferred revenue	**(351,430)**	7,250
Contributions repayable	**1,676**	-
	(272,113)	(9,845)
Investing activity		
Purchase of capital assets	**(6,235)**	(6,772)
Decrease in cash	**(278,348)**	(16,617)
Cash, beginning of year	**569,436**	586,053
Cash, end of year	**$ 291,088**	$ 569,436

Notes to the Financial Statements

March 31, 2004

1.Organizational Purpose

Independent Environmental Monitoring Agency ("the Agency") is a non-profit organization incorporated under the *Societies Act* of the Northwest Territories. It is exempt from income tax under Section 149(1) of the *Income Tax Act*.

The mission of the Agency is to oversee environmental management of BHP Billiton Diamonds Inc. at the Ekati mine site in the Northwest Territories.

2.Significant Accounting Policies

The following is a summary of the significant accounting policies used by management in the preparation of these financial statements.

Notes to the Financial Statements (continued)

March 31, 2004

(a) Financial instruments

All significant financial assets, financial liabilities and equity instruments of the Agency are either recognized or disclosed in the financial statements together with other information relevant for making a reasonable assessment of future cash flows, interest rate risk and credit risk.

(b) Fund accounting

The Agency follows the deferral method of accounting for contributions.

The general operating fund accounts for current operations, programs and general operations, and the Agency's capital assets.

(c) Revenue recognition

The Agency recognizes unrestricted contributions when they are received or receivable if the amount receivable can be reasonably estimated and its collection is reasonably assured.

(d) Capital assets

Equipment purchases are recorded on the balance sheet at historical cost less accumulated amortization. Amortization is calculated by the declining balance method at the annual rates set in Note 3. In the year of acquisition, amortization is taken at one-half the annual rates.

(e) Deferred revenue

Contributions received in advance are deferred. The amounts will be taken into income as services and goods are acquired.

(f) Use of estimates

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the balance sheet date and the reported amounts of revenues and expenses during the year. Actual results could differ from those estimates.

3. Capital Assets

				2004	2003
	Rate	Cost	Accumulated Amortization	Net book value	Net book value
Office equipment	20%	$ 13,992	$ 5,351	$ 8,641	$ 9,599
Computers	30%	12,870	6,265	6,605	8,514
Computer software	100%	1,335	1,121	214	-
		$ 28,197	$ 12,737	$ 15,460	$ 18,113

Notes to the Financial Statements (continued)

March 31, 2004

4. Deferred Revenue

Deferred revenue consists of the funds contributed by BHP Billiton Diamonds Inc. for the March 31, 2005 year end. This amount will be taken into revenue in 2005, as services and goods are acquired.

5. Investment In Capital Assets

	2004	2003
Balance, beginning of year	**$ 18,112**	$ 18,703
Purchases of capital assets	**6,235**	6,772
Disposition of capital assets	**(4,600)**	(2,149)
Amortization	**(4,287)**	(5,214)
	$ 15,460	$ 18,112

Disposed assets consist of:	
Dell Laptop	$ 1,677
Digital camera	1,228
Overhead projector	278
Proxima DS2 projector	1,155
Other	262
	$ 4,600

6. Economic dependence

The agency receives contribution funding from BHP Billiton Diamonds Inc. Management is of the opinion that operations would be significantly affected if the funding was substantially curtailed or ceased.

7. Contributed Services

BHP Billiton Diamonds Inc. has directly paid for the office rent and equipment lease for the Agency. The monthly rent is $2,019 and the equipment lease is $3,262 per year. The Agency recognizes the contributed services at the fair value of the services provided.

Schedule of DIAND Contributions

For the year ended March 31, 2004

	2004	2003
Revenue		
Government of Canada - Indian Affairs and Northern Development	$ 30,000	$ -
Contributions repayable, end of year	(1,676)	-
	28,324	-
Expenses		
Facilitation	4,170	-
Report preparation and background materials	7,880	-
Room rental and catering	423	-
Travel and accommodations	10,907	-
Honorarium for community members	1,250	-
Administrative support (15%)	3,694	-
	28,324	-
Net revenue	$ -	$ -

The agency made contributions in kind of $8,192 staff time and directors' honoraria for participation in the workshop.

Summary of 2004-2005 Workplan and Core Budget

Based on recommendations we received at our 2002 Annual General Meeting, in addition to the Agency's regular activities, the Agency intends to devote more effort to:

- Facilitating the integration of community knowledge and traditional knowledge in monitoring and management programs at the Ekati mine
- Encouraging and participating where appropriate in discussions for the development of monitoring activities in a more regional context to better assess *cumulative effects*
- Review plans and designs of infrastructures relative to the newly approved mine expansion (Sable, Beartooth, and Pigeon pipes)
- Monitor the effects of dust on water, vegetation and animals
- Discussion on *reclamation* and revegetation issues
- Implementation of refined monitoring programs for 2003-2007 with regard to aquatic effects, wildlife effects, and Panda Diversion Channel
- Increasing availability of web-based resources

It is important to note the Agency's activities continue to increase with modifications and expansions to the project.

Core-Budget 2004 - 2005:

- Budget figures are all in $1000's (thousands of dollars).
- Budget (not including honoraria) has been increased by 3.0 % (predicted rate of inflation) for the 2004-2005 year compared to the 2003-2004 year.

	1st quarter	2nd quarter	3rd quarter	4th quarter	2004-2005
A. Operations					
1 Insurance	0.55	0.55	0.55	0.55	2.3
2. Telephone, fax, email	2.1	2.1	2.1	2.1	8.7
3. Office supplies, software	1.7	1.7	1.7	1.7	7.0
4. Postage, courier, freight	0.6	0.6	0.6	0.6	2.5
5. Bookkeeping	0.6	0.6	0.6	0.6	2.5
6. Auditing, accounting	0.0	0.0	0.0	4.7	4.9
				Subtotal	**27.9**
B. Board Support					
1. Travel	17.1	8.9	17.1	8.9	53.6
2. Accommodation	5.6	2.8	5.6	2.8	17.2
3. Meals	2.2	1.2	2.2	1.2	7.0
4. Honoraria (Note 1)	46.2	33.6	46.2	33.6	159.6
				Subtotal	**237.4**
C. Communication / Consultation					
1. Communication (Note 2)	32.0	1.5	1.5	1.5	37.6
2. Community Consultation (Note 3)	10.5	10.5	10.5	10.5	43.0
				Subtotal	**80.6**
D. Staffing					
1. Manager	21.0	21.0	21.0	21.0	88.0
2. Environmental Analyst	13.25	13.25	13.25	13.25	55.0
3. Benefits & Payroll taxes	6.25	6.25	6.25	6.25	25.8
4. Outside experts	4.0	4.0	4.0	4.0	16.5
				Subtotal	**185.3**
				Total	**531.2**

1. Based on 6 meetings/yr (3 days each) and 1.5 days/month/director for office work and participation in workshops. Meetings are planned in April, June, August, October (with Annual General Meeting), December, and February (with workshops) and 14 days for the Chair for community consultation.
2. Annual report ($32k), 3 newsletters and web site ($4.5k)
3. Costs for holding meetings in communities, and attendance/ presentations at Aboriginal assemblies. The Agency has an open invitation to meet with communities to discuss issues related to the mandate of the Agency

Glossary

Ammonia
The most toxic form of nitrogen, most commonly associated with blasting at Ekati.

*Acid Rock Drainage (ARD)
Occurs when minerals containing sulphide and sulphur are exposed to the weathering effects of oxygen and water and when the resulting acidity is entrained by water.

Benthic Macroinvertebrates
Invertebrate organisms (i.e. those without a backbone – insects, worms, mollusks, etc.) large enough to be seen that live on the bottom of rivers, lakes and ponds.

By-catch
Accidental mortality to other species that occurs during removal of fish from water bodies.

CCME
Canadian Council for Ministers of the Environment.

Cladocera
Very small animal *(Zooplankton)* which lives in water; also referred to as a water flea.

Cumulative Effects
The environmental changes that occur from a project or activity combined with effects from other human activities.

Emissions
The process of sending out or releasing contaminants into the air.

Environmental Agreement
Created as a legally binding instrument to provide monitoring and input into management practices not covered by other authorizations.

Eutrophication
The addition of excessive amounts of nutrients (usually nitrates and phosphates) to water bodies, which causes rapid growth of plants and can lead to lower oxygen levels and fish kills.

Fecundity
A relative measure of potential reproductive capacity based on the number of eggs produced by an individual or population.

Fishout
Removal of fish from water bodies in preparation for mining activities.

Fry
Early life stage of fish following absorption of yolk sac (alevin) stage.

Geochemistry
The chemistry of the earth and its rocks and minerals.

Kimberlite
A rare, potentially diamond bearing iron and magnesium rich rock from deep in the earth's mantle. Kimberlites are generally found as vertical pipe-like structures.

Limnology
The study of the physical, chemical and biological characteristics of lakes.

*Metal Leaching
Associated with acidic drainage due to high metal solubility and sulphide weathering rates under acidic conditions.

Mine water
Water found within the pit containing wastes from mining practices.

Mineralogy
The scientific study of minerals.

Nitrate
A nutrient, like a fertilizer, derived from nitrogen.

Phosphorous
A plant nutrient that can cause rapid bacteria and algae growth when present in high amounts, leading to eutrophic conditions.

Phytoplankton / Periphyton
Microscopic plants, such as algae, found in freshwater and ocean environments.

Pit Water
Runoff, groundwater and water mixture that is leftover after the mill removes the valuable rocks (i.e. diamonds).

Polishing
The process of enhancing water quality by retaining water in a holding facility to settle suspended solids and chemicals and remove *ammonia*.

Processed Kimberlite Effluent (tailings)
The waste material and water mixture that is left over after the mill removes the valuable minerals (i.e. diamonds).

Progressive Reclamation
Reclamation that occurs while the mine is still operating. As mine activities are completed and the infrastructure no longer required, roads are reclaimed, buildings and equipment are removed, areas are revegetated and landfills and dumps are remediated.

Reclamation
The recovery of areas of land and water-bodies that have been disturbed during mining.

Sulphide
A mineral containing iron and sulphur that has the potential to react with water and oxygen to produce acid.

Tailings
The waste material and water mixture that is left over after the mill removes the valuable minerals (i.e. diamonds) from the ore. Also referred to at Ekati as processed *kimberlite*.

Toxicity
The ability to cause harmful or deadly effects to plants and animals.

Zooplankton
The small, almost microscopic animals that live suspended in freshwater (and ocean) environments. Zooplankton feed on *phytoplankton* and small particles in the water.

**From Guidelines For Metal Leaching and Acid Rock Drainage at Minesites in British Columbia, William A. Price and John C. Errington, Ministry of Energy and Mines, August 1998*

Independent Environmental Monitoring Agency

Technical Annual Report 2003-2004

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