

A PUBLIC WATCHDOG FOR ENVIRONMENTAL MANAGEMENT AT EKATI DIAMOND MINE™



# Annual Report 2001-2002



Independent Environmental  
Monitoring Agency



# 2001-2002 Annual Report Recommendations

## Traditional Knowledge

1. BHPB should work with aboriginal people to develop a method of documenting the suggestions and concerns of aboriginal people visiting the site.

## Wildlife

2. The wolverine track survey should be expanded to four or five times per season. At the same time, BHPB should develop and implement the scent station monitoring program.

3. The data relating to caribou abundance and distance from mine infrastructure should be analysed and presented independently for the northern migration and post calving period.

## Aquatic Effects Monitoring

4. BHPB should expand the AEMP to include Leslie Lake.

## Special Effects Monitoring

5. BHPB should determine the cause of elevated nitrates within Little Lake.  
6. BHPB should conduct follow-up sampling in Little Lake within three or four years to confirm that the lake has recovered completely from nutrient inputs.

7. BHPB should continue monitoring fish in the Panda Diversion Channel in 2002.

8. BHPB should develop a conceptual plan for the flooding of the Panda and Koala pits, and either the long term maintenance or abandonment of the Panda Diversion Channel.

## Waste Rock

9. BHPB should conduct a thorough mineralogical examination of all kimberlite types.

10. Next year the seepage survey report should explicitly highlight any occurrences of non-compliant seeps for easy reference.

## Air Quality

11. BHPB should establish a dust monitoring program along the Misery road similar to the one in place along the Sable road.



## Reclamation

12. BHPB should provide estimates of liability for the Ekati Diamond Mine™, that do not include the assumption that progressive reclamation has been carried out.

13. The company, regulators, government and other interested agencies promptly begin a process to develop clearly defined reclamation completion criteria.



## Introduction to Technical Report

Welcome to the 2001-2002 Independent Environmental Monitoring Agency Annual Report. This portion of the report provides a more detailed analysis and discussion of issues identified in our summary report.

The Annual report produced every year by the Agency provides our assessment of environmental monitoring and management of the Ekati Diamond Mine™ located in the sub-arctic tundra of the Northwest Territories. Ekati is an open-pit and underground operation mining diamonds from kimberlite pipes. The mine was permitted in 1997 and following construction began commercial operations in October 1998. For an explanation of the processes involved in mining at Ekati please refer to our summary report.

The Independent Environmental Monitoring Agency was established as a part of the *Environmental Agreement* signed by BHP Billiton (BHP at the time), the Governments of Canada and the Northwest Territories. This Agreement was a prerequisite to BHPB receiving its permits. The Agency holds a responsibility to act as a watchdog for environmental monitoring and management of the mine. The Agency fulfills its mandate through the review of BHPB's monitoring and management reports, conducting site visits and regularly meeting with the company, regulators and government.

The Agency also holds a responsibility to listen to, and in turn forward to the company, concerns expressed by aboriginal peoples who have traditionally hunted, fished and trapped the area in which the mine is now located.

We hope that you find this report useful. If you have any comments regarding the material in the report, its format or have any questions or concerns relating to the environmental monitoring or management of the Ekati Diamond Mine™, please do not hesitate to contact us. Our contact information is included on the back cover of this report.

*Independent Environmental Monitoring Board of Directors*



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## Glossary



*John Witteman (BHPB) and Agency Directors Bill Ross and François Messier at Ekati (Left to Right)* AGENCY

### **Aerators**

Mechanical pumps that add oxygen to a body of water.

### **Ammonia**

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

### **Barren Kimberlite**

Kimberlite that does not contain enough diamonds to be economically processed in through the mill.

### **Benthic Macroinvertebrates**

Invertebrate animals (i.e. those without a backbone - insects, worms, mollusks, etc.) that live on the bottom of rivers, lakes and ponds.

### **Biotite Schist**

Schist is a type of sedimentary rock (mudstone or sandstone) that has been subjected to tremendous heat and pressure to change it into a layered, crystalline rock. Biotite is type of mica that is abundant enough in the Lac de Gras schists to have the rock called a biotite schist. Because the schist also has higher levels of sulphides in it, it has the potential to react with air and water and produce acid.

### **Coarse Kimberlite**

Kimberlite that has been processed in the mill and generally has particles the size of sand or greater than 0.65 mm.

### **DFO**

Department of Fisheries and Oceans

### **DIAND**

Department of Indian Affairs and Northern Development

### **Electrical Conductivity**

The ability of a material to conduct electricity. This can provide a measure of the level of dissolved ions in the material.

### **Eutrophic**

Waters rich in nutrients and therefore supporting a dense plant population. The oxygen required to decompose dead plant life can deplete the oxygen levels in the water which can kill other aquatic life.

### **Eutrophication**

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

### **Flocculants and Coagulants**

Chemicals used to make solids stick together and settle out of water quicker.

### **Fry**

A baby fish that is fully formed, usually less than six months old, has absorbed its yolk sac, and is rearing in the stream.

### **Geochemistry**

The chemistry of the earth and its rocks and minerals.

### **GNWT**

Government of the Northwest Territories

### **Groundwater**

Water that flows beneath the surface of the tundra.

### **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.

### **Kimberlite Fines**

Kimberlite that has passed through the mill, has a particle size of less than sand-size and is generally deposited as a slurry with water.

### **Larvae**

A fish or invertebrate that has recently hatched from an egg and typically looks anatomically very different than the adult.

### **Limnology**

The study of lakes and other fresh waters.

### **Mineralogy**

The scientific study of minerals

### **MVLWB**

Mackenzie Valley Land and Water Board

### **Neutralising Material**

Minerals in a rock that neutralize acid.

### **Nitrate**

A nutrient, like a fertilizer, derived from nitrogen.

### **Perennials**

Plants that grow for more than one year

### **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 other waters that collect in the bottom of the pits

### **Processed Kimberlite Tailings**

The waste material and water mixture that is leftover after the mill removes the valuable rocks (i.e. diamonds).

### **RWED**

GNWT's Department of Resources, Wildlife and Economic Development

### **Sulphide**

A complex compound that has the potential to react with water and oxygen to produce acid.

### **Toxicity**

The ability to cause harmful or deadly effects to organisms in the environment. Either immediately upon exposure (acute) or over a prolonged time period (chronic).

### **Turbidity**

A measure of the clarity of water. The more turbid the water the less clear it is.

### **Young-of-the-year**

Fish less than one year old.

### **Zooplankton**

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





# Traditional Knowledge

## BHPB's Activities

Under the *Environmental Agreement* BHPB is required to consider and incorporate all available traditional knowledge into its environmental plans and programs. The company has attempted to achieve this goal through funding or providing resources for aboriginal organizations to complete traditional knowledge studies, and several studies have been completed in previous years. The company also provides opportunities for community members, especially elders, to visit the mine site each year to inspect and comment on environmental management issues, particularly issues relating to caribou interactions with mine infrastructure. A third, less formal approach, which involves varying degrees of applied traditional knowledge, is through the employment of aboriginal people in the company's archaeological investigations, wildlife monitoring (particularly, the wolverine snow-track survey, which is designed and carried out by experienced Inuit trappers) and lake fish-outs.

Completed traditional knowledge studies funded by the company include a study undertaken by the Dogrib Treaty 11 Council entitled "A Tlicho Perspective on Biodiversity", and the Yellowknives Dene First Nation report; "Weledeh Yellowknives Dene a traditional knowledge study of Ek'ati". The company is currently funding or providing technical support to traditional knowledge GIS-based mapping systems being developed by the Lutsel k'e Dene First Nation, Kitikmeot Inuit Association and North Slave Metis Alliance.

In 2001 representatives from the aboriginal groups participated in site visits to observe the spring caribou migration. Community members from the Dogrib and Yellowknives Dene also accompanied archaeologists in conducting archaeological surveys within the BHPB claim block.

## The Agency's Assessment

Progress in achieving the effective use of traditional knowledge in the environmental management of the mine, a main objective of the *Environmental Agreement*, continues to be elusive. It is an objective that, while obviously challenging to both the company and the aboriginal organizations, is achievable through greater effort and discipline.

Somewhat concerned about this issue, we recommended in last year's annual report that aboriginal groups meet together to develop a consensus where they and their knowledge can best fit into BHP's environmental management and monitoring programs. The notion was that an initial meeting amongst themselves to discuss this issue might be more fruitful to achieving a unified vision or approach which could then be brought forward to BHPB for further consultation and, ideally, for implementation. We were disappointed that the recommendation was not taken up over the past year. However, we are pleased to have proposed such a meeting of the aboriginal groups in collaboration with the Environmental Monitoring Advisory Board, a community-based monitoring body for the Diavik project for next year. We are also encouraged by the fact that all aboriginal members were involved in a committee that recently made recommendations to the companies involved in the environmental management and operation of the winter road to the Lac de Gras area.

*Aboriginal elder working on an animal hide* RWED/GNWT





## Traditional Knowledge

The support being given by BHPB to the GIS-based land information systems that three of the aboriginal groups are developing is commendable, and will no doubt be of great value to the communities in future land use decision-making. However, the link between these systems and the use of traditional knowledge in the environmental management of BHPB's diamond projects is not transparent.

In June 2001 the Dogrib Treaty 11 Council submitted a proposal to the company to carry out monitoring of caribou behaviour and habitat in and around the BHPB claim block area during spring and fall caribou migrations. The Dogribs also indicated a willingness to work with BHPB on its reclamation projects. The Agency encourages BHPB to seriously consider this proposal and, where appropriate, to work closely with the Dogrib Treaty 11 Council in designing and conducting the proposed work for 2002 field season and beyond.

While the Agency has heard positive remarks from our aboriginal members regarding the site visits to observe the caribou migration, we have also heard concern about the lack of reporting and follow-up by the company to comments and suggestions made by those participating. Some of our members have indicated that, while these trips have been informative, they do not consider the current form of the site visits to be sufficiently constructive. This reflects an on-going concern that we have continually raised with the company—there is a clear need to document the advice and concerns related to environmental management as expressed by aboriginal people visiting the site, and to document the response

of the company to these. This is an issue that demands complete transparency in order that the use of traditional knowledge by the company can be demonstrated. It is not sufficient to simply report, as BHPB continues to do, that aboriginal people have participated in the site visits during caribou migration and sometimes express concerns.

In this regard we understand that BHPB is testing a new format for the upcoming year, specifically focusing on monitoring wildlife interactions along the Misery road with the Lutsel K'e Dene and Kitikmeot Inuit. As we stated in a letter to BHPB in September 2000, we again stress the need for a meaningful reporting of the issues raised by those participating from the communities, and of BHPB's responses to the issues raised during the monitoring. And we encourage the company to continue discussions with all aboriginal groups on how the overall effectiveness of site visits can be improved.

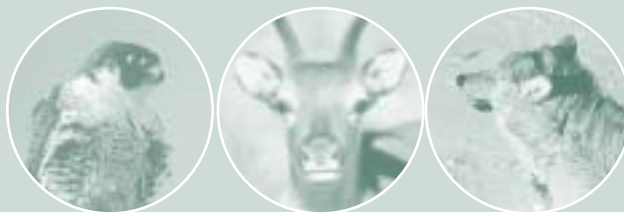
### *Director Tim Byers meeting with the Lutsel K'e Land, Wildlife and Environment Committee*



### **Traditional Knowledge — Recommendation**

1. *BHPB should work with aboriginal people to develop a method of reporting the suggestions and concerns of aboriginal people visiting the site.*





# Wildlife

## Introduction to the Wildlife Effects Monitoring Program

Infrastructure and activities at the Ekati Diamond Mine™ have the potential to directly or indirectly affect the abundance or behaviour of wildlife species. The wildlife effects monitoring program (WEMP) has been developed and refined over the last five years to monitor a number of wildlife species, including caribou, grizzly bears, wolves, wolverines, upland breeding birds and raptors. These species are selected as being key species as indicators of change, or species of significant importance to the people of the north.

BHPB monitors potential impacts on wildlife using a number of different survey techniques, including aerial surveys, snow track surveys and behavioural observations. Different survey techniques are used depending on the species and potential impact being monitored. For example, to assess the abundance and behaviour of caribou groups around the mine site, an aerial survey is flown once per week during the period April through October each year. Another example is the weekly visual observation of the landfill for attractants and the presence of any wildlife at such sites.

*Caribou herd in winter* RWED/GNWT



Monitoring for all species is carried out within the “Wildlife Study Area”. This is an area of 1600km<sup>2</sup> which covers a large portion of the BHPB claim block, and includes all mine developments including those currently in regulatory review, such as Sable, Pigeon and Beartooth.

## Effects of Mining

The WEMP continues to show that infrastructure and activities at the mine site appear to be having a negligible effect on the abundance or health of wildlife living near or, passing through the mine site.

Caribou numbers vary year to year, and given the natural variation in the numbers passing through the study area, no significant trend has as yet been identified. It should be noted that an analysis of caribou activities and group composition (i.e., number of groups with cow and calves as opposed to groups without calves) in relation to the distance from the mine infrastructure showed a decrease in the number of cow and calf groups feeding closer to the mine site. No caribou have been reported killed or injured as a result of mine site activities.



*Caribou crossing on Misery haul road.*

AGENCY



## Wildlife

Of note in 2001 were the observations throughout the North Slave region of limping caribou. Hunters and elders from communities expressed concern to us about the possible causes of the limping caribou. One suggestion is that the limping is caused by footrot and cuts on legs. Footrot may have been caused by the unusually damp conditions seen in 2001. Community members have expressed some concerns about the possible effects of the haul roads on caribou. Further work needs to be carried out to support (or dismiss) these roads as a possible cause of foot injuries leading to footrot cases.

Impacts to wolverines due to the Ekati Mine have been greatly reduced in 2001 compared to 2000. The Agency expressed concerns in last year's report about the high number of wolverines killed or relocated in the Lac de Gras region. This year, improved waste handling procedures and employee awareness have reduced impacts to wolverine at the BHPB Ekati and Misery sites. Nonetheless, three wolverines have been destroyed or relocated due to waste management issues at Ekati and Misery camps. As this impact was noted as a cumulative effect, the practices of Diavik and winter road operators are also important for mitigating impacts.

Monitoring of grizzly bears, wolves, upland breeding birds, loons and raptors have not shown significant impacts.

### Agency's Assessment of Wildlife Effects Monitoring at Ekati

The Agency was pleased to have been able to offer our advice in the development of the final report of the 2001 wildlife effects monitoring program through our participation in a technical meeting in December 2001 to discuss preliminary findings. As our concerns often

relate to the manner in which data are presented, this enabled us to provide suggestions in the drafting of the report directly to BHPB's consultants. This meant that by the time the environmental workshops were held in February 2002, we and other workshop participants were better able to concentrate on discussing the results of the 2001 program with members of the communities and reviewing potential changes for the 2002 monitoring program.

Following the workshops, the Agency wrote to BHPB with our comments on the report, review process and recommended changes for the next year. The Agency made the following observations. The 2001 WEMP report is professionally presented and summarizes well the findings of the 2001 monitoring program. The expanded Plain English summary helps communicate the results to a broader audience. Overall, the 2001 WEMP report is the best produced by BHPB since the beginning of mine operations.

The Agency would like to note the greater openness of BHPB in discussing problems about wildlife encountered at the mine site (e.g., carnivore incidents) or difficulties with specific monitoring activities (wolverine track surveys). This approach is welcome as it allows a more balanced view of successes and difficulties related to the monitoring program. It also permits meaningful inputs from workshop participants in order to work with BHPB toward resolving such difficulties.

The Agency is pleased that BHPB is responding to concerns raised by the communities about the interaction of caribou with haul roads by developing a community-based observation program. However, we remain concerned about the lack of reporting within the wildlife report of advice and concerns received from aboriginal people visiting the site. The observations of aboriginal people could make a meaningful



*Wolverine* ROB GAU/RWED/GNWT







## Wildlife

contribution to understanding the effects of the roads on caribou movements and activities, and we hope that the new program will address this deficiency.

The monitoring program for wolverine needs revision and strengthening. The Agency recommends expanding the number of winter track surveys to four or five in order to better document yearly changes in wolverine abundance in the Wildlife Study Area. The Agency also supports the testing of new approaches for monitoring wolverine abundance in the Wildlife Study Area, such as the use of scent stations and DNA tests. However, the participation of aboriginal people in the wolverine-monitoring program should be maintained as it represents an excellent example of tangible participation of aboriginal people in monitoring activities.

The Agency stresses the need to have detailed data on traffic volumes for haul roads (Misery, Sable). Such data are a prerequisite to interpreting monitoring data of caribou along haul roads. The Agency understands that the necessary traffic data will be provided and reported by BHPB in 2002.

The analyses of caribou data from aerial surveys (e.g., relative abundance of caribou versus mine footprint) needs to be more refined in future years. For example, the effects of distance from infrastructure and habitat type on group composition and caribou behaviour should be addressed in the statistical design of the analysis. Further, data should be analysed independently for the northern

and the southern migration (or for each of the northern migration, post-calving period, and fall migration).

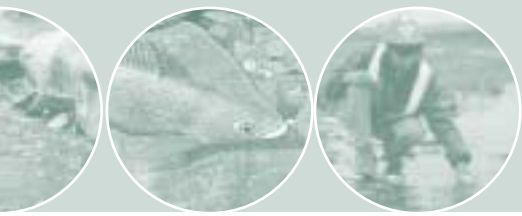
The Agency continues to encourage BHPB to collaborate with Diavik (and other companies) in developing monitoring activities that use the same protocols for data collection. This approach will permit better assessment of potential impacts on wildlife from a more regional perspective. Harmonization of protocols is especially important for caribou, wolverine, and grizzly bear. We are pleased to report that late in the year we have heard from BHPB that Diavik and BHPB have agreed to carry out joint caribou aerial surveys and discussions are ongoing for the harmonization of other wildlife effects monitoring activities.

*A Ptarmigan* C. CALF/RWED/GNWT



### Wildlife — Recommendations

- 2. The wolverine track survey should be expanded to four or five times per season. At the same time, BHPB should develop and implement the scent station monitoring program.*
- 3. The data relating to caribou abundance and distance from mine infrastructure should be analysed and presented independently for the northern migration and post calving period.*



# Aquatic Effects Monitoring

BHPB's aquatic effects monitoring program, a requirement under its Class 'A' water licence and the *Environmental Agreement*, is designed to detect any changes that the project has on surrounding aquatic ecosystems. Significant effects are determined by comparing baseline data collected prior to construction activities with later post-development data, and by comparing potentially affected lakes to control or reference lakes (those presumably not affected by mine activities).

The aquatic effects monitoring program measures various physical, chemical and biological features of the aquatic ecosystem, which serve as indicators of fish and ecosystem health. Collected data are then evaluated in order to identify any effects that may be caused by the mine. If appropriate, follow-up actions are then supposed to be taken to minimize or correct any adverse effects. While the monitoring program monitors environmental changes, BHPB is required to control water effluent quality and volumes at a number of regulated stations specified by its Class 'A' water licence.

**Left: Stream on BHPB's claimblock**  
JERI HERMANN/BHP BILLITON DIAMONDS INC.

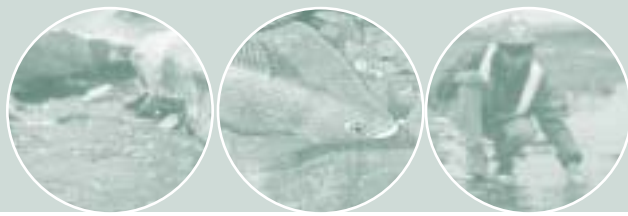
## Outline of Studies

Figure 1 shows the 2001 sampling locations for the aquatic effects monitoring program. The year 2001 was the fourth year of post-baseline data collection at monitoring program locations within the Koala drainage, the two reference areas outside of the Koala drainage, and in Lac de Gras. The year 2001 was also the first year of post-baseline monitoring within the King-Cujo drainage at the Misery site. In addition, aquatic baseline collection continued in a number of potentially affected lake and stream sites in the Horseshoe (Sable) and Pigeon drainages (Figure 2). These sites were added to the aquatic effects monitoring program as of February 2001.

Open water sampling was conducted during July, August and September 2001 and included an assessment of meteorology, hydrology, lake & stream water quality, physical *limnology*, *phytoplankton* (*periphyton* in streams), *zooplankton*, and lake and stream *benthic macroinvertebrates*. Lake sediments and lake fish communities were not monitored in 2001, but will be in 2002. Winter dissolved oxygen concentrations were also measured in a number of aquatic effects monitoring program and non-aquatic effects monitoring program lake sites in February 2001. A snow survey was conducted in 2001 to determine the potential effects of dust and mining emissions on surface water quality.



**BHPB's Environmental department taking a water sample**  
BHP BILLITON DIAMONDS INC.



# Aquatic Effects Monitoring

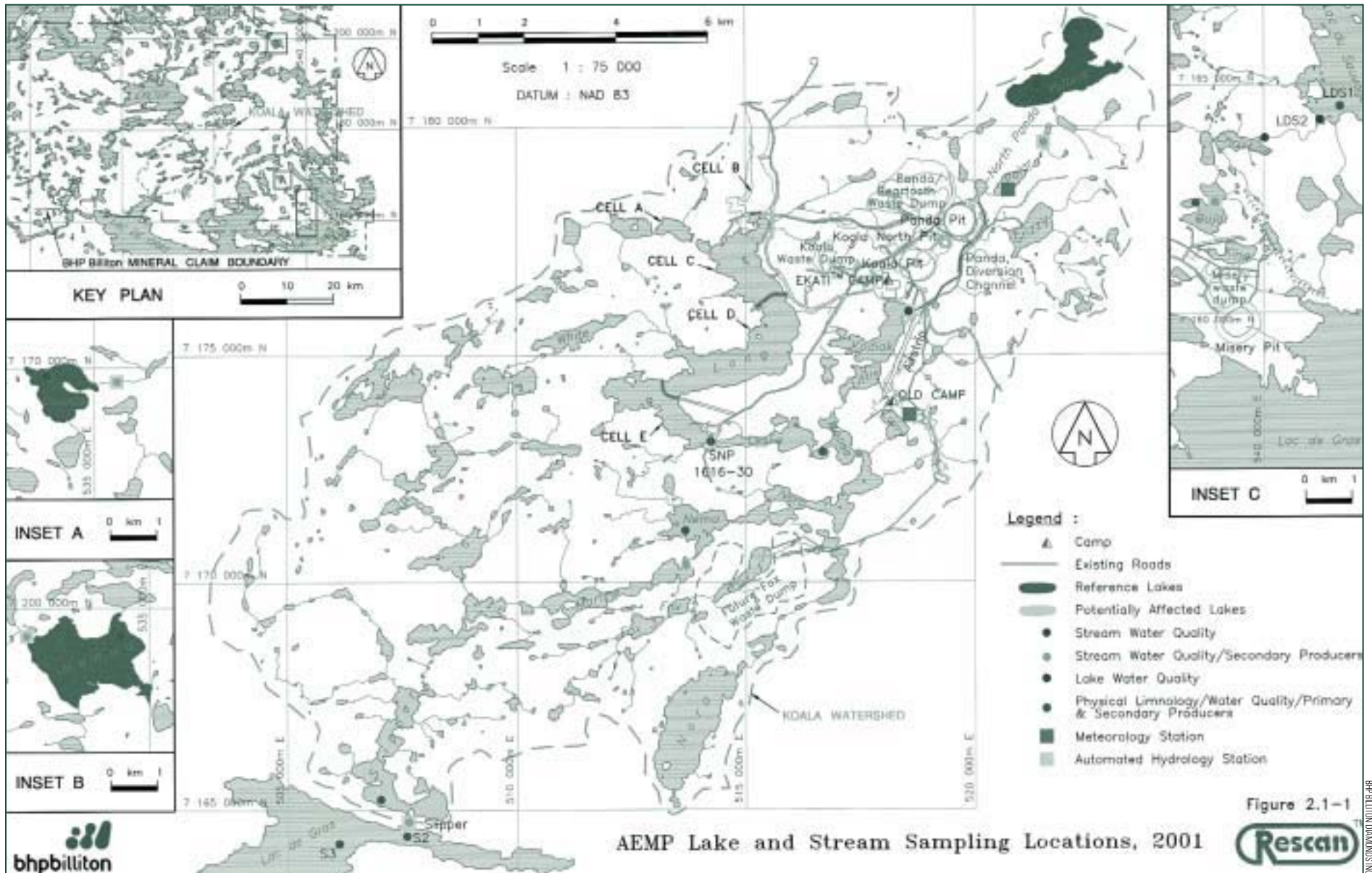
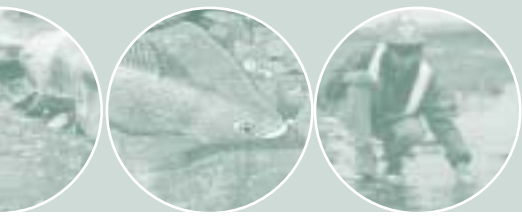


Figure 1





# Aquatic Effects Monitoring

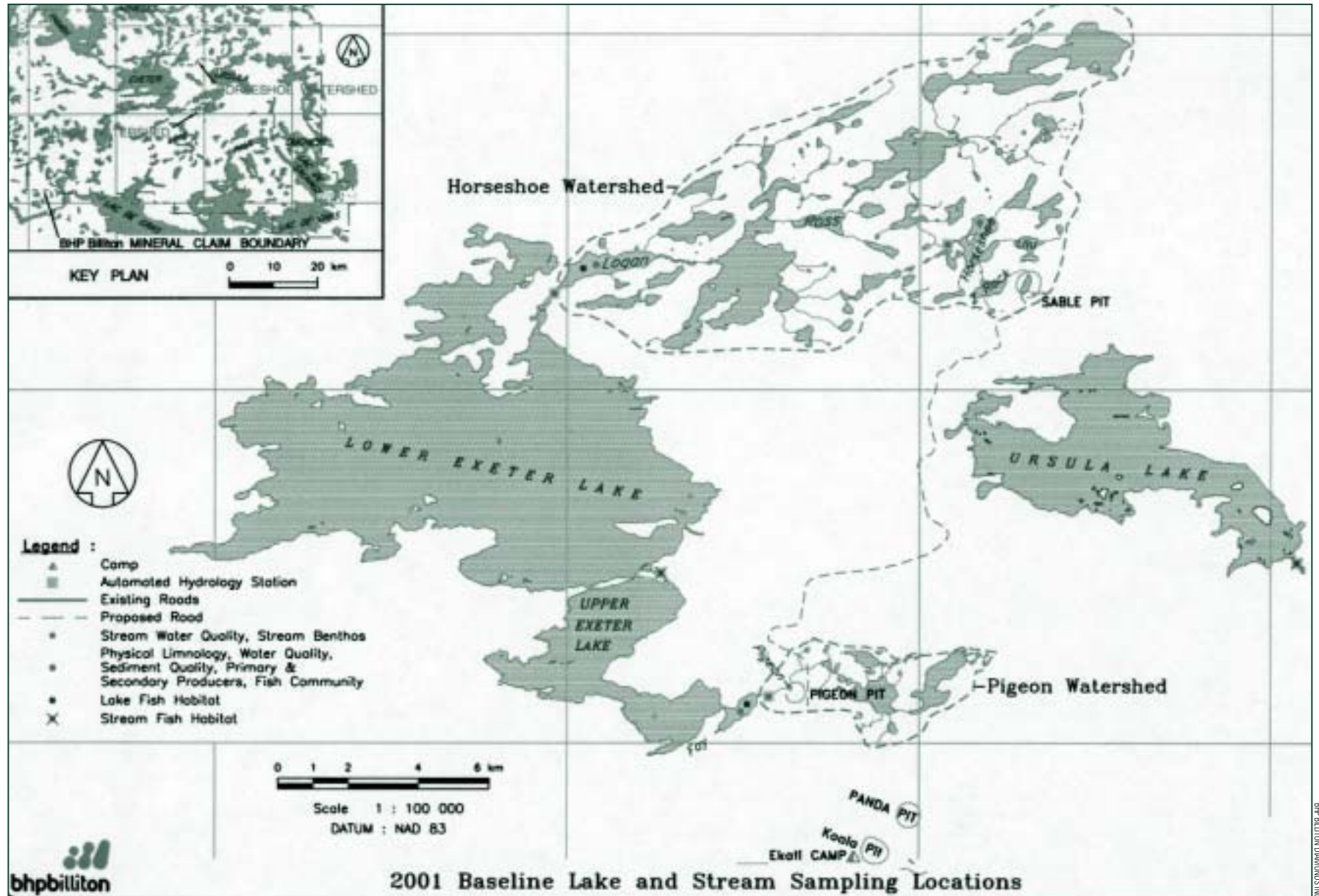
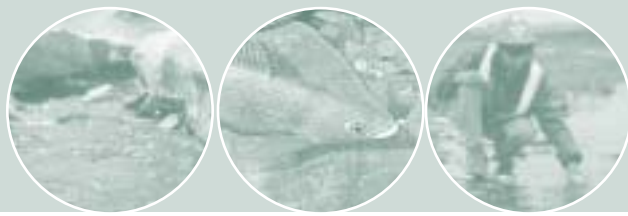


Figure 2





# Aquatic Effects Monitoring

## Effects of Mining on the Waterbodies Studied

Mining activities have resulted in downstream changes in water quality and aquatic environments within the Koala watershed. The effects include depressed winter oxygen levels, increases in nutrient loading and, to some extent, phytoplankton biomass as well as slightly elevated concentrations of major ions, total dissolved solids and several metals. Effects detected in the King-Cujo watershed (from mining at the Misery pit) include increases in nutrient loading, total aluminum and, to a lesser degree *turbidity* and total suspended solids.

Among nutrients, *nitrate* concentrations continue to increase in Moose and Nema lakes and Slipper Lake. This was predicted by BHPB. Since nitrate originates from the nitrogen-based explosives used in mining, concentrations will almost certainly remain elevated as long as mining continues. During freshet, stream nitrate concentrations were elevated in the watershed downstream of Long Lake, including the Slipper outflow into Lac de Gras. These increases are largely the result of discharges from the Long Lake processed *kimberlite* containment facility and, to a lesser degree, from the Panda diversion channel. Elevated nitrate in Cujo Lake and outflow is most likely the result of construction of the King Pond dam and wastewater discharge from King Pond. A second important nutrient, *phosphorous*, appears to be unaffected in the water column by mining activities at this time.

Among metals, concentrations of copper and nickel appear to be elevated above pre-project levels at some monitored sites within the Koala watershed. Likely sources include diversion channel discharges and dust produced from mining activities, which includes metals. Concerns

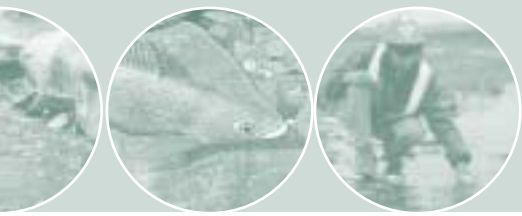
regarding elevated copper concentrations within the Koala watershed prompted BHPB to carry out an ecological risk assessment for copper in 2001, which indicated that current copper levels in the Koala watershed, although exceeding Canadian Council of Ministers of the Environment (CCME) guidelines in the winter, pose a low to negligible risk to aquatic species. At the Misery site, a detectable increase in total aluminum was observed in Cujo Lake and outflow. This was most likely a result of the construction of King Pond dam and the effect is expected to be temporary.

Since 1997, oxygen levels have decreased in some monitored lakes within the Koala drainage indicating some degree of *eutrophication* from the addition of nutrients from sewage (refer to section on Kodiak Lake Sewage Effects Study) and other sources, such as construction of the diversion channel and dewatering of lakes (e.g., Panda, Koala). In 2001, dissolved oxygen concentrations in Moose and Slipper Lakes decreased for the second year in a row while levels in Nema Lake remained similar to the low levels observed in the previous year. Mining activities have not affected winter dissolved oxygen concentrations in Cujo Lake.

Phytoplankton biomass has increased in both Moose and Nema Lakes since the baseline years, most likely a result of nutrient addition. It is expected, however, that affected lakes within the Koala watershed will recover from this effect as long as BHPB continues to control the introduction of phosphorus by routing sewage to the Long Lake containment facility and by other appropriate means of controlling phosphorous loading. In general, phytoplankton and zooplankton parameters (i.e. biomass, abundance, and diversity) demonstrate no consistent trends either seasonally or among

*Right: Aerial view of Horseshoe watershed (Sable development)* AGENCY





# Aquatic Effects Monitoring

lakes. Neither the zooplankton nor benthic macroinvertebrate communities in monitored lakes in either of the two watersheds have been demonstrably affected by project activities. There is also no evidence of changes to benthic invertebrate communities in monitored streams, and no significant effects were detected at the Lac de Gras or Lac du Sauvage monitoring stations in 2001.

## Agency's Assessment of Aquatic Effects Monitoring at Ekati

Monitoring of the Koala drainage suggests that the project is having effects as far downstream as the Slipper Lake outlet, and these effects may reach Lac de Gras in the near future as development within the Koala watershed intensifies. The much shorter King-Cujo watershed at the Misery site is also now being affected by project activities, and effects will most likely be detected in Lac du Sauvage in the near future. The effects detected are not yet significant, although they provide indications for future monitoring programs and for mine management.

In general, the aquatic effects monitoring program continues to improve, and BHPB should be commended for expanding the dissolved oxygen sampling program, and incorporating winter water quality sampling for all monitored lakes (as requested by the Agency) starting in the winter of 2002. Another improvement in this year's report is that BHPB defines exactly which historical data have been used for analysis. The Agency is also pleased to hear that a comprehensive review of air quality monitoring data (including snow core surveys) is currently underway, as recommended by the Agency last year. However, emerging concerns over possible impacts from dust and the resulting snow chemistry has called into question the suitability of some existing reference lakes, especially Vulture Lake which, while upstream in the Koala watershed, is located near existing and proposed developments and thus may be affected by airborne dust from mine activity. Consideration should be given to the need of adding more distant

reference stations to the monitoring program. BHPB is also encouraged to refine its use of trend analysis to interpret observed changes. Over the past several years, BHPB has for a variety of reasons (e.g. improved laboratory techniques) made changes to the detection limits used in the monitoring program and water licence compliance monitoring. These changes have made the determination of long-term trends difficult and called into question the reliability of certain baseline water quality data. The compatibility of data collected using different detection limits should be more closely examined by BHPB to ensure that observed trends are real and not attributable to changes in laboratory techniques.

**Average total dissolved solids (TDS) concentrations AEMP Lakes, open water season, baseline and 2001**

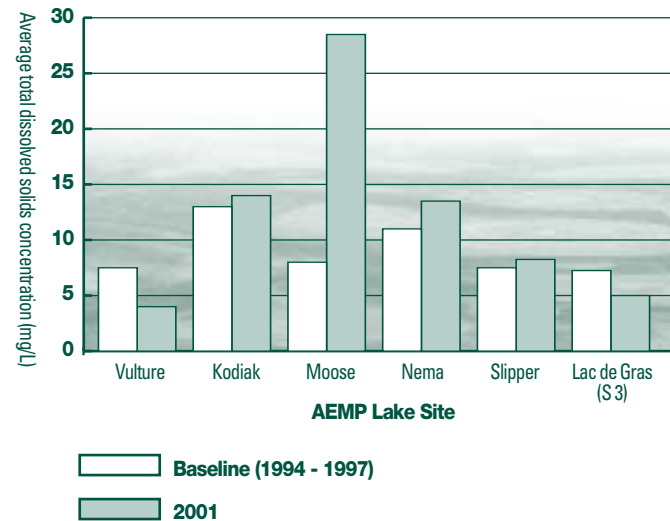
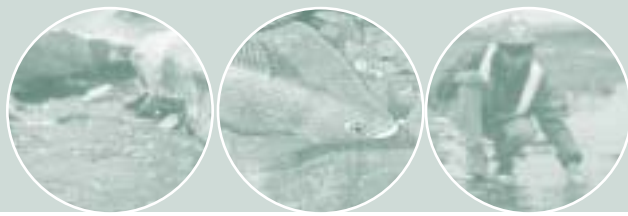


Figure 3



# Aquatic Effects Monitoring

The Agency is becoming increasingly concerned with the rising concentrations of dissolved solids being discharged from the Long Lake containment facility into downstream waterbodies in the Koala watershed and, possibly, into Lac de Gras. This trend can be seen in Figure 3, where average concentrations of total dissolved solids are displayed. This distribution of values is typical of a situation in which there is a relatively concentrated source of contaminants that is moving downstream in a watershed. The highest average concentration is in Moose Lake, which receives waters from both Kodiak Lake and from Long Lake. The Long Lake containment facility is likely the main source of total dissolved solids. To date, however, the bay of Lac de Gras near Slipper outflow has yet to experience any significant changes for total dissolved solids. Although there is limited baseline information for Leslie Lake, the first lake downstream of the Long Lake containment facility, it has strategic importance as an early warning for downstream water quality changes in the Koala system and should be added to the aquatic effects monitoring program.

The predicted levels of major ions from Long Lake as reported by BHPB, are unlikely to be directly toxic to aquatic species. However, increasing dissolved salts in the naturally salt-poor waters of the area will likely lead to a change in the composition of sensitive and specialized aquatic communities that are highly tolerant of very low salinity. Significant increases in salinity could result in some of these highly sensitive and specialized local organisms being eliminated, as other more salt-tolerant species replace them. At the end of the project, dissolved solids concentrations will return to normal, and more disruption to the aquatic community will likely occur. Our reviewer, Dr. John Sprague, noted that special local varieties of organisms might be lost when this occurs at mine closure,

resulting in a distorted community far into future decades or centuries. The re-evaluation of the AEMP and synthesis of existing AEMP results, currently being carried out by BHPB, should review this issue in addition to the ones previously raised (e.g. improved trend analysis, suitability of reference lakes).

Overall, it appears at this time that the impacts detected are not yet of a serious nature. However, more data and studies are needed to confirm this and continued diligence is required to prevent significant adverse environment effects from occurring in the future.

*Panda Diversion Channel (spring runoff)* AGENCY



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## Aquatic Effects Monitoring — Recommendation

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4. BHPB should expand the AEMP to include Leslie Lake.



## Special Effects Monitoring

Under its agreements and authorizations from DFO, BHPB was required to conduct special studies to determine and monitor the impacts of mine developments on water and biological communities in Kodiak Lake and the Panda diversion channel.

### Kodiak Lake Sewage Effects Study

Treated sewage was discharged from the main camp to Kodiak Lake from April 1997 to January 1999. A study was conducted to determine what impacts this discharge has had on Kodiak and Little Lakes, immediately downstream of the sewage outfall. Soon after the discharge began, a major reduction of dissolved oxygen, which is critical for fish survival in winter, was observed in Kodiak Lake. BHPB quickly installed *aerators* to restore oxygen levels in the lake. This process has been continued every winter since. Little Lake was also aerated in the winters from 1998 to 2001.

In January of 1999, BHPB stopped discharging sewage to Kodiak Lake, and redirected it to the Long Lake containment facility. The sewage effects study conducted from 1997 to 1999 found that the aquatic ecosystem of Kodiak Lake had indeed been affected by nutrient loading (principally phosphorous) from the sewage discharge, nutrient-rich sediments originating in the Panda diversion channel and from Panda Lake dewatering. Little Lake was also affected, though to a lesser extent than Kodiak Lake

Monitoring of Kodiak and Little Lakes was continued in 2001 and the results indicate the following:

- Oxygen levels in Kodiak Lake have mostly recovered from the effects of past sewage discharge, but the lake is still being affected by current project activities (e.g. discharge from the Panda diversion channel, and dust). Snow samples taken near Kodiak Lake had the highest measured concentrations for most of the monitored variables (e.g., total suspended solids, *ammonia*, phosphorous, copper, zinc).
- Although water quality in Kodiak Lake has improved since sewage discharge was stopped, nitrate concentrations remain high relative to reference lakes and baseline conditions, likely due to inputs from the diversion channel (e.g. blasting residues). Nitrate concentrations in Little Lake were unexpectedly higher than those observed in Kodiak Lake. Values for pH remained slightly higher in 2001 compared to baseline conditions and winter total copper concentrations in both Kodiak and Little Lakes were high, but similar to those recorded in past years.
- Phytoplankton and zooplankton communities appear to have returned to conditions similar to those observed in baseline years.

*Aerators on Kodiak Lake* AGENCY







# Special Effects Monitoring

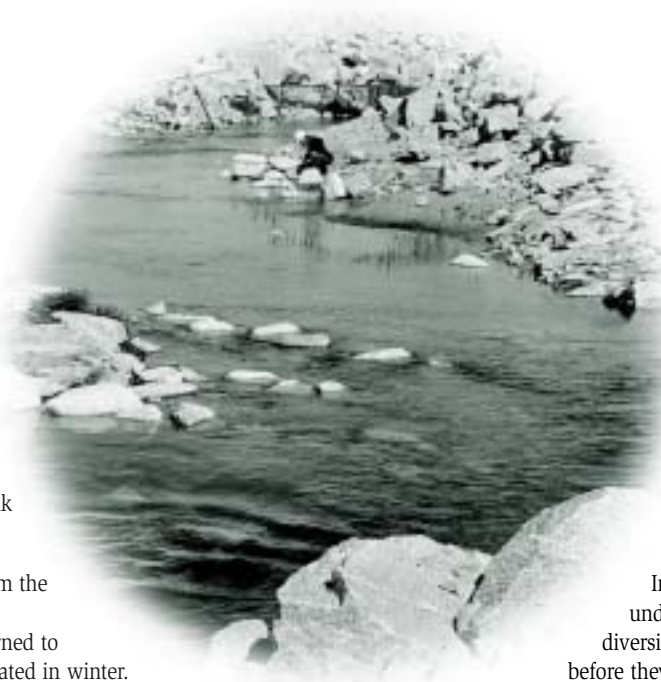
- The biomass and density of benthic macroinvertebrate communities remained higher than normal in the north end of the lake near the location where treated sewage was discharged in the past, likely due to elevated levels of available phosphorous in the sediments.

- The lake continues to recover slowly from the effects of sewage disposal and nutrient loading, and winter dissolved oxygen concentrations suitable for the survival of fish and their eggs have been maintained, as a result of aeration. However, it is not clear whether aeration of Kodiak Lake should be discontinued or not.

- Little Lake also continues to slowly recover from the effects of eutrophication. Dissolved oxygen concentrations in the winter appear to have returned to typical levels and this lake is no longer being aerated in winter.

## Agency's Assessment of the Kodiak Lake Sewage Effluent Study

While Kodiak Lake has shown evidence of recovery, it will probably remain more *eutrophic* than its original condition as long as the mine remains in production and the lake continues to receive nitrate and phosphorous from sources such as the diversion channel. The water quality in Kodiak and nearby lakes is also expected to be further affected by dust as development continues to increase in this area (refer to Aquatic Effects and Air Quality sections). BHPB has properly placed greater emphasis on winter water quality sampling and interpretation of metal data in the 2001 special effects monitoring report. Since continued monitoring in Kodiak



Lake should supply the answers needed about lake recovery, the Agency supports BHPB's addition of Kodiak Lake and Kodiak-Little stream to the aquatic effects monitoring program and the suspension of the more deluxe Kodiak Lake Sewage Effects Study. However, before monitoring is suspended indefinitely for Little Lake, BHPB should identify the source of elevated nitrate concentrations in Little Lake. BHPB should also sample Little Lake within the next three to four years to confirm the trend towards baseline conditions.

## Panda Diversion Channel

In order to mine the kimberlite pipes located underneath the Panda and Koala lakes, the Panda diversion channel was built to divert water around the lakes before they were dewatered. Construction of the channel was completed in 1997. Fish habitat structures were then constructed in the channel as a way of compensating for lost stream habitat.

2001 is the fourth consecutive year that fish habitat within the 3.4 km long channel has been monitored and improved. Monitoring in 2001 indicated the following:

- Peak flow estimates during the 2001 freshet were the highest recorded to date for the four years of monitoring in the channel. The channel and recreated habitat was stable within the channel and was not affected during this high flow year.

Above: Panda Diversion Channel AGENCY



# Special Effects Monitoring

- Arctic grayling continue to use the channel for migration and spawning, but lower numbers of spawning grayling were observed in 2001 compared to 2000. Arctic grayling also spent less time within the channel as compared to previous years. The lowered use may reflect the high flow conditions.
- Arctic grayling spawning continues to be successful in the channel, but the observed numbers of fish *larvae* and *young-of-the-year* were reduced compared to previous years potentially due to fewer adults spawning in the channel and high flow conditions resulting in downstream displacement of newly emerged *fry*.

*View of Ekati™ main camp complex across Kodiak Lake* BHP BILLITON DIAMONDS INC.



- The lengths and weights of young-of-the-year Arctic grayling were similar to those observed in the past in the channel. However, their slow growth rates compared to those grayling reared elsewhere in natural streams throughout the Koala watershed continue to be a concern.
- Other species using the channel in 2001 included lake trout, burbot, and slimy sculpin.
- Benthic macroinvertebrate and periphyton biomass and diversity continue to increase in the channel, but still remain significantly lower than that seen in natural streams.
- The channel continues to provide adequate habitat for several fish species and their life stages as well as maintaining stream connectivity and migration habitat in the open water season.

## Agency's Assessment of the Panda Diversion Channel

The channel continues to be used by spawning grayling as well as other fish, and habitat enhancements in the channel appear to provide useable habitat for Arctic grayling. However, the slow growth rates and small size of Arctic grayling young-of-the-year continue to be a major concern. Channel-reared grayling fry may be less competitive than larger young-of-the-year grayling reared outside the channel. Concerns about channel productivity and the growth of young-of-the-year grayling remain. Continued monitoring and research on these issues should remain a high priority for 2002.

The Agency does not support BHPB's proposal to discontinue fish sampling at both the upstream and downstream fish boxes within the channel in 2002. The upcoming monitoring year of 2002 is a fish-monitoring year for all aquatic effects monitoring program sites (including Kodiak Lake) and would be a year in which





# Special Effects Monitoring

information describing fish populations from Kodiak and the diversion channel could be used together to gain a better understanding of fish ecology in this particular watershed. This opportunity will not be available again for five years.

BHPB's other proposed changes to the diversion channel monitoring program are acceptable. BHPB has proposed a multi-stakeholder technical meeting in the near future to discuss these proposed changes.

The Agency is concerned with the long-term future of the diversion channel. The channel requires annual snow removal in its deeper, upstream channel in order to prevent flooding and scouring of the downstream portions during spring runoff. This unanticipated requirement for snow removal means that the diversion channel will not be a "walk-away" structure following mine closure. It will have to be reclaimed, and fish habitat will have to be compensated for in another way.

During reclamation, water will need to be diverted away from the diversion channel, in order to fill the Panda, Koala and Beartooth pits. The effect this will have on the water flows in the diversion channel and entire Koala watershed is currently unknown. BHPB needs to address this issue in the near future to determine what effects might occur on downstream aquatic communities.



## Special Effects Monitoring — Recommendations

5. *BHPB should determine the cause of elevated nitrates within Little Lake.*
6. *BHPB should conduct follow-up sampling in Little Lake within three or four years to confirm that the lake has recovered completely from nutrient inputs.*
7. *BHPB should continue monitoring fish in the Panda Diversion Channel in 2002.*
8. *BHPB should develop a conceptual plan for the flooding of the Panda and Koala pits, and either the long term maintenance or abandonment of the Panda Diversion Channel.*



## Waste Rock

At present, there are two waste rock piles being constructed on the BHPB property, one at Misery and one at Panda. The waste rock is comprised mostly of granitic rock, with substantial portions of diabase and *biotite schist* at Misery, along with lesser amounts of till, lakebed sediments and *barren kimberlite*. The waste rock piles will ultimately grow to over 50 metres high.

Waste kimberlite from the process plant is deposited both as a fine-grained slurry fraction pumped to the Long Lake containment facility (for further discussion on this fraction see section Wastewater and Processed Kimberlite), and as a coarse-grained waste rock pile that will ultimately be buried by granitic waste rock as the Panda waste rock pile expands to the southwest. Drainage from this area flows into the Long Lake containment facility.

At the Panda waste rock pile, an experimental toe-berm was constructed in 2001 to capture drainage from the northeast face of the waste rock dump where poor quality seepage (seepage not in compliance with the water license) had been observed in previous years. Monitoring was carried out at this new structure to assess its effectiveness in containing seepage.

*Director Tony Pearce* AGENCY

BHPB has revised its waste rock management practices several times since mining began in 1998, and the company's current approaches to waste rock disposal are outlined in its Waste Rock & Ore Storage Management Plan submitted to the Mackenzie Valley Land and Water Board (MVLWB) in June of 2001. This plan was not approved as of March 31st, 2002.

During 2001 a detailed monitoring program was conducted by BHPB to measure important physical and chemical properties of the Panda and Misery piles such as internal temperatures, water flow through the dumps, location and quality of dump seepage and downstream flow, and shallow ground water flow.

### Monitoring Program for Waste Rock

- Rock geochemistry of blast rock
- Waste rock dump temperature profiles
- Seepage monitoring (flow and chemistry)
- Geophysical surveys
- Groundwater monitoring
- Environmental baseline

Results of the 2001 monitoring indicate that:

- granite waste rock has very little sulphur content and, therefore, low potential to generate acid
- biotite schist, a waste rock found at the Misery pit, has significantly higher concentrations of *sulphides* and has a potential to generate acid
- poor quality drainage was observed draining from the *coarse kimberlite* rejects pile. High levels of sulphate, magnesium, calcium, aluminum, iron, nickel and potassium were present in a few seeps, as well as some low pH's (high acidity). Concentrations of a number of other variables were also elevated above background levels in a few other seeps





## Waste Rock

- the inside of the Panda waste rock pile are being “super-cooled” (well below freezing) throughout the year, indicating that most water draining into the dumps will freeze and not seep out
- seepage from the Panda pile can have elevated ammonia and sulphate concentrations which BHPB attributes to excess blasting residue (ammonia) and stray blocks of kimberlite (sulphate)
- elevated ammonia concentrations were also observed in seeps from Misery waste rock pile

### Agency’s Assessment of Waste Rock Management and Monitoring

The Agency is encouraged with the amount of effort the company has made over the last two years in attempting to gain a better understanding of the waste rock geochemical behaviour. This year’s consolidation of waste rock investigations into a single program is a significant improvement over the separate programs conducted previously. The integrated monitoring program is now providing the company with good data on the conditions affecting seepage (i.e., temperature profiles, waste rock characterization and groundwater flow paths). BHPB’s technical consultant has developed a robust approach to identifying and analysing the problems that have arisen, and is beginning to arrive at some generally sound explanations for observed waste rock behaviour.

Of some significant concern to the Agency is the absence in the 2001 seepage and waste rock survey report of a clear link between results and specific management actions that may, in the eyes of the technical experts, be required. To invest this degree of effort in attempting to understand a potentially serious environmental problem and not have the report include suggestions on management action appears to us to be an oversight.

We would also like to see the annual waste rock seepage report explicitly highlight issues of non-compliance for all seeps, whether or not they directly affect the receiving environment. This would better provide regulatory agencies and reviewers with a clear statement of the potential problems. The company may also need to develop a system for more rapidly identifying poor quality water. Experience at Misery with waste rock management and monitoring reveals that there have been instances where poor quality seepage has escaped undetected into the environment for weeks while the off-site lab was analysing the samples.

*Panda/Koala Waste Rock Pile (June 2002)* AGENCY





# Waste Rock

## Fox Pipe

At the May 2001 public hearing into the company's application to amend its existing water licence to include mining of the Fox pipe, the absence of detailed waste rock management plans to support the application was raised as an issue by the Agency. We are concerned that the MVLWB approved the amendment without having detailed information on proposed waste rock placement at the Fox development. The Agency is of the opinion that the company has sufficient information about waste rock management on site to develop at least draft waste rock management plans as part of the applications, as was done for the regulatory review of the Sable, Pigeon and Beartooth pipes. As of June 2002 an updated waste rock management plan still had not been provided to the MVLWB.

## Panda Waste Rock Pile

The Agency remains concerned about the detected poor quality of some seepage waters on the northeastern side of the Panda waste rock pile. BHPB's consultant reports that this seepage occurs as ponds rather than flowing streams and, since the flows are predicted to be "very slow", there is little potential for impact from waste rock seepage on the downstream waterbodies (Beartooth Lake). Our consultant argues that concentrations of sulphate, ammonia and nickel in drainage near the toe of the dump have increased over the past year at two locations and in the nearby groundwater, and that groundwater flow toward Beartooth Lake could be orders of magnitude faster than that indicated by BHPB's consultant. *Electrical conductivity* studies conducted by BHPB support the notion that a high-sulphate groundwater plume is moving down gradient in at least one location. While no evidence of any water quality change has been seen in Beartooth Lake itself, the Agency considers it important that BHPB pays special attention to this area over the next few years.

The toe-berm constructed last year along a portion of the dump edge buried one of the problem seeps, and so far there has been no drainage observed along its outside edge. A single year's data are insufficient to determine that the toe berm concept is a successful mitigation measure, so careful monitoring will be required here in future years to evaluate its long-term effectiveness. This is especially important as BHPB has proposed the use of toe berms as a mitigation measure for other rock piles, for example, at the Sable pipe.

### Geochemistry Workshop on Year 2000 Seepage Survey



In April 2001 BHPB sponsored a workshop with ourselves and government regulatory officials to review the results of the 2000 seepage survey and explore possible causes of poor quality drainage found that year in several locations. Observed acid drainage from at least three sites on the north face of the

Panda waste rock pile was explained by BHPB technical experts as arising, at least in part, from oxidation of sulphide in the absence of a neutralizing material, a finding which contradicted the evidence from the acid-base

accounting tests that none of the rocks found near the Panda pit were potentially acid generating. For example, kinetic testwork which examined the depletion rate of neutralizing potential in Misery kimberlites showed that 58 years would be required to exhaust the carbonate neutralizing potential, although acidic conditions were appearing in the field within two years of rock deposition. As the sources of the sulphides are believed to be blocks of kimberlite mistakenly transported to the waste rock dumps this shows that processes in the field are more complicated due to the presence of acidic tundra water and soils.

**Left: Waste rock pile seepage monitoring** DARREN UNRAU/DIAND



# Waste Rock

## Coarse Kimberlite Reject Piles

Through its original *geochemistry* test-work, BHPB predicted that the coarse rejects would be net acid-consuming, and that the very high measured content of carbonate minerals in the kimberlite would neutralize any acid produced. However this has not been the case observed in the field, and acidic waters are being detected in seeps adjacent to, and down gradient some 300 metres from, the coarse rejects pile. While the company's technical expert has proposed a possible explanation, monitoring and analysis should continue in order for the company to accurately understand the geochemical processes affecting kimberlite weathering at this site, and thus better manage kimberlite disposal. The Agency has called for proper mineralogical studies of the various kimberlite types since the beginning of the operation, since the *mineralogy* is key to understanding the observed behaviour of these rocks.

## Misery Waste Rock Pile

Open pit mining at Misery was commenced in 2000. The company is currently considering changing from open pit mining to a combined open pit and underground mining approach. Misery pit rock contains a large amount of biotite schist, a waste rock that contains an average sulphur concentration of 0.13%. This compares to an average of 0.02% for granite, and between 0.07% and 0.11% for diabase. The amount of carbonate to act as a potential *neutralising material* in all these rocks is low, so, biotite schist has been predicted to be a potential acid generator.

The company's main strategy for dealing with this potential problem is to enhance freezing conditions within the waste rock pile so that any infiltration of water will quickly freeze, preventing sulphide oxidation. Freezing is encouraged by interspersing 10 metre thick layers of schist with 5 metre thick layers of blocky granite to allow air convection within the pile.

*Coarse kimberlite reject pile* AGENCY



*Misery waste rock pile* AGENCY



*Misery waste rock pile* AGENCY





# Waste Rock

The company proposes to collect any unacceptable drainage and discharge it to King containment pond where it must meet discharge requirements before it can be pumped to the receiving environment (Cujo Lake).

While no major problems appear to have developed at this time at the Misery site from the biotite schist, ammonia levels in waste rock seepage in 2001 reached unacceptable levels at one site immediately upstream from Desperation pond. Ammonia levels were greater than 4 mg/L (the maximum allowable under the water licence) for 11 out of 17 samples taken during the period June 12th, 2001 to September 1st, 2001. The licence limits were first exceeded on June 12th, 2001, although action was not taken until lab results were received by BHPB on July 5, at which time water was diverted to King Pond. For three weeks, non-compliant water was able to seep into Desperation pond.



BHPB's environmental management system needs improvement here. The company needs to develop a faster process for identifying and managing problem drainage. BHPB has identified ammonia as a potential problem at the Misery site due to increased retention of this blasting residue by the schist and already high ammonia levels are being reported by BHPB in seepage and compliance monitoring data for discharges from King Pond. The Agency is concerned about the potential impact on downstream aquatic organisms from ammonia, and recommends that BHPB increase its vigilance over ammonia levels in seeps and other drainage. The company is planning to store, what now appears to be, acid-generating barren kimberlite in a separate rock pile at Misery, without a collection and treatment system integrated with the pad design. Extra precaution should be taken here in looking for possible acid drainage. BHPB should also examine more carefully acceptable contingencies for treatment in the event that water in King pond does not meet discharge criteria.

*Waste rock pile seepage monitoring* JIRI HERMANN/BHP BILLITON DIAMONDS INC.

## Waste Rock — Recommendations

9. *BHPB should conduct a thorough mineralogical examination of all kimberlite types.*
10. *Next year the seepage survey report should explicitly highlight any occurrences of non-compliant seeps for easy reference.*







# Wastewater and Processed Kimberlite Management

In addition to waste rock deposited near the pits, processed kimberlite ore (mill tailings) is the second significant type of rock waste produced from mining. The mill crushes the ore and separates diamonds from the kimberlite to produce a waste stream comprised of fine-grained (approximately 70%) and coarse-grained processed kimberlite. The *kimberlite fines* are pumped to the Long Lake containment facility where they are permanently deposited. The coarse fraction is stored in piles in an area that will eventually be covered by the Koala waste rock dump.

The Long Lake containment facility (formally a multi-lake system that has been divided by dykes into sections) contains four cells designed for holding *processed kimberlite tailings*, and an additional downstream cell for sediment settling (Figure 4). Over the life of the mine some 130 million m<sup>3</sup> of processed kimberlite will be deposited. The solids in the processed kimberlite slurry will settle out, and water will drain to the last cell of the facility, from which it will be released downstream into the Koala watershed once it meets water license discharge limits.

In addition to processed kimberlite, the Long Lake containment facility will also receive *pit water* from Panda, Koala, & Koala North, seepage from waste rock piles, treated sewage, and drainage from areas near existing mine site infrastructure. For the Misery development, King Pond will be used to contain wastewater from the pit, waste rock pile, and drainage from areas near existing mine site infrastructure. Upon meeting water licence discharge limits, this water is released into Cujo Lake, and ultimately, Lac du Sauvage.

During 2001 processed kimberlite was discharged into cells B and C of Long Lake. Re-vegetation studies also continued on the tailings beaches at the top end of cell B. At the Misery site, King Pond dam was constructed in the spring of 2001 and during spring thaw some silt-laden run-off entered Cujo Lake from sediments exposed during construction. While BHPB responded quickly to mitigate the situation, the incident could have been avoided by more careful management. Wastewater from King Pond was first discharged into Cujo Lake in the summer of 2001.

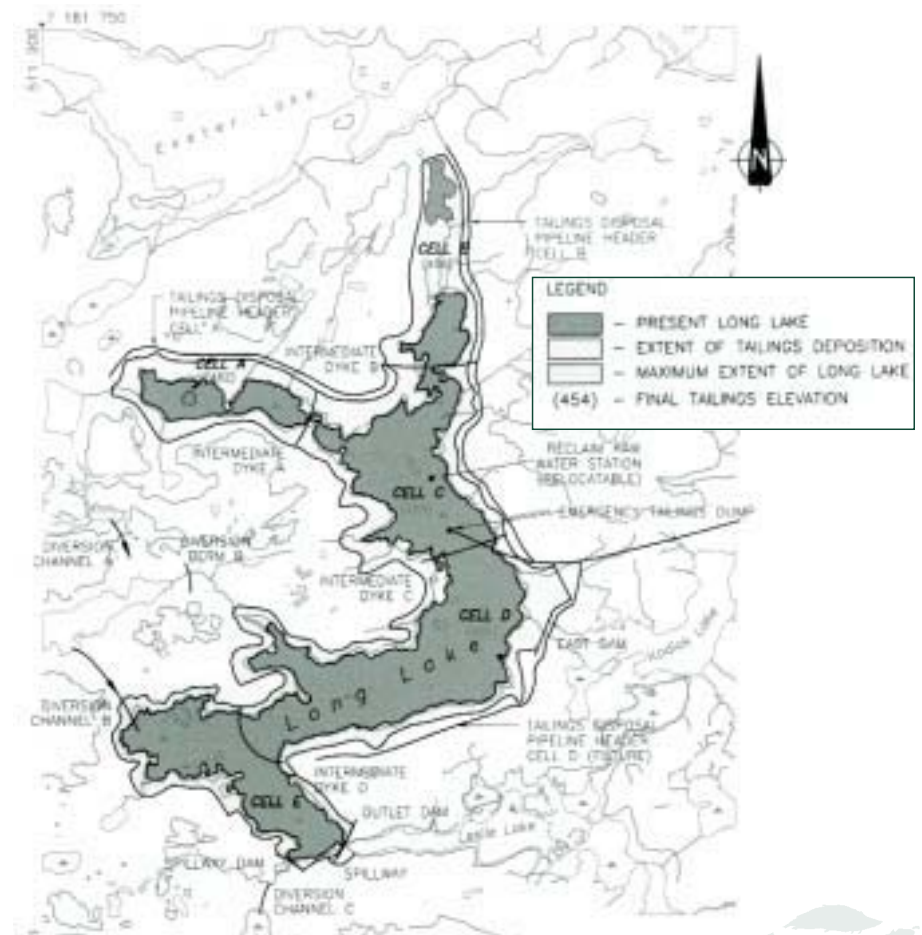


Figure 4. Long Lake containment facility BHP BILLITON DIAMONDS INC.



# Wastewater and Processed Kimberlite

## Toxicity Studies

The first of a series of independent studies examining the toxic effects of processed kimberlite effluent on zooplankton has been completed by researchers at the University of Saskatchewan (thesis by Simone J. Crocquet de Rosemond). Initial results indicate that significant decreases in zooplankton abundance and diversity occurred in cells B & C of the Long Lake containment facility. These effects were not observed in cells D & E where no deposition of kimberlite has occurred. In contrast, water quality changes have been observed in all cells of the containment facility including cell E. The results also indicate that the processed kimberlite itself is not the cause of the *toxicity* but, rather, residual amounts of the artificial settling agents (*floculants and coagulants*) used to settle the fine kimberlite particles in the water column appear to be the toxic agent. These results have led Environment Canada to initiate a supplementary study on environmental effects of these additives. One objective of the study is to develop techniques for the accurate analysis of coagulant and flocculant concentrations in the tailings discharge and to evaluate the persistence of these compounds in the environment. At this time, there is no evidence of these toxic effects downstream of the Long Lake containment facility, but they might occur (in Leslie Lake for example), as mining continues.

The second phase of the study will investigate whether a lake bottom covered with tailings (as is developing in cells B & C of Long Lake) will provide a viable physical and chemical environment for benthic organisms. This comprehensive multi-phase study involves water quality, sediment and benthic sampling and analysis throughout the operating life of the facility.

## Tailings Characterization Study

Under the type 'A' water licence, there is a requirement for BHPB to complete a tailings (processed kimberlite) characterization study. This study is designed to carry out standard geo-technical classification testing (e.g., particle size distribution) and to investigate a variety of tailings properties (e.g., thermal, strength, segregation size) under different conditions. The first phase (lab portion) of this study was completed in 1998. The second phase (fieldwork portion) was to be carried out in the spring of 2001, but the results are still not available as of March 31st, 2002. However, the Agency is pleased to hear that the final results of this field component of the study are currently being compiled by BHPB and the report will be submitted to the MVLWB in June 2002. This study is important because of the major uncertainties identified during the original licensing of this project about the physical and chemical stability of kimberlite tailings (e.g., how quickly they will settle and water will clarify, whether the build-up of ice in the tailings slurry would present a problem for the water balance of the facility, how the mineralogy of the tailings will affect water chemistry, how quickly tailings will freeze so that reclamation can be completed).

Independent research by Queen's University suggests that some form of layering of fine and ultra fine-grained processed kimberlite in the tailings deposits is occurring, and that the ultra fine kimberlite particles have more sulphide and sulphates than the coarser-grained fines. The implications of this for long-term water chemistry in the impoundment are not yet known. The answers to these questions may have significant implications for how tailings need to be managed during operations and for the ultimate effectiveness of the facility.



*Water discharge from cell E of the Long Lake containment facility* JIRI HERMANN/BHP BILLITON DIAMONDS INC.



# Wastewater and Processed Kimberlite

## Water Quality Issues

As a result of additional pits being added to the mine plan (Fox, Sable, Pigeon & Beartooth), BHPB was requested by the MVLWB to produce reports detailing the current and predicted future operations of the Long Lake containment facility. BHPB subsequently modeled future changes in water quality for the Long Lake discharge. The modeling looked at a number of water quality parameters, described the various inputs and outputs (mass balance analysis) from the tailings impoundment, and predicted the changes in discharge water quality. The results showed that the levels of all variables are predicted to increase over time, with most increasing by a factor of 20 or more over the next decade.

To determine potential downstream environmental effects of these predicted increases, BHPB conducted a preliminary assessment of 12 measured parameters that have showed an increase in concentration in the first three years in Long Lake discharge. The BHPB study predicted that the maximum concentrations from end of pipe discharges would occur in 2009 and concluded that toxic effects to downstream aquatic ecosystems will likely not occur since CCME guidelines for the protection of aquatic life would not be exceeded. While no toxic effects are expected, subtle changes to sensitive aquatic communities may occur in the downstream watershed, as some species may no longer be able to compete as effectively in the new altered environment. Refer to the Aquatic Effects section for more detail on this issue.

However, subsequent work on other potential contaminants not initially examined (e.g., aluminum, arsenic, cadmium, copper, chromium, lead, and zinc) showed that discharge concentrations of at least three of these metals (i.e. arsenic, cadmium, copper) would exceed CCME guidelines. While BHPB maintains that its modeling was conservative, it is not clear that this is the case since only the composition of the Panda pit water was used to estimate kimberlite contributions

to water quality in Long Lake. Since the mineralogy of the various kimberlites is quite variable, metal contributions from the new pipes may be quite different than Panda and, hence, affect Long Lake water quality accordingly.

## Land Treatment

In July 2001, BHPB proposed a pilot land treatment system for wastewater at the Misery site similar to that previously proposed for the Fox site. This system would discharge water through fine nozzles over a selected tundra site under the notion that vegetation would filter contaminants such as suspended solids and nitrates to acceptable levels before the water reached the receiving lake (i.e. Cujo Lake).

*Cell B of the Long lake containment facility* AGENCY





# Wastewater and Processed Kimberlite

Water would be discharged through fine nozzles in both the summer and winter, with most of the water discharged in the summer expected to evaporate. The Agency provided comments to the MVLWB on this treatment proposal. Some of these comments include concerns about the potential effect to vegetation and soil communities from salinity, nutrient and water level changes, the effects from additional snow being deposited in the drainage, and the potential effects on surface and ground water quality. As the proposed treatment was not in the scope of the original environmental assessment for the project, the MVLWB has notified BHPB that it will need to apply for a separate water licence to carry out this system. BHPB had not applied for this licence as of March 31st, 2002.

## Agency Assessment of Wastewater & Processed Kimberlite Management

While still early in the operation, it appears that the Long Lake containment facility is working as predicted and is effectively retaining processed kimberlite. However, an emerging concern is the rising concentrations of nutrients (e.g., nitrate), metals (e.g., molybdenum, aluminum, arsenic, cadmium, chromium, copper) and major ions (e.g., calcium, magnesium, sodium, potassium, chloride) being discharged from Long Lake and King Pond into downstream waterbodies. Little is known of the impact that increasing concentrations of major ions (essentially increased salinity) will have on downstream aquatic communities. The MVLWB appropriately initiated discussions on this subject in 2001 by conducting a preliminary study on possible approaches to regulating major ions in mine discharge waters. This potential problem should be further examined by experts with a view to developing criteria that would guard against long-term community change. The Agency believes that the MVLWB should continue to investigate this issue. BHPB will need to continue intensive biological community monitoring in these receiving downstream waterbodies for quite some time to accurately determine impacts to biological communities.

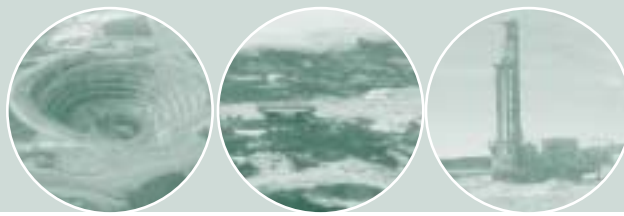
The continuing research on processed kimberlite toxicity by Environment Canada and the University of Saskatchewan will be valuable. The apparent toxic effect from the unbound portions of the cationic polymer coagulant used to reduce tailing turbidity, as reported in the first phase of the toxicity study, is of concern to the Agency. The Agency will review and report on this work, as well as the study of tailings (processed kimberlite) characterization currently being conducted by BHPB.

Regarding BHPB's proposed land treatment system, the Agency generally sees promise in this innovative treatment technique and supports the proposed initiative at a small pilot scale with the condition of a rigorous monitoring program to determine the effects of the techniques on soils, vegetation, wildlife and water quality.

*Director Bill Ross at Tailings discharge into cell C of the Long Lake containment facility.* AGENCY







## Expansions and Amendments

The year 2001 saw increased activity by BHPB in preparing to develop four new open pit mines located within BHPB's claim block—Fox, Sable, Beartooth and Pigeon. The Fox development was added to the existing Class A water licence by the Mackenzie Valley Land and Water Board (MVLWB), and the Sable, Beartooth and Pigeon pipes completed their environmental assessment under the Mackenzie Valley Environmental Impact Review Board (MVEIRB) and moved back to the MVLWB for their land use permits and water licence.

### Sable, Pigeon and Beartooth

BHP Billiton's application to mine three new pipes (Sable, Beartooth, and Pigeon) located north of the present development entered its third year in 2001. In February the MVEIRB completed its environmental review and recommended approval of the application along with 62 recommendations to minimize environmental and social impacts.

*Culvert on Sable Haul road at Pigeon stream crossing* AGENCY



The Minister of Indian Affairs and Northern Development subsequently took issue with the fact that 60 of the Review Board's recommendations had no attached finding of "significant adverse impact", as is required by the Mackenzie Valley Resource Management Act. The Minister argued that only the two recommendations that did have a finding of significant adverse impact were valid. After consulting with the MVEIRB, the Minister decided that the rest of the recommendations would stand as "observations", the difference being that when issuing land use permits and water licences, the MVLWB must adopt recommendations made by the Review Board, whereas observations need only be "considered".

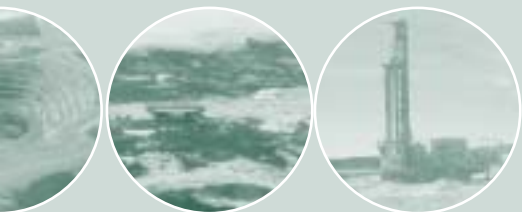
*François Messier at BHPB's Environmental workshop* AGENCY



Following the resolution of that issue, and petitioning by the company to expedite permitting of the Sable access road so that winter construction would not be held up, the MVLWB made a decision in the early summer of 2001 to process the Sable haul road separately from the rest of the application. The haul road application was distributed to interested parties for comments, and the necessary permits were issued in October. The Agency submitted recommendations for improving environmental management practices for the protection of caribou and grizzly bear movement and habitat during road construction and use.

The Sable haul road water license and land-use permit were issued in October 2001. The Agency notes that while the land-use permit included terms requiring the reporting of traffic volumes on the road, no special measures have been included that require the company to limit traffic volumes, or enforce special





## Expansions and Amendments

measures such as closing the road, during periods of peak caribou migration through the area, as we had recommended. We are of the opinion that processing separately the various components of the same development application, as was done in this case, undermines an integrated approach to resource management. For more discussion on this issue please refer to the section “Assessment of the Regulators”.

A public hearing for the remainder of the application was set for the spring of 2002, and the hearing opened on April 4th, 2002. Prior to the hearing, the Agency requested more detailed information on waste rock management plans for the three new pipes, additional aquatic baseline data, an updated wastewater and processed kimberlite management plan, more detailed road construction data (in relation to wildlife movements) and an updated wildlife management plan. BHPB responded to these information requests in a timely manner, and additional information was available prior to the public hearing.

Our formal intervention at the public hearing stressed the following points:

1. adequate investigation and design work for the proposed Pigeon diversion channel had not been conducted to assure the Board that upstream fish and aquatic resources would remain viable during operations and following closure of the Pigeon mine.
2. waste rock at the new pipes, particularly Pigeon, had not been properly sampled, so that no representative picture of the volumes of problem waste rock (potentially acid-generating biotite schist) was before the Board.
3. proposed mitigation measures for poor quality waste rock drainage (frozen waste rock dumps, frozen core toe-berms, and setbacks from lake edges) were all undemonstrated technology and, therefore, experimental with some degree of risk attached.

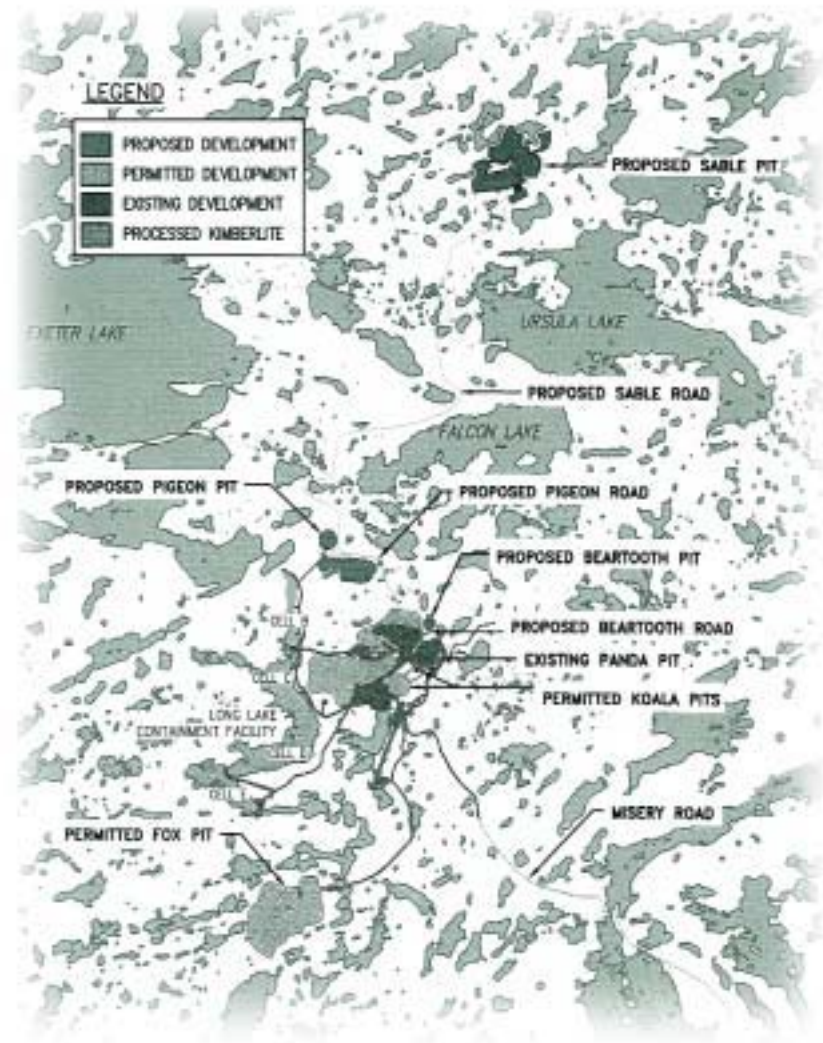
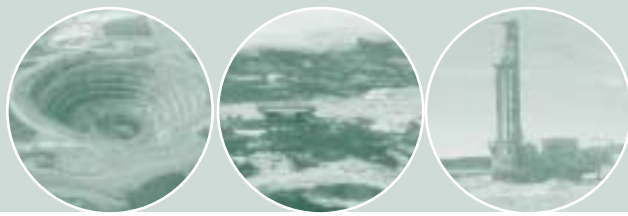


Figure 5. Ekati Diamond Mine™ including Sable, Pigeon and Beartooth.



## Expansions and Amendments

4. given the reasonable possibility of climate change in the future, and the warming of the tundra, the waste rock dumps should be designed for unfrozen conditions.
5. certain additional aquatic baseline data need to be collected prior to mining.
6. the Board should begin to consider the role greenhouse gas mitigation and compensation plans might play in the regulatory process.
7. construction and operation of the haul roads around the pits need careful attention to minimize the risk of impact to wildlife, particularly caribou and grizzly bear.

The public hearing and followup discussions toward the Class A licence and land use permits for the three new projects were still underway when we went to press. We will report subsequently on the outcome.

DFO is also proceeding with its regulatory review of the proposal, and requires the company to submit documents including a No Net Loss plan. The company has submitted a document describing proposed compensation concepts that would achieve no net loss. DFO has developed a work plan for the development of the authorization required for the development of Sable, Beartooth and Pigeon, which requires BHPB and DFO to consult with communities on compensation proposals and draft authorisations..

### Fox Development

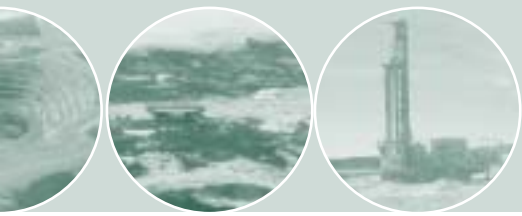
The Fox pipe, one of five originally approved in the 1996 environmental review, went before the MVLWB in 2001 as an application for inclusion in the company's existing Class A water licence. The application was for both dewatering Fox Lake and for the subsequent mining of the kimberlite pipe beneath the lake.

In its original application BHPB proposed to use a process of land treatment to dispose of both lake and mine water. However, this proposal was withdrawn from the application immediately prior to the May 2001 public hearing. The new proposal was that all water not immediately meeting discharge limits would be pumped into the existing Long Lake containment facility from which it would be released only when it meets discharge limits.

The MVLWB's public hearing on the application was held on May 14th, 2001. In our submission to the Board, we supported the application to dewater the lake but did not support approving the mining of Fox at that time, since there was a lack of critical information available for the public hearing, particularly about the details of waste rock management and the potential impact of Fox mine water on the Long Lake containment facility. At the hearing BHPB committed to providing the Board with an updated waste rock management plan for the Fox pipe by the spring of 2002 although, as we go to press in June, the plan has not yet been submitted.

*Fox Bridge crossing the Nero-Nema stream* AGENCY





## Expansions and Amendments

In June 2001 BHPB received approval from the MVLWB to drain Fox Lake, and a dewatering plan was submitted to the MVLWB in September 2001, with dewatering commencing early February 2002.

However, an authorization was not issued at that time for mining Fox.

Following the public hearing, the MVLWB requested information from the company relating to expected water quality changes in Long Lake from the addition of Fox effluent, and potential downstream aquatic effects.

The company conducted studies which predicted how discharge water quality from the Long Lake containment facility would change for certain variables for three operating scenarios, and whether the predicted changes might cause toxicity



to aquatic life. BHPB concluded that there would be no toxic effects to aquatic life from the predicted discharge concentrations, and therefore, no toxic effects in the receiving environment, given that Long Lake effluent would be further diluted as it moves downstream.

However, subsequent work by BHPB revealed that the predicted maximum concentrations in cell E for three important metals (arsenic, cadmium and copper) could be expected to “marginally exceed” the federal guidelines for the protection of aquatic life. The Agency notes that cadmium may be a serious concern, since it could reach concentrations slightly over 10x the federal guideline under each of the operating scenarios. No toxicity analysis was conducted for the three metals, and there is no dilution modeling for the downstream Koala drainage that would tell us how these concentrations change as effluent moves down the drainage. While there is an aquatic effects monitoring program in place, it may not be able to detect all adverse effects, especially sub-lethal ones that could result in these higher releases of metals from Long Lake. This issue requires further analysis by the company.

In early 2002, despite the lack of an updated waste rock management plan, the MVLWB proceeded to recommend approval for mining the Fox pit, and the project received approval from the Minister.

*The Mackenzie Valley Land and Water Board at the public hearing for Sable, Pigeon and Beartooth* AGENCY





# Air Quality Monitoring

A variety of operations at the mine affect air quality in the vicinity and consequently have the potential to affect water quality and vegetation important to wildlife. In accordance with the *Environmental Agreement*, BHPB has established an air quality management and monitoring program to address these issues.

## Monitoring Programs

BHPB currently conducts the following monitoring activities to keep track of changing air quality:

- suspended airborne particles from the plant and dust emissions
- winter dust deposition through snow-core sampling
- dust deposition on vegetation
- road dust sampling
- water quality sampling

### Sources of Airborne Contamination

- Diesel electricity plant
- Vehicle emissions
- Blasting in pits
- Road construction
- Road traffic
- Waste rock and tailings dust

Sampling locations for the monitoring program are shown in Figure 6.

Total suspended particulates are sampled every six days from spring to fall. Snow and vegetation surveys take place on a three-year cycle, with the last comprehensive survey conducted in 2001. Water quality sampling was added to the air quality-monitoring program in 2000 and takes place on the same three-year cycle as the snow surveys. It consists of one sampling site, located on Grizzly Lake (a lake that was previously a reference lake for the aquatic effects monitoring program).

Concerns from the Agency and others regarding the possible effects of road dust on vegetation used by wildlife along roads resulted in BHPB initiating a road dust survey in 2001 along the proposed Sable road corridor. This survey will also have the same three-year cycle as the other surveys in the air quality-monitoring program.

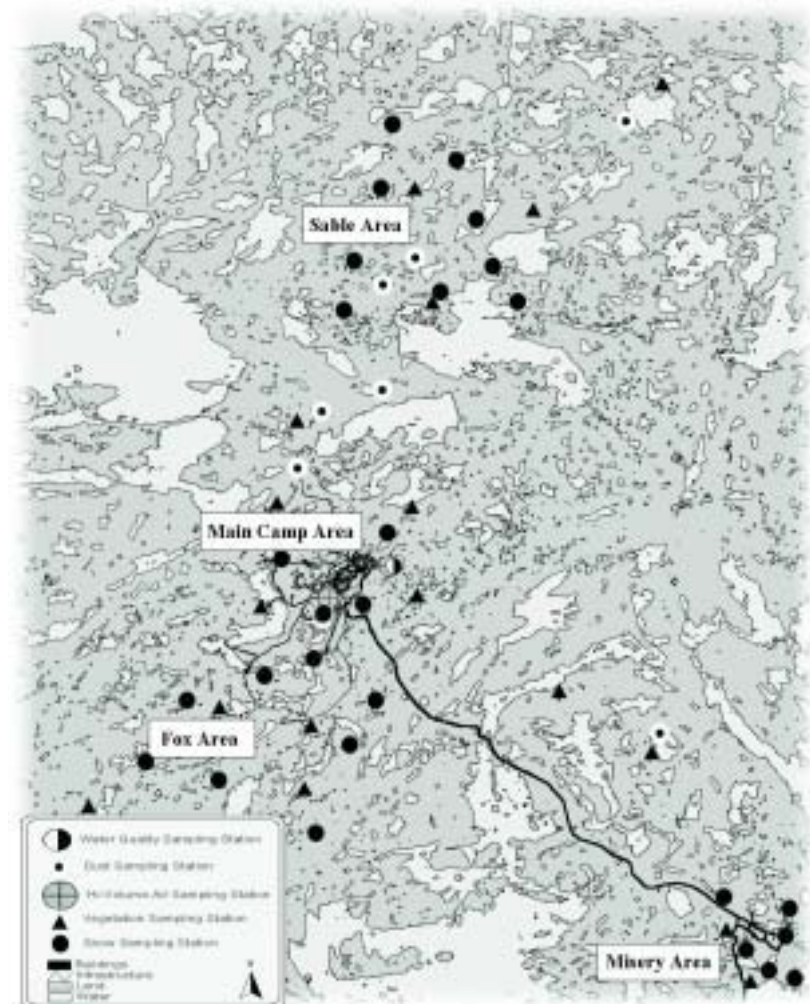
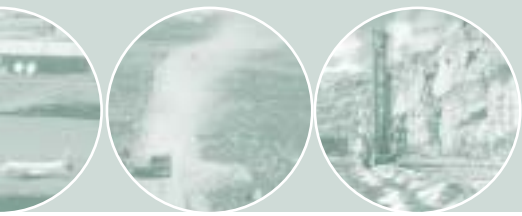


Figure 6. Air Quality Stations BHP BILLITON DIAMONDS INC.



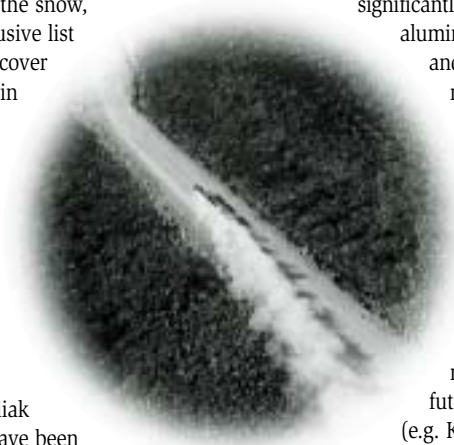
# Air Quality Monitoring

A variety of physical (e.g. pH, conductivity), nutrient (e.g. phosphorous, nitrate) and metal (e.g. arsenic, copper) parameters is measured in the snow, vegetation and water quality surveys, although a more inclusive list of parameters is used in the vegetation surveys. Vegetation cover and species composition (i.e. diversity) are to be evaluated in the Sable road dust survey.

## Effects of Mining on Snow and Vegetation

At this time, the only results available from the 2001 monitoring program are from the snow and vegetation surveys. The April 2001 snow survey results revealed that the area near Kodiak Lake, the closest lake to many of the dust-generating mine activities (e.g. airstrip, roads, active pits, and the main camp), had the highest measured concentrations for most parameters. This indicates that Kodiak Lake, in comparison to other monitored lakes, appears to have been influenced to the greatest extent by dust. Stations near Polar and Moose Lakes had the next highest measured concentrations.

Chemical parameters strongly associated with dust, exhibiting higher concentrations nearer mining operations, include total suspended solids, turbidity, aluminum, arsenic, chromium and nickel. Values for these were 10 times greater than that measured at reference sites. Additional parameters that also appear to be associated with dust include total ammonia, total phosphorous, copper and zinc. These results suggest that dust may be adversely affecting the water quality of Kodiak Lake, other nearby lakes, and downstream lakes in the Koala watershed.



Vegetation monitoring in 2001 indicates that several metals in lichen tissue are significantly higher in areas closer to project activities. These include aluminum, titanium, iron, electrical conductivity, calcium, potassium and magnesium. BHPB assumes that, as many of these metals are not typically associated with equipment emissions, they are caused by dust generated from mining activities.

## Agency Assessment of Air Quality Effects

Mining operations are causing increases in a number of airborne contaminants (including nutrients and metals) in snow and vegetation near areas exposed to levels of high dust.

The potential exists for the quality of surface runoff and meltwater to become degraded in the Koala watershed in the future, especially as development intensifies with additional pipes (e.g. Koala, Fox, and Beartooth). These trends are also possible for waterbodies around Misery pit and the proposed Sable and Pigeon pits as development increases in these areas. As dust appears to be responsible for these reported effects, there is a distinct need for conducting a study that characterizes each of the possible sources of dust in order to test BHPB's assumption. A source characterization study would indicate what contaminants are coming from vehicle emissions, plant emissions, or blasting activities. Further dust monitoring, such as that committed to for the Sable road, is also recommended. The comprehensive review on all air quality data as committed to by BHPB should place considerable emphasis on these issues.

Above: Haul trucks on Misery Road causing dust AGENCY

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### Air Quality — Recommendation

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11. BHPB should establish a dust monitoring program along the Misery road similar to the one in place along the Sable road.







# Reclamation

As part of its mine plan BHPB has proposed to conduct progressive reclamation at the site as particular components of the mine become available for reclamation. Additionally, the company's water licence requires on-going research into revegetation and other reclamation techniques to improve the reclamation success in the long-term. The current version of BHPB's proposals for reclamation of the mine site are described in its 2000 Abandonment and Reclamation Plan, which describes the approaches to be used in reclaiming each aspect of the mine development (i.e. the open pits, waste rock piles, buildings, roads and infrastructure etc.).



*Vegetation growing along banks of the Panda Diversion Channel* AGENCY

An example of reclamation research is BHPB's experiments with different methods of revegetating kimberlite tailings in cell B of the tailings impoundment. If kimberlite tailings can be successfully revegetated, BHPB has proposed that it may revegetate portions of the tailings impoundment, which would be a marked improvement over its current plan to simply cover the whole facility with waste rock.

## Reclamation Research

Reclamation research was continued in 2001. The research focussed on identifying the potential for growing plants on the processed kimberlite tailings as a means of permanently stabilizing them against wind and water erosion. In previous years, research has shown that kimberlite tailings are a poor medium for plant growth due to the very low levels of nutrients, high salt levels and low moisture retention capacity of the kimberlite fines. As a result, plant trials have produced low growth rates and unhealthy plants.

*John Witteman (BHPB) showing growing vegetation in Fred's Channel reclamation area.* AGENCY





# Reclamation

Results from the 2001 investigations indicate that lakebed sediments and additions of peat to the kimberlite tailings show the most potential for encouraging growth. BHPB researchers believe that this is likely due to the increased ability of the soil to retain moisture and plant nutrients. *Perennials* showed the best response to these soils additions, whereas annual grasses showed increased growth only in the peat plots.

BHPB also transplanted willow cuttings, willow bundles, and shrubby tundra species (dwarf birch, blueberry, crowberry and bearberry) into the soil amendment plots. Results showed that willow cuttings in a lake sediment and peat soil amendment showed signs of successful growth, willow bundles sprouted regardless of soil treatment, and the shrubby tundra species showed mixed response to transplanting.

A grazing study revealed that arctic hare and caribou are potential grazers of revegetated species, and thus a challenge to successful revegetation.

## Reclamation Activities

In 2001 BHPB carried out progressive reclamation activities at the Panda diversion Channel, the airstrip, Culvert Camp and Fred's Channel, mostly to revegetate the affected areas and to improve drainage pathways to stabilize landforms. In all, some 10.5 acres of land around the mine site is now reclaimed, according to BHPB, and another 26.9 acres is currently undergoing progressive reclamation.

*Long Lake cell B re-vegetation plots* AGENCY



## Agency's Assessment of Reclamation Research and Activities

The revegetation studies appear to be providing the company with good information on the potential effectiveness of revegetation to reclaim the Long Lake tailings facility. We are encouraged that the reports produced by BHPB's consultants provide specific recommendations for management and describe some of the implications for implementing a revegetation program.

Last year we expressed concern about the potential uptake of certain trace metals such as cadmium, chromium and nickel in plants growing on kimberlite. While some work is being carried out by the company to understand the chemical uptake of plants, an ecological risk assessment of these metals on wildlife has not yet been done. The Agency recommends that BHPB examine this issue.

A continuing, substantial deficiency in the ability for BHPB to continue reclamation planning is that no criteria for determining reclamation success have yet been developed. These are critical for gauging the success of any reclamation undertaken on the site, and for calculating credits to the reclamation security

*Long Lake cell B re-vegetation plots*



DENSE BURNING/REHAB/BLITTON/DIAMONDS INC.





# Reclamation

deposit as progressive reclamation is claimed by the company. Currently the reclamation values presented are based on BHPB's professional judgement. While the areas considered "reclaimed" may have been restored to an ecologically viable condition, there is no process for objectively determining this at the moment. In our view, regulators and other reviewers ought to be involved in developing a clearly defined and consistent set of reclamation criteria. This will enable regulators to sign off on areas considered reclaimed with some degree of certainty and consistency, and provide credits properly to the company from its security deposits.

## Security Deposit for Reclamation

As the mine development proceeds, and BHPB achieves varying levels of reclamation, the amount of outstanding reclamation liability at any particular moment may differ significantly from what is currently available in the security deposit, since it was established through predicting the development plan at the time of licensing. The principle in the *Environmental Agreement* and the Class A water licence is that if the liability, as re-evaluated by BHPB, and agreed to by the regulators is greater than what is in the security deposit, the deposit should be "topped up" to match the liability. Similarly, a credit is due to BHPB if the deposit exceeds the liability. The *Environmental Agreement* provides the means to identify these variations and to make adjustments from time to time as appropriate. Such discussions were initiated about a year ago when, in May 2001, BHPB proposed a new model for calculating its reclamation liability in a report titled "Reclamation Liability Estimate or the Ekati™ Diamond Mine" (Komex International Ltd./BHP; May 2001).

The analysis in this report showed that the current security held by the Crown is adequate to cover mine site liability at this time, and so no change to the security terms was required. However, the new model has important implications for calculating liability in future years at the mine. The Agency conducted a preliminary review of the model and determined that regardless of the model used, BHPB's incorporation in its model of assumed, completed progressive reclamation in calculating the outstanding liability (in other words, a net liability) for future years was unsupportable, since the assumptions made it impossible to gain a real picture of ultimate gross liability in any given year. (See next page). The new model has initiated some serious discussion and debate between the company and regulators, including the Agency, with no resolution as we go to press.

*BHPB environmental staff replanting willows along a stream bank*





# Reclamation

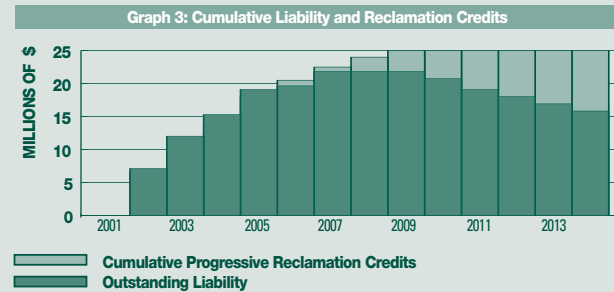
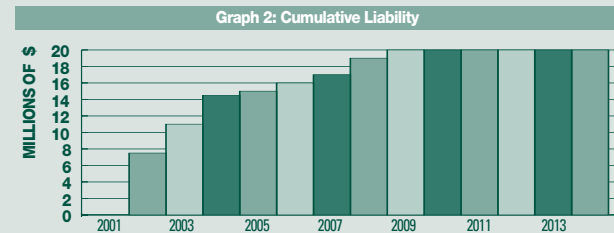
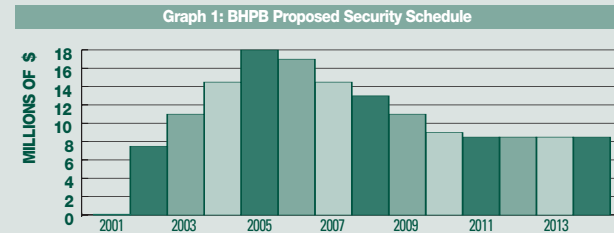
## Calculating Liability at Ekati Diamond Mine™

The following graphs illustrate the major concerns the Agency has with BHPB's approach to calculating future predictions of security at the mine site.

**Graph 1:** This graph provides an example of a BHPB proposed security schedule. BHPB's model assumes that progressive reclamation work will be conducted throughout the mine life, and hence the liability proposed for any one year reflects only the outstanding (net) liability. The model does not provide an estimate for maximum liability at any given time—i.e. how much would it cost to restore the mine site assuming no progressive reclamation. (Figures from BHPB's estimates of liability for the Sable, Pigeon and Beartooth development)

**Graph 2:** This graph shows how reclamation security held by the Crown should build cumulatively and assume no progressive reclamation, so that if a company has not completed its required reclamation activities, resources are available for the responsible authority to complete the work. Such security needs build cumulatively through the project's life-time as disturbance to the land occurs. (Numerical values for illustrative purposes only).

**Graph 3:** Credits could be applied against the security deposit after the completion and approval of reclamation activities. In this example, \$1 million per year of progressive reclamation has been carried out, starting in 2005. Note by the end of the mine life the company has reduced the maximum liability by approximately \$10 million by carrying out \$1 million/year of reclamation activities over 10 years. The establishment of reclamation criteria is key to determining triggers for credits. (Numerical values for illustrative purposes only).



### Reclamation — Recommendations

12. BHPB should provide estimates of liability for the Ekati Diamond Mine™, that do not include the assumption that progressive reclamation has been carried out.
13. The company, regulators, government and other interested agencies promptly begin a process to develop clearly defined reclamation completion criteria.



# Assessment of the Regulators

## Assessment of the Regulators

Part of the Agency's mandate is to "serve as a public watchdog of the regulatory process", and we offer the following comments on last year's performance of several regulatory bodies.

The Mackenzie Valley Land and Water Board (MVLWB), Department of Indian Affairs and Northern Development (*DIAND*) and Department of Fisheries and Oceans (DFO) all hold certain responsibilities for regulating the BHPB Ekati Diamond Mine™. The MVLWB is responsible for the Class A water license originally issued by the Northwest Territories Water Board. DFO is responsible for authorizations for the harmful alteration, disruption or destruction of fish habitat (pursuant to section 35(2) of the Fisheries Act). DIAND is responsible for land leases, and for ensuring compliance with the water license, land-use permits and land leases, and is a signatory to the *Environmental Agreement*.

BHPB must also comply with the Government of Northwest Territories' wildlife acts and regulations. The company also requires, at different points in the development, other permits, for example, Wildlife Research Permits. The *GNWT* is also a signatory to the *Environmental Agreement*.

## Mackenzie Valley Land and Water Board

The Agency was concerned with the lack of consistency in some of the decisions and directions taken by the MVLWB last year. One item of concern to the Agency was the Board's action to separate, at the

proponent's request, the Sable haul road application and deal with it prior to, and apart from, the main application review process for the new Sable, Pigeon and Beartooth developments. By separating this application from the rest of the development application, the haul road did not receive the same level of review as the rest of the project is currently receiving (as we go to press) through a public hearing, nor was it followed by a draft license review by interveners. The expeditious treatment of the access road application resulted in an important recommendation of ours (for traffic regulation on the road) getting lost in the shuffle. During the environmental assessment process we expressed our concern that the Sable haul road offers possibly the greatest potential for impacts to wildlife, particularly caribou and grizzly bear, from the new developments.

Of further concern to the Agency is the continued use by the Board of conditional water licenses which permit the subsequent tabling of important information after the public hearing and review process is finished. In our view, much of this information is necessary and relevant to the application review, and should be submitted with the application in time for the public hearing. Last year, for example, BHPB's application to add the development of the Fox pipe to its existing Class A water license was entertained by the Board, despite there being no substantive plans for managing waste rock at the site. The Fox pipe differs from the other pipes on the property in its mineralogy and chemical properties, and has distinctive features which will present unique challenges for waste rock and waste water management. We took the



Bob Turner at BHPB's Environmental workshop AGENCY





# Assessment of the Regulators

position that allowing mining of Fox at that time was premature, and were pleased with the Board's decision after the May 2001 public hearing to allow only the dewatering of Fox Lake (as we recommended), and not mining activity at Fox. However, we were later disappointed to learn that the amendment was subsequently issued by the Board for mining Fox without having a proper waste rock management plan submitted by the company. Another deficiency in the process was that the draft amendment to include Fox in the existing water license was not circulated to intervenors for review. The Agency contends that these procedures allowed the application for a new mine to escape a complete and transparent review by intervenors and the public. We urge the MVLWB to review its procedures in this light, with a view to improving the transparency and effectiveness of the mine approval process.

## DIAND's Inspection and Enforcement

In past years the Agency has complimented DIAND for the high quality of land and water inspections that its inspectors have carried out. Unfortunately the departure of the inspector in charge of the BHPB file in August 2001 left the site without a full-time inspector. Inspectors have been assigned to the file on an irregular basis since that time. However, these inspectors have not consistently been able to provide the same high level of attention to the BHPB as they have other duties and lack the history with the project required to maintain a high quality of inspection. Our records show that in the five months preceding August 31st 2001 (when the original inspector departed DIAND) eight inspections were carried out. However, in the subsequent seven month period only three inspections were carried out. This was a period when BHPB was carrying out a high level of activity to prepare for the mining of the Sable, Pigeon, Beartooth and Fox pipes.

In February 2002 we expressed our concern to the Regional Director General of DIAND regarding the lack of a full-time inspector for the mine. DIAND responded that the hiring process was underway, and that DIAND was working hard to find a qualified person to fill this post. As we go to press in early June the position had still not been filled. For an industrial operation the size and uniqueness of the current project, this lapse in regulatory inspection is a serious breach of public duty and is, in our view, unacceptable. The Agency recommends that the enforcement arm of DIAND review its procedures for the hiring of inspectors, with a view to ensuring that the required continuity and experience is properly provided.

## Review of Security Deposit

Every two years the *Environmental Agreement* requires a report from the company describing any variances with the Reclamation Plan and updated costs estimates. BHPB submitted its first report on cost variance in March of 2001, along with a new proposal on how to estimate its outstanding liability in the future. Since that time not much seems to have happened. This is an issue that requires prompt attention by the parties involved, and we urge them to devote the resources required to complete the review in a timely fashion. BHPB's new liability estimate and model are discussed in more detail in the section on reclamation.

## Review of the Environmental Agreement

The *Environmental Agreement* itself is up for review by the signatory bodies this year. Subsequent reviews will be carried out every five years. Our mandate provides for our participation in this review, and we have made ourselves available to the signatories to discuss how potential changes to the Agreement may affect the operations of the Agency. We also have taken the appropriate steps to inform our aboriginal society members that the review is underway. Early





## Assessment of the Regulators

in the review we expressed our concern to the signatory parties (DIAND, GNWT and BHPB) about the lack of transparency and involvement of aboriginal communities in the review process. As this review is just getting started, there are no results to report this year. We will report on the outcome of the review in future newsletters and reports.

### Lake Habitat Compensation Fund

The matter of compensating for fish habitat lost through the destruction of a dozen lakes by the original project is still far from being settled. A community-based advisory committee has been established to assist the Department of Fisheries in spending the \$1.5 million contributed by the company for lake habitat compensation. As we noted last year the Department needs to speed up the review and approval process for acceptable projects. We reported then that only

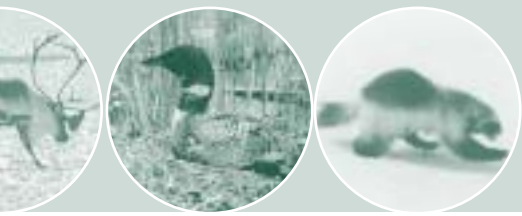
*Panda Diversion Channel (in front) Koala Pit, Koala North Pit and Panda Pit (Panda/Koala waste rock pile behind)* AGENCY



one project (North Slave Metis Alliance) was funded. As we go to press this year (early June) only one additional project (Lutsel K'e Dene First Nation) to carry out work at Stark lake has been funded. Another project, the reclamation of an old mine site at Matthews Lake, is currently being reviewed internally by DFO.

The Agency remains concerned about the continuing lack of progress in conducting projects that will achieve the goals of the federal Fish Habitat Compensation Policy—i.e. replacement of equal value like-for-like fish habitat. This is a challenging goal, and it is not obvious how this can successfully be done. It may not be possible, and this may force the department into a more flexible approach.

The Agency is pleased with an apparent, emerging openness on the part of DFO to consult more widely on the acceptability of the various habitat destruction authorizations the department issues for this project. An example is the work plan circulated by DFO for comment on the development of the fish habitat authorizations required for the Sable, Pigeon and Beartooth developments. In the past DFO has been widely criticized for its lack of consultation while developing fisheries authorizations. The Sable, Pigeon and Beartooth work plan highlights a number of points at which community consultations are required. The Agency will be following the execution of the work plan closely, and will be interested in hearing from the communities on how successfully they felt DFO (and BHPB) conducted the whole process.



## Cumulative Effects and Regional Monitoring

The management and monitoring of cumulative effects continues to be an issue raised whenever the Agency visits communities or talks with members of the public and government. To many, looking separately at individual projects and developing new agencies for each project does not work towards this ideal.

Over the past couple of years, the federal government has attempted to champion the development of a system for reviewing and monitoring cumulative effects. While a number of discussion papers have been produced, meetings held, and workshops hosted, steps towards implementation still seem a long way off. Reliable funding and a detailed implementation plan appear to be major stumbling blocks in the development of any coordinated approach to cumulative effects management. The concept of a regional environmental monitoring agency, widely supported by our aboriginal members, has been discussed at a number of forums, and support for the principle has been expressed by the Agency. At our last annual general meeting in June of 2001, DIAND noted that the department is working towards having a regional monitoring agency in place within two years.

The concept of a regional monitoring agency is also being discussed as part of the *Environmental Agreement* review (see section Assessment of the Regulators), triggered early in 2002 by BHPB. The *Diavik Environmental Agreement* requires the signatories to the agreement to look at the potential of consolidating activities into a regional monitoring agency. A proposal has been put forward to include a similar clause in the *BHPB Environmental Agreement*. It has been suggested that a regional monitoring agency would be responsible for carrying out watchdog activities

for numerous development projects. Such a body would likely be cost effective for both funding parties and efficient. The Agency is generally supportive as such a body could deal more effectively with cumulative effects. But, the Agency strongly supports an effective independent watchdog role and strong community and scientific expertise to guide the body.

In March 2002, directors commenced a review of portions of DeBeers' environmental assessment for the Snap Lake diamond project to assess the potential for cumulative effects as a result of the development of the DeBeers project in combination with the Ekati Diamond Mine™ and Diavik. Directors noted that any cumulative effects are most likely to be seen (if at all) in relation to wildlife, especially caribou, wolverine and grizzly bear. We will report on our findings next year.



This year the Agency took a proactive approach to working with other organisations in order to maximize effectiveness and efficiency. The Environmental Monitoring Advisory Board (EMAB) for the Diavik project (formed in April 2001) took up office space immediately next door to the Agency. This has provided many opportunities for maximizing efficiency in terms of cost, and more importantly has made it possible for open dialogue between our organisations. In the past year the executive of EMAB and directors of the Agency have met, staff have regularly discussed joint areas of concern and staff and directors of the two boards have attended joint community visits: this we have found as particularly useful, as when in communities we have often found that people have concerns about what is happening to a resource, (i.e., caribou) from ALL potential stressors, and not just individual mine sites.

Truck on Lupin winter road BHP BILLITON DIAMONDS INC.





# Cumulative Effects and Regional Monitoring



**Diamond drill** DARREN UNRAU/DIAND

We are pleased to report that recommendations coming out of both EMAB and the Agency have led BHPB and Diavik to combine some components of their wildlife monitoring programs. In 2002 BHPB announced that it would be extending the existing aerial survey (caribou monitoring) to include the east

island (Diavik) and surrounding area. This as a positive step towards developing a cumulative effects monitoring system for the Lac de Gras region and will create better coverage of effects on the Bathurst Caribou herd in a more cost effective manner.

We are pleased to hear that staff from BHPB and Diavik are discussing common approaches to other monitoring programs. Opportunities exist for coordination between the companies in air quality monitoring, water quality monitoring and other aspects of the wildlife monitoring programs. The next step will be to ensure that the joint monitoring protocols are providing information that can be used effectively by regulators to identify cumulative effects fully, in order that they be properly managed.

Finally, last year the Agency reported that we determined that the impact on wolverines (the death or removal of ten wolverines from the Lac de Gras area from 1998 to 2001) from mining activities to be a “significant adverse effect” and recommended immediate actions to reduce the risk of attracting wolverines and grizzly bear to camp.

We are pleased to report that significant improvements have been made over the last year, and the Agency is pleased with BHPB’s response to this important issue. However, we continue to stress the importance of regular staff training, awareness campaigns, and frequent inspections of landfills and other waste sites. We hope that similar improvements have been made by other operators.

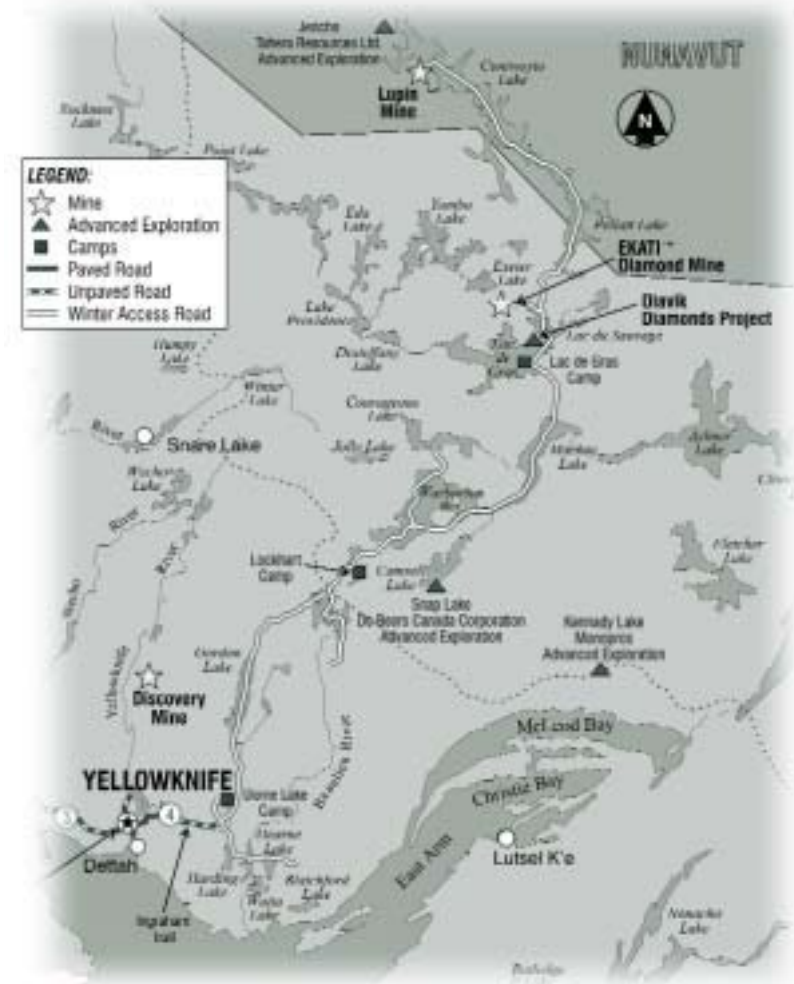


Figure 6. Lupin winter road site map BHP BILLITON DIAMONDS INC.





## 2001–2002 Year in Review

The past year was very eventful and one in which the Agency has spent considerable effort fulfilling its mandate as a public watchdog for environmental management at Ekati Diamond Mine™. The Agency provided advice and recommendations to BHPB on the Aquatic, and Wildlife Effects Monitoring Programs. The Agency also attended numerous technical meetings to discuss mining-related issues such as waste rock seepage geochemistry, reclamation, and cumulative effects. We were also directly involved in the regulatory review processes for BHPB's proposal to mine the Sable, Pigeon & Beartooth pipe open pit mines and Fox pipe development. Further efforts were made to improve communication between the Agency and its members. In addition, the Agency and the newly formed Environmental Monitoring Advisory Board (EMAB) for the Diavik project have begun a cooperative relationship by coordinating activities such as community visits.

### April 2001

- The Agency submitted comments and recommendations to BHPB on the Aquatic and Wildlife Effects Monitoring Program workshops held February 5th – 6th, 2001.
- The Agency and a number of regulatory authorities attended a meeting hosted by BHPB to discuss the results of the 2000 seepage surveys around the waste rock piles.

- The position of communications administrator was ended and a new position, Environmental Analyst, created. Robin Staples was appointed to this new position.
- Our Environmental Analyst attended a meeting regarding the Monte Carlo reclamation model proposed by BHPB.
- Director François Messier and the Manager, Zabej Nevitt, attended a meeting with BHPB and others to discuss the proposed refinements to the Wildlife Effects Monitoring Program.



*Independent Environmental Monitoring Agency's 2001 Annual General Meeting* AGENCY

### May 2001

- The Agency presented its review comments to the Mackenzie Valley Land and Water Board (MVLWB) at the May 11th public hearing assessing BHPB's application to amend its class 'A' water licence to dewater and mine the Fox pipe.
- The Environmental Analyst attended an advisory committee meeting for the DFO's Lake Habitat Compensation Fund.
- The Agency conducted a technical review of BHPB's proposed seepage monitoring program for 2001, and submitted comments to the MVLWB.

### June 2001

- The Agency submitted comments to the Minister of DIAND on the adequacy of BHPB's 2000 Annual Environmental Report for the Ekati Diamond Mine™.
- The fourth Annual Report of the Agency, covering the 2000-2001 fiscal year, was released.
- The 24th meeting of the Board of Directors was held in Yellowknife June 26th – 28th. The Agency discussed the outcome of the Fox Pit amendment public hearing, the water licence and land use permit applications for the Sable, Pigeon &





# 2001–2002 Year in Review

Beartooth development and the ongoing review of BHPB's Operating Environmental Management Plan.

- The fourth Annual General Meeting of the Agency was held on June 26th. The performance of the Agency over the past year was reviewed and society members provided input for future activities.
- The Directors and staff of the Agency visited the mine site on June 28th.

## July 2001

- The Agency reviewed the report "Preliminary screening - Desperation and Carrie Ponds" and submitted comments to the department of Fisheries and Oceans (DFO)
- The Agency reviewed BHPB's application to construct the Sable Haul road and submitted comments to the MVLWB.
- The Agency reviewed BHPB's proposal for land treatment of wastewater at the Misery site and submitted comments to the MVLWB.
- Agency staff visited the mine site with the Inter-Agency Coordinating Team.
- Agency's website upgrade completed.

## August 2001

- The Manager attended the Dogrib Treaty 11 Council annual general meeting held in Wekweti (Snare Lake).
- The Environmental Analyst attended an acid rock drainage course.
- Director Red Pedersen met with representatives of the Kitikmeot Inuit Association.

## September 2001

- The North Slave Metis Alliance appointed Bob Turner as a director of the Agency replacing Marc Stevenson and Akaitcho Treaty 8 appointed Tim Byers as a director of the Agency.
- Director Tim Byers met with both the Yellowknives Dene and Lutsel K'e First Nations.
- The 25th Meeting of the Board of Directors was held in Yellowknife September 21st - 23rd. The Agency reviewed BHPB's Misery land treatment proposal, preliminary screening for Carrie and Desperation ponds, and the 2001 waste rock seepage survey. The Agency also met with the executive of EMAB.

- The Manager attended a workshop on Preliminary Screening and Environmental Assessment under the MVRMA.

## October 2001

- The sixth issue of the Ekati Monitor, the Agency's newsletter, was published.
- The Agency reviewed the additional information supplied by BHPB, in support of its amendment application to mine Fox pipe, and submitted comments to the MVLWB.
- The Manager attended a mine reclamation workshop and the Environmental Analyst attended an aquatic toxicity workshop and a copper risk assessment workshop.
- Director Peter McCart met with representatives from BHPB to discuss outstanding Agency concerns on the Aquatic Effects Monitoring Program.
- Directors Red Pedersen, François Messier and the Manager attended the caribou monitoring workshop hosted by EMAB.
- Director Bill Ross and the Manager participated in interviews on the future of the West Kitikmeot Slave Study and project specific environmental agreements.

## November 2001

- The Agency reviewed BHPB's water licence and land use permit applications for the Sable, Pigeon & Beartooth development and submitted comments to the MVLWB.
- The Manager and Environmental Analyst visited the mine site.
- The Manager attended a workshop regarding the development of a plan for cumulative effects research and monitoring in the slave geological province.
- Director Tony Pearse presented the BHPB and Agency case study to the National Association of Communities Impacted by Mining in Peru.

## December 2001

- Director Peter McCart met with Tracy Williams of Lutsel K'e regarding the Lutsel K'e Stark Lake research project funded by the Fish Habitat Compensation Fund.



# 2001–2002 Year in Review

- The Agency notified aboriginal society members of the review of BHPB's *Environmental Agreement*.

Director Bob Turner met with the North Slave Metis Alliance (NSMA) on this issue and both the NSMA and Lutsel K'e Dene First Nation submitted their comments and proposed amendments to the three signatories of the agreement.

- Directors Peter McCart, François Messier, Bill Ross, the Manager and Environmental Analyst attended pre-workshop technical meetings on the Aquatic and Wildlife Effects Monitoring Programs with BHPB and others.

- The 26th meeting of the Board of Directors was held in Yellowknife December 13th – 15th. The Agency discussed the cost variance and environmental agreement reviews, various fisheries authorizations and regional cumulative effects monitoring initiatives.

- The Agency hosted a Christmas open house.

## January 2002

- The Manager met with Lutsel K'e Dene First Nation representatives regarding the five-year *Environmental Agreement* review.

- Director Bob Turner and the Manager attended the five-year *Environmental Agreement* meeting with representatives from BHPB, DIAND and the GNWT.

- Director Bill Ross and the Manager attended a workshop to review the proposed NWT Cumulative Effects Assessment and Management Strategy and Framework.

## February 2002

- The Agency participated in the annual workshops hosted by BHPB on the Aquatic & Wildlife Effects Monitoring Programs.

- The 27th meeting of the Board of Directors was held in Yellowknife February 3rd & 6th - 7th. The Agency discussed the lack of inspections being carried out by DIAND, the review of proposed water quality limits for major ions, and followed-up on the annual aquatic and wildlife workshops hosted by BHPB.

- The Agency sent a letter to DIAND expressing concerns over the irregular inspections of the Ekati Diamond Mine™.

- The Agency reviewed the proposed water quality limits for major ions and submitted comments to the MVLWB.

- The Environmental Analyst attended a meeting with BHPB, DIAND, GNWT and others regarding the reclamation cost variance review.

- Directors Peter McCart, François Messier, Tony Pearce and the Environmental Analyst participated in the fisheries and caribou workshop hosted by EMAB.

## March 2002

- The Agency submitted its notice to intervene at the public hearing for the licencing of the Sable, Pigeon and Beartooth pipes and provided a listing of outstanding issues and recommendations to the MVLWB.

- The Manager attended a workshop on GNWT's Protected Areas Strategy.

- The Environmental Analyst attended a water quality training workshop hosted by the MVLWB.

- Directors Tim Byers, François Messier, Peter McCart, the Manager and representatives from EMAB jointly met with the Lutsel K'e Wildlife, Lands and Environment Committee to discuss community concerns regarding development at both the Ekati Diamond Mine™ and Diavik.

- The 28th meeting of the Board of Directors was held in Yellowknife March 24th – 26th. The Agency discussed the licencing process for Sable, Pigeon & Beartooth, air quality vegetation monitoring, future joint initiatives with EMAB, and initiated preparation of the 2001-2002 Agency annual report.

- Directors Tony Pearce and the Manager met with representatives of the Dogrib Treaty 11 Council to discuss community concerns regarding the Sable, Pigeon and Beartooth expansion at the Ekati Diamond Mine™.

- Director Pete McCart and the Manager met with the Dogrib traditional knowledge team to discuss the Fish Habitat Compensation Fund.





## Management's Report

The management of the 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 disclosed in the attached notes. The preparation of the financial statements necessarily includes some amounts which are based on the 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**

April 17, 2002

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### Financial Statements March 31, 2002

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Management's Report <b>45</b>	Statement of Financial Position <b>48</b>
Auditors' Report <b>46</b>	Statement of Cash Flows <b>49</b>
Statement of General Operating Fund and Fund Balance <b>47</b>	Notes to Financial Statements <b>49</b>



## Auditors' Report

### To the Directors of Independent Environmental Monitoring Agency

We have audited the statement of financial position of the Independent Environmental Monitoring Agency as at March 31, 2002 and the statement of general operating fund and fund balance and the statement of 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, 2002, and the results of its operations and cash flows for the year then ended in accordance with Canadian generally accepted accounting principles.



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**Yellowknife, Northwest Territories Chartered Accountants**

April 17, 2002

## Statement of General Operating Fund and Fund Balance

For the year ended March 31,

	2002	2001
<b>Revenue</b>		
BHP Billiton Diamonds Inc.	\$ 501,400	\$ 493,600
Over-contribution from BHP Billiton Diamonds Inc.	-	(31,700)
Moving	-	563
Government of Northwest Territories - "Training on the Job" program	-	3,938
Contributed services (Note 2)	23,837	22,483
Interest income	8,794	5,049
	<hr/> 534,031	<hr/> 493,933
<b>Expenses</b>		
Accounting and auditing fees	6,279	6,443
Advertising	310	1,800
Amortization	5,118	3,926
Board support		
- per diem fees	158,282	152,682
- travel, meals and accommodation	90,044	75,917
Community consultation	13,628	23,437
Contributed services		
- office lease	22,800	16,995
- equipment lease	770	4,788
- moving	-	700
- copying	267	-
Equipment	-	280
Insurance	2,055	2,073
Moving	-	561
Office management	-	12,241
Office supplies	9,379	3,721
Outside consultants	14,803	16,549
Postage and freight	1,055	1,828
Printing, design and communication	37,557	34,775
Relocation	8,604	6,619
Training	-	265
Telephone and fax	6,094	7,044
Wages and benefits	134,320	105,267
	<hr/> 511,365	<hr/> 477,911
<b>Excess of revenue over expenses</b>	22,666	16,022
<b>Fund balance, beginning of year</b>	49,655	35,116
<b>Transfer to investment in capital assets fund</b>	(4,636)	(1,483)
	<hr/>	<hr/>
<b>Fund balance, end of the year</b>	\$ 67,685	\$ 49,655

# Financial Statements

## Statement of Financial Position

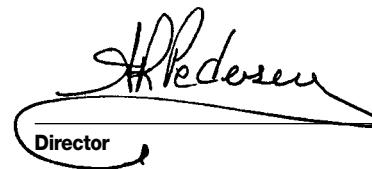
As at March 31,

	2002	2001
<b>Assets</b>		
<b>Current</b>		
Cash	\$ 586,053	\$ 100,710
Accounts receivable	2,519	630
Prepaid expenses	1,155	195
	<hr/>	<hr/>
	589,727	101,535
<b>Capital assets (Note 3)</b>	18,704	14,068
	<hr/>	<hr/>
	\$ 608,431	\$ 115,603
<b>Liabilities</b>		
<b>Current</b>		
Accounts payable	\$ 10,692	\$ 17,980
Repayable contributions	-	33,900
Deferred revenue (Note 4)	511,350	-
	<hr/>	<hr/>
	522,042	51,880
<b>Net Assets</b>		
<b>Investment in capital assets fund (Note 5)</b>	18,704	14,068
<b>General operating fund</b>	67,685	49,655
	<hr/>	<hr/>
	\$ 608,431	\$ 115,603

Approved on behalf of the Directors



Director



Director

## Statement of Cash Flows

For the year ended March 31,

	2002	2001
<b>Cash provided by (used in) Operating activities</b>		
Excess of revenue over expenses	\$ 22,666	\$ 16,022
Item not affecting cash Amortization	5,118	3,926
<b>Changes in non-cash operating working capital</b>		
Accounts receivable	(1,889)	2,745
Prepaid expenses	(960)	(3)
Accounts payable	(7,287)	(2,678)
Repayable contribution	(33,900)	31,700
Deferred revenue	511,350	-
	495,098	51,712
<b>Investing activity</b>		
Purchase of capital assets	(9,755)	(5,409)
<b>Change in cash position</b>	485,343	46,303
<b>Cash position, beginning of the year</b>	100,710	54,407
<b>Cash position, end of the year</b>	\$ 586,053	\$ 100,710

## Notes to the Financial Statements

March 31, 2002

### 1. Accounting Policies

The 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)l of the *Income Tax Act*.

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

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

March 31, 2002

### (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 available information for a reasonable assessment of future cash flows, interest rate risk and credit risk.

### (b) 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 out in Note 3. In the year of acquisition, amortization is taken at one-half the annual rates.

### (c) Economic dependence

The Agency receives all of its 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.

### (d) 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.

### (e) Recognition of revenue

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.

Revenue is recorded in the year specified in the funding agreement with BHP Billiton Diamonds Inc.



# Financial Statements

## 2. Contributed Services

BHP Billiton Diamonds Inc. has directly paid for the office rent, equipment lease and moving expense for the Agency. The monthly rent is \$1,900 and the equipment lease and photocopying expenses are \$770 and \$266 respectively. The Agency recognizes the contributed services at the fair market value of the services provided.

## 3. Capital Assets

				<b>2002</b>	<b>2001</b>
	Rate	Cost	Accumulated Amortization	Net Book Value	Net Book Value
Computers	30%	\$ 16,835	\$ 8,538	\$ 8,297	\$ 8,083
Computer software	100%	907	454	453	-
Office equipment	20%	14,519	4,565	9,954	5,985
		<b>\$ 32,261</b>	<b>\$ 13,557</b>	<b>\$ 18,704</b>	<b>\$ 14,068</b>

## 4. Deferred Revenue

Deferred revenue consists of the funds contributed by BHP Billiton Diamonds Inc. for the March 31, 2003 year end. This amount will be taken into income in 2003. Total contributions for 2003 is \$511,350 of this amount \$33,900 was withheld to repay the over-contributions from 2000 and 2001.

## 5. Investment in Capital Assets

	<b>2002</b>	<b>2001</b>
Balance, beginning of year	\$ 14,068	\$ 12,585
Purchase of capital assets	9,754	5,409
Amortization	(5,118)	(3,926)
Balance, end of year	<b>\$ 18,704</b>	<b>\$ 14,068</b>

# Summary of 2002–2003 Work Plan and Core-Budget

In last year's report the Agency committed to spend more time devoted to:

- Consultations and communications with aboriginal communities and organizations.
- Facilitating the integration of traditional knowledge into environmental management at EKATI Diamond Mine™.
- Developing strategic plans in order to develop clear and effective methods of delivering its mandate; including how the Agency can work with the members to be more constructive in its monitoring and advisory roles.

Communication activities have been increasingly successful over the past year, and directors and staff have been invited to attend and present at a number of meetings in communities and with our members (see section "Listening to our Members" in Plain English Summary). This year we will continue to devote time to these important items as well as:

- Encouraging BHPB and governments to move towards regional monitoring programs and organisations.
- Dedicating increased time to environmental data analysis.
- Increase availability of web-based reports.

## The activities of the Agency are as follows:

Reviewing and commenting on BHPB's environmental management plans, reports and research studies, and the activities of regulatory agencies as they pertain to Ekati. The Agency identifies problems and suggests solutions, and reports these to the company, regulators, and Society Members.

Serving as a public watchdog of the regulatory process and implementing the *Environmental Agreement* requires the Agency to keep up to date with regulatory proceedings, and to review, comment and act as an intervener on regulatory approvals sought by BHPB.

Compiling and analyzing environmental data in order to make recommendations on environmental effects monitoring programs; government inspection and compliance reports; and the integration of traditional knowledge into environmental plans and programs, among other activities.

Providing an accessible public repository of relevant environmental data, studies, and reports. The Agency provides information or copies of reports contained in its library of over 400 documents related to Ekati Diamond Mines™.

Providing information to aboriginal peoples and the public about the Agency's mandate and activities by publishing an annual report, newsletter, web site, as well as, meeting aboriginal organizations.

Providing aboriginal people with a channel to bring their concerns to BHPB and the general public about environmental management of the project.

Participating in dispute resolutions under the *Environmental Agreement*. No incidents of dispute resolution have occurred to date.

# Core-Budget 2002 – 2003

## Core-Budget 2002–2003

Budget figures are all in \$1000's (thousands of dollars); and rounded to the nearest \$10.

The budget (not including honoraria + staff salaries) has been increased by 2.5% (predicted rate of inflation) for the 2002-2003 year compared to the 2001-2002 year.

A. Operations	1st Q	2nd Q	3rd Q	4th Q	2002-03
1. Insurance	0.54	0.54	0.54	0.54	2.16
2. Telephone, fax, email	2.05	2.05	2.05	2.05	8.2
3. Office supplies, software	1.65	1.65	1.65	1.65	6.6
4. Postage, courier, freight	0.58	0.58	0.58	0.58	2.32
5. Bookkeeping	0.58	0.58	0.58	0.58	2.32
6. Auditing, accounting	0.0	0.0	0.0	4.6	4.6
<b>Subtotal</b>					<b>26.2</b>

B. Board Support	1st Q	2nd Q	3rd Q	4th Q	2002-03
1. Travel	17.	8.85	17	8.85	51.7
2. Accommodation	5.5	2.8	5.5	2.8	16.6
3. Accommodation - Chair	3.7	3.7	3.7	3.7	14.8
4. Meals	2.15	1.15	2.15	1.15	6.6
5. Honoraria (Note 1)	46.2	33.6	46.2	33.6	159.6
<b>Subtotal</b>					<b>249.3</b>

C. Communication/ Consultation	1st Q	2nd Q	3rd Q	4th Q	2002-03
1.Communication (Note 2)	1.5	1.5	1.5	32.5	37.
2.Community Consultation (Note 3)	9.45	9.45	9.45	9.45	37.8
<b>Subtotal</b>					<b>74.8</b>

D. Staffing	1st Q	2nd Q	3rd Q	4th Q	2002-03
1.Salaries	32.5	32.5	32.5	32.5	130.0
3.Benefits & Payroll taxes	4.5	4.5	4.5	4.5	18.0
4.Outside experts		6.0		7.1	13.1
<b>Subtotal</b>					<b>161.1</b>
				<b>Total</b>	<b>511.4</b>

## Notes:

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 June, August, October (with AGM), December, February and March and 14 days for the Chair for community consultation.
2. Annual Report (\$32.5K) and 3 newsletters (\$1.5K).0
3. Costs for attending meetings in communities and attendance/presentations at assemblies.

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# Independent Environmental Monitoring Agency



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