Independent Independent Environmental Monitoring Agency



PLAIN ENGLISH-ANNUAL REPORT 2002-2003

A PUBLIC WATCHDOG FOR ENVIRONMENTAL MANAGEMENT AT EKATI DIAMOND MINE™



 ASSESSING THE REGULATORS ASSESSING BHPB TRADITIONAL KNOWLEDGE AQUATION EFFECTS WILDLIFE EFFECTS MINIMIZING TERRESTRIAL AND AQUATIC IMPACTS AND AQUALITY EFFECTS AT EKA



2002-2003 PLAIN ENGLISH-ANNUAL REPORT

Message from the Chairperson

I am happy to present to you the fifth annual report of the Independent Environmental Monitoring Agency. Last year, representatives at our Annual General Meeting commended the Agency on producing a plain English annual report to accompany the technical report. They felt that both were well written and easy to read. Therefore, we have produced two reports again this year. This publication is the plain English annual report. We have included inside the back cover a list of the recommendations resulting from our technical report.

Last year the workload of the Agency increased due to the expansions and modifications of activities at the Ekati mine. This past year saw us change our office staff as well as one of our Directors. I take this opportunity to thank the previous staff and Director for their hard work.

The Agency continues to fulfill its mandate through regular meetings with regulators and Society members, review of reports, licences and plans and maintenance of a website and resource centre. One of our biggest achievements in the past year was co-hosting a traditional knowledge workshop. The workshop resulted in a unanimous recommendation from our Society members on how to proceed with incorporating traditional knowledge into environmental practices at Ekati.

BHPB and the regulators continue to work together in a manner that is both protective of the environment and responsive to the Agency and community members. We are particularly pleased to see the adaptive management practices used by BHPB in response to results from its monitoring programs. We believe that BHP Billiton (BHPB) and others need to look more closely at the long-term plans for closure of the mine and at the impacts the mine is having combined with the impacts from other mines nearby.

An important part of our mandate is to help the communities deal with concerns they have about Ekati. Please contact us if you have any comments on the mine's activities or how the mine is monitored or if you would like us to visit your community. Our contact information is on the back cover of this publication.

We look forward to another successful year of monitoring Ekati.

Respectfully

Red Pedersen Chairperson

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The Agency at Work

The Agency at Work

The Independent Environmental Monitoring Agency (referred to as the Agency) was formed in 1996 as part of the Environmental Agreement. This agreement was negotiated between BHP Billiton Diamonds Inc, (referred to as BHPB) and the federal and territorial governments in consultation with the Dogrib, Akaitcho, Métis and Inuit of the Kitikmeot region. The seven parties mentioned above make up the Agency Society members.

The Agency's main role is to act as a public watchdog for the environmental management practices at Ekati Diamond Mine[™] (referred to as Ekati). We monitor the activities of both BHPB and the government regulators.

The Agency is guided by a Board of Directors who are selected by our Aboriginal Society members but do not represent the members. The directors provide technical reviews of Ekati environmental reports, work with communities to identify concerns and then with BHPB and regulators to find ways to address those concerns. ■



Agency Director Pete McCart speaking at the BHPB annual environmental workshop. JERI HERMANN/BHP BILLITON DIAMONDS INC.

Agency Mandate		To meet its mandate in 2002 the Agency:
\checkmark	Review, report and make recommendations on BHPB and government reports and plans.	 Reviewed and provided comments to the appropriate regulatory authorities on the 2002 Seepage Monitoring Plan for Beartooth and Bearclaw, the Fox Pit Waste Rock Management Plan, AEMP Re-evaluation and Refinement, Leslie Lake fish habitat compensation, BHPB's Annual Report and Impact 2003 Report. Reviewed wolverine harvest data from Nunavut, DIAND inspection reports, wildlife incident reports and Surveillance Network Program reports.
\checkmark	Make recommendations on the integration of traditional knowledge and experience of Aboriginal Peoples into environmental plans and programs.	 Co-hosted with the Diavik Environmental Monitoring Advisory Board a workshop on traditional knowledge for government, Aboriginal members, BHPB and Diavik. Recommended that Government of Canada, NWT and BHBP support the recommendation from the traditional knowledge workshop which was to establish a regional TK panel.
\checkmark	Participate as an intervenor in regulatory processes.	 Intervened in the public hearings for the Sable, Pigeon and Beartooth expansion project, provided comments on the Misery Surplus Water Atomization project
\checkmark	Provide an accessible public repository of all environmental information relevant to the project.	 Maintained a web-site which contains copies of reference documents, minutes, correspondence inventories and photos. Maintained and updated a reference centre of relevant correspondence and reports.
\checkmark	Provide ways of distributing information to Aboriginal Peoples and the public.	 Produced and distributed an annual report, a plain English summary and a poster outlining our mandate and activities. Provided copies of all minutes from our Directors meetings, Inter-Agency Coordinating Team meetings and major correspondence to our Aboriginal members. Participated in a multi-party workshop to explore approaches to regional environmental monitoring. Provided a technical summary to our members on potential nitrate toxicity issues to fish. Directors and staff formally responded to concerns and provided technical advice at our Annual General Assembly, community visits and meetings with environment committees. Informally, directors and staff frequently responded to concerns of individuals in side conversations during workshops and meetings and while conducting day-to-day business not necessarily related to diamond mining.
\checkmark	Provide an effective means to bring to BHPB and governments the concerns of Aboriginal Peoples and the general public.	 Coordinated Inter-Agency Coordinating Team (IACT) meetings. Conveyed concerns of the communities during IACT meetings, workshops, public hearings and meetings with regulators and BHPB. Provided copies of notes from the Annual General Meeting to regulators and BHPB. Hosted our Annual General Assembly to identify concerns and were informed by our Aboriginal members that they were pleased with our performance.

Mining at Ekati Diamond Mine[™]

BHPB is mining diamonds on its claim block north of Lac de Gras in the barrenlands of the Northwest Territories (for location see map on previous page). The diamonds are contained in large carrot-shaped rock formations, called kimberlite pipes, extending over 300 metres below the ground. Most of the pipes BHPB is mining are located beneath lakes.

Independent Environmental Monitoring Agency

1. Tailings Pond The Tailings pond or Long Lake Containment Facility is where a mix of very fine ground kimberlite and water, sewage sludge and mine water is deposited. The facility (formerly lakes) has been split into five sections or cells. As water passes downstream, through each cell, the quality improves as the tailings settle. By the time it leaves the last cell of the facility, all water must meet requirements set in the water license. *Photo: Cell B of the Long Lake containment facility*. AGENCY

2. Main Camp BHPB has built accommodation buildings, a truck shop and process plant. These buildings are some of the biggest in the Northwest Territories. The process plant washes and grinds the kimberlite rock, and separates out the diamonds. *Photo: Ekatī[™] main camp complex*. BHP BILITON DIAMONDS INC.

3. Fox Pit BHPB began draining Fox Lake, the site of the future Fox Pit in early 2002. Overburden removal of the Fox Pit, expected to take two years, is now underway. *Photo: Mining within the Fox Pit*. AGENCY



Mining at Ekati Diamond Mine™









4. Waste Rock Piles Rock that does not contain diamonds, is placed in waste rock piles. These piles will grow up to 50 metres tall and cover large areas of the tundra. *Photo: Panda/Koala Waste Rock Pile (June 2002)*. AGENCY

5. Open Pits Diamonds are mined using open pits. The pits will be up to 300 metres deep and 800 metres across. Most of the pits were originally lakes, that had to be drained.

Panda Diversion Channel This is a man-made channel that diverts water around the pits and is intended to replace streams lost through development. *Photo: Panda diversion channel (in front) Koala pit, Koala North Pit and Panda Pit (Panda/Koala waste rock pile behind) June 2002.* AGENCY

6. Underground Mining BHPB will also mine underground beneath some of the pits. This involves digging tunnels beneath the ground to reach the kimberlite—the rock diamonds are found in. *Photo: Koala North Underground Decline*. AGENCY 7. Haul Roads Roads made of waste rock and quarried rock connect all parts of the mine, including the Misery, Fox and Beartooth sites and the Sable and Pigeon developments. Haul roads may cause problems for migrating wildlife because of steep edges, traffic on the road, or dust. *Photo: Haul trucks on Misery Road.* AGENCY

8. Bearclaw Frozen Core Dam and

Jetty In order to mine the kimberlite beneath Beartooth Lake, BHPB pumps water from Bearclaw Lake, located upstream of the new pit through a jetty and pipeline into North Panda Lake. Photo: Jetty used to pump water around the Beartooth Pit. AGENCY

9. Beartooth Pit Beartooth is the first of three new pits to be developed by BHPB as part of the mine expansion approved in 2002. Beartooth Lake has been drained and excavation will begin in summer 2003. *Photo: Beartooth Pit prior to removal of waste rock*. AGENCY



10. Misery Site The Misery site is about 30 km southeast of the main site. Here a pit is being mined, and waste rock piled. This development often has to be looked at carefully as it is a long way from the main camp, and can have its own set of environmental issues. *Photo: Misery development.* JIRI HERMANNIBHE BILLITON DIAMONDS INC. 3



Additions to the Mine Independent Environmental Monitoring Agency



Inspecting the Fox Lake dewatering line

The DIAND inspector for the Ekati project asked BHPB to change the location of a section of the Fox Lake dewatering pipeline. It was originally laid on the east side of Fox road. If the pipe broke and the water spilled it would have flowed towards an undisturbed lake rather than the Long Lake Containment Facility (LLCF). BHPB responded by rerouting the critical sections of pipeline along the west side of the road, ensuring any spill would flow towards the LLCF.

Protection on Mine Roads

Sable Haul Road Traffic Management

We were concerned that caribou and grizzly bear movement and habitat could be affected by the new Sable haul road. We recommended that the number of trucks on the road be limited when the animals are in the area. This recommendation was adopted by the MVLWB in BHPB's permit to use the land around Sable Lake. BHPB must ensure that during periods of caribou migration, the total number of vehicle trips entering or leaving the Sable area is less than 200 each day.

BHPB has begun development of two new diamond pipes (Fox and Beartooth), and has approval to develop two more in the future (Sable and Pigeon). To mine these pits, BHPB has built access roads and drained lakes, and will create new waste rock piles or add to existing waste rock piles already at the main mine site.

The Agency participated in reviewing three main expansion activities at Ekati in 2002. These were:

- the Misery Land Treatment project;
- the Sable, Pigeon and Beartooth expansion; and
- the Fox pit.

For information on the Misery Land Treatment Project see the Mine Wastes section (page 18) of our report.

Beartooth Open Pit Development

Beartooth pit is the first new development of the Sable, Pigeon and Beartooth mine expansion approved by the MVLWB. Development of this kimberlite pipe requires draining of Beartooth Lake and permanent re-routing of Bearclaw Stream around the future pit through a pipeline. Based on our recommendation BHPB put a screen on the pipe outlet to prevent the entry of fish that could be attracted by the water flowing into North Panda Lake.

Below: Bearclaw jetty, used to pump water around the Beartooth Pit. Riaht: Frozen core dam at the outlet of Bearclaw Lake, AGENCY





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Additions to the Mine



Beartooth Pit prior to removal of waste rock, Bearclaw Lake dam and jetty in background. AGENCY

Fox Pit Development

In early 2002, BHPB received permission to drain Fox Lake, the site of the future Fox pit, into a nearby lake. During dewatering, the water level below the ice lowered until the ice collapsed. This disturbed sediments on the bottom of Fox Lake. The remaining lake water became cloudy with sediment and could no longer be pumped downstream. BHPB asked permission from the MVLWB to add chemicals to the water to remove some of the sediment, then release the cleaner water onto a boulder field that drains naturally to cell D, a lower chamber of the LLCF. The MVLWB granted permission for the discharge of the Fox Lake water to cell D. They asked that the mine apply to be able to discharge mine water from Fox, once it is drained.

Site preparation of Fox pit began in the summer of 2002. Lake bottom sediments and waste rock around the kimberlite pipe will be removed next.



Mining in the Fox Pit. AGENCY.

What the Agency Thinks...

We did not support BHPB's request to use cell D as its location for pumping cloudy Fox Lake water. We are concerned about the chemicals in the cloudy water. The ones used to remove the sediment from the water might be dangerous to small bugs and plants in the water downstream. These and other chemicals and solids in the water would pass through more filters if the water was pumped into cell C and not cell D. This would likely result in cleaner water being discharged into the environment. For these reasons, we thought BHPB should pump the water from Fox Lake into cell C.



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Independent Environmental Monitoring Agency

Traditional Knowledge

Under the Environmental Agreement BHPB is required to give full consideration to available traditional knowledge (TK) and science when developing and implementing its environmental monitoring programs. For the past few years the company has attempted to achieve this goal through:

- funding of TK projects submitted by individual communities or society members;
- provision of site tours to community members and elders; and
- employment of Aboriginal Peoples as mine employees and contractors.
 Although these are good activities we believe BHPB needs to improve its programs so that TK can contribute more to the overall environmental management of the mine.

TK projects funded in 2002 include the continuation of the Inuit Naonaiyaotit Traditional Knowledge Study and the North Slave Metis and the Lutsel K'e geographic information systems. These projects are intended by BHPB to provide long-term capacity for these organizations so that they can continue to help monitor Ekati.

An important community-based project that occurred in 2002 was the monitoring of caribou behaviour along the Misery road. This was done with Lutsel K'e Dene and Kitikmeot Inuit. The Lutsel K'e people have told us many times that they believe the mine roads could be causing increased crippling of caribou. To support their claims, Lutsel K'e Dene videotaped caribou crossing the road as part of their monitoring. This video did document that some of the caribou crossing the road were limping. However, the company thinks the number of limping caribou is very small compared to the total number of caribou that crossed the road that day. BHPB had planned to have

Aboriginal employees monitoring the Panda Diversion Channel. AGENCY

Aboriginal representatives from this study present their findings and recommendations at the February 2003 technical workshop. Unfortunately, there was not enough time to do so.

During the environmental review of the expansion into Sable, Pigeon and Beartooth pits, BHPB heard recommendations from the Yellowknives Dene on how to reduce the impacts to Ulu Lake from the waste rock piles. BHPB has agreed to implement those recommendations.



Traditional Knowledge

What the Agency Thinks...

We support the community-based monitoring of the interaction of BHPB operations and animals similar to what was done along the Misery road. We also support the continued use of Aboriginal employees to take the fish out of lakes that are about to be drained. One of the benefits is the establishment of open communications between BHPB staff and Aboriginal Peoples about what people see in the field.

At this point, we are not sure how successful the mine is at using traditional knowledge in its environmental management practices. The company states that it listens to advice from Aboriginal visitors but we still hear concerns that constructive criticisms made by Aboriginal visitors to the site are not being documented by BHPB. We will continue to urge BHPB to document both concerns and suggestions that aboriginal people on site (employees or visitors) put forward.

Community representative speaking at the traditional knowledge workshop. AGENCY



Based on concerns we have heard from our Aboriginal members, the Agency believes the Phase II TK studies require more input from the Aboriginal members. Although each Aboriginal group determines how it wishes to participate in TK studies, the Agency has heard that Aboriginal groups prefer a more coordinated approach. This could help ensure that TK funds are dedicated to projects that contribute more directly to environmental management at Ekati. We have also noted that many Aboriginal representatives are not aware of previous TK projects or their results. It would be helpful to all if BHPB were to summarize the projects and distribute this to our Aboriginal Society members.

Traditional Knowledge Workshop

The Agency has heard from our Aboriginal Society members that they would like TK to be looked at in a more coordinated manner. At our 2002 annual general assembly a resolution was passed by our society members which asked us to consider establishing a TK advisory panel to look at diamond mines.

To respond to the resolution, we co-hosted with the Diavik monitoring board a very productive workshop. Its purpose was to get all of our Aboriginal Society members to explore whether there was a common approach that could be adopted for bringing TK into environmental management at the Ekati and Diavik mines. The main recommendation from the workshop was for the formation of a TK panel. We believe such a panel would present significant opportunity to advance the role of TK in the environmental protection of the diamond fields. As a follow-up to the workshop, we asked BHPB, the federal government and the territorial government to respond quickly to the recommendation. ■



Lutsel K'e elder during meeting with Agency. AGENCY

Important results from the Traditional Knowledge (TK) Workshop – March 12-14, 2003

- The recommendation to create a regional TK panel was supported by all the Aboriginal members.
- The TK panel proposed is to be regional in scope and not specific to one mine.
- The panel is to consist of elders and others with TK expertise. This will increase community input into environmental management at the mines.
- Membership of the panel will change from time to time depending on the issue being discussed. Different TK holders have expertise on wildlife such as caribou, fish, or wolverine.

Consultations and Communications

Independent Environmental Monitoring Agency

Suggestions for improving BHPB's Annual Public Environmental Workshop

- Technical information should be presented in a non-technical format using many photos and maps.
- Presentations should be reviewed by non-experts before they are delivered to a large audience.
- Presentations should end with simple, clear messages that are easy to understand and remember.
- Hand-outs should be given to workshop participants before the presentations so that they do not have to write down everything they see and hear.
- Hand-outs should also be given to interpreters before the workshop to help them understand the topics better.
- A CD containing all the presentations should be given to all interested parties immediately after the workshop.
- The workshop should offer more time for participants to review and discuss the data, perhaps in smaller working groups.

Part of our mandate is to ensure that Aboriginal Peoples and the general public have a good understanding of BHPB's activities and an opportunity to explain to the company their information needs and concerns.

The Environmental Agreement describes how consultations should be conducted by BHPB with government, the Agency and Aboriginal Peoples. Because Ekati is a large mine and is dealing with processes not used before in the North, it is important that BHPB communicates regularly and effectively with all interested people. BHPB communicates with others by producing reports, hosting workshops, visiting communities and conducting tours at Ekati.

A good example of BHPB's communication activities is the annual environmental workshop held each February. The workshop provides an effective way to deliver environmental information to Aboriginal Peoples and others who attend.

What the Agency Thinks...

We believe the workshop in 2003 was not as effective as it could have been in receiving input into the proposed monitoring programs from Aboriginal Peoples (see sidebar).

BHBP should consult with interested parties well in advance of producing reports and not afterwards. This would help ensure that concerns from others are addressed in the reports. BHPB's consultation process for the preparation of the Impact 2003 Report was not conducted in this fashion, and we found it frustrating. The impact report is very important as it



Elders at the traditional knowledge workshop. AGENCY

is only produced every three years and it summarizes the environmental changes that have occurred at the mine site.

BHPB asks interested parties to suggest changes to its monitoring programs based on the results from the programs from the previous year. Sometimes the reports are distributed too late for people to review them and suggest changes before the monitoring program starts.

We have recommended that BHPB consult with interested parties well in advance of preparing reports and well in advance of making changes to its monitoring programs.

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Minimizing Terrestrial and Aquatic Impacts

Independent Environmental Monitoring Agency

When assessing an activity that affects both land and water, regulators and BHPB are faced with a challenge to minimize the impacts to both. Stream crossings have the potential to affect both the land and the water. Measures must be taken to make sure that crossings are not built larger than necessary just to avoid affecting water because large structures can affect animal behaviour. The construction of the culvert crossing at Pigeon stream along the new Sable haul road is an example of a challenge that regulators and BHPB faced. The Pigeon culvert was designed large enough to avoid disturbing fish habitat. The result of this is that the large amount of rock on each side of the culvert could block a natural movement corridor for caribou in this area.

BHPB has explained to us that it designed the stream crossing like it did because it was easier to construct, less expensive and an authorization from the Department of Fisheries and Oceans would not be required.

What the Agency Thinks...

Our main concern with the culvert is the increased waste rock volume deposited on the tundra. The height and length of the approaches act as barriers to caribou migration, particularly in this small valley, which appears to be used heavily by caribou. A bridge, requiring lower approaches and much less rock would have made it easier for caribou to cross the road. The crest of the road surface is now over eight metres above the original tundra.

BHPB's reasons for selecting the large culvert are clear. The impact on land caused by the structure is greater than it should be. The decision was made mainly for regulatory and engineering reasons, with less attention paid to environmental concerns. This is not precautionary or conservative environmental management. We recommended that the company improve its approach when making road-building decisions in the future.

Below: Two Agency Directors atop the Pigeon Culvert. AGENCY

Cumulative Effects and Regional Monitoring

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Aboriginal Peoples and others are concerned with the growing number of projects occurring close to each other. They are worried about the impacts on the land, water and animals from all the projects combined together.

Cumulative Effects

Cumulative effects (or cumulative impacts) are the effects from one project combined with effects from other projects. The other projects can be from the past such as abandoned mines, from the present such as other operating mines or future projects that are likely to start up within the next few years. Activities not related to mining such as hunting, fishing and tourism also contribute to cumulative effects because they can affect the animals and fish in the area.

We have heard many concerns from Aboriginal members about the impacts that increased development activities are potentially having on the environment. The Inuit of the Kitikmeot region are



particularly concerned about the possible cumulative impacts on fish and water quality in the Coppermine River watershed and the Inuit, Dene and Métis are concerned about the impact the mines might be having on caribou migration routes.

The federal government, territorial government, mining companies, Aboriginal communities and ourselves are looking at ways that we can monitor the effects on the environment from all the mines combined, and not just from each mine individually. This will require the mines to work together to make sure they are measuring the same things in the environment, using the same methods.

Regional Monitoring

Monitoring programs should look at impacts on the environment for an entire region, not just around the mines. The formation of a regional monitoring agency would help with this. Both diamond mines, Ekati and Diavik, have independent monitoring boards to watch over the environmental practices at each mine. With the possibility of the Snap Lake diamond mine starting up, people are talking about forming one agency to oversee the three diamond mines instead of three separate agencies.

Because the three diamond mines are in the same area they will have the same Aboriginal Peoples represented on each board. The increase in the number of boards has meant an increase in the

Parts of the Environment that may be affected by more than one mine:

- wildlife with large habitats or migration ranges
- water quality (chemical and physical components)
- water flow and amount air-borne pollutants
- habitat loss fish air quality birds

amount of stress on the communities who want to participate on them effectively. There are not enough community resource people to participate on all the Boards, review stacks of technical documents, consult with their communities and then attend meetings and workshops. A regional monitoring agency could help lessen the stress by providing a central coordinating function for these activities.

Workshops have been held to look at forming a regional monitoring agency. The DIAND identified the following principles were identified to help form such an agency:



Cumulative Effects and Regional Monitoring



- efforts cannot supercede Aboriginal and treaty rights, land claims, self-government agreements, federal or territorial legislation.
- the approach must be a community-based partnership.
- existing mines do not have to contribute more funding than they do now.

What the Agency Thinks...

Assessing cumulative effects and conducting regional studies can be very difficult. We encourage the government and industry to work together to develop practical guidelines and tools to help conduct these assessments and studies.

The formation of a regional monitoring agency faces many challenges and may not occur for a few years. We have added a clause in our environmental agreement that would allow us to change more easily into a regional agency.

The Agency encourages BHPB, Diavik and De Beers (if the Snap Lake mine is approved) to work together and develop cooperative environmental monitoring programs. ■



Map of development within the Slave Geological Province and West Kitikmeot region. BHP BILLITON DIAMONDS INC.







Monitoring of wildlife around Ekati looks for changes in the way birds and animals act when they are near the mine. BHPB tries to make sure that no animals are hurt or killed because of mining activities. So far, BHPB feels that the mine is having almost no impact on the animals directly around the mine.

Wolverine on the Ekati claim block. PAUL NICKLEN.

The wildlife monitoring program looks at effects of the mine on animals that are important to the people of the north. BHPB has refined the program over the past six years based on comments from community members and others. BHPB uses many different techniques to monitor wildlife, including surveys from the air, searching for tracks in the snow and looking to see if animals behave differently when they are near the mine. For most of these activities, BHPB relies on traditional land users to help develop and conduct the monitoring program. If an effect is observed, BHPB will try to change the way it operates to reduce the harm it causes. This is called adaptive environmental management.



Animals and Birds Monitored

• caribou • grizzly bears • wolves • wolverines
 • ptarmigan, sparrows, sandpipers • falcons
All injured or dead animals and birds found around the mine are
reported and looked at by BHPB and sometimes RWED.

Effects from Mining

Wildlife monitoring continues to show that diamond mining at Ekati appears to be having little effect on the amount or health of wildlife coming into contact with the mine. One trend that has emerged in the last few years is that caribou with calves are spending slightly less time feeding when they are within 5 km of the mine. There is also some suggestion that caribou close to roads or waste rock piles are at a greater risk of being killed by wolves.

In the past, we have criticized BHPB's management of garbage which led to the death of wolverines. Surveys at landfills in 2002 show that BHPB has improved in this area and no wolverines were lost in



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Wildlife



2002. Unfortunately one wolf was killed at Ekati when it was hit by a truck. This is the first time an animal that is part of the wildlife monitoring program has been killed by a vehicle since the mine opened.

Last year we noted the concerns of hunters and elders from the North Slave region about the possible causes of limping caribou. Based on general observations it appears limping caribou were more abundant in 2001 than 2002. No caribou have been reported killed or seriously injured as a result of mine site activities. However, an adult bull caribou was caught in the electric fence surrounding the airstrip. It needed help getting out of the fence once it had become exhausted from trying to escape.

Similar to previous years, we participated in a technical meeting with the BHPB wildlife team and other stakeholders to refine the 2002 wildlife report and next year's monitoring program.

What the Agency Thinks...

The wildlife monitoring program continues to provide the necessary information to identify impacts on key animals and to assess impacts that may not have been predicted previously. Landfills and holding ponds need to be managed better so that birds are not attracted to them. There is also a need to better understand if haul roads and waste rock piles are used by wolves to hunt caribou.

Wolverines are legally harvested by outfitters in the Lac de Gras area. It is unclear how many wolverines have been harvested within the BHPB wildlife study area since monitoring began in 1997. We recommend that the governments of the NWT and Nunavut work together to report the number of wolverines harvested in the North Slave and West Kitikmeot regions. We also feel that the changes BHPB has suggested to the wolverine monitoring program will improve our ability to determine how many wolverines are using the area around the mine. The scent station monitoring we discussed last year did not prove suitable for inclusion in the 2003 wolverine monitoring program.

The loss of two loons when BHPB was removing fish from lakes scheduled for mining was regrettable. We think that this harmful capture of birds, called by-catch, can be avoided if the Canadian Wildlife Service and DFO change the rules telling BHPB how long it must leave nets in the lake when conducting fishouts. ■

Ducks at the Ekati Landfarm

During the 2002 Ekati site visit by the Agency Directors, three oil-covered ducks were found around the landfarm. The landfarm is used to store snow, ice and other material that have been contaminated by spills of fuel or hydraulic fluid. During spring, melting water forms a shallow pool at the base of the landfarm. Oil and *hydraulic fluid float on top of the water.* Migrating waterfowl can be attracted to this open water. In order to ensure the landfarm does not cause further harm to birds, BHPB placed wires and flagging across the area soon after the initial incident. BHPB has made a commitment to cover the area of the landfarm collecting water, to ensure birds are not hurt or killed again in the future. This action should it occur, is an example of adaptive management practiced by BHPB to reduce impacts on wildlife.

Flagging tape as a deterrent at the Ekati landfarm.





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Fish sampling at the Panda Diversion Channel. BHP BILLITON DIAMONDS INC.

BHPB looks at fish, water and the small plants and animals that live in water to see if the mine is having effects on them. BHPB takes measurements in locations near the mine, directly downstream from the mine and from farther away. Small changes have been noticed in the downstream environment that may require further monitoring. When necessary, the mine changes how it operates to make sure the water and fish are better protected.

In 2002, BHPB consulted with government and community members to see how it could improve the monitoring program for aquatics (fish, water, sediment, small plants, small animals and bugs). Based on what it heard BHPB made many changes to the program so we can better understand the effects of the mine. Last year, BHPB completed a special study to find out why water in Kodiak Lake had higher levels of some nutrients and lower levels of oxygen. Based on the early results, BHPB moved its sewage discharge away from Kodiak Lake in 1998, and the lake has largely recovered.

Effects of Mining on Lakes and Streams

Changes in the water quality and the fish, animals and plants that live in the water have occurred. Most of these changes were predicted before the mine was approved and began operations. The effects have mainly occurred to the small plants and animals in water from a few lakes and to water quality in lakes and streams downstream from the mine operations where water leaves the property. Changes to the living community include lower numbers and fewer types of small animals immediately downstream of Ekati and higher amounts of small plants downstream of the Misery pit. Changes to water quality in lakes and streams include increased nutrients such as nitrate from the explosives used in mining, trace metals such as molybdenum and nickel, and dissolved solids such as salts. These were mainly observed downstream of Ekati. Even with these changes the quality of the water released into the environment meets the requirements of the water licence.

Monitoring of the Panda diversion channel has shown that a wide variety of fish species use the stream. Particular attention is given to the number



and size of grayling that enter the channel to spawn, and the ability of their young to survive. In 2002 the second highest number of grayling on record entered the channel, although the

Tiny animal found in northern lakes. Note; cannot be seen without magnification. AGENCY

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Water and Fish

size of individual fish was lower than in other years. The presence of juvenile grayling (1+ years old) in the channel may indicate that grayling born in the channel are surviving the winter, and the channel is providing safe fish habitat.

What the Agency Thinks...

We are concerned about the changes in the communities of small animals in the water (zooplankton) in Moose Lake. Moose Lake is downstream of the basin where wastewater and kimberlite tailings are deposited by BHPB. Since 1998, the amount of different kinds of some of those tiny animals (water fleas) has declined. Water fleas are an important food for fish. Studies have shown that in 2002 round whitefish ate more larval flies than water fleas that dominate their normal diet. We do not know what has caused this shift and what the change in diet means to the health of the fish. A pattern is occurring and may be related to the increasing influence of water from the mine.

We are pleased that in response to our recommendation, BHPB has agreed to expand its zooplankton sampling program in 2003 to include Leslie Lake, the first lake downstream of the mine. This expanded program may tell us whether the apparent shifts in the zooplankton community of Moose Lake are related to the discharge from the LLCF.

The Agency has been concerned about potential harm to fish eggs and larvae that could be caused by the elevated nitrate in the water from mine operations as a result of blasting. Nitrate is used to make explosives and is also a plant nutrient. We suggest that DFO should study local fish to determine if nitrate is toxic to fish, especially at the levels found around Ekati.

Another issue that drew our attention was the concentrations of mercury in the muscle and liver of lake trout, which increase downstream of the mine. Mercury is not known to be associated with diamond mining and high levels in some fish could be natural. It is hard to determine if mercury levels are getting higher or lower because different lakes and fish were sampled in the two main study years, 1997 and 2002. BHPB has agreed to sample fish in 2003 in Leslie Lake, a location requested by the Agency because it is immediately downstream of the mine. This will help to find out what amounts of mercury are in Leslie Lake fish and whether mercury in those fish is from natural or human causes. ■



Independent Environmental Monitoring Agency

Oualit



BHPB is studying how much dust is produced from roads. A new road will be constructed to join Sable pit to the rest of the mine. Before the road was built, BHPB started a study that looked at the plants in the area. It measured the amount of dust and type of plants at different distances from where the road will be built. This is called a "baseline" study. While the road is being built BHPB will be able to measure dust and plants from the same places BHPB measured before and see if there are any changes. They will then do the same study once trucks start using the road to see how much dust the trucks produce and will also study the effects the dust has on plants.

Dust plume from ore truck on Misery haul road. AGENCY.

A number of activities at Ekati produce dust and air pollutants, which can affect the air, water and plants around the mine. BHPB measures air quality by using computer models to estimate the levels of pollutants and dust in the air. They then collect samples of air, snow, plants and water to see if the estimates are accurate. Although a lot of dust is produced, BHPB does not feel that the dust is having a bad effect on the environment. The effects of air pollution produced by the mine are not yet well known or understood.

The Agency has heard concerns from our Aboriginal Society members about the dust on plants because caribou eat the plants. Last year BHPB produced a report that contains data on air quality and dust collected between 1998 and 2001.

Effects from Mining

During every summer BHPB measures dust levels at two locations, one on top of the kitchen building and one farther away from the mine. Every three years it measures snow and plants for dust from many locations around the mine.

Dust from the mine can be seen easily and contains small amounts of metals such as copper and iron. Air

pollution is usually invisible and contains small amounts of chemicals such as ammonia. BHPB reported that dust could travel up to 5 km from the mine and air pollution could travel at least 20 km from the mine. It could be traveling farther but BHPB has not taken samples from places over 20 km away. Studies also show that the levels of contaminants are higher close to the mine and become less the farther you move away from the mine.

Estimating Air Quality

When the mine was first proposed BHPB made predictions on how much dust and air pollution would be produced and what the levels would be if you

Air Quality

Mining activities that affect air quality

• Blasting of rocks and quarries

- · Burning of diesel for electricity
- Truck emissions
- Burning of waste oil and contaminated dirt
- Road dust

measured them at the edge of BHPB's property. It was predicted that the air pollution would be very low and would not have bad affects on the environment. There are no limits placed on the mine on how much air pollution it can produce as long as the levels of dust and contaminants are lower than predicted. The mine takes samples of air, water and plants to check that its predictions are still good.

What the Agency Thinks...

We think that BHPB should improve its air quality monitoring program. We have made recommendations to the mine that it:

- redo predictions from 1995 using up-to-date information;
- based on the new predictions, update the monitoring program;
- put the dust monitors in better locations and add monitors if necessary; and
- use information on wind direction and speed to accurately determine what effects explosives produce.

Some of the things that have changed since BHPB made its predictions in 1995 are:

- the mine has added four new pits to its operations;
- Diavik, which is 10 km from BHPB's Misery pit, was built and started operating;



Experimental wastewater treatment system at Misery site, see page 18. AGENCY

- BHPB can now use actual amounts of dust and air pollution produced based on five years of mining rather than estimates;
- more of certain chemicals are released than predicted; and
- computer programs that estimate air quality are much better and more accurate now.

We intend to work with BHPB on improving our understanding of how the mine may be affecting air quality.



Independent Environmental Monitoring Agency

Wastes



Definitions:

Waste Rock

mined rocks that do not contain diamonds

Wastewater

water that contains wastes from the mining process including sewage and chemicals from explosives

Seepage

water that runs through a waste rock pile and can pick up metals and other chemicals from the rocks and carry these chemicals into the water around the waste rock piles

Processed Kimberlite

also referred to as tailings. The crushed kimberlite that remains once the diamonds have been removed. Because it contains very fine clay particles, processed kimberlite is usually treated with chemicals to make the particles settle out of the water

Long Lake Containment Facility (LLCF)

the LLCF used to be a series of small lakes. It now contains dams that separate the lakes into five cells. Most of the wastewater and the processed kimberlite is pumped into the LLCF. The water that leaves the LLCF is monitored to make sure it meets the requirements of BHPB's water licence

Preparation of Fox Lake for mining. AGENCY



Diamond mining produces three main types of wastes: waste rock, wastewater and processed kimberlite. Waste rock is stored in piles close to the pits where it came from. Wastewater is pumped into holding facilities and treated before it is released into the environment. Processed kimberlite is sent to the Long Lake Containment Facility (LLCF) for permanent storage. BHPB samples the water seeping from the waste rock piles to find out if any chemicals are being released into the water. The water released from the LLCF is measured regularly to make sure it meets the requirements of the water licence. As mining progresses, the amount of waste rock and processed kimberlite will increase.

Effects from the Waste Rock Piles

With the development of Fox pipe, there are now waste rock piles at Panda/Koala, Fox and Misery pits. The current mine now covers an area similar to the size of the city of Yellowknife, but has less roads and buildings. The waste rock dumps make up approximately one half of the area affected by the mine.

Waste rock at Ekati is not affecting the quality of water right now although there are concerns with ammonia in several locations. Ammonia is a chemical that attaches to the rocks during blasting and is washed off into the water when it rains or snows. The waste rock at Ekati also contains sulphides. Rocks from different pits have different amounts of sulphides. Sulphides occurs naturally in rocks but can increase the amount of acid in the water around it. Some seeps at the Misery waste rock pile showed elevated levels of acid. BHPB controls this seepage by directing it to the LLCF or King Pond where water from the mine is stored until it meets discharge limits. BHPB is looking at ways to control the amount of acidity produced from the waste rock piles. One way that looks promising is to build the waste rock piles so that they remain frozen all year round. The temperature is measured from the core of the piles every year to make sure they are safely frozen.

Treatment of Wastewater

In 2002 BHPB applied to the MVLWB to try a new kind of wastewater treatment system at the Misery site. It will use water that contains less contaminants than what BHPB is already allowed to pump into the environment. The water will be mixed with air and sprayed over land that drains into Cujo Lake. Small amounts of ammonia in the water will change to a gas and disappear into the atmosphere, while other contaminants in the water will fall to the ground. Environment Canada and BHPB will monitor the soil, water, plants and bacteria where the wastewater is sprayed to see if they are becoming contaminated. If the new system works it might be expanded to handle more wastewater.

Mine Wastes

Other Studies

Chemicals are used to settle particles out of wastewater and water drained from lakes. There are concerns that these chemicals could be harmful to zooplankton (tiny bugs that live in water). Studies are being conducted to see if this is true. Another study is looking to see if the processed kimberlite is having an affect on the very tiny bugs and worms (benthic organisms) that live on the bottom of lakes. No final results have been reported to date.

What the Agency Thinks...

BHPB has worked hard to understand the effects of waste rock at Ekati. This will help with long-term management and closure of the mine. BHPB compares the amount of contaminants in the water seeping from the waste rock piles to the amount allowed in its water licence. We would like BHBP to also compare these amounts to the Canadian guidelines for protecting aquatic life. BHPB is not too worried about the seeping water from the waste rock piles because all the water ends up in the LLCF. We think this is fine for now but once the mine closes the water from the waste rock piles could leak into the environment. We are also concerned about the effects global warming may have on the ability of the waste rock piles to remain constantly frozen.

BHPB has begun to mine the Fox pit but remains a few years away from removing any kimberlite. We know that kimberlite from Fox behaves differently than kimberlite from other pits. This could affect the water seeping from waste rock piles. As BHPB collects more information about the behaviour of Fox kimberlite, we will continue to monitor the results. After reviewing the project carefully, we supported the new wastewater treatment system being tried at Misery. We think it could be successful in reducing the amount of contaminants that enter the aquatic environment. We stressed the need for a good

Waste rock storage area with Panda Pit in background. AGENCY

monitoring program for the project to ensure the treatment system does not harm the land or water. We look forward to receiving the results from BHPB and Environment Canada when they become available. ■



Reclamation and Waste Management

The progressive reclamation of a large project, although never before done in the north, is a concept well supported by northerners. Through progressive reclamation, the amount of clean-up required once a mine closes is less than if no reclamation had occurred during the life of the project. Progressive reclamation activities should also influence the amount of a security deposit the mine must set aside to cover costs if the mine should close early.

Independent Environmental Monitoring Agency

In 2002, BHPB focused on three main reclamation activities: reclamation of sites and infrastructure no longer needed, revegetation studies, and establishment of reclamation completion goals. So far, BHPB has reclaimed the old camp area and some roads that are no longer used.

Reclamation Research

BHBP is looking at growing plants on the processed kimberlite tailings so that eventually the tailings will look more natural and be more stable. For eight years BHP has been conducting studies to see how well plants grow using different plants and adding different types of materials to the kimberlite. It has found that:

- seedlings (plants that are grown indoors until the plants are small) grow better than when the seeds are planted directly into the kimberlite;
- adding nutrients, sewage sludge and paper waste to the kimberlite provides better growth rates;
- rocks provide shelter from the wind and help the plants grow better; and
- higher levels of four metals were found in the plants grown on kimberlite than in plants growing naturally in other areas.

BHPB is thinking about filling the empty mine pits with waste materials such as rocks and processed kimberlite. This option has advantages and disadvantages for the environment. A pit filled with

Researchers at an Ekati revegetation plot. JERI HERMANN/BHP BILLITON DIAMONDS INC.

Definitions

Reclamation

the recovery of areas of land and water-bodies that have been disturbed during mining

Progressive reclamation

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

Reclamation and Waste Management

water would not likely be good for the growth of small plants and animals that live in water. The pits would be very deep. The nutrients and decaying material would sink into the deep water, leaving not much food in the water at the top, where the small animals and plants live. A pit filled mostly with kimberlite and waste rock would create a shallow lake on top. The success of such a lake would depend partly on the amount and effect of chemicals found in the kimberlite and waste rock. BHPB is conducting studies to look at these chemicals.

What the Agency Thinks...

BHPB has done a good job developing reclamation tools such as the revegetation of tailings.

We have heard concerns from community members about the type and amount of garbage being put in dumps at Ekati. BHPB has been doing a good job recycling, reusing oil and other types of lubricants and in taking hazardous materials away from the mine such as antifreeze and vehicle batteries.

Tundra vegetation at the Ekati mine. BHP BILLITON DIAMONDS INC.



However, we think that BHPB should track the kinds of waste that are not being recycled better than it does now.

Aboriginal members are worried about caribou eating the plants that have been grown on kimberlite tailings. BHPB needs to do more studies to see if the chemicals in the plants would be harmful to caribou.

We are also pleased that the amount of money BHPB provides as a security deposit is enough to cover the costs of remediation if the mine shuts down early. Once mine closure criteria are developed, BHPB

Revegation plot on the Long Lake Containment Facility. Jeri HERMANN/BHP BILLITON DIAMONDS INC.

should be able to receive credit for the areas it has cleaned up successfully.

BHPB will be revising its Abandonment and Restoration Plan in 2003. It must pay more attention to what it will do to finally close the mine, especially how it will fill the empty pits and what it will do with the kimberlite tailings in the Long Lake Containment Facility. We urge BHPB to ensure that the Aboriginal Peoples and others are properly consulted during the process of creating acceptable closure standards for Ekati.





Independent Environmental Monitoring Agency

Watching Ekati and its Regulators

BHPB and its regulators play an important role in ensuring that the impacts on the environment from the Ekati mine are minimized. BHPB visits communities and conducts tours at Ekati to let others know about the activities at the mine and to receive comments on how it can improve its performance. Through public processes, regulators provide a venue for public concerns to be heard and addressed and an opportunity for regulators to provide information to communities.

BHPB

One of the important principles used in environmental management at Ekati is that of adaptive management. BHPB defines adaptive management as "a formal process of formulating and continually improving resource management policies and practices by learning from the outcomes of operational programs."

The company has been successful in changing its environmental monitoring and management programs based on new information received and on input from regulators and others. For example:

• It was determined that elevated levels of chemicals found in Kodiak Lake were coming from a nearby storage facility. The chemicals were then moved and the storage pad was dug up and removed.

- Ducks were observed covered in oil from the area where oily soil and water are kept. That area was surrounded by wire and flagging tape to scare the birds. As well, the area was drained more often.
- Wolverines were attracted to the garbage at Ekati. Garbage management was changed to decrease the amount of wolverines visiting the site.

Airstrip, Kodiak Lake and main camp at Ekati. JERI HERMANN/BHP BILLITON DIAMONDS INC.

• The monitoring programs that look at water and wildlife are regularly modified based on the results from the previous seasons.

Environmental awareness has increased among the staff at Ekati in part due to voluntary efforts such as the formation of an environment committee. We congratulate BHPB for its award winning energy



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Watching Ekati and its Regulators

saving program at Ekati that led to a large decrease in the amount of emissions procuced by the company.

In general, small changes are being found in the environment downstream from the mine and very few changes are being found in the animals. BHPB will do more studies to look at downstream impacts and will continue its studies to look at revegetation, the toxicity of kimberlite tailings, waste rock behaviour and wastewater treatment.

We believe BHPB should improve the way it looks at air quality, seepage from waste rock piles, the fish in the diversion channel and cumulative effects. We believe BHBP should also consult more on how it uses traditional knowledge and on how it writes its reports.

The Regulators

In general, the regulators continue to work together to ensure that the licences and permits granted to Ekati are followed. The Mackenzie Valley Land and Water Board (MVLWB) has improved how it reviews

DIAND diamond mine inspector Darnell McCurdy.



applications but the process could still be enhanced

The Agency is pleased to see that the Department of Fisheries and Oceans (DFO) is continuing discussions on the consultation processes for both the Fish Habitat Compensation Fund and for future fish habitat alteration authorizations.

Environment Canada and GNWT's Resources, Wildlife and Economic Development (RWED) have been helpful in reviewing the air quality program and the wastewater treatment studies.

Misery waste rock storage area and Pit. JERI HERMANN/BHP BILLITON DIAMONDS INC.

The Agency is pleased to see the Department of Indian Affairs and Northern Development (DIAND) once again has full time diamond mine inspectors. The site inspection reports produced by the DIAND inspector provide a valuable contribution to the effective environmental management at the mine.

At the end of the year, the Agency noted that DIAND was not participating fully on environmental issues related to diamond mining. As this comes at a time when diamond mining is expanding rapidly, we will monitor this development. ■





Recommendations from the 2002-2003 Technical Report Independent Environmental Monitoring Agency

Further details on the following recommendations can be found in the

BHPB employees and the Agency at the Fox Pit. AGENCY

technical version of our annual report.

Traditional Knowledge, **Consultation and Communications**

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

Minimizing Terrestrial and Aquatic Impacts

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

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Recommendations from the 2002-2003 Technical Report

Wildlife Effects Monitoring Program

3. RWED, in partnership with the Nunavut Department of Sustainable Development, should publicly report the number of wolverines harvested in the North Slave and West Kitikmeot Regions in order to determine the total number of wolverines removed from the wildlife study area.

4. DFO, in consultation with the Canadian Wildlife Service, should consider revisions to the criteria used to conduct fishout studies to reduce the potential for by-catch of birds.

Aquatic Effects Monitoring Program

5. DFO should conduct studies to further assess the potential toxicity of nitrate to local fish species.

Air Quality

6. We recommend that a new air dispersion modelling analysis be conducted by BHPB, and be used as the basis for future air quality monitoring work, including the siting of sampling stations.

Agency Board Meeting. AGENCY



Waste Rock Management

7. BHPB should assess the long term, i.e. post closure implications of poor quality seepage from the coarse kimberlite storage area.

Reclamation

8. BHPB should continue to explore the uptake by grazing animals of metals in plants being considered for revegetation of processed kimberlite.

9. BHPB should improve its reporting of the type and amount of materials stored in waste landfills.

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



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Independent Environmental Monitoring Agency

How To Reach Us

In Person 5006 Franklin Avenue Yellowknife, NT

By Mail P.O. Box 1192 Yellowknife, NT X1A 2N8

By Telephone (867) 669-9141

By Fax (867) 669-9145

By E-Mail monitor@yk.com

or visit our webpage www.monitoringagency.net

Office Hours Monday to Friday 9:00 a.m. — 12:00 p.m. 1:00 p.m. — 5:00 p.m.

Directors

 Red Pedersen

 Chairperson

 Box 275, Kugluktuk, NT X0E 0E0

 Phone
 (867) 982-5788

 Fax
 (867) 982-3178

Bill Ross

Vice Chairperson Faculty of Environmental Design, University of Calgary, Calgary, AB T2N 1N4 Phone (403) 220-6961 Fax (403) 284-4399 E-mail ross@ucalgary.ca

François Messier

Secretary-Treasurer Department of Biology, University of Saskatchewan, 112 Science Place, Saskatoon, SK S7N 5E2 Phone (306) 966-4421 Fax (306) 966-4461 E-mail francois.messier@usask.ca Tony Pearse RR1 — S6 C-9 Wilkes Road, Mayne Island, BC VON 2J0 Phone (250) 539-3015 Fax (250) 539-3025 E-mail tpearse@gulfislands.com

Peter McCart

Box 78, Spruce View, AB TOM 1V0 Phone/Fax (403) 227-6774 E-mail Pmcca102@aol.com
 Dave Osmond

 Gartner Lee Limited

 #490, 6400, Roberts St

 Burnaby, BC
 V5G 4C9

 Phone
 (604) 299-4144 (ext. 225)

 Fax
 (604) 299-1455

dosmond@gartnerlee.com

Tim Byers

E-mail

Box 1049 Teulon, MB RO3 3B0 Phone/Fax (204) 886-4642 E-mail Byerses@escape.ca

Office Staff

Carole Mills Manager

Zabey Nevitt Manager (to November 2002)

Sean Kollee Environmental Analyst