

# Mining at Ekati

► BHP Billiton (BHPB) is mining diamonds using large open pits and underground tunnels to remove the *kimberlite* rock that contains the diamonds.



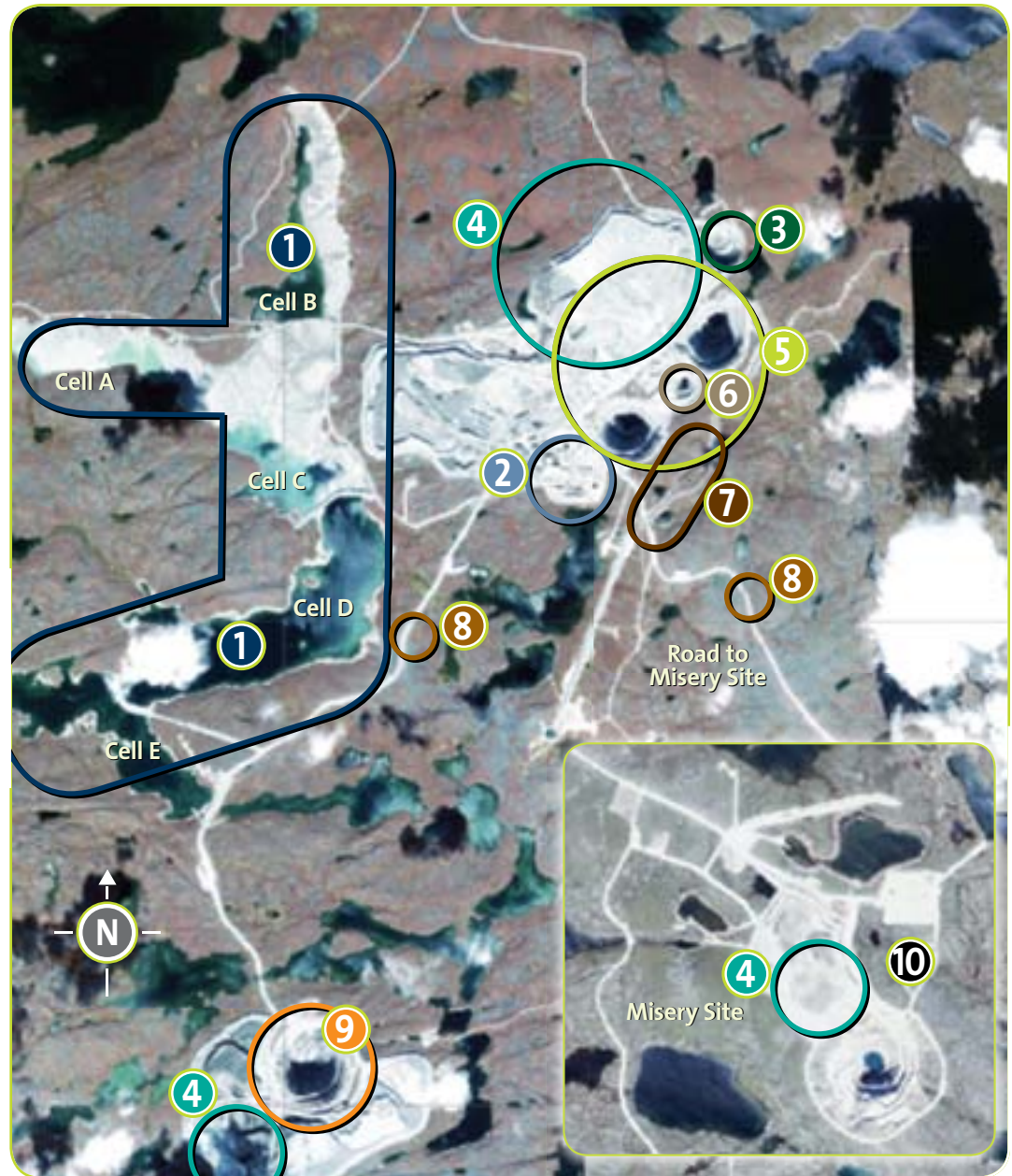
## 1 Long Lake Containment Facility (Tailings Pond)

The Long Lake Containment Facility (LLCF), holds the crushed wet *kimberlite* that remains after diamonds are removed. It is a lake split into five sections by dykes so the *processed kimberlite* can settle. Water is eventually released into lakes downstream when it is clean and below the water licence limits.



## 2 Main Camp

This area includes: an accommodation building for hundreds of workers; a power plant; a truck shop; and a processing plant where the diamonds are removed from the *kimberlite*.



SATELLITE IMAGE 2007/BHP BILLITON DIAMONDS INC.

MINING AT EKATI



3

**Beartooth Pit**

BHPB continues to mine ore from Beartooth Pit. Beartooth Pit will be one of the first pits to be reclaimed at Ekati.



4

**Waste Rock Piles**

Rock that does not contain diamonds is piled in layers up to 50 metres high. BHPB has received permission to expand the waste rock pile to store more rock from Beartooth Pit.



5

**Panda and Koala Pits**

Open pit mining has finished here and underground mining is now underway.



6

**Underground Mining**

BHPB has built one large underground tunnel and a conveyor belt system to provide access to the bottoms of the pits.



7

**Panda Diversion Channel**

This is a man-made stream to divert water that would otherwise flow into the pits. Fish, mostly grayling, use it for spawning.



8

**Haul Roads**

BHPB has built all-weather roads to connect the pits to the main camp. BHPB carefully applies dust suppressant to the roads to make sure that it does not seep into the lakes and streams.



9

**Fox Pit**

This is the biggest pit at Ekati and most open pit mining activity is happening here.



10

**Misery Site**

BHPB has stopped mining at Misery Pit. It may re-open the site in a few years.

Top photo courtesy of Jiri Hermann/BHP Billiton Diamonds Inc.



# Waste Rock

## Highlights:

- ▶ **BHP Billiton (BHPB) is expanding the main waste rock storage pile because Beartooth Pit will be made larger; and**
- ▶ **BHPB finished studies on the quality of water that flows through waste rock and *kimberlite* that is stored in piles at the mine.**

From the beginning of mine life until the end of 2007, BHPB has removed about 160 million tonnes of waste rock from the pits at Ekati. BHPB was granted

permission by the Wek'èezhii Land and Water Board (WLWB) to expand the size of its main waste rock pile because it is now removing more rock from

the Beartooth Pit than originally planned. Our preference would have been for the waste rock pile to be made taller instead of wider. We also recommended that BHPB reuse the rock if it builds a road to the Sable Pit in a few years.

Drainage out of large waste rock piles is a concern because the water can dissolve chemicals along the way and then flow into lakes and streams where it could harm the fish. BHPB feels that it now knows enough about the kinds of

rocks in its waste rock piles that it can sample the rock less often and that the water seeping from the piles is not a concern. Based on two special studies that were done last year, BHPB has now said that it is confident that seepage from the waste rock will not contain harmful chemicals. It also feels that the freezing in the piles prevents most seepage and that the piles will remain frozen for many years. We feel that in the long-term, some seepage from the coarse *kimberlite* waste rock area may happen as the freezing of the *kimberlite* area is not happening as fast as BHPB had planned.

We feel that BHPB has been doing a good job of managing the waste rock at Ekati. The special studies that BHPB has now finished show us that it is serious about making sure seepage from the piles will be safe. We are not as sure as BHPB that all the waste rock piles will freeze so we will continue to monitor the temperatures inside of the waste rock piles each year. ■



View of the Fox waste rock pile.

# Processed Kimberlite and Wastewater Management

## Highlights:

- ▶ **BHP Billiton (BHPB) studied and predicted the water quality in the Long Lake Containment Facility (LLCF); and**
- ▶ **Fine processed kimberlite (crushed kimberlite) does not settle well in the LLCF and it will be hard for BHPB to manage in the future when the mine closes.**

Mining at Ekati produces a large volume of crushed *kimberlite* as the diamonds are removed in the process plant. The crushed *kimberlite* is very fine, and behaves like a mixture of sand and clay in water. For environmental reasons, it is important to keep this *kimberlite* contained. During the processing, it is combined with water that is pumped to the upper areas or cells of the LLCF. Some of it settles on the sides of the cells like 'beaches' while the rest flows beneath the water. BHPB has found that some of the extra-fine crushed *kimberlite* does not settle to the bottom. It stays beneath the surface of the water in the LLCF where it remains. Some of these unsettled areas are now 13 metres deep and are just slightly heavier than the cleaner water

above. Managing the extra-fine crushed *kimberlite* is a key concern of ours and is one of the greatest risks faced by BHPB when it closes Ekati. For more information on how BHPB will manage the cleanup of the LLCF please see the section in our report on closure and *reclamation* planning.

Another concern about the LLCF is the cleanliness of the water that is above the *kimberlite* and in the lowest cells of the LLCF. Eventually this water drains downstream of the LLCF into the lakes and streams that have fish in them, all the way to Lac de Gras. Based on studies conducted by BHPB, the most important thing that determines the cleanliness of the water leaving the facility is the quality of the water that drains out of the crushed *kimberlite*.

BHPB cannot pump water out of the LLCF unless it is sure that it will be safe for the fish downstream. For more information on what the quality of the water will be like in the future please see the section in our report on aquatic monitoring.

The LLCF is broken up into smaller cells by dams where BHPB can pump the crushed *kimberlite* year round from many spigots. This helps it to reduce the amount of unwanted ice in the lake that

would take up space needed for the *kimberlite*. The mine has made a lot of crushed *kimberlite* over the last 10 years, so it now has less space to pump the *kimberlite* than it did at the start of mining. It also cannot build roads out over the softer beach areas in the LLCF so it must pump the *kimberlite* from the sides of the LLCF rather than the middle. This makes it harder for BHPB to pump the *kimberlite* in a way that completely fills each cell. If more cells in the LLCF are



*Drill core sample.*

## PROCESSED KIMBERLITE AND WASTEWATER MANAGEMENT

needed to store the *kimberlite* then there is less time for it to settle before the water above the *kimberlite* is pumped downstream.

The dried out *kimberlite* in the beach areas is easily spread by the wind and worn away by rain and streams. It is very hard to grow plants in the dry *kimberlite* so BHPB will have to make sure it stays in the LLCF by a combined rock and plant cover.

BHPB is doing a good job operating the LLCF so far. We think it needs to work harder to explain how it will make sure

the fine crushed *kimberlite* stays behind the dams where it belongs, forever. BHPB is not being clear about the kind of research it is doing to address this challenge. We recommended that the WLWB delay approval of BHPB's plan to operate the LLCF until it answers our questions about closure and *reclamation*. We also want BHPB to more seriously consider pumping the fine *kimberlite* clay to the bottom of an open pit where it could be more safely stored. ■



View of the LLCF, cell B.

## Traditional Knowledge

*Highlights:*

- 🕒 **A fish study was conducted with Aboriginal traditional use experts where deformities, eroded fins, lesions and tumors (DELT) testing and other monitoring was done;**
- 🕒 **The Caribou and Roads Traditional Knowledge Project continued with mixed results from the *inokhok* program; Kugluktuk Elders recommended monitoring *inokhok* in different seasons and trying other methods of moving caribou away from dangerous areas of the mine; and**
- 🕒 **We believe that BHP Billiton (BHPB) should provide written details on the use of Traditional Knowledge (TK) and responses to Aboriginal site visit comments and concerns.**

Over the years, BHPB has tried to develop ways of incorporating TK into its monitoring programs. One way that they do this is by hiring local Aboriginal people familiar with science and the land as wildlife technicians each year to gather field data and assist in monitoring and minimizing effects on wildlife.

In 2007, as part of the Aquatic Effects Monitoring Program (AEMP), a fish study was conducted with Aboriginal

traditional use experts and BHPB employees. As part of the study they measured liver and gonads, recorded any DELT, photographed each fish, and collected samples for analysis of the concentrations of contaminants in the liver and muscle tissue.

Also in 2007, an archaeology field program was done in areas of proposed land-based exploration activity. This was the 14th year of the program, and a North Slave Métis Alliance



(NSMA) member took part in the fieldwork. A total of 14 advanced exploration locations were looked at from the air and nine of these were looked at more closely on the ground. One new archaeological site was discovered. This brings the total of recorded sites on the BHPB claim block to 200.

BHPB also continued with the Caribou and Roads TK Project with the Elders Advisory Group from Kugluktuk. With the assistance of a Professional Wildlife Biologist, Kugluktuk elders provided advice to BHPB using traditional and scientific knowledge. The Agency can only report on activities related to the Caribou and Roads Project for 2006-07 that the Agency received in December 2007. The Agency has not yet received any reports for the 2007-2008 program.

In 2006, the Elders visited the Ekati Mine site twice with respect to the Caribou and Roads Project. The first was in June and involved putting up a temporary snow fence at the Beartooth Pit. The Elders Advisory Group first identified

the Beartooth Pit as a concern in 2004, as caribou had access to the edge of the pit from the east. At a workshop in Kugluktuk in January 2006, the elders recommended a temporary snow fence be built. They felt this was the best way to stop caribou from going in that direction as the pit edge is lower than the surrounding ground area and the caribou have a clear view, thus *inokhok* and/or berms would not serve as visual barriers to caribou. The second site visit, the annual elders visit, was held for a week in early



Elder at Ekati site visit.

August 2006 where the elders watched the caribou behaviour around roads (with and without traffic), mine pits, buildings, the airstrip, etc. and looked at how well that the *inokhok* worked at stopping caribou from going near these areas. They also spent time watching caribou behaviour away from the mine site in areas without development. In August 2006, few caribou were seen at the site and time was spent building more *inokhok* and making them more visible by making them bigger, painting hats on them and adding



Elders at an Agency event.

flagging tape. In March of 2007, BHPB held a community follow-up meeting in Kugluktuk.

*Inokhok* have been built in three places: Pigeon Valley across the Sable Road; Fox Road at the Nero-Nema Lakes crossing; and the airstrip. In October 2006, caribou were seen in the Pigeon Hill region, all around the *inokhok*. *Inokhok* do not appear to be completely successful at redirecting caribou from dangerous areas. During the March 2007 workshop in Kugluktuk, there was much

## TRADITIONAL KNOWLEDGE

discussion over the results of the *inokhok* and whether they were doing what they were designed for. The elders noted that traditionally, *inokhok* were built by the elders for the purpose of hunting caribou during spring migration and that they did not know if they would deter caribou during other seasons, or other conditions (i.e. caribou may walk by in July when it is really hot, and if they are in a big herd). They noted that this is why monitoring during different seasons and with different methods of deterring caribou are needed. BHPB would like to see an Elders Advisory Group come up in the spring to watch and see how the caribou behave around the roads and with the *inokhok*.

The Agency believes the Caribou and Roads Project is a good example of how BHPB is applying TK in caribou monitoring at Ekati. BHPB has done a good job at developing this project with the community and elders from Kugluktuk. However, the Agency recommends that BHPB

make more effort to involve other communities and elders in developing projects that would use TK. Workshops should be held where elders from all affected communities can share information and recommend the best methods for preventing wildlife access, especially caribou, to hazardous areas.

Over the years, the Agency has also recommended that BHPB work with Aboriginal Peoples to develop a method of documenting the suggestions and concerns arising from their site visits. We are pleased to learn that BHPB is in the process of creating a TK report that will include how TK has been, and can be, used at the mine site. It is also developing a multi-year TK strategy that will continue with existing projects (Naonayaotit Traditional Knowledge Project and the Caribou and Roads Project). We look forward to receiving more information on these initiatives. ■

## Wildlife Monitoring

*Highlights:*

- ▶ **Seeing caribou, especially calves, is more likely when far from Ekati;**
- ▶ **Wolverine monitoring has not been done since the DNA program was finished; and**
- ▶ **Grizzly bear monitoring methods could be improved.**

BHP Billiton (BHPB) has been monitoring wildlife at Ekati for 11 years. It looks at caribou, grizzly bears, wolverines, wolves and birds. It tracks the wildlife from airplanes and on the ground when animals are spotted to see if their behaviour changes near the mine.

BHPB has worked hard to improve its management of

garbage so that animals are not attracted to Ekati. No large animals were killed by trucks or other mining activity last year, but some hare and ptarmigan were hit by trucks. Bear bangers were used to scare off bears nine times and one bear was darted and relocated. Many wolves and bears were observed last year.

### Caribou Monitoring

Almost 6,000 caribou were seen within the Ekati wildlife study area between July and October 2007. Work done on looking into caribou movement since 2005 by BHPB and other scientists tells us that caribou are less likely to be near Ekati than far away from it, and that groups with calves are even less likely to use the Ekati area. Snow track surveys and other observations tell us that snow



*Red fox at Ekati.*

banks and truck traffic make it harder for caribou to cross roads.

### Grizzly Bear Monitoring

Results from the monitoring show that Ekati is not having an effect on the bears. BHPB believes that bears do not appear to be moving farther away from Ekati or avoiding the mine area.

### Wolf Monitoring

BHPB looks at the wolf dens that are known to be around Ekati each year to find out if the mine has an effect on them. BHPB appears to be relying on the GNWT to do the wolf surveys so not all the dens were looked at in 2007.

### Wolverine Monitoring

There were no wolverines killed by mine operations in 2006 or 2007 as reported by BHPB, and only nine wolverine observations were made all year. BHPB has not monitored wolverine since the DNA fur-sampling program ended in 2005.

### Bird Monitoring

Raptors (bird predators) like peregrine falcons and gyrfalcons use the pit walls at Ekati to nest. There were peregrine nests spotted



*Grizzly bear at Ekati.*

at Ekati in 2007 but little success in raising young was reported. This may be because prey for the peregrines were low in numbers.

### Our Assessment

We reviewed BHPB's wildlife monitoring report and found it to be well done. Because Ekati is close to Diavik, we support BHPB's decision to include the Diavik site in its monitoring for caribou. We think that BHPB should look at testing different ways to see whether the caribou are avoiding the area of the mines. BHPB also looks at the behaviour of the caribou around the mine site but last year the numbers observed

were too small to allow any conclusions to be reached.

We feel that the methods of monitoring grizzly bears (looking for signs of the bears in study plots) is not a good way to make sure that the bears are not affected by mining. We think BHPB could find a better way to monitor the bears. It also seems like BHPB is relying on the GNWT to monitor wolves and that little monitoring has been done recently.

For wolverine, the lack of

monitoring is a bigger concern. It seems that BHPB would prefer to go back to snow track survey monitoring of wolverine, but in our view this does not provide as much information as DNA analysis. The DNA monitoring needs to be done every two years for it to provide trend information about the number of wolverine in the area and how far they range. We think BHPB should work cooperatively with the GNWT and monitor wolverine DNA in 2009 and every second year after that. ■



*Caribou near Ekati.*