



# **TECHNICAL ANNUAL REPORT 2012-13**

A PUBLIC WATCHDOG FOR ENVIRONMENTAL MANAGEMENT AT EKATI DIAMOND MINE™



**INDEPENDENT**  
ENVIRONMENTAL  
MONITORING AGENCY



Whati, September 2012. L – R: Bill Ross and Isadore Zoe.

On April 10, 2013, Dominion Diamond Ekati Corporation (DDEC) acquired from BHP Billiton (BHPB) its controlling interest in the Ekati Mine. This sale commenced months earlier. The Environmental Agreement that created the Agency will continue in place with DDEC having assumed all of BHPB's responsibilities. The same people are largely now working for DDEC and so I have every expectation that the good working relationship with BHPB will continue with DDEC.

Once more, it is my pleasure to report that BHPB continued to do a good job of environmental protection at the mine.

Moreover, our working relationship with staff at Ekati has been very good. We do not agree on everything but we work respectfully toward our mutual goal of good environmental management.

Major developments in the last year have been the renewal of the water licence (good process), the (much improved) 2012 Environmental Impact Report, and the company's first annual progress report on the Interim Closure and Reclamation Plan (ICRP); adequate in some ways but with significant weaknesses. We stress in this annual report the importance of better integration of the various monitoring results (air quality, wildlife and aquatic

## MESSAGE FROM THE CHAIR 2013

effects) for the explicit purpose of better *adaptive management* of the project. For example, dust is a possible cause of caribou avoidance of the mine. Better understanding of dust deposition, as measured in air quality monitoring, could be used to reduce dust deposition and hence (adaptively) reduce adverse effects on caribou. The results of such mitigation efforts would need to be documented through wildlife monitoring.

Last year, I expressed optimism concerning the process for determining the correct amount for the financial security necessary to close the mine based on the approved ICRP. I am sad to report that the process stalled and, while there is now a preliminary amount proposed, the Agency is not yet able to assure our Society Members that there will be no public liabilities whenever the mine is closed in accordance with the ICRP.

The Agency has continued with major developments in carrying out the task of implementing our communications plan; we have information available in many languages; we circulate summaries of our activities to interested parties, and our website is significantly improved. At the beginning of this year, Allison Anderson left as our Communications and Environmental Specialist and she

has been replaced by Jessica Simpson, whom we welcome. We also had a change in the director appointed by the North Slave Métis Alliance. Sheryl Grieve was replaced by Arnold Enge. We thank Sheryl and Allison for their contributions.

In the coming year, we will monitor the transition from BHP Billiton to Dominion Diamond Ekati Corporation and we will continue to insist that Ekati Mine is operated in a manner that is suitably protective of the environment, as it has been for the last 16 years.

As always, we welcome input and suggestions and will make our best efforts to address any questions or concerns. ■

William A. Ross, Chairperson  
March 31, 2013





# TABLE OF CONTENTS

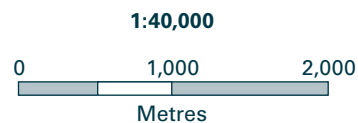
i	Message from the Chair	37	Financial Statements
ii	Ekati Diamond Mine	46	Summary of Work Plan and Core Budget 2013-14 and 2014-15
iii	Director Biographies	48	Acronyms
02	Agency Recommendations for 2012-13	49	Glossary (A listing of all italicized words used in this report except the names of laws, policies and publications)
03	Agency Activities and Assessing the Agency		
08	Waste Rock and Processed Kimberlite Management		
10	Reclamation and Closure		
14	Aquatic Effects		
23	Air Quality		
26	2012 Wildlife Effects		
30	Regional Monitoring and Cumulative Effects		
31	Traditional Knowledge		
33	Assessment of the Regulators 2012-13		
35	Assessment of BHP Billiton		



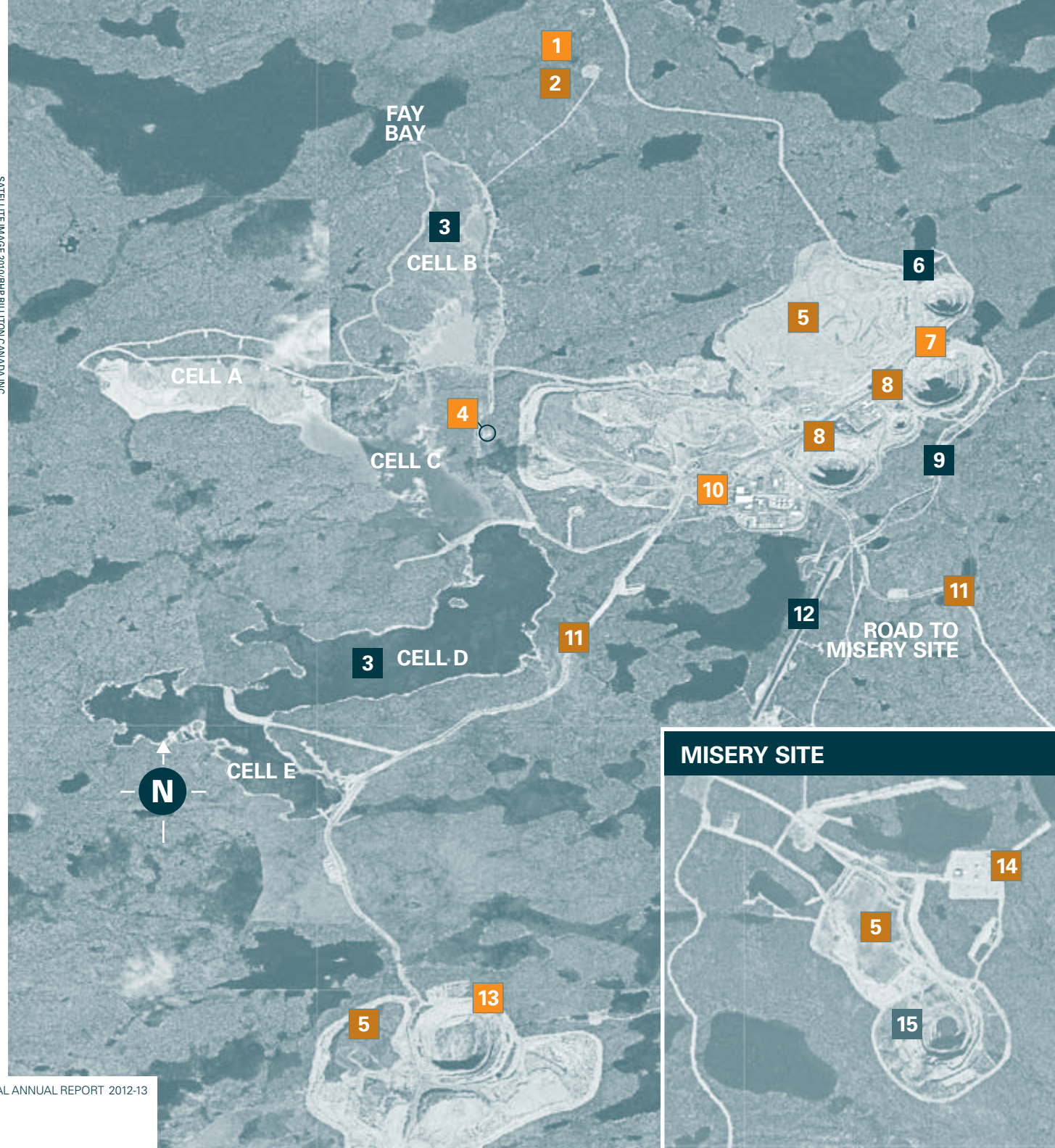
■ NORTHWEST TERRITORIES  
■ NUNAVUT

# EKATI DIAMOND MINE

- 1** PIGEON STREAM DIVERSION
- 2** PIGEON PIPE
- 3** LONG LAKE CONTAINMENT FACILITY (CELLS A-E)
- 4** INCINERATOR
- 5** WASTE ROCK PILES
- 6** BEARTOOTH PIT
- 7** PANDA PIT
- 8** KOALA AND KOALA NORTH PIT
- 9** PANDA DIVERSION CHANNEL
- 10** MAIN CAMP
- 11** HAUL ROADS
- 12** AIRSTRIP
- 13** FOX PIT
- 14** MISERY CAMP
- 15** MISERY PIT



SATELLITE IMAGE 2010/BHP BILLITON CANADA INC.





# DIRECTOR BIOGRAPHIES



## **BILL ROSS** APPOINTED APRIL 1997

Appointed by BHP Billiton, Government of the Northwest Territories and Government of Canada (in consultation with the Aboriginal governments).

Bill Ross has studied and participated in the professional practice of impact assessment for 35 years with a focus on cumulative effects assessment and follow-up studies. He has served as a director of the Agency since its inception and as its Chairperson since 2003. His goal for the Agency is that, when the Ekati Mine closes, BHPB will be recognized as having operated the best environmentally-managed mine in Canada's North.



## **TIM BYERS** APPOINTED MAY 2001

Appointed by Akaitcho Treaty 8 First Nations (Łutsel K'e Dene First Nation and Yellowknives Dene First Nation).

Tim Byers is an independent consultant living in Manitoba who has been working on projects in the Canadian Arctic since 1980. He specializes in studies of fish, Arctic seabirds and marine invertebrates and has assisted Aboriginal communities in documenting their indigenous environmental knowledge. Tim would like to see more Aboriginal youth engaged in the environmental sciences and Traditional Knowledge used more effectively in environmental monitoring, research and impact assessments. Tim has served as the Agency's Vice-Chairperson since 2004.



## **Jaida Ohokannoak** APPOINTED DECEMBER 2003

Appointed by Kitikmeot Inuit Association.

Jaida Ohokannoak lives in Cambridge Bay, Nunavut and has lived and worked in small northern communities for 20 years. She is experienced in environmental assessment, renewable resource management, research and monitoring studies. Jaida believes mining can be conducted in an environmentally responsible manner that benefits both industry and local people. Jaida has served as the Agency's Secretary-Treasurer since 2004.



## **ARNOLD ENGE** APPOINTED SEPTEMBER 2012

Appointed by North Slave Métis Alliance.

Arnold Enge was appointed by the North Slave Métis Alliance in September 2012. Arnold has 30 years of experience working in the North with the federal and territorial governments as well as Rio Tinto. Arnold is of North Slave Métis ancestry and represents the North Slave Métis on several boards monitoring the environmental impacts of northern projects.



## **LAURA JOHNSTON** APPOINTED DECEMBER 2006

Appointed by BHP Billiton, Government of the Northwest Territories and Government of Canada (in consultation with the Aboriginal governments).

Laura Johnston retired from Environment Canada after 30 years of service, the last 15 in environmental protection in the Northwest Territories and Nunavut. Her expertise is in the fields of chemistry and geology with a focus on water-related issues, especially groundwater quality.



## **TONY PEARSE** APPOINTED MARCH 1997

Appointed by the Tłıchǫ Government.

Tony Pearse is a resource planner specializing in planning and policy development for First Nations in areas related to treaty negotiation and land use.



## **KIM POOLE** APPOINTED DECEMBER 2006

Appointed by BHP Billiton, Government of the Northwest Territories and Government of Canada (in consultation with the Aboriginal governments).

Kim Poole is an independent wildlife biologist with over 25 years of experience in the Northwest Territories, Nunavut and British Columbia in the areas of wildlife research and assessment of impacts due to forestry, mining and tourism.

# AGENCY RECOMMENDATIONS 2012-13

## RECOMMENDATION 1

The WLWB should issue a directive to the company to conduct and complete reclamation and closure of Phase 1 tailings pond and Old Camp in accordance with a prescribed deadline determined by the WLWB.

**WLWB Response:** Our intention is to present this topic to the Board at their upcoming meeting on June 17, 2013. Following this meeting, the Board's decision on how to proceed with DDEC's Annual Progress

Report will be communicated to DDEC and all members of the Board's distribution list. [In a letter dated June 25, 2013, the WLWB required DDEC to submit a plan for the closure of the Old Camp by July 31, 2013.]

## RECOMMENDATION 2

The Agency recommends that GNWT-ENR establish guidelines for when and how carnivore and caribou monitoring programs should be conducted. The guidelines should focus on standardizing methods and the use of monitoring data for mitigation, species management, and cumulative effects management. We suggest that draft guidelines be circulated by October 1st 2013, prior to the next scheduled wildlife monitoring workshop in late 2013.

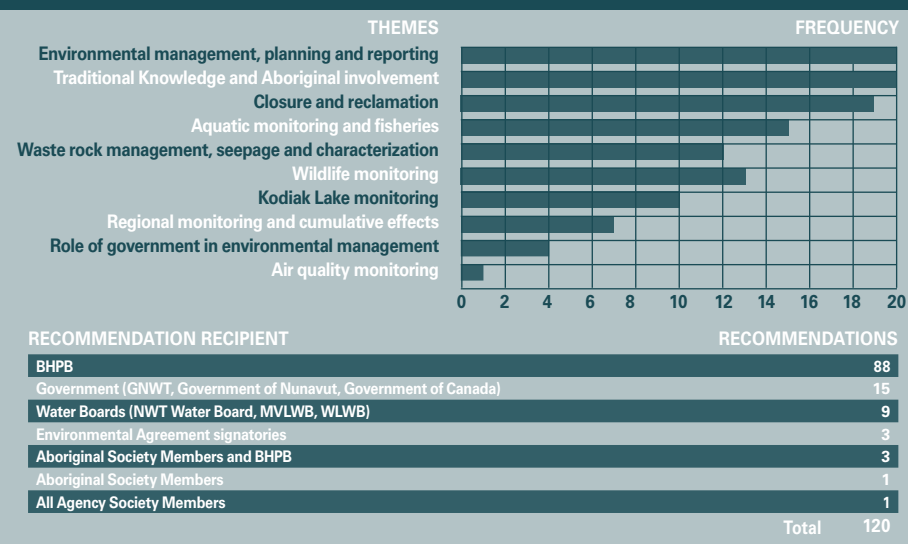
**GNWT-ENR Response:** At the wildlife monitoring workshops held in March 2013, the Wildlife Division agreed to draft standardized monitoring protocols for wolverine, grizzly bears and barren-ground caribou. Draft protocols will be reviewed and refined with partners during our fall 2013 follow-up workshops.

The intention is to share the draft protocols with workshop participants so they have time to review them before the fall workshops. Work on the drafts is ongoing and in some cases, results of previous year's work still need to come in before statistical analyses that will inform the development of

the protocols can be conducted.

The Wildlife Division is also working to develop a Bathurst Caribou range plan with our co-management partners (first meeting coming up in early July). The Wildlife Division believes that this type of plan – and other programs/products discussed at the March 2013 workshop, including the development of a research and monitoring program for wildlife in the Slave Geological Province – will inform how monitoring using agreed-upon protocols will link to species management, mitigation of any project specific impacts, and cumulative effects assessment and management.

FIGURE 1: AGENCY RECOMMENDATION THEMES 1997-2013





Meeting in Agency boardroom.

## HIGHLIGHTS

**Four board meetings, the annual general meeting and open house in Whati.**

**Further improvements in our communications efforts and website.**

**Participation in the water licence renewal, 2012 Environmental Impact Report, and financial security review.**

**Site visits to Ekati Mine.**

# AGENCY ACTIVITIES AND ASSESSING THE AGENCY

## Activities 2012-13

**T**his year, the Agency held four board meetings in Yellowknife, as well as our annual general meeting and open house in December 2012. Participants in our annual general meeting discussed their concerns about water quality downstream in the Coppermine River, Aboriginal Affairs and Northern Development Canada (AANDC) inspection capacity, employment opportunities for Aboriginal youth, and the possible change in ownership of the mine.

The Agency conducted two site visits to the Ekati Mine this year. Agency staff visited the site in April 2012 to see the widening of the Panda Diversion Channel and the Pigeon Stream Diversion. Our directors and staff toured the mine and met with staff from BHP Billiton (BHPB) in June 2012.

## Technical Reviews and Input

Throughout the year, the Agency participated in reviews of key regulatory initiatives and BHPB environmental reports.

The Agency was focused on two major processes during the year, the water licence renewal and 2012 Environmental Impact

Report. We provided BHPB with some early indications of issues and concerns with the water licence renewal when we met with the company in June 2011. BHPB filed a large water licence application containing much new and helpful information including predictions of water quality downstream to the end of mine production. The Agency carefully reviewed this material and was an active participant in technical sessions sponsored by the Wek'èezhìi Land and Water Board in October 2012. Our intervention on the water licence application was filed in December 2012 and we presented at the public hearing and asked questions of other parties in February 2013. Final arguments on the water licence renewal were submitted in written form later in the month and we also reviewed the draft water licence in April 2013. We look forward to the conclusion of this process.

We were pleased that BHPB took our advice from our discussion paper on the 2009 Environmental Impact Report (EIR) and began early *consultations* on the preliminary findings and format of the 2012 EIR. The company also shifted its focus away from comparing effects at the site to the original

## 4 | AGENCY ACTIVITIES AND ASSESSING THE AGENCY

environmental assessment predictions, towards long term trends and residual effects and their mitigation. We attended July and November 2012 EIR meetings that were successful, and recommended that the EIR be accepted by the responsible federal and territorial ministers. We look forward to the close-out report on the final workshop and responses to the comments that we and other parties submitted.

In July 2012, at our suggestion, BHPB held a meeting to bring together University of Alberta researchers and its own consultants to discuss future monitoring of fish habitat in the Panda Diversion Channel. The early adoption of a *nitrate* site specific water quality objective (SSWQO) as a discharge criterion for Long Lake Containment Facility (LLCF) water was discussed at a September 2012 meeting. The company wanted to discharge a backlog of water using this higher discharge criterion. In December 2012, the

Agency and others attended a workshop to discuss the three-year re-evaluation of the Aquatic Effects Monitoring Program.

On the issue of wildlife monitoring, the Agency participated in several GNWT Environment and Natural Resources workshops held in March 2013. The purpose was to review objectives and standardizing methods as well as use of monitoring data from carnivore and caribou monitoring, with a view to more effective mitigation and *cumulative effects* management. Much work remains to be done.

### Agency Communications and Collaboration

The Agency did not host an environmental workshop in 2012-13 as the company carried out the EIR and held two helpful multi-stakeholder workshops. We were pleased with these efforts and thought the collaborative approach was most helpful in putting



Agency visit to Whati.

TABLE 1: AGENCY INCOMING CORRESPONDENCE 2012-13

SENDER	# OF PIECES
AANDC	17
Agency Society Members	4
BHPB	36
EC	1
EMAB and/or SLEMA	1
DFO	5
GNWT	4
WLWB	29
WRRB or others	6
<b>TOTAL</b>	<b>103</b>

SUBJECT	# OF PIECES
Administration	1
Air Quality	4
Aquatics, including AEMP, PSD, PDC widening and monitoring, SNP monitoring, pumping	24
Closure and Reclamation (including ICRP, draft guidelines and policies and financial security)	6
Community Engagement and Consultation	3
Environmental Agreement and Water Licence Annual Report, EIR	3
PK and Waste Rock Management, including WPKMP, WROMP, PK deposition plan and seepage reports	6
Traditional Knowledge	0
Water Licence (including inspections, approvals and renewals)	39
Wildlife (including WEMP, grizzly bear monitoring program)	11
Other	6
<b>TOTAL</b>	<b>103</b>

TABLE 2: AGENCY OUTGOING CORRESPONDENCE 2012-13

RECIPIENT	# OF PIECES
AANDC	3
Agency Society Members	3
BHPB	5
Other interested parties	1
GNWT	3
WLWB	10
<b>TOTAL:</b>	<b>25</b>

SUBJECT	# OF PIECES
Administration	1
Aquatic, including AEMP	3
Community consultation	4
Water licence renewal	5
Traditional knowledge	1
Wildlife	3
Waste rock management, including WPKMP and WROMP	2
EIR	1
Closure and Reclamation	1
<b>TOTAL:</b>	<b>21</b>



Whati community government office.



together a much improved EIR in 2012.

The Agency was very pleased with the assistance we received from the Community Government office in Whati in planning and hosting the Agency's board meeting in the community and advice and assistance with the open house. Questions were raised about mine impacts on caribou and water and we were able to answer most questions. We followed up with a brochure sent to the community and a letter with community concerns to the company and governments. Further information on the Agency's communications efforts is found in the text box in this section.

The Agency and the *Environmental Agreement* signatories (BHPB, GNWT and the Government of Canada) hold biannual meetings, held this year in June 2012 and February 2013. These meetings improve coordination and communication between the Agency and the signatories and provide each party with opportunities to give an update on its activities. The Agency also reports on financial expenditures and future plans, and signatories are offered an opportunity to respond to formal recommendations made by the Agency in its annual report for the previous year.

In March 2013, a meeting was held by the Inter-Agency Coordinating Team (IACT). IACT consists of the Agency and a group of government regulators, including the GNWT, AANDC, Fisheries and Oceans Canada (DFO) and Environment Canada. This was a useful meeting in understanding the process for the change of ownership for the mine.

(See Table 3, as well as specific chapters in this report for details on these activities).

## Assessing the Agency

The Agency has made progress on the implementation of our Communications Plan. We have several new tools that help us explain our role and responsibilities (see text box for a list of our new communications tools).

We appreciated the positive feedback we received at our annual general meeting from our Society Members. We also heard that there may be opportunities for us to tap into the skills and enthusiasm of youth from Aboriginal communities. We will also be exploring the use of social media.

The Agency held a successful open house in Whati and we have now visited all of the directly affected communities at least once either as a full board or individual directors and staff. We look forward to further community visits in 2013-14.

We were pleased to see that many of our major recommendations on the water licence renewal were adopted by the WLWB, especially with regard to the need to regulate *nitrate* and *chloride* and for a response plan for *nitrate* with a focus on source reduction.

We have consistently pushed for a comprehensive review of the *reclamation* liability for the mine with a view to assuring the public and our Society Members that there is adequate financial security to cover full implementation of the approved Interim Closure and Reclamation Plan (ICRP). We have also provided detailed comments on the first annual progress report on implementation of the ICRP. We are concerned that *reclamation* research is slipping and

## New Agency Communications Tools

The Agency's Communications Plan, completed in October 2011, summarizes our key messages and target audiences as well as factors influencing how we communicate; defines our communications objectives and outcomes; outlines our specific communications tools and products; and provides for the evaluation and improvement of these tools and products.

We completed a number of new communications initiatives in 2012-13 including:

- Two issues of the Agency's newsletter, the 'Ekati Monitor', in April and November 2012 with an expanded distribution list;
- Brochures about the Agency in the languages of our Aboriginal Society Members (Chipewyan, Tłıchq̓ Weledeh and Inuinnaqtun), French and English;
- An updated poster about the Agency in the languages of our Aboriginal Society Members (Chipewyan, Tłıchq̓ Weledeh and Inuinnaqtun), French and English;
- Further improvements to the Agency's website and the Ekati Timeline;
- A summary brochure following the Agency's visit to Whati in September 2012; and
- Recruiting a replacement for our Communications and Environmental Specialist who started with the Agency in April 2013 (Jessica Simpson).

In 2013-14, we will be working on further communications efforts including:

- Completion and distribution of our 2012-13 Annual Report as technical, plain language and summary brochure versions;
- Indexing and reorganization of our public registry and resource library in the Yellowknife office, including our large photo collection;
- Further improvements and more material posted to our website;
- Community visits;
- An Environmental Workshop to be held in conjunction with our annual general meeting, likely in December 2013;
- Possible social media (e.g., Facebook and Twitter) activities by the Agency;
- Changes to our website and communications products to reflect the change in ownership of the Ekati Mine to Dominion Diamond Ekati Corporation;
- A display about the Agency for use in schools and trade shows; and
- An introductory video about the Agency in the Aboriginal languages, French and English, likely to be posted to our website and available on CD or DVD.

For further details on the Agency's Communications Plan or to review our Communications Plan Background Paper, please visit our website at [www.monitoringagency.net](http://www.monitoringagency.net).

that opportunities for *progressive reclamation* have not been realized.

The Agency has also advocated strongly for improved wildlife monitoring programs with focused objectives to reduce the



*zone of influence* on caribou and to better test the effectiveness of mitigation. We will continue to pursue these matters as we know the importance of wildlife for our Aboriginal Society Members. ■

## 6 | AGENCY ACTIVITIES AND ASSESSING THE AGENCY

**Table 3: Main Agency Activities**

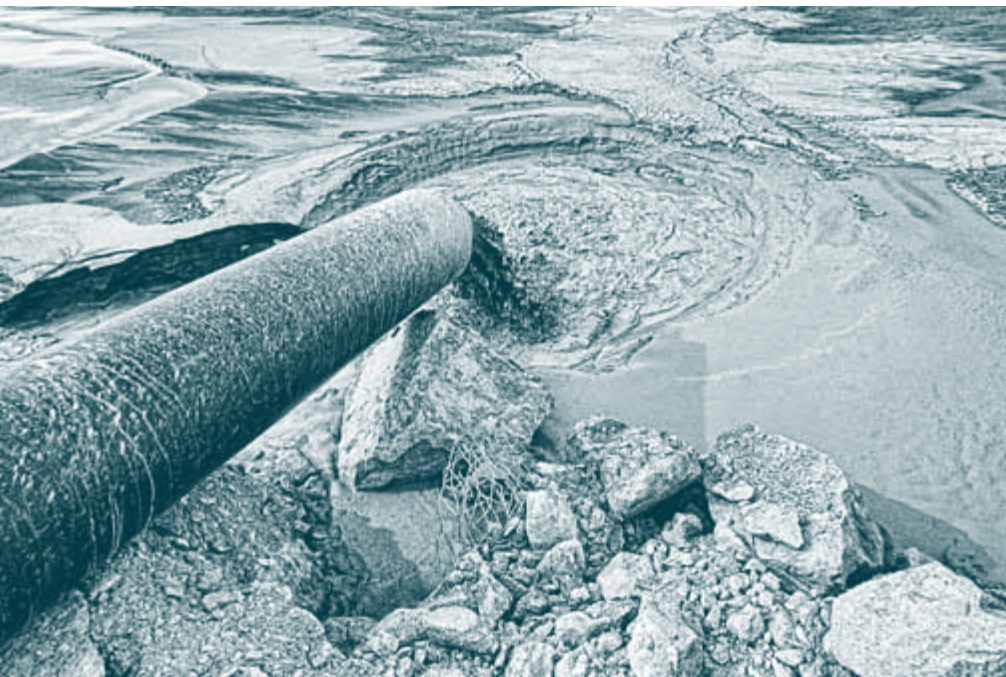
	DATE AND LOCATION	PURPOSE	MAIN ISSUES
 <p>Water licence renewal public hearing.</p>	<b>APRIL 24, 2012</b> Yellowknife	Guidelines for Closure and Reclamation	<ul style="list-style-type: none"> <li>Update provided by Chair of the MVLWB working group coordinating development of joint AANDC and Water Boards' closure and reclamation guidelines.</li> <li>Agency had submitted comments on draft guidelines based on our experience with the Ekati ICRP.</li> </ul>
	<b>APRIL 26, 2012</b> Ekati Diamond Mine	Site Visit	<ul style="list-style-type: none"> <li>Agency Executive Director visited the Pigeon Stream Diversion where work was under way on the diversion channel and settling pond. The Panda Diversion Channel was also visited where widening on the west side of the canyon section had recently been completed.</li> </ul>
	<b>JUNE 5, 2012</b> Yellowknife	AANDC Inspection Capacity	<ul style="list-style-type: none"> <li>Meeting with WLWB and EMAB staff to discuss AANDC capacity to carry out timely inspections.</li> </ul>
	<b>JUNE 8, 2012</b> Yellowknife	Environmental Agreement Implementation Meeting	<ul style="list-style-type: none"> <li>Agency and BHPB gave presentations on communications activities.</li> <li>Agency presented an overview of its 2011-12 annual report with recommendations.</li> <li>There was some discussion of how to better communicate changes to wildlife monitoring programs.</li> </ul>
	<b>JULY 9, 2012</b> Yellowknife	Panda Diversion Channel Meeting	<ul style="list-style-type: none"> <li>Presentations by both BHPB and University of Alberta researchers on the effectiveness of the Panda Diversion Channel as fish habitat. Further habitat improvements built in the channel to finalize the compensation agreement with DFO.</li> </ul>
	<b>JULY 10-11, 2012</b> Yellowknife	2012 Environmental Impact Report (EIR)	<ul style="list-style-type: none"> <li>Agency and others attended BHPB-sponsored meeting to discuss the format and preliminary findings of the 2012 EIR.</li> <li>Much improved discussion over the previous EIR and BHPB was open to the constructive input offered, especially with an emphasis on residual risks and trends.</li> </ul>
 <p>Site visit in June 2012.</p>	<b>SEPTEMBER 17, 2012</b> Yellowknife	Early Adoption of the Proposed Nitrate Site Specific Water Quality Objective (SSQWO)	<ul style="list-style-type: none"> <li>Agency directors, staff and regulators attend meeting with BHPB where the company would like to adopt its proposed nitrate site-specific water quality objective in discharging a backlog of water held in the LLCF before the water licence renewal was completed.</li> <li>No legal impediments to BHPB's release of water from the LLCF based on the SSWQO but additional information requested by the Agency and others.</li> </ul>
	<b>SEPTEMBER 17, 2012</b> Ekati Diamond Mine	IACT Site Visit	<ul style="list-style-type: none"> <li>Agency Director attended a site tour to view the PDC widening, PSD, Beartooth Pit, Fay Bay, spill revegetation and the new incinerator.</li> </ul>
	<b>SEPTEMBER 18-20, 2012</b> Whati	Community Visit	<ul style="list-style-type: none"> <li>Agency board meeting held in the community with an open house one evening.</li> <li>Concerns expressed at the open house included caribou, water quality and proper closure planning for the mine. Directors and staff also visited the school.</li> </ul>
	<b>OCTOBER 23, 2012</b> Yellowknife	Water Licence Renewal Technical Workshop	<ul style="list-style-type: none"> <li>WLWB staff hosted a technical workshop to discuss BHPB's water licence renewal application. Agency directors and staff participated in the meeting.</li> <li>The following matters were discussed; the updated water quality model, SSQWO proposed by BHPB, the draft water licence proposed by BHPB, the draft Response Framework and changes to the Surveillance Network Program.</li> <li>Information requests were developed by the WLWB based on the discussions and the next steps in the licencing process were discussed.</li> </ul>



	DATE AND LOCATION	PURPOSE	MAIN ISSUES
	<b>NOVEMBER 6-7, 2012</b> Yellowknife	2012 Environmental Impact Report Workshop	<ul style="list-style-type: none"> <li>Agency participated in this workshop on the 2012 EIR. Participants were of the view that the process and report were much improved over the last EIR and the shift in focus from verifying environmental assessment predictions to residual risks and trends was more helpful.</li> </ul>
	<b>DECEMBER 3, 2012</b> Yellowknife	Ekati Financial Security Review	<ul style="list-style-type: none"> <li>BHPB reviewed progress to date but still concerned about security that may be required outside of the Interim Closure and Reclamation Plan.</li> <li>Agency concerned about slippage with the review schedule and the need for an estimate as part of the water licence renewal process.</li> </ul>
	<b>DECEMBER 6, 2012</b> Yellowknife	Agency Annual General Meeting	<ul style="list-style-type: none"> <li>Concerns raised and answered around water quality downstream into the Coppermine River, AANDC inspection capacity, employment opportunities for Aboriginal youth, and possible change in ownership of the mine.</li> </ul>
	<b>DECEMBER 12, 2012</b> Yellowknife	Aquatic Effects Monitoring Program Re-evaluation Public Workshop	<ul style="list-style-type: none"> <li>Workshop hosted by BHPB with the Agency and other interested parties as participants.</li> <li>AEMP found to be a good program capable of showing downstream changes. Not clear how fish are possibly being affected but should be better understood with 2012 AEMP fish sampling results.</li> </ul>
	<b>FEBRUARY 8, 2013</b> Yellowknife	Environmental Agreement Implementation Meeting	<ul style="list-style-type: none"> <li>Agency presentation on recommendations and findings, and work plan and budgets.</li> <li>BHPB presentation on operations for 2012-13.</li> </ul>
	<b>FEBRUARY 12-13, 2013</b> Behchokò	Water Licence Renewal Public Hearing	<ul style="list-style-type: none"> <li>Much of the hearing revolved around the changes proposed by BHPB and the land and water boards of the Mackenzie Valley's policy on effluent and water quality that contains two main objectives, achievability and pollution prevention.</li> </ul>
	<b>MARCH 4, 2013</b> Yellowknife	IACT Meeting	<ul style="list-style-type: none"> <li>BHPB provided an update with a focus on TK projects, the water licence renewal, reclamation security, change of ownership and permit assignments.</li> </ul>
	<b>MARCH 5-6, 2013</b> Yellowknife	Carnivore Monitoring Workshop	<ul style="list-style-type: none"> <li>GNWT workshop to discuss wolverine and grizzly bear monitoring program objectives, design, results and best management practices. Stronger participant commitment to work together and feed monitoring results into better management.</li> </ul>
	<b>MARCH 7-8, 2013</b> Yellowknife	Bathurst Caribou Monitoring and Cumulative Effects Workshop	<ul style="list-style-type: none"> <li>GNWT workshop to discuss caribou monitoring program objectives, design, results and best management practices along with cumulative effects. An agreement to set up a working group to continue discussions and actions.</li> </ul>

Agency visit to Whatì. L – R: Allison Anderson, Kevin O'Reilly and Isadore Zoe.

Agency annual general meeting, December 2012.



Processed kimberlite deposition into Long Lake.

## HIGHLIGHTS:

**Approval of processed kimberlite deposition into Beartooth Pit.**

**Some waste rock piles not freezing as planned.**

**Follow-up work needed on hydrocarbons in coarse kimberlite rejects and cause of some waste rock piles remaining unfrozen.**

# WASTE ROCK AND PROCESSED KIMBERLITE MANAGEMENT

## Activities 2012-13

**M**ining in 2012 continued at Koala North, Koala Underground, and Fox, and resumed at the Misery Pit in 2012, after a seven-year hiatus. Four-fifths (82%) of *kimberlite* processed in 2012 came from the Fox Pit.

Revised management plans for both *waste rock* deposition and the operation of the Long Lake Containment Facility (LLCF) to reflect updated operations in both areas were approved by the WLWB.

The latest version of the company's 'Wastewater and Processed Kimberlite Management Plan' now provides for use of the Beartooth Pit as an option for *tailings* deposition, as well as for deposition in new areas of LLCF cells A and C. Roads have been built around the far sides of the two cells to allow more *kimberlite tailings* to be deposited there, a conservative move to enhance the possibility that deposition of *tailings* in cell D can ultimately be avoided. *Tailings* discharge to the LLCF amounted to 5.8 million m<sup>3</sup>, a slight increase from last year's operations.

Seepage sampling of *waste rock* and coarse *kimberlite* rejects was conducted in spring and fall of 2012, with expanded sampling at Misery due to renewed pit

operations there, and reduced sampling at Fox since no mining of *waste rock* was conducted at that site during 2012. The results were comparable to previous years. Slightly elevated concentrations of ammonia are showing up in some seeps indicating continued leaching of blasting residues from the *waste rock*. Other sites showed a decline in ammonia concentrations. A few seeps in the northeast section of the Panda/Koala Waste Rock Storage Area (WRSA) show elevated sulphate, calcium, and magnesium likely as a result of *kimberlite* interacting directly with tundra water.

Samples from Fox showed similar patterns of *kimberlite* leaching. Slight exceedances of effluent quality criteria of *total suspended solids* (TSS) at 34 mg/L (licence limits for average grab sample 15 mg/L and maximum grab sample 25 mg/L), and total aluminum (Al) at 2.5 mg/L (licence limits for average grab sample 2.0 mg/L or maximum grab sample 4.0 mg/L).

The coarse *kimberlite* rejects storage area (CKRSA) also showed elevated concentrations of sulphate, calcium, magnesium, sodium, and *molybdenum* indicating leaching of *kimberlite* waste. High rates of flow at two seeps, despite low rainfall in 2012, suggest that the



coarse *kimberlite* rejects are contributing significant chemical loading to the LLCF.

Sampling at the coarse *kimberlite* rejects pile also showed the presence non-halogenated volatiles (*e.g.*, toluene, styrene and benzene) and *hydrocarbons*. *Hydrocarbons* were previously detected in 2010 and have been increasing since that time.

As in past years, temperature readings of the interior of the various *waste rock* and ore piles were conducted by EBA Engineering Consultants. Trends from past years continued in 2012—the coarse rejects pile apparently remains unfrozen, the Koala-Panda/Beartooth *waste rock* dump has a frozen core, and large parts of the Fox dump remain unfrozen with temperatures at depth of up to 5.6° C. EBA attributes the lack of freezing as a function of placing either warm rock on the dump or dumping in above-freezing temperatures,

but acknowledges the precise reason is unknown. EBA does note that chemical reactions within the pile may be a cause.

The '2012 Annual Seepage Report' recommends that residual *kimberlite* waste in the Misery Temporary Ore Storage Area and Waste Kimberlite Storage Area (WKSA) should be monitored carefully for acid generation as part of the Misery pushback operation. This residual material is affecting water quality draining into Cujo and Desperation ponds. The report notes that co-disposal of *kimberlite* and schist at Misery has previously caused significant deterioration in water quality at Misery.

The general rock geochemistry picture emerging at Ekati is that metal leaching at neutral or near-neutral pH is occurring and will continue as a result of weathering and leaching of *waste rock*. The company expects this pattern to occur into the future, and anticipates that

long-term drainage from the WRSA's will show minor enrichment in a number of metals (magnesium, calcium, manganese, *molybdenum*, nickel, potassium and sodium) in addition to ammonia and sulphate, as a result of leaching from granite and *kimberlite waste rock*. Typical seepage is not expected generally to exceed the water licence effluent quality criteria. Sulphate should eventually decline as sulphide is exhausted over time and once mining ceases, ammonia will decline as blasting residues decompose.

## Agency Assessment

No substantive issues with *waste rock* management or drainage from the various *waste rock* and ore piles emerged in 2012. Water quality criteria are generally being met, with some sporadic slight exceedances in some areas reflecting *kimberlite* leaching or interaction with tundra water. The general trend for regulated contaminants of concern, however, is stabilized or decreasing concentrations of those variables that had elevated concentrations in past years. Other, unregulated variables, such as the leached metals noted above, are increasing and may become a management concern at closure.

We support the recommendations in the '2012 Annual Seepage Report' for follow-up on the causes of *hydrocarbons* and organic compounds that are appearing in the CKRSA seepage, and to determine the extent of breakdown of *kimberlite* due to weathering.

The lack of freezing of the Fox dump

interior is a concern that we have noted in previous years. The company's plans for controlling the quality of drainage from the various rock piles rely largely on the interior of the dumps attaining a frozen condition. This is happening for most rock dumps, but not the Fox *waste rock* pile. EBA's report, as noted above, does not explain why this is happening only at the Fox dump but not the others.

An apparently unfrozen core is also present in the coarse rejects pile. We previously suggested further investigation on the company's part to explain the trends, and some thinking on developing an *adaptive management* approach to the problem.

In EBA's '2011 Waste Rock Storage Area Thermal Monitoring Report', and again in the 2012 report, EBA recommended that ground surface around the ground thermistor cables be surveyed to evaluate the quantity of cover material which has been removed for crusher feed. This work was apparently not done by BHPB.

Some of the ground temperature cables have become lost, buried or otherwise inoperable over the years, meaning less and less data are being collected. This situation runs counter to the company's approved *reclamation* research program for investigating the growth of permafrost in the *waste rock* piles which, among other things, required the installation of more temperature cables. (More information is provided in the Closure and Reclamation section.) ■



Processed kimberlite spill recovery, cell B slope into Fay Bay, June 2012.



Processed kimberlite spill recover, June 2012.

## HIGHLIGHTS:

**Company submits first annual progress report on Interim Closure and Reclamation Plan implementation.**

**Panda Diversion Channel widening and Old Camp reclamation delayed.**

**Updated financial security estimate of \$224 million submitted by BHPB.**

# RECLAMATION AND CLOSURE

## Activities 2012-13

As we noted in last year's report, the Interim Closure and Reclamation Plan (ICRP) was approved in November 2011 by the Wek'èezhìi Land and Water Board (WLWB).

One requirement was to produce an updated estimate for the costs of mine closure that accurately reflected the new ICRP. BHP Billiton (BHPB) submitted a *reclamation* security estimate in March, 2013.

The other significant event related to *reclamation* closure in 2012 was the production of the first annual progress report on *reclamation* research, a requirement of the WLWB.

## Financial Security Review

The amount of closure security for the Ekati Mine currently held by Aboriginal Affairs and Northern Development Canada is a total of \$126.8 M. This security is held as irrevocable letters of credit (ILOCs) split between the Class A Water Licence (\$83 M), the *Environmental Agreement* (\$43 M), and the Class A Land Use Permit (\$0.4 M) based on figures provided by AANDC. The amount of the security deposit over time is shown in Figure 2.

On December 6, 2011, the WLWB formally requested an updated security estimate for the Ekati Mine based on the approved ICRP (Version 2.4). The original submission

date of January 31, 2012 was revised to November 16, 2012 based on a detailed work plan submitted by the company which comprised: a development of a security estimate by BHPB (118 days); a cost comparison process principally between the company and AANDC (83 days); and discussion of a securities distribution framework amongst BHPB, AANDC, WLWB, GNWT, and the Agency (23 days).

On August 21, 2012, as part of the Diavik Diamond Mine financial security review, the WLWB sent an information request to AANDC asking for clarification on various aspects of the RECLAIM model for estimating *reclamation* liability for mine sites. As a result, BHPB then requested a delay in its submission until the requested clarification had been received. In December the WLWB met with AANDC, GNWT, the Agency and the company to discuss AANDC's response and to re-initiate the security review process for Ekati. Finally, on March 4, 2013, the WLWB formally requested from BHPB the updated security estimate reflecting the total liabilities associated with completing all the closure activities within the ICRP.

At the end of March, 2013, BHPB submitted its revised 'Reclamation Security Estimate' of \$224,790,094 to the WLWB. A breakdown of the security by mine component is provided in Figure 3.



Figure 2: Ekati Diamond Mine Financial Security

**Notes:** The company estimates are based on the annual reports for 1999-2012. No estimate was provided in 2012. The 2013 figure is from the BHPB estimate provided to the WLWB on March 22, 2013. Security held by AANDC is based on the Environmental Agreement and relevant water licences covering the main site and Sable, Pigeon and Beartooth. Financial security held by AANDC is likely to increase in 2013.

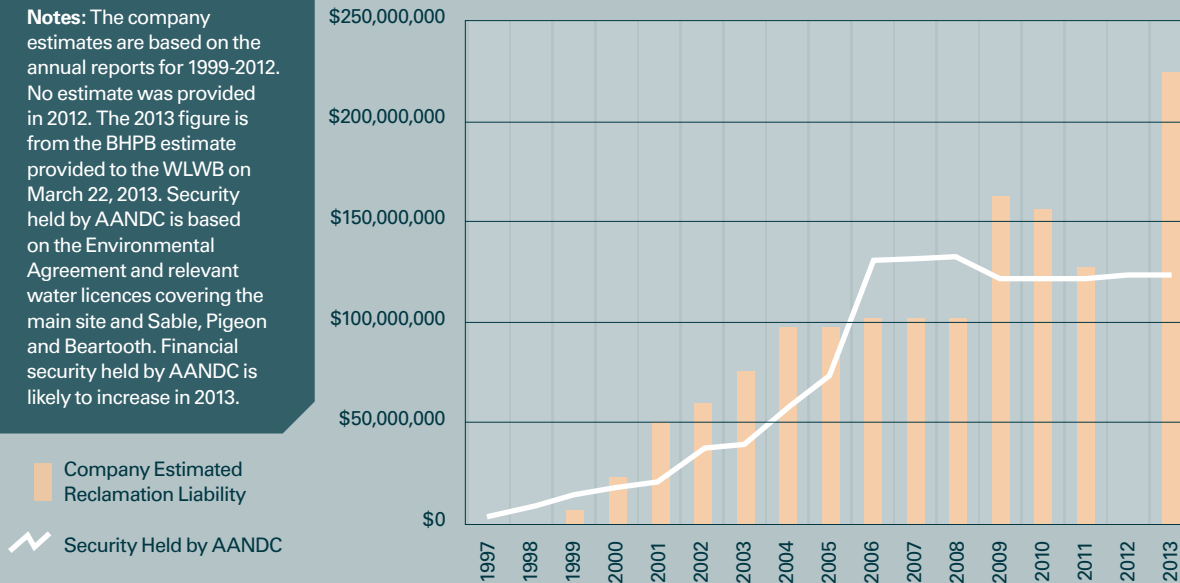
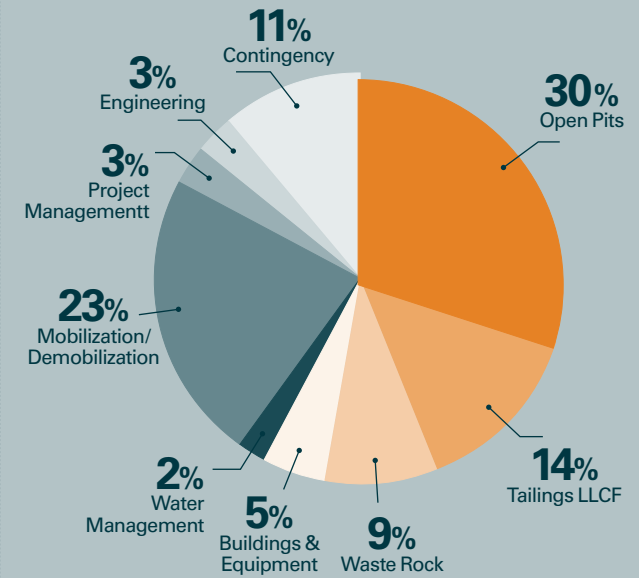


Figure 3: 2013 Ekati Reclamation Security Estimate



## Agency Assessment

With respect to the process that culminated in the revised 'Reclamation Security Estimate', we were not pleased that it dragged on and that the review period had to be shortened to accommodate the water licence renewal process. As a result, neither the anticipated collaborative cost comparison review nor the securities distribution framework discussion occurred.

The Agency has reviewed the '2013 Reclamation Security Estimate.' At the time of writing, we had just received the AANDC review of the estimate (as

opposed to a collaborative report).

The Agency is not in a position to make representations on the distribution of financial security across the available instruments including the water licence, land use permits, and the Environment Agreement. We should be in a better position to do this once AANDC reports on the review it commissioned to examine the appropriateness of the financial security held under the *Environmental Agreement*.

The Agency is of the view that BHPB made good use of RECLAIM to generate a *reclamation* liability estimate. It was reasonably easy to follow the thread

from the ICRP to the cost estimates, and the activities and assumptions regarding operational requirements and costs appear reasonable.

The main high level concerns of the Agency with respect to the substance of the new estimate are:

- Uncertainty as to how cost escalation over time (Consumer Price Index or inflation) was calculated in the report;
- A lack of transparent costing of the *reclamation* research plans; and

- A lack of regulatory costs related to preparation of a final closure and *reclamation* plan and other design amendments or approvals during the post-closure phase.

In summary, while there is now a preliminary security amount proposed, the Agency is not yet able to assure our Society Members that there will be no public liabilities when the mine is closed in accordance with the ICRP.

### 2013 Reclamation Security Estimate

The objective of the 2013 Security Estimate is to provide a reasonable, all-inclusive cost estimate for *reclamation* of the Ekati Mine based on the approved ICRP that meets regulatory requirements and government policy. Further, the estimate provides a single cost model that identifies individual work items which can be individually addressed for cost updates or removed upon completion. The estimate provides all costs for *reclamation* of the Ekati Mine, based on third-party costs and including:

- Reclamation engineering designs;
- Reclamation activities;
- Support activities and infrastructure;

- Environmental monitoring during and following *reclamation* activities for land, water, fish, air, wildlife, physical stability, chemical stability, etc.;
- Reporting; and
- Contingencies.

The ICRP describes the *reclamation* work under six major mine component groups:

- Open pits;
- Underground mines;
- Waste rock storage areas;
- Tailings (i.e., *processed kimberlite*) containment areas;
- Dams, dikes and channels; and
- Buildings and infrastructure.

Proposed *reclamation* and closure activities were incorporated as

straightforwardly as possible into the RECLAIM model, resulting in the following model components: open pits; *processed kimberlite* containment areas; rock piles; post closure monitoring and maintenance; water management; chemicals and soil contamination; and underground mines.

The quantities (material volumes and tonnage, seeding surface area, pipe lengths, etc.) for all ICRP *reclamation* activities were obtained for a number of sources, in order of precedence: the approved ICRP; WLWB approved documents; Ekati as-built drawings; Ekati internal reports; previous security estimates; and engineering judgment.

### Reclamation Research Conducted in 2012-13

- Literature reviews on scientific and Traditional Knowledge (TK) aspects of wildlife barrier design for pit perimeter considerations.
- Preliminary conceptual design work for pit lake littoral zones and channel connectors.
- Updated pit lake water quality modeling to include Beartooth *processed kimberlite* (PK) backfill.
- Continued Lac de Gras outflow stream monitoring.
- Literature review on *processed kimberlite* (PK) backfill.
- Preparing report on preliminary water quality modeling predictions for LLCF, to be submitted in 2013.
- Review of existing information related to permafrost growth in LLCF.
- The vegetation research plans were revised and vegetation work was conducted at *progressive reclamation* sites, research sites as well as the assessment of plant propagation techniques.
- Soil analysis in the proposed pilot study location in LLCF.
- Literature review of TK used at other sites.
- Meetings with Aboriginal communities to provide an update on the ICRP.
- Literature review initiated on wildlife closure objectives and criteria.

### Chronology of Events for the Ekati Financial Security Review

**MAY 2002** – Revised ICRP approved.

**MAY 2004** – Detailed Reclamation Liability Estimate provided by BHP to MVLWB but not approved.

**MAY 2004 - NOV 2011** – Water licence renewal and BHPB directed to prepare revised ICRP

**NOV. 10, 2011** – ICRP version 2.4 approved by the WLWB.

**DEC. 6, 2011** – WLWB requests a revised *reclamation* liability estimate from BHPB by Jan. 31, 2012.

**JAN. 26, 2012** – Meeting held amongst BHPB, AANDC and WLWB staff to begin discussions on a financial security review.

**FEB. 2, 2012** – Agency meets with WLWB staff to discuss the financial security review and the role of the Agency.

**FEB. 3, 2012** – Agency meets with GNWT and AANDC to discuss the financial security review and the role of the Agency.

**FEB. 20, 2012** – BHPB circulates draft review schedule and tasks for the financial security review.

**FEB. 27, 2012** – Meeting held amongst Agency, BHPB, AANDC, GNWT and WLWB staff to discuss the draft review schedule and tasks for the financial security review.

**MAR. 5, 2012** – BHPB submits revised review schedule and tasks to the WLWB.

**MAR. 12, 2012** – WLWB accepts the review schedule and tasks as submitted by BHPB.

**MAY 31, 2012** – Agency receives legal advice on its role in the review of financial security.

**AUG. 10, 2012** – BHPB halts its work on the financial security review to wait for clarification on the RECLAIM model (used to estimate *reclamation* liability) from WLWB and AANDC.

**AUG. 21, 2012** – WLWB issues information request to AANDC to clarify aspects of the RECLAIM model by late September 2012.

**OCT. 23, 2012** – AANDC responds to the WLWB information request for clarification on RECLAIM.

**DEC. 3, 2012** – BHPB holds meeting to discuss the Ekati financial security review. The Agency, AANDC and WLWB staff participate.

**MAR. 4, 2013** – WLWB issues a directive to BHPB to submit an updated RECLAIM security estimate by Mar. 22, 2013.

**MAR. 22, 2013** – BHPB submits revised security estimate.



Panda Diversion Channel.



## Progress on Reclamation Research

The current Ekati Mine ICRP was approved by the WLWB in November 2011.

The new ICRP updates the previous (2002) ICRP including such things as flooding the open pits, and covering the Long Lake Containment Facility (LLCF) with a combination of *waste rock* and vegetation cover. Most importantly, and as a direct result of the Agency's intervention in the planning process, the new plan enables the use of the final pit lakes by fish and requires the company to conduct research into a number of its proposed closure options.

An annual progress report on the research is also required, and the first report (this year) identifies the *reclamation* work done (see text box on opposite page).

## Agency Assessment

Since the 1997 Class A Water Licence was issued there has been an explicit requirement for the company to "endeavour to carry out *progressive reclamation* of areas as soon as is reasonably practical." Unfortunately, there has not been much success on this objective to date.

In our review of the '2012 ICRP Annual Report', we found that *reclamation* of the Phase 1 (pre-production) *tailings* pond, committed to be completed years ago, still has not been done. Additionally, the Panda Diversion Channel (PDC) widening project was not completed in 2012-13 as earlier proposed. We also found that *reclamation* of Old Camp (pre-production camp), committed to

be completed in 2008 and then again in 2012, still has not been completed. In explaining to the WLWB why this had not been done in 2012, the company stated only that delivery of the *reclamation* plan for Old Camp "has been postponed for business decisions concerning the most effective time to conduct the Phase 1 *tailings* pond *reclamation* work." In our view, this is not an acceptable reason for delaying *progressive reclamation*.

This *reclamation* work has slipped for years now, and the ICRP annual report did not indicate any new dates for completion. Consequently, we requested in February, 2013 that the WLWB establish a timeframe for submission of a plan for the *reclamation* of Old Camp, and to instruct the company that once approved by the WLWB, the plan should be promptly implemented by the company. To date we have not received a response.

Our review of the '2012 ICRP Annual Progress Report' also uncovered a troubling issue with regard to slippage in the required *reclamation* research projects needed to inform closure plans. Some 14 *reclamation* research projects are to be carried out by BHPB, but many are falling behind schedule by one or more years.

Research project #7, which is to investigate the growth of permafrost in the *waste rock* piles, is only one example where work is clearly lagging. An array of additional short term research tasks originally scheduled to be completed or started in 2012 are behind schedule, as shown in Table 4.

At this point, with the anticipated end of

## RECOMMENDATION 1

**The WLWB should issue a directive to the company to conduct and complete reclamation and closure of Phase 1 *tailings* pond and Old Camp in accordance with a prescribed deadline determined by the WLWB.**

**Table 4: Research project #7, growth of permafrost in the waste rock piles**

TASK #	TASK	SCHEDULED DATES	STATUS AT END OF 2012
4	Literature review	2011 for completion	has been initiated
5	Report on waste rock deposition	2011 for completion	information on materials placement in the Panda/ Koala, Fox and Misery WRSAs has been collected and compiled.
6	Develop a 3D model & deposition plan for the WRSA	2011 for completion	no information on status
7	Prepare report on WRSA water balance;	2012 for completion	no information on status
8	Installation of ground temperature cables	2012 for completion	no action to date
9	Geotechnical investigation & instrumentation	2012 for completion	no action to date
10	Thermal modeling	2012 start date	no information

mine production by 2019, we are concerned that critical information from the research program will not be available to inform the timely implementation of closure plans.

Both the company and the WLWB need to place more emphasis on ensuring the research projects are expedited so that they can meet their target dates for completion. ■



Pigeon Stream.

## HIGHLIGHTS

**Results of three-year Aquatic Effects Monitoring Program review incorporated into 2012 AEMP.**

**Certain major ions, nutrients and metals elevated downstream of the mine.**

**Significant plankton changes in lakes downstream of Long Lake Containment Facility.**

**Strong correlation between metals in lake sediment and in fish tissue.**

**Panda Diversion Channel work on final habitat construction is nearing completion.**

## AQUATIC EFFECTS

Each year BHP Billiton (BHPB) carries out a number of programs and studies to determine if changes in the aquatic environment downstream from its operations are occurring as a result of mining activities. There are two separate watersheds (Koala-Lac de Gras and King-Cujo) into which regulated mine effluent is released, and water bodies in these two systems, as well as background sites are sampled. The Aquatic Effects Monitoring Program (AEMP) collects information on any changing trends in water quality, sediment quality, benthic macroinvertebrate communities, *zooplankton* and *phytoplankton*, as well as fish populations and fish tissue. Two separate studies were undertaken as part of the special effects studies and monitoring programs.

### Activities 2012-13

*Processed kimberlite*, treated sewage and pit water were discharged into the Long Lake Containment Facility (LLCF) and comprise the main sources of potential contaminants entering the downstream environment. Effluent was released from the LLCF from June to December 2012, entering the receiving environment of the Koala watershed through Leslie Lake, being diluted as it flows downstream through Moose Lake, and eventually entering Lac de Gras. Minewater continued to be pumped into Beartooth Pit.

A second source of potential contamination is effluent discharge from the Misery site. Water from behind the Waste Rock Dam was discharged into King Pond Settling Facility (KPSF) mainly in August 2012. No water was pumped from Misery Pit in 2012. In June and July, water was released from the KPSF to Cujo Lake from where it eventually flows into Lac du Sauvage. Water from Desperation Pond was pumped to Carrie Pond in June, July and September.

### 2012 Aquatic Effects Monitoring Program (AEMP) Re-evaluation

As required by the water licence, BHPB conducted a three year re-evaluation of the Aquatic Effects Monitoring Program (AEMP). The re-evaluation contained 33 recommendations for improvement in the 2013 to 2015 AEMP Plan. The Agency participated in a technical workshop sponsored by the company to discuss the changes. We have no major concerns with the current program or the proposed changes.

### Changes to the 2012 AEMP

A revised work plan for the 2012 fish monitoring was approved by the WLWB, resulting in a number of positive changes being implemented



in the 2012 sampling program:

- Slimy sculpin was added to the fish species being monitored. Unlike lake trout and round whitefish which are monitored every 5 years (this will increase to 6 years from now on), slimy sculpin are to be monitored every 3 years starting with the 2012 program.
- For lake trout, muscle tissue biopsies were used to check for contaminants to avoid the whole-body lethal sampling of past years.
- Ethoxyresorufin-O-deethylase (EROD), an enzyme in fish that is a biomarker for exposure to *hydrocarbons*, was tested in round whitefish and slimy sculpin.
- PCBs, dioxins and furans were monitored for the first time in whitefish (3 fish in each of the 6 AEMP lakes with the highest EROD activity).

### AEMP Monitoring Results

#### Water Quality Sampling and Results

Each year BHPB reports the results of its AEMP to the WLWB and provides the highlights in its 'Environmental Agreement and Water Licence Annual Report.'

This is the 15th year of monitoring for the Koala-Lac de Gras system and the 12th year for the King-Cujo system. The AEMP reference lakes and outflow streams are shown in Figure 4. The mining effects on water quality in the Koala and King-Cujo watersheds are shown for selected parameters in Table 5. This table is adapted from the AEMP report with additions resulting from the Agency's review of the monitoring results. One

FIGURE 4: AEMP REFERENCE LAKES AND OUTFLOW STREAMS



TABLE 5: MINING EFFECTS ON WATER QUALITY FLOWING THROUGH THE KOALA AND KING-CUJO WATERSHEDS

Parameters Monitored	Parameters elevated in Koala watershed									Parameters elevated in King-Cujo watershed			
	Long Lake Containment Facility Lac de Gras									King Pond Lac du Sauvage			
	Leslie	Leslie-Moose	Moose	Moose-Nero	Nema	Nema-Martine	Slipper	Slipper-Lac de Gras	Lac de Gras	Cujo	Cujo Outflow	Christine-Lac du Sauvage	Lac du Sauvage
pH	●	●	●	●	●	●	●	●	●	●	●	●	■
Alkalinity	●	●	●	●	●	●	●	●	●	●	●	●	
Hardness	●	●	●	●	●	●	●	●	●	●	●	●	
Total Dissolved Solids	●	●	●	●	●	●	●	●	●	●	●	●	
Chloride	●	●	●	●	●	●	●	●	●	●	●		
Sulphate	●	●	●	●	●	●	●	●	●	●	●	●	
Potassium	● ■	●	● ■	●	●	●	●	●	●	●	●	●	
Total Ammonia	●	●	●	●	●	●	●		■			■	
Nitrite	● ■	●	●	●	●								
Nitrate	●	●	●		●	●							
Total Phosphate	■	●	■		■		■		■	■			■
Total Organic Carbon										◆	◆	◆	
Aluminum													■
Antimony	●	●	●	●	●	●	●	●					
Arsenic	●	●	●										
Chromium													
Copper						■							
Iron													
Molybdenum	●	●	●	●	●	●	●	●	●	●	●		
Nickel	●	●	●	●	●	●	●						
Selenium													
Strontium	●	●	●	●	●	●	●	●	●	●	●	●	
Uranium	●	●	●	●	●	●							

addition to the table this year is the inclusion of water analysis from the stream connecting Leslie and Moose lakes.

Under ice temperature seems to be cooling in all lakes downstream of the LLCF as far as Nema Lake but the cause is unclear. A warming trend was detected in Kodiak Lake along with a corresponding change in dissolved oxygen. These changes began in the first year in which aerators were no longer used (2007) and likely represent undisturbed conditions. Grizzly Lake is showing some degree of thermal stratification, with cooler surface temperatures. The cause is unclear. Given that this change may have implications for the biological community, the company proposes assessing the biological communities as part of the 2013 AEMP sampling program.

Of note, during the open water season, total iron concentrations increase further downstream from the LLCF. The company suggests that this may be due to iron limitation in the biological components of lakes and streams closest to the LLCF, which could be associated with the downstream spatial gradient in nitrogen. Iron is an important micronutrient that can become limiting in nutrient rich waters. This could be associated with the rising concentrations of *nitrate* in LLCF waters as described in last year's report.

*Molybdenum* levels downstream of the LLCF and King Pond continued to decline or remained stable since their peak in 2005, but continued at or above the current Canadian Council of Ministers of the Environment (CCME) guideline, especially under ice. The values did



remain below the Site Specific Water Quality Objective (SSWQO) of 19.4 mg/L developed by the company. Despite the decrease in recent years, the concentrations in the Cujo Outflow were higher than any previous year. These levels are of concern as *molybdenum* can affect trout fry development at high concentrations.

Other notable changes include:

- Potassium mean concentrations have reached the SSWQO (41 mg/L);
- Selenium remains at pre-2007 levels after the spike above the CCME guideline that occurred in 2010;
- Copper concentrations in the PDC and Kodiak Lake continued to rise slightly over the past three years and remain at or above the CCME guideline, similar to all reference lakes;
- Arsenic levels were elevated under ice in Leslie and Moose lakes; and
- Total organic carbon (TOC) concentrations are elevated, relative to reference sites, in Cujo Lake, Cujo Outflow and Christine-Lac du Sauvage, with concentrations decreasing downstream from the King Pond Settling Facility.

## Biota Sampling and Results

**Plankton:** Plankton appears to be affected by the mine both downstream of the LLCF and of the Misery Pit. Both *phytoplankton* and *zooplankton* diversity is decreasing substantially (<75% - generally considered by aquatic biologists to be an indication of possible negative changes in the aquatic ecosystem) in Leslie Lake.

In Leslie Lake, green algae have been replacing diatoms over the past 3 years, while diatoms have been

replacing cyanophytes (blue-green algae) in lakes downstream of Leslie Lake. This is not happening in reference lakes or in Kodiak Lake, suggesting LLCF discharges are responsible.

In Cujo Lake, for the past 2 years (2011 and 2012) *phytoplankton* densities were less than baseline densities by more than 2 standard deviations. Densities have been depressed relative to baseline since 2003.

The *cladocera* populations of Moose and Nema lakes are still depressed relative to baseline years. Historical trends suggests that the overall decline of *cladocerans* in Leslie, Moose, and Nema lakes is due to the decline in population density of just one dominant species, *Holopedium gibberum*. Populations of *H. gibberum* have been depressed in Moose and Nema lakes since 2005 and absent in Leslie Lake since monitoring began there in 2003. Overall, Leslie, Moose and Nema lakes have higher populations of cyclopoid copepods and lower populations of *cladocerans* and rotifers than in reference lakes. This may be significant for fish health as stomach analyses from past fish monitoring showed that *cladocera* are a preferred food but cyclopoid copepods are not.

**Fish:** Trout growth rate and condition factor seems to have decreased over time in all lakes downstream of the LLCF and growth rate is higher in reference lakes compared to monitored lakes. As yet there has been no similar trend in whitefish growth.

**Selenium:** Unlike in reference lakes, selenium concentrations in lake trout and round whitefish muscle in Leslie, Moose and Nema lakes, as well as in Cujo Lake,

have consistently increased over time. In Leslie Lake, mean concentration in whitefish muscle is above British Columbia Ministry of Environment (BCMOE) guidelines (4 mg/kg dry wt), with 19 of 21 whitefish samples and 6 of 13 trout muscle samples above the guideline. Also, the only lakes having slimy sculpin (7 fish in total) with selenium concentrations above BCMOE guidelines were all downstream of LLCF (Leslie, Moose, Nema & Slipper). None in the three reference lakes was above that guideline.

These are likely mine effects. Given that almost the entire Leslie Lake whitefish and half the trout sample populations have levels of selenium above the BCMOE

benchmark, a discussion is warranted on what this might mean for the health of these populations and possible source reduction strategies. It is troubling that this is not found in the AEMP report.

A statistically significant correlation was found between fish tissue and sediment concentrations of selenium. The company stated that

*“Because of the relatively tight fit between sediment and fish tissue concentrations, any observed increases in sediment concentrations in future monitoring years will likely result in increases in fish tissue concentrations.”*



Pigeon Stream Diversion.

## Water Quality Benchmarks

Water quality benchmarks are important in determining mine impacts on the environment. Benchmarks can include CCME water quality guidelines and calculated SSWQOs. At Ekati, a number of water quality variables are compared to the CCME values: pH, nitrite, total phosphate-P, total aluminum, total arsenic, total copper, total iron, total nickel, total selenium, total uranium and total zinc. The CCME values for copper and nickel are hardness dependent, while the value for total

ammonia-N varies with pH and temperature.

In the 2012 AEMP Evaluation of Effects, BHPB developed SSWQO's for *chloride*, sulphate, potassium, *nitrate*, and *molybdenum*. The SSWQO values were developed through a review of water quality guidelines in Canada and the United States, literature in the US EPA Ecotox database, and experimentation using species present or closely related to those at Ekati. The SSWQOs for *chloride* and sulphate are hardness dependent, with an upper limit set at 160 mg/L as calcium carbonate (CaCO<sub>3</sub>).

In some cases, the SSWQO was used as a basis for proposing an Effluent Quality Criteria for inclusion in the Ekati water licence. Review of the SSWQOs, especially as related to

establishment of an EOC, was one of the focal points of the water licence renewal process.

The SSWQO proposed for *nitrate* was of particular interest to the Agency. Rising *nitrate* concentrations at Ekati have been an ongoing concern as outlined in previous annual reports. A meeting with interested parties on September 18, 2012 to discuss the early adoption of the proposed SSWQO was very helpful in better understanding the company's research and concerns. The Agency recognized that there was no legal requirement or water licence condition that prevented the company from discharging water based on the proposed SSWQO. However, the Agency had concerns about this approach in terms of the acceptability of the magnitude of downstream water quality changes which could result in changes to biotic life.

The Agency was concerned that the water to be discharged through the LLCF as a result of early adoption of the SSWQOs would also contain elevated hardness related to calcium and magnesium. In the most recent three year review of the AEMP, a multivariate analysis showed that hardness was one of the key causes of declines in *cladocera* populations downstream of the LLCF. The Agency suggested a more rigorous chemical characterization of the water to be discharged under the proposed SSWQO for *nitrate* and the potential biotic consequences of such a discharge. The Agency also requested a formal documentation of the efforts to reduce the sources of *nitrate* at the mine. The company did not formally respond, but the issues were largely resolved during the water licence renewal.

Photo: Cujo Lake





Given this, it is likely that selenium in sediments is the source of elevated selenium levels seen in fish as the 2011 AEMP showed mid-depth sediment selenium levels in all AEMP lakes downstream of LLCF steadily increasing since 2002 (Leslie Lake since 2005).

**EROD:** Ethoxyresorufin-O-deethylase (EROD) is an enzyme whose presence in fish tissue is an indicator of exposure to *hydrocarbons* and/or organochlorines (PCBs, dioxins, and furans). There was a significant inverse correlation between EROD activity in slimy sculpin and distance from LLCF as well as elevated EROD activity in whitefish in affected lakes compared to reference lakes. The company states that this

*"suggest[s] a possible link between mining-related activities and hydrocarbon releases into the environment, although the exact source remains unknown."*

**Dioxins and Furans:** While three fish in each of six lakes were sampled for PCBs, dioxins and furans, only one was sampled from Kodiak Lake, the very lake that a previous study has shown to be exposed to deposition of these contaminants. No sculpins were tested.

PCBs were below detection limits in all lakes. Results were inconclusive for dioxins and furans although these were measured in detectable levels in whitefish only in Leslie and Nema lakes downstream of the LLCF as well as one reference lake (Nanuq). The Agency believes that the inconclusive results for dioxins and furans warrant further study.

**DELT:** Both trout and whitefish were looked at by Aboriginal fishers for deformities, eroded fins, lesions and tumours (DELT). This year the fish were seen as being in good physical condition. Tumours were observed in a smaller proportion of trout than in 2007 (this was reversed in Cujo Lake trout). Lesions and eye malformities were in a larger portion of trout in some lakes downstream of the mine in 2012 (in Cujo Lake it was lower) than in 2007 but this was also the case in reference lakes. High rates of eroded fins were observed and recorded in both whitefish and trout, something reported solely in Nema Lake trout in 2007.

**Parasites:** A few round whitefish had unidentified internal parasites (clear gelatinous balls) that were found floating in the abdominal cavity, unattached to any organ. As in 2007, *Ligula intestinalis* infection in sculpin was generally greater in monitored lakes than in reference lakes, with the highest infection rates in Cujo (76%), Kodiak (46%) and Moose (14%) lakes. Unlike previous years, Leslie Lake had no infected sculpin but that is likely due to small sample size as only two fish were sampled. Disregarding Leslie Lake, infection rates declined with distance from the mine.

### Special Effects Studies and Monitoring Program

In 2012, two studies were undertaken as part of the Special Effects Monitoring Programs and Studies:

- Endocrine-disrupting compounds (EDCs) at Ekati; and
- 2012 Panda Diversion Channel Proposed Habitat Enhancements.



Water licence renewal technical session.

### Endocrine Disrupting Compounds:

Upon a request from the Agency, BHPB tested the sewage effluent at Ekati for presence of 17 $\alpha$ -ethinylestradiol (EE2), a synthetic estrogen compound found in pharmaceuticals that is known to adversely affect fish reproduction. Concentrations in Ekati sewage were below detection levels (0.2 ng/L). The results of the survey indicate that this compound is not a concern for the aquatic ecosystem downstream of the mine.

**PDC Habitat Enhancements:** During the 2012 summer field season a habitat assessment was done to identify areas most suitable for the installation of in-stream vegetation mats and rock habitat structures. These were deemed necessary to capture sediment created by overland flow into the channel at freshet and during heavy rains (vegetation mats) and to increase diversity of habitat for fish and

insects (rock structures). Vegetation mats may also provide fish nursery habitat and nutrients for benthic invertebrates. Vegetation mats of eelgrass taken from Pigeon Stream were subsequently placed during the summer field season, while rock structures were placed during winter to prevent impacts to fish from the physical disturbance of large objects being deposited into the channel.

Rocky ramps have been the

most successful type of rock structures placed in the PDC thus far, so the majority of proposed habitat structures consist of rocky ramps along with rock groynes and boulder clusters.

These improvements, along with completion of the channel widening at the high-walled "canyon" designed to prevent rocks and soil slumping into the channel at closure, should be the final alterations to the PDC channel. This will provide final closure of the PDC monitoring program and the last requirements under the BHPB/DFO 1996 Fish Habitat Compensation Agreement. The PDC will remain connected to the Upper Panda, Grizzly and Kodiak lakes. Lessons learned from the 15 years of PDC monitoring will be incorporated into habitat construction and monitoring of the Pigeon Stream Diversion (PSD) that will circumvent the Pigeon Pit.

*Continued on page 22*

# Water Licence Renewal

In June 2011, the Agency met with BHPB to discuss the upcoming water licence renewal for Ekati and to allow the Agency to provide its initial thoughts. A more formal meeting with all interested parties was held in December 2011.

On April 30, 2012, BHPB applied to the Wek'èzhii Land and Water Board (WLWB) for a renewal of the Ekati water licence (MV2009L2-0001). BHPB argued that, as no material changes were proposed to the project, the application should be exempt from preliminary screening. The WLWB agreed with an exemption in September 2012.

The application included a draft with proposed changes to the water licence. The main changes requested were:

- A decrease in the number of variables subject to Effluent Quality Criteria at some Surveillance Network Stations;
- A decrease in the total number of Surveillance Network Stations and changes to the location of some stations;
- Addition of a Response Framework as part of Contingency Planning;
- A decrease in the number of requirements specified for some plans such as the AEMP; and
- Reformatting of the licence to include a series of Schedules containing the details of various requirements such as the Annual Report, Security Deposit, etc.

A number of supporting documents were provided with the application: "The Review of Protection Measures

for the Aquatic Environment at the Ekati Mine" (April 2012); "Water Quality Modeling of the Koala Watershed"; five Freshwater Toxicity Benchmark papers (*chloride*, aluminum, cadmium, copper and selenium); and six proposed Site Specific Water Quality Objectives (SSWQO) (*chloride*, *molybdenum*, *nitrate*, *potassium*, *sulphate*, and *vanadium*).

The Review of Protection Measures report contained a review of the water quality data and environmental protection measures related to water at the mine. As part of the review, the company updated and expanded its predictive water quality model for mine effluent and receiving lakes. In evaluating the potential impact of the mine, two main types of benchmarks were used: applicable Canada Council of Ministers of the Environment (CCME) water quality guidelines for the protection of freshwater aquatic life and site specific water quality objectives (SSWQOs). These benchmarks are described in greater detail on page 18. The document also included a proposal for a Response Framework.

In September 2012, the Agency provided a preliminary response to the WLWB. In general, the Agency was complimentary regarding the amount of work that went into the application. The Agency did identify a number of issues with BHPB's proposed changes to the water licence with respect to:

- The use-protection approach (i.e., protecting the end-use of the affected water bodies for

humans rather than the ecological integrity of those water bodies);

- Some details of the proposed Response Framework;
- Proposed changes to the effluent quality criteria;
- Changes to the aquatic effects program requirement; and
- Some changes proposed for the Surveillance Network Program Stations.

In support of the licence review, the WLWB provided a report it had commissioned – Review of Technical Documents submitted as Part of BHP Billiton's Water Licence Renewal Application (Sept 2012). The review focused on water quality modelling, derivation of SSWQOs, variables of interest deemed not of potential concern, parameters of potential concern above 75% of SSWQO (with no EQC)

In October BHPB provided its response; the main issue was the lack of specific comments from the reviewers, particularly with regards to the proposed SSWQOs.

To discuss and clarify initial comments submitted by reviewers, the WLWB hosted a technical session, held on October 23 - 24, 2012, in Yellowknife. A number of issues were resolved during the workshop. However, additional information was still needed to inform the discussion. On October 30, the WLWB staff issued a number of Information Requests (IRs) to the company and other parties who participated in the workshop. Several of the IRs addressed the lack of supporting information for the SSWQOs. Other areas addressed in the company response of November 30 were:

- The setting of effluent quality



King Pond discharge to Cujo Lake.

criteria for Cujo Lake;

- Provision of a report detailing *nitrate* source reduction efforts;
- Proposed changes to the aquatic effects monitoring requirements; and
- A comparison of AEMP and SNP Stations.

In its December 21, 2012 submission to the WLWB the Agency supported a number of the changes proposed by the company. In the areas where there was disagreement, we made 26 recommended changes, the main ones being:

- Set Effluent Quality Criteria (EQC) for Nitrate-N for all three effluent streams;
- Set EQC for *Chloride* for the Long Lake Containment Facility;
- Prepare Response Plans for Nitrogen and *Chloride* for the Koala watershed;
- Prepare a Response Plan for Nitrogen for the King-Cujo watershed;
- Link the Response Framework and Aquatic Effects Program;
- Retain current requirements for Conditions Applying to Aquatic Effects;
- Do not approve the use of Cujo Lake as a dilution zone without further information;
- Set a regulated fish tissue

benchmark for selenium; and

- Set EQC for release from Desperation Pond to Carrie stream the same as those for the King Cujo discharge.

The Agency further recommended that a global security deposit based on the ICRP be developed as soon as possible, preferably allowing time for a review by all intervenors.

On January 28, 2013, the company provided its written response to interventions by the Yellowknives Dene First Nation, the Agency, AANDC, North Slave Métis Alliance, and jointly by Environment Canada and the Department of Fisheries and Oceans. The information provided was most useful in preparing the Agency's submission for the public hearing.

The public hearing for the renewal of the Ekati water licence was held in Behchokq February 12–13, 2013. The Agency's presentation focused on three main areas:

1. The changes proposed by BHPB where there were remaining differences of opinion;
2. The need for additional Effluent Quality Criteria for discharge from the Long Lake Containment Facility and to Cujo Lake; and
3. The immediate need for a Response Framework and Response Plans for *nitrate* and *chloride*.

Following the hearing, we wrote to the Board that a number of our issues had been resolved either through the additional information provided by the company or as a result of commitments made by the company. The main recommendations for action included:

- For the Long Lake Containment Facility:
  - They need to set effluent quality criteria for nitrate-N and *chloride*;
  - They need to develop response plans for nitrogen, *chloride* and selenium.
- For discharge from King Pond Settling Facility (KPSF):
  - The need to set EQC for nitrate-N;
  - The need to explore alternatives to the use of the whole of Cujo Lake as a mixing zone;
  - The need to develop response plans for nitrogen and selenium.
- Response framework and response plans;
  - The need for immediate response plans for nitrogen and *chloride*.
- Security Deposit:
  - The need to develop a security deposit cost estimate based on the Interim Closure and Reclamation Plan (see the ICRP chapter for details);
  - The need for opportunity for intervenors to provide feedback on the cost estimate.

The March 20, 2013 draft water licence addressed these recommendations. The Agency provided written comments on

the draft to the WLWB on April 9. As we went to press, the WLWB was in the process of preparing the final water licence and Reasons for Decision for submission to the Minister of AANDC for review and decision.

## Agency Assessment

The Agency commends the WLWB for a well run and thoughtful water licence renewal process. Given the complexity of the issues covered by the water licence, the WLWB's request for written closing comments orally delivered at the hearing was a good idea.

The Agency commends BHPB for the effort put into the water licence renewal process.

The Agency was pleased with the thorough peer review of the proposed SSWQOs during the water licencing process. While full agreement was not reached on the proposed values, the reviews were most helpful in developing confidence in the proposed SSWQOs and the resulting Effluent Quality Criteria derived from these studies. The SSWQOs were also most valuable in assessing the potential impact of the mine effluent on the receiving environment. Overall, while BHPB focused on a use-protection approach to water management, the Agency took a more balanced approach with equal emphasis on waste minimization. This reflects the two objectives of the Mackenzie Valley Land and Water Board's Water and Effluent Quality Management Policy.



North end of Gordon Lake.



Continued from page 19

### Agency Assessment

Our review of the 2012 reports indicates that the company is generally doing a good job of protecting the aquatic environment at the mine site, although there are still a few challenges. The AEMP continues to be comprehensive in scope and has the ability to detect small changes in the sampled parameters that can alert managers to any emerging problems. We still have concerns with some metals that continue to increase downstream from the mine.

The three year review of the AEMP conducted by BHPB served to strengthen an already good monitoring program. The recommendations made by the Agency were addressed to our satisfaction by both the WLWB and BHPB. The Agency encourages the company to do more analyses to determine how far up the food chain changes are occurring as a result of nutrients from the mine.

Biota sampling was carried out in the summer of 2012, as required by the AEMP under the water licence. Plankton densities and distribution appear to be affected by the mine, both downstream of the LLCF and the Misery Pit. This may be significant for fish health but further study is required. Trout growth rate and conditions seems to have decreased over time in the monitored lakes although there is no similar trend in whitefish growth. The element in fish at Ekati of most concern to the Agency is selenium. Concentrations in lake trout and round whitefish muscle in several monitored lakes have increased over time and are

above BCMOE guidelines. The increase appears to be a mine related effect and further discussion is warranted regarding implications for population health and possible source reduction strategies as none was found in the current AEMP.

EROD activity which indicates possible exposure to *hydrocarbons* and/or organochlorines, was detected higher in fish closer to the LLCF compared with reference lakes. The company suggests that there is a possible link between mining activity and hydrocarbon releases although the source remains unknown. PCBs were below detection in all lakes but the results for dioxins and furans were inconclusive. The Agency was disappointed to see that the company did not analyze sculpins using a composite sample for dioxins and furans. We had expected that sculpins in Kodiak Lake and at least one reference lake would be sampled given that dioxin and furan levels in Kodiak Lake sediments are above CCME guidelines. The Agency believes that additional work is warranted in this area.

Two special effects studies were undertaken in 2012. The endocrine disrupting compounds study requested by the Agency was conducted in a very timely manner and indicated that these compounds are not a concern for the aquatic ecosystem downstream of the mine. The Agency was pleased to see BHPB's responsiveness to this new concern. The work carried out in the PDC to identify suitable areas for installation of habitat structures was successful. These improvements, along with completion

of the channel widening in the canyon section of the PDC should be the final alterations required and allow completion of the monitoring program. However, we still await completion of the PDC widening and the habitat enhancement. The Agency is pleased to see that lessons learned from the 15 years of monitoring will be incorporated into habitat construction and monitoring in the PSD.

Finally, the Agency was pleased that BHPB followed our advice to investigate effects of dust deposition on aquatic

ecosystems. Its 'AEMP Re-evaluation Report' (December 2012) states that contributions of dustfall to concentrations of lake water chemistry variables at Ekati were considered negligible given that summer dustfall contributions were several orders of magnitude lower than observed concentrations of water quality variables in impacted Ekati lakes. The company has committed to studying this again whenever its Air Quality Monitoring Program (AQMP) shows higher amounts of dust being generated and deposited. ■



Misery waste rock pile and King Pond.



Misery Road.

## HIGHLIGHTS

**2011 Air Quality Monitoring Program Report (2009-2011) submitted in June 2012.**

**Agency concerned over same problems with ambient air quality sampling methodology.**

## Activities 2012-13

The Ekati Air Quality Monitoring Program (AQMP) is comprised of the following components: meteorological monitoring (daily); air emissions and greenhouse gas calculations (annually); total suspended particulate (TSP) measurements through high volume air sampling (HVAS) (every

six days); continuous ambient air monitoring (NO<sub>x</sub>, SO<sub>2</sub>, TSP and PM<sub>2.5</sub>) (24 hour); dustfall monitoring (summer months); snow chemistry sampling (every three years); and lichen tissue sampling (every three years). Results are reported on every three years in concert with the snow and lichen sampling program. The

# AIR QUALITY

last AQMP report was issued in June 2012 for the 2009-2011 reporting period.

In our 2011-12 annual report, the Agency provided BHPB's executive summary of the results of the 2009-2011 AQMP. In 2012 the Agency hired a consultant (SENES) to independently review the AQMP and report on each of the above components of the air monitoring program in place at the Ekati Mine.

Two new waste incinerators for Ekati were commissioned in 2012. BHPB reports that during 2012 and into 2013, there was a focus on waste streams and waste batching to determine optimal incinerator operations. In 2013 the company expects to implement an incinerator emissions monitoring program, which will include incinerator stack testing.

BHPB has also made some waste management improvements on site to help reduce the amount of plastics being sent to the incinerator. They have discontinued using plastic disposable clam shell food containers and all plastic utensils in favour of more environmentally friendly or biodegradable products constructed from bamboo, sugarcane, and palm pulp fibres. They are also going to use a new type of semi-transparent corn based biodegradable garbage bag that will be used to hold incinerator waste. These products are much more suitable for incineration as they do not produce as much volatile emissions

as plastics. The Agency commends BHPB on implementing such measures to utilize more environmentally friendly products.

## Agency Assessment What is Working

The Agency is pleased with BHPB's increased focus on making improvements to the AQMP over the past few years. The continuous air monitoring (CAM) building is now located in an improved location at the Polar Explosives site, which places the monitor at a downwind location with regard to mine site activities. The snow and lichen sampling programs have been improved to include more sample site locations that coincide with dustfall sampling sites to allow for comparison, and are located in a radial pattern outward from the mine site in order to measure change with distance from mine site. The lichen tissue monitoring program appears to be well designed and providing useful data. Lichens are important as indicators of dust distribution, particulate and air emissions from a variety of sources, including but not limited to road dust, mine sites and vehicle exhausts. The chemical analysis of lichen tissue provides a precise measurement of ambient air pollution levels over time.

BHPB has begun to compare the residual effects of fugitive dust, including the amount of TSP concentrations, *nitrate* and



sulphate deposition, and other chemical elements between the dustfall, snow chemistry and lichen tissue sampling programs. Selected snow chemistry data have been compared to background conditions from Snare Rapids Canadian Air and Precipitation Monitoring Network (CAPMoN) station. The snow chemistry parameters monitored are the same as those used in the AEMP for water quality. BHPB has also followed the Agency's suggestion and has evaluated the contribution of dust to the aquatic environment which was done in its '2012 Aquatic Effects Monitoring Program (AEMP) Re-evaluation Report.' That report states that contributions of dustfall to concentrations of lakewater chemistry variables at Ekati were considered negligible given that summer dustfall contributions were found to be several orders of magnitude lower than observed concentrations of water quality variables in impacted Ekati lakes.

BHPB has acknowledged that its long-term ambient air quality monitoring (e.g., HVAS and CAM) data sets have some missing data related to equipment malfunction. The company has indicated it has made some improvements and will continue to address the issues including investigating alternative technologies to increase the reliability and accuracy of TSP measurements.

The new incinerators at Ekati are now installed and operational. It is anticipated that this will reduce emissions (particularly dioxins and furans) entering the environment.

### What isn't working

The ambient air quality program needs to be improved on considerably.

*"The goal of the Ekati AQMP is to provide the monitoring data that the mine needs to track ambient concentrations in order to determine if it is necessary to initiate adaptive management actions that would prevent adverse effect to the environment (BHPB AQMP 2012)".*

BHPB also cites

*"High ambient concentrations of particulate matter (especially fine particles <30µ) from emissions and fugitive dust could, if not mitigated, have effects on wildlife and vegetation populations (Bell and Threshow 2002)".*

However, the HVAS program that measures TSP and continuous air monitoring and the continuous air monitoring program that measures SO<sub>2</sub>, NO<sub>x</sub>, TSP and PM<sub>2.5</sub> continue to be plagued by calibration errors and equipment failures resulting in poor or unusable data. In addition, conclusions drawn between the two programs contradict each other. HVAS says that *"A long-term trend of decreasing TSP concentrations over time can be seen when looking at the historical dataset."* This statement contradicts the following statement from the discussion of the continuous air monitoring results: *"The monthly mean TSP levels from 2008 to 2011 show that there has been a slight increase of TSP over time."*

### High Volume Air Sampling

Between 2009 and 2011 13% of the HVAS filters returned negative values following analysis. It was reported that the monitoring technicians were having problems with portions of the filter paper sticking to the rubber edge of the filter cassette and being torn, or incorrect measurements of the filter's initial or final weight. Filters are weighed before and after sampling is run, and the difference in weight is the amount of TSP loading. The Agency has noted that there are also no calibration procedures identified for the scale used to pre- and post-weigh the filters. This is of particular importance, as issues with filter weights have been raised in the AQMP report as potentially affecting the reported particulate concentrations.

The AQMP also suggests that only the negative values were questionable – yet if the amount that was torn off during removal does not happen to outweigh the loading resulting in a positive concentration, then the data are not necessarily usable and should be treated as compromised samples. The company should also look into the cause of the exceedances of Canadian Ambient Air Quality Objective (CAAQO) and the GNWT's Ambient Air Quality Standards in TSP besides filter weight calibration, such as off-site events (e.g., forest fires) that should be compared to the continuous air monitoring data for the same dates.

Another problem identified is that the HVAS samples are being run from mid-afternoon to mid-afternoon and the sampling may miss or may not fully



Inside the incinerator building.



represent non-daily events (*e.g.*, blasting). Samples collected in this manner are also not directly comparable to CAM data for which 24 hour concentrations are averaged from midnight to midnight. The Agency recommends that the HVAS samples be run from midnight to midnight to more accurately reflect events over a calendar day and be directly comparable to the CAM data.

As recommended by the Agency and government regulators, HVAS was conducted during the winter of 2010-11. The winter HVAS program had a number of sampling problems due to freezing motors and dials, filter paper covered in frost and snow, and severe weather where staff could not visit HVAS sites due to safety concerns. Government and other consultants operate HVAS in these conditions and we recommend BHPB consult further with them for help to improve the winter sampling methods.

### Continuous Air Monitoring

During the 2009-2011 reporting period, over 75% of the PM<sub>2.5</sub> data were not valid due to equipment issues. This would not be expected with regular calibration of the equipment. We note that there were two years of faulty measurements before staff removed equipment for repair. Exceedances of CAAQO and the GNWT ambient air quality standards in TSP are identified but there is no investigation into potential causes. It would be appropriate to attempt to link these exceedances with an event (on-site or off-site).

### Dustfall Monitoring

Potential for contamination of samples due to helicopter landing procedures was identified in BHPB's 2008 AQMP report. The Agency observes that the same problems are still occurring and new procedures have not yet been implemented.

Dust suppression has been used as one mechanism to mitigate the effects of fugitive dust. Various methods of dust suppression are used on-site including road watering, the application of DL10 around main camp and on the Fox Haul Road and the use of EK-35 on the airstrip. We would like to see BHPB's report to the WLWB 'Evaluating the Effectiveness of DL10 as a Dust Suppressant on the Misery Haul Road' expanded upon. The current dustfall monitoring program provides an opportunity to evaluate the dust suppression efforts. An evaluation should include a comparison to meteorological data and actual haul road usage. Trends in amount of dustfall may be explained by changes in road usage, particularly wet or dry conditions, time since suppressant was applied, etc. Any conclusions may then inform whether the dust suppression activities need to be changed (*e.g.*, more frequent application, starting earlier in the season, etc.).

### Snow Chemistry Sampling

In past reports the Agency has noted there were quality assurance and quality control issues with snow sampling methods, allowing samples to melt before analysis that may result in the degradation of *nitrates* and *sulphates* in the samples.

The Agency acknowledges that BHPB carried out a separate study to compare frozen vs unfrozen snow core samples however, *"The results of the comparison were inconclusive and no conclusions could be made unless a much larger data set was used"* (BHPB 2012). The Agency suggests that the study should be redone with a larger sample set to get a more conclusive result.

### Other

Local climate (air temperature, wind speed and direction, relative humidity, and precipitation) is monitored in support of the current monitoring programs at Ekati. The Koala monitoring station however was not operational in January, February, April and May of 2011 due to a power failure and there are data missing for all variables during this time period. BHPB provides no explanation to demonstrate that the company was aware of the issue after it occurred and

what steps were taken to resolve it in a timely manner. Monitoring temperature is an important component of the AQMP as day-to-day ambient temperatures control the rate of chemical reactions that generate or transform a number of secondary air pollutants (*e.g.*, O<sub>3</sub>, NO<sub>x</sub>). Wind speed and direction are important in assessing how air emissions from the mine will be distributed to the local surrounding area and region.

The Agency would like to see the AQMP further improved. In many of our past reports we have highlighted the importance of understanding linkages between different monitoring programs; Specifically the linkages between ambient air quality, dust deposition, caribou distribution and the *zone of influence* for caribou avoidance around the mine site. We would like to see the company continue to work on mitigating the residual effect of the distribution of dust on both the aquatic and terrestrial environments, particularly caribou. ■



Incinerator building.



Grizzly bear.

## HIGHLIGHTS

**Lac de Gras grizzly bear DNA study conducted in 2012.**

**Limited effective monitoring of caribou is currently being conducted.**

**Use of remote cameras to document caribou numbers, movements and behaviours has become a major thrust of caribou monitoring.**

# 2012 WILDLIFE EFFECTS

## Activities 2012-13

**B**HP Billiton's (BHPB) Wildlife Effects Monitoring Program (WEMP) documents wildlife impacts resulting from mining activities, and assesses the effectiveness of wildlife mitigation and management efforts. The WEMP at Ekati is in its 16th year. This year's report covers calendar year 2012. As in previous years, the 2012 WEMP focused on wildlife habitat and wildlife species of greatest interest; caribou, grizzly bear, and wolverine. Monitoring techniques included compilation of incident reports and visual observations, ground-based surveys, and behaviour observations. A major thrust of the caribou monitoring program is shifting to use of remote cameras to document caribou numbers, movements and behaviours; this program was presented as an addendum report to the WEMP.

GNWT's Environment and Natural Resources (ENR) sponsored the Carnivore Technical Workshop and the Caribou Monitoring and Cumulative Effects Workshop with mines and other interested partners in Yellowknife in early March 2013, covering wolverines, grizzly bears, and caribou. The primary purpose was to review and establish standardized monitoring programs that can test monitoring objectives for developments, aid in species management, and feed into

*cumulative effects* assessment. The main diamond mines and several proposed mining developments provided overviews of existing and proposed monitoring program methodology and results, and ENR reviewed regional monitoring, with a focus on the Bathurst caribou herd. The Agency participated in these generally productive workshops to remain current in the latest developments in monitoring and *cumulative effects* assessment, and to lend expertise and opinion to the directions taken.

## Ekati Mine Footprint

The mine footprint increased by 212 ha during 2012. The total footprint of the mine site now covers 3,214 ha (32 km<sup>2</sup>).

## Wildlife Incidents

BHPB continues its efforts to improve its waste management practices and reduce attractants at landfills, to reduce wildlife incidents, and to exclude wildlife from areas of danger (*e.g.*, airstrip, high traffic areas). Adherence by employees to proper waste disposal practices is an ongoing challenge for the company, as the disposal of wildlife attractants at the Ekati landfill increased in 2011 and 2012. Some observations from the report include:

- Fourteen vehicle-related animal mortalities, none of which were



*valued ecosystem component* species (e.g., caribou, grizzly bear);

- Four non-vehicle related wildlife mortalities, including two caribou (caused by wolf predation); and
- Deterrents were required to move four groups of grizzly bears, two wolves, and two foxes away from site.

## Caribou Monitoring

In the past, BHPB has documented caribou abundance, distribution, incidental observations, and behaviour relative to the mine using aerial and ground-based surveys. No aerial surveys have been conducted since 2009. In 2012, incidental observations estimated 4,674 caribou within the Ekati study area, with most observed during the northern migration (21 April to 29 May) and southern migration (23 October to 26 November).



Caribou crossing on Misery Road.

Caribou continue to be of paramount concern for northerners. The major decline in Bathurst herd numbers is of direct relevance to Ekati since low population densities can affect the ability of a population to adapt to further change which in turn influences the amount of risk to populations from development. The Bathurst herd was counted in June 2012 (estimated herd size 35,000), which suggested that the decline has halted; However, evidence suggests a rapid rebound is not occurring. A number of causes for the decline have been suggested including natural cycles, climate change, habitat change, predation, harvest levels, and disturbance from mineral exploration and developments. Although mineral development in all likelihood did not cause the entire decline, community members have singled out the diamond

mines for impacting caribou distribution, and causing injuries as a result of road development. There is clearly a need to identify the causal mechanism why caribou are avoiding the documented 14 km radius *zone of influence* (ZOI) around mine sites.

We understand that in 2012 BHPB collaborated with Diavik Diamond Mine to conduct aerial surveys for caribou, but no mention of the program was

supplied in the 2012 WEMP. During 2012, the behaviour of 69 individual caribou was documented near Ekati. Comparison with activity budgets for caribou at greater distance from mine activities conducted by Diavik Diamond Mine was not presented.

Seventy-six remote cameras were deployed on the property in 2012 to monitor the interaction of wildlife with mine infrastructure, with a particular focus on the Misery Road. The cameras replaced the previous programs which monitored caribou distribution relative to roads and caribou snow track density. The main objectives for the camera program were to examine trends in abundance and behaviour, and to determine if the structure of tundra roads deters caribou from crossing. Camera data suggested that encounter rates (number of groups detected corrected for camera effort) were higher in the Sable Road and Pigeon areas, and lower along the Misery Road; this was attributed to differences in habitat among areas. The cameras also showed that 8% of caribou groups that approached roads were deflected.

## Grizzly Bear Monitoring

Grizzly bears are a top carnivore and *valued ecosystem component* species that occur at low densities within the barrens. In 2012, BHPB and Diavik Diamond Mine collaborated to conduct a large-scale DNA-based mark-recapture study to estimate the population of grizzly bears in a 16,000 km<sup>2</sup> study area surrounding the two mining operations. One-thousand nine hundred

hair samples were provided for DNA analysis, but results were not yet available at the time of this writing. The southern portion of this joint study, conducted by De Beers Canada is being initiated in 2013.

## Wolf Monitoring

Annual surveys of den sites are the main monitoring method used to assess the potential mine-related effects on wolf movements and presence within the Ekati study area. Of 22 historic dens surveyed in collaboration with ENR in 2012, four were occupied in June, but no pups were observed in August. Only one den has been successful since 2007, likely reflective of lower Bathurst caribou numbers.

## Wolverine Monitoring

As a follow-up to wolverine DNA sampling conducted in 2005 and 2006, concurrent studies were conducted at Ekati, Diavik Diamond Mine and Daring Lake in April 2010 and 2011. Results presented at the March 2013 workshop showed that coverage of the Ekati wolverine sampling area in 2011 was poor, resulting in ambiguous interpretation of population trend. A final report combining all four years of data is pending.

## Bird Monitoring

Tundra breeding bird monitoring is no longer conducted at Ekati, although the 'North American Breeding Bird Survey' was conducted for the 10th year. As recommended at the 2010 technical and

## RECOMMENDATION 2

The Agency recommends that GNWT-ENR establish guidelines for when and how carnivore and caribou monitoring programs should be conducted. The guidelines should focus on standardizing methods and the use of monitoring data for mitigation, species management, and cumulative effects management. We suggest that draft guidelines be circulated by October 1st 2013, prior to the next scheduled wildlife monitoring workshop in late 2013.



White-Fronted Geese.

community workshops, regional raptor surveys will occur on a 5-year basis. Rough-legged hawks, peregrine falcons, gyrfalcons, and common ravens nested successfully in pits during 2012.

### Agency Assessment Review of the 2012 WEMP Report

From the 2012 WEMP report it was difficult to determine where and how Traditional Knowledge (TK) has been integrated into wildlife monitoring. Results of the programs conducted were reasonably well presented, although the interpretation was sometimes questionable. For example, in discussing

the results of the caribou behaviour monitoring, the WEMP report states

*"Caribou spent the majority of their time (67% for males, 64% for females) either bedded or feeding. Results are consistent with those observed in 2011, which suggests some level of tolerance for areas in proximity to the mine."*

We suggest that consistency in results between years does not indicate tolerance, since comparison of activity levels with control areas far away from the mine is not presented. As the behavioural studies are a collaboration with Diavik Diamond Mine, and they conducted behaviour studies up to and beyond 30 km from mine infrastructure in 2012 (Diavik 2012 WEMP, March 2013), we would have expected results and discussion examining this range of sampling. Also, we suggest that the wildlife research permit application is not the best venue to announce changes to the WEMP, as occurred during the 2012 application process.

As mentioned in previous reviews, we suggest that the discussion portion of each section focus on long-term trends and the importance of results, rather than reiterating results. The Agency would



Red Fox.



Long-Tailed Duck.



like to see future WEMP reports include more information on the big picture of what is happening to wildlife at Ekati and a more thorough assessment of the efficacy of mitigation measures.

BHPB has removed raw wildlife monitoring data and weather data from the WEMP, citing response to stakeholder reviews. The Agency would appreciate seeing some of these data summarized, notably brief weather summaries and dates of partial and complete snowmelt. These types of data set the context for much of the ecology and timing of events in the Arctic, and aid in the interpretation of results.

BHPB and Diavik Diamond Mine have collaborated on several joint programs in recent years; among them the aerial surveys and behavioural studies for caribou, and the grizzly bear DNA study. BHPB participated in aerial surveys during 2012 to further examine the ZOI the mines are having on caribou. However, the 2012 BHPB WEMP makes no mention of aerial surveys. Just prior to this writing it became apparent that BHPB and Diavik Diamond Mine made a request to ENR to omit the ZOI requirement for caribou monitoring, resulting in an agreement to discontinue aerial surveys. We are extremely concerned with this decision. While we do not advocate continual monitoring, we do recommend re-evaluating the ZOI when there is a change in mine site activity that may affect the ZOI, or to test a mitigation strategy meant to reduce the ZOI. Traffic along Misery Road is expected to increase substantially in 2013 and beyond during the operation of Misery Pit as ore will be hauled to Main Camp for processing. Aerial surveys, conducted when

caribou are present, have been proven to provide the most robust data to establish a ZOI related to mine activity. We strongly suggest that BHPB should either restart the aerial survey flights, or provide an alternative monitoring program design that examines the distribution and abundance of caribou relative to mine infrastructure.

Major changes have been made to the BHPB WEMP over the past several years (*e.g.*, removal of aerial surveys for caribou distribution and abundance; addition of DNA-based grizzly bear monitoring). Emphasis was directed towards greater focus on caribou behavioural studies, and testing of remote techniques for monitoring. We commend BHPB for their leadership on the grizzly bear DNA study. However, progress has been slow in offering alternative programs to mitigate and monitor the influence of mine-related activities on the relative abundance and distribution of caribou. Monitoring and *adaptive management* are rarely applied to evaluate the efficacy of mitigation. The remote camera program appears to provide some interesting data related to road crossing behaviour, but we are unsure that the design is adequately capturing deflection rates because of incomplete viewing angle relative to the road alignment. Although the camera program may provide effective monitoring of some aspects of the development, BHPB appears to be sliding away from programs designed to lead to mitigation decisions or to test effect predictions. For example, a ZOI of approximately 14 km surrounding mine infrastructure within which caribou abundance is lower than expected now

appears to be generally accepted by mining companies and governments. This ZOI is a residual effect after mitigation (*e.g.*, noise and dust suppression efforts). However, there is no effort to determine if mitigation can be modified to reduce the extent of the ZOI, and the 14 km ZOI has become an accepted norm. Movement on studies to identify mechanisms (possibly dust deposition) that may be influencing the distribution of caribou relative to the mine footprint, followed by changes to mitigation measures and further evaluation of the ZOI – in effect *adaptive management* – is not evident. Linkage between the Air Quality Monitoring Program and the WEMP should be strengthened, as air quality may be influencing caribou distribution at the mine.

## Wildlife Monitoring and Management

The March 2013 workshops highlighted the requirement for establishing guidelines for when and how monitoring programs should be conducted. Parameters for when re-examination of the ZOI should be undertaken have not been established. These guidelines should fit within a framework to manage *cumulative effects*. The responsibility to establish monitoring guidelines rests with ENR. Guidelines should include:

- Standardized sampling methods to assess abundance and distribution relative to mine infrastructure, including the conditions when sampling should be conducted;
- Development of specific methods

to test and evaluate mitigation measures and best practices;

- Triggers for re-evaluating ZOI monitoring, such as changes in operations, new roads, large fires, etc.;
- Shared data storage and study details (coverage, time period and other factors) to assist with regional and future efforts; and
- Direction for data compatibility to ensure regional and *cumulative effects* assessment and management (*i.e.*, how individual project monitoring will feed into species and landscape planning and management). ■



Remote camera on Misery Road.



Frank Channel near Behchokǝ.

## HIGHLIGHTS

**ENR completed the Bathurst caribou herd summer range pilot project but further work is needed for cumulative effects assessment and management.**

**Little progress from AANDC and GNWT on best practices for caribou protection measures as recommended by the WRRB.**

**Cumulative Impact Monitoring Program is focused on caribou, fish and water, overall purpose and use of information is not clear.**

# REGIONAL MONITORING AND CUMULATIVE EFFECTS

## Activities 2012-13

**R**egional monitoring is a useful tool for *cumulative effects* monitoring and management. In this section, we review new developments with regard to regional monitoring and *cumulative effects*.

The Government of the Northwest Territories (GNWT), Department of Environment and Natural Resources (ENR) committed to carry out a modelling pilot project in the Bathurst caribou herd summer range in 2008. The work was finally released in late 2012. The objectives were not to assess *cumulative effects* as such, but rather to demonstrate how it may be done in a collaborative and interdisciplinary manner. The report examined three modelling approaches to show that linking them is likely feasible and practical. Additional work is required to develop functional relationships that will serve as both outputs and inputs between the various models. It is not clear whether GNWT is pursuing any further work in this area.

ENR hosted the 'Bathurst Caribou Monitoring and Cumulative Effects Workshop' in March 2013. The Agency participated as did representatives of the diamond mines, including BHPB. Although some information was shared and a working group is to be established, there was little real progress on assessing and manag-

ing *cumulative effects*. For further thoughts on this workshop and where the work should go, see the wildlife section of this annual report.

The Wek'èezhì Renewable Resources Board (WRRB) released its decision on caribou management on October 8, 2010. The WRRB recommended that AANDC and ENR collaboratively develop best practices for mitigating effects on caribou during calving and post-calving. These would include consideration of mobile caribou protection measures (temporary restrictions on land use activities tied to caribou movements) and monitoring landscape changes, including fires and industrial exploration and development, to assess potential impacts to caribou habitat. There does not appear to have been any progress made on this work in 2012-13.

The Cumulative Impact Monitoring Program (CIMP) was intended to provide information on the state of the environment for the Mackenzie Valley and to evaluate the functioning of the integrated resource management system. CIMP held a workshop in Yellowknife in February 2013 to advance a framework for managing *cumulative effects*. Although fish, caribou and water are now the priorities for CIMP, much of the work to date appears to be marginally relevant to environmental management at Ekati. For example, we have as yet no strategy for investigating cumulative impacts on Lac de Gras from the Ekati and Diavik Diamond Mine. ■





Whati Community Hall.

## HIGHLIGHTS

**Some community Traditional Knowledge consultations conducted although no results yet reported.**

**Community-based Traditional Knowledge projects continue to be funded by the company.**

**First stages of Traditional Knowledge in closure planning completed.**

**The use of Traditional Knowledge in wildlife monitoring is not reported in the Wildlife Effects Monitoring Program.**

# TRADITIONAL KNOWLEDGE

## Activities 2012-13

### Community-Based TK Projects:

**Yellowknives Dene First Nation:** The 'Goyatiko Language Society Proposal for Digitization of Elders Stories' is intended to produce a digitized database/catalogue of Yellowknives Dene First Nation TK material, metadata on TK from audio tapes made decades ago. The Prince of Whales Northern Heritage Centre is also a collaborator on the project.

**Lutsel K'e Dene First Nation:** Phase III of Lutsel K'e's 'Traditional Knowledge Archive Project' is intended to produce a database for preserving Lutsel K'e's TK for future generations, and would assist in various priorities of the First Nation including protection of the land and wildlife management.

**North Slave Métis Alliance:** The NSMA's 'Community Heritage Project' is intended to conduct and document genealogical research on the history of North Slave Métis families. The work involves full time staff within the North Slave Métis Alliance, research at southern archive locations, database documentation, and community workshops.

**Kitikmeot Inuit Association:** KIA's 'Content Development of the Naonayaotit Traditional Knowledge Project (NTKP) Publication' is

intended to develop content for a future publication(s) based on material from the NTKP. Future publications are intended for beneficiaries of the Nunavut Land Claim Agreement (NLCA) including schools, Hunters and Trappers Organizations, Elders Centres, Libraries and Visitor Centres.

**Tłıchq First Nations:** The 'Tłıchq Digitizing Tapes and Database Project' is intended to ensure that the observations and narratives of harvesters' and elders' documented and digitized. These observations and narratives are inserted into a GIS at the Tłıchq Land Protection Department.

### Ekati-Based TK Projects: Community Engagement

Community members went to the minesite for educational tours by BHPB to show first-hand how environmental monitoring and management are carried out at Ekati. Activities conducted in 2012 include:

- 'Freshet Tour' (June 6-7, 2012) which showed how the Ekati mine conducts its water management operations during the spring freshet;
- 'Non-lethal Fish Sampling' (August 8-29, 2012) which demonstrated and provided hands-on-experience on how the Environment Department

will be conducting its new non-lethal fish sampling program;

- 'Ekati/Diavik Community Caribou Monitoring' (September 17-20, 2012 for Yellowknives Dene First Nation; October 13-17, 2012 for Tłı̨chǫ) which demonstrated and provided hands-on experience on how caribou monitoring programs are conducted at both diamond mines. The Yellowknives Dene participated for 4 days at each mine site;
- 'Interim Closure and Reclamation Plan (ICRP)': an update on the ICRP was presented, and minesite workshops were proposed to bring communities together in addressing *reclamation* uncertainties; and
- Grizzly Bear DNA Project: North Slave Métis Alliance helped BHPB to locate suitable grizzly bear habitats to set up hair sampling posts, based on what they consider to be areas that bears may frequent.

In addition to these community-based activities, the company informed us that its wildlife monitoring programs benefit from Aboriginal community members job-shadowing members of the Ekati Environment Department for a period of five to seven days. This created an opportunity for two-way dialogue and information sharing, as well as providing some capacity-building within the community while working directly with the wildlife technicians in the field.

In 2012, the TK focus in the Aquatic Effects Monitoring Program (AQMP) was on the assessment of fish health. Experienced

Aboriginal fishers worked alongside company biologists to assess physical health of fish from lakes downstream of the mine, as was done in 2007. Deformities, eroded fins, lesions and tumours (DELT) and parasites were jointly documented, and the TK holders additionally examined the condition of internal organs and noted any other abnormalities (see page 19).

### Reclamation Research

- A TK literature search has provided input on design of barriers for prevention of wildlife access into pits during flooding, although no details have been reported as yet;
- A literature review on how TK has been used in mine *reclamation* at other northern sites was conducted by the company in 2012. Thirty-three remediation projects were reviewed, including the Alberta Oil Sands, Faro Mine, Giant Mine and Colomac Mine which were given a more in-depth review. BHPB reports that the following principles were learned from this review and will be adopted in its own *reclamation* approach:
  - Keep communities informed of *reclamation* activities and identify local representatives to assist communication.
  - Baseline studies are a good reference point for *reclamation* planning.
  - The links between *reclamation* and culturally

significant species (plants, wildlife) will provide a common goal that all parties work toward.

- Adopt a targeted approach to data collection by developing consensus and science-based thresholds; and
- Choose indicators to reflect the landscape and ecosystems scales, and a research focus on interrelationships.

## Agency Assessment

The effective incorporation of TK in the environmental management of the mine, and in the closure planning activities being conducted by the company, remains a challenging issue. This was one of the important mandates given to the company by our Aboriginal Society Members at the time of mine licencing and, while there are glimmers of light here and there, it is disappointing that success in achieving the goal has been so limited over the past 15 years.

In 2011, some progress has apparently been made in conducting community

*consultations*. We have asked to see BHPB's reports from the 2012 community *consultations* but have not received these to date.

The Agency has also asked to receive the company's TK literature reviews and reports done in 2012 as part of the *reclamation* research plans but has not yet received this material.

Without the requested

information we are unable to evaluate the effectiveness of the community engagement program or the value of the TK literature review to closure planning at Ekati.

*Progressive reclamation* and *reclamation* research work are behind schedule (see Closure and Reclamation Chapter for details). DDEC should move ahead with a TK working group similar to the Diavik Environmental Monitoring Advisory Board TK panel to assist with closure planning. As we have previously stated, the Agency believes it is critical to involve TK-holders in the design of *reclamation* and closure measures, and closure-related monitoring and research programs, rather than relying solely on recording Aboriginal observations based on the company's own study designs.

The company has not followed its own formal TK strategy to document TK learned from community visits. The company needs to document lessons learned from the community site visits, and to describe how, where applicable, the lessons have been incorporated into the closure plan.

Assessing fish condition through TK experts from the communities using Aboriginal-developed criteria in concert with biologists should help to effectively identify potential mine impacts. The company should investigate additional opportunities for using TK in aquatic effects monitoring, not solely for fish but for other sectors of the aquatic (and terrestrial) environment at Ekati.

We are disappointed to see that use of TK in wildlife monitoring is not reported in the WEMP. ■



Agency open house, Whati, September 2012.





Wek'èezhii Land and Water Board Technical Session, October 2012.

## HIGHLIGHTS

**WLWB ran an efficient and effective water licence renewal process for Ekati. The financial security review was not completed in a timely fashion.**

**AANDC inspection capacity issues continued. Helpful technical support during water licence renewal.**

**DFO downsizing but very helpful support during water licence renewal and Aquatic Effects Monitoring Program Re-evaluation.**

**GNWT workshops on carnivores and caribou helpful but little leadership.**

# ASSESSMENT OF THE REGULATORS 2012-13

## The Regulators and Our Mandate

As the public watchdog for environmental management at Ekati, we monitor not only the performance of the operator but also the federal and territorial government agencies that regulate the mine. The following are our comments regarding the regulators' performance in 2012-13.

## Agency Assessment

As in previous years, the regulators remain effective in ensuring that BHPB operates an environmentally sound mine. Over the course of 2012-13, we identified some instances where we felt that government agencies and regulators performed well and some instances where their involvement could have been improved. We were pleased to observe the willingness among all regulators to collaborate and share resources. For example, this year the GNWT played a key role in coordinating discussions of wildlife monitoring.

### Aboriginal Affairs and Northern Development Canada (AANDC)

The inspections carried out in 2012 by Jason Brennan, the AANDC inspector for

Ekati have been thorough and effective as in past years. However, we note also that they were reduced from nine in 2010-11, six in 2011-12 to five in 2012-13. This was due largely to the reassignment of the regular inspector for Ekati to other duties, a pattern noticed also by the federal Commissioner of the Environment and Sustainable Development who reported in March 2013 on the need for more mine inspections by AANDC and greater efforts to ensure sites do not become public liabilities.

AANDC staff were thoroughly engaged in the water licence renewal process and continued to provide sound technical advice to the WLWB on water issues. We recognize that this has been increasingly difficult given the reduced resources the department devotes to these responsibilities. It will be important for AANDC to retain the ability to hire independent technical expertise during the transfer of most of its resource management responsibilities to GNWT through the devolution process.

### Department of Fisheries and Oceans (DFO)

DFO staff continue to be helpful to the Agency and others by providing good technical reviews during such processes as the water licence renewal and the AEMP

re-evaluation. We await publication of the DFO-sponsored toxicity testing on northern fish species, which should help in the setting of water quality objectives and contaminant discharge limits. DFO completed its regulatory work related to Pigeon Pit development in a timely manner. An interesting habitat enhancement project was also identified on the Stagg River near Behchokò as replacement for the loss of Carrie-Desperation stream as a result of the expansion of the Misery waste rock pile.

### **Government of the Northwest Territories (GNWT), Department of Environment and Natural Resources (ENR)**

ENR provided good advice in 2012 on air quality monitoring. We were also pleased with ENR's initiative in hosting carnivore and caribou workshops to review monitoring program objectives and to discuss better coordination of methods and analysis. While the diamond mines were receptive to taking action, it is clear that ENR will need to take on more of a leadership role in the use of monitoring data for more effective mitigation, species management and *cumulative effects* management.

We understand that a new version of the *Wildlife Act* is a priority for GNWT and we look forward to formal regulation of wildlife monitoring and management plans at Ekati under the new *Act*.

ENR, given its broad mandate for environmental protection, should have been more involved during the past year in a technical capacity with reviewing

BHPB submissions to the WLWB. With a devolution agreement now signed, it will be important for GNWT to take a broader and more active role in reviewing Ekati related applications and reports.

### **Environment Canada (EC)**

EC continues to provide essential technical advice although its input over the last year was less than in previous years. EC plans to expand the *Metal Mining Effluent Regulations* to cover diamond mines or develop a separate set of regulations. The Agency looks forward to more information on this initiative and our involvement based on our more than 15 years experience with the Ekati Mine.

### **Wek'èezhì Land and Water Board (WLWB)**

The Agency was satisfied with the water licence renewal process that the WLWB put in place. Despite tight deadlines there were good opportunities for discussion. We were pleased to see that the WLWB retained an independent expert to provide advice along with its capable staff.

WLWB completed guidelines for engagement, land use permitting and closure (awaiting AANDC approval). The Agency is still waiting for clearer guidelines or direction that set out the WLWB's expectations for the content and level of detail in management plans. The Agency encourages further work and development of supporting documentation required to implement the 'Water and

Effluent Quality Management Policy.'

In our last annual report, we encouraged the WLWB to complete guidance on *adaptive management* within water licencing and management. Some advances in this were made through the water licence renewal but a guideline or discussion paper on the topic is still needed.

We were disappointed that the WLWB did not take the necessary steps to ensure that a collaborative review of the financial security requirements for the Ekati Mine was completed prior to the water licence renewal. As we discussed in our last annual report, we had hoped for the more detailed and collaborative financial security review as proposed by BHPB and approved by the WLWB. ■



Regulators and Agency visit the Pigeon Stream Diversion, April 2012.





Regulators and Agency visit the Pigeon Stream Diversion, April 2012.

## HIGHLIGHTS

**BHPB continues to operate Ekati in an environmentally sound manner.**

**Strong leadership on grizzly bear monitoring but room for improvement on communicating wildlife monitoring changes.**

**Good preparatory work for the water licence renewal.**

**Aquatic Effects Monitoring Program improved through three year re-evaluation with better analysis and reporting.**

**2012 Environmental Impact Report much improved over the 2009 Environmental Impact Report.**

**Poor progress on reclamation research and progressive reclamation.**

# ASSESSMENT OF BHP BILLITON

In the view of the Agency, BHP Billiton (BHPB) continues to operate Ekati in an environmentally sound manner, as it has for many years. There were no significant adverse effects that arose this past year, largely due to BHPB's good environmental management. We have noted some areas where improvements should be made. We will continue to work with the company and others to ensure that the good environmental practices and management are maintained.

We continue to enjoy a good working relationship with the Environment Department staff. They were particularly helpful in keeping the Agency informed of the change in ownership of the Ekati Mine and we look forward to working with the new company, Dominion Diamond Ekati Corporation (DDEC).

We commend BHPB for the preparatory work that went into the water licence renewal. Original research and literature reviews were commissioned and the water quality model was improved to predict downstream water quality out to mine closure. This work made for a much smoother and constructive process compared to the renewal of the Sable, Pigeon and Beartooth water licence renewal of a few years ago.

The Aquatic Effects Monitoring Program (AEMP) at Ekati continues to provide very useful feedback on mine effects and downstream changes. The AEMP re-evaluation was done well and will result in further improvements in analyses and reporting. The company responded positively to comments on its proposed fish sampling proposals. We also thank the company for accepting our advice to investigate the potential role of dust deposition on lake water quality, and for quickly responding to the Agency's concern with the potential aquatic effects from *endocrine disrupting compounds*. We were, however, disappointed that the 2012 fish sampling program does not appear to have resulted in enough data to examine the issue of dioxin and furan contamination in Kodiak Lake from incineration.

The Agency was pleased with the much improved 2012 Environmental Impact Report (EIR) and the workshop held to review the preliminary results and format of the document. We had encouraged the company to shift the focus to current residual effects and long-term trends and it did.

BHPB demonstrated strong leadership on wildlife monitoring by designing and carrying out a regional scale grizzly bear

DNA sampling program. The Agency would like to see improvements in caribou monitoring especially collaborative work with others, including GNWT, to ensure monitoring methods are standardized and results are used in

*adaptive management.* At the March 2013 wildlife monitoring workshops, we were pleased to see that the diamond mines, including BHPB, supported the need to undertake improved wildlife monitoring.

We encourage DDEC to integrate its

monitoring programs to help identify causal links to changes and to develop more effective mitigation. For example, more work is needed to determine the drivers or cause of the avoidance or *zone of influence* (ZOI) for caribou around

Ekati. There is some correlation between the spatial extent of avoidance and dust deposition. We believe that more effort on dust suppression may help reduce the effects on caribou by shrinking the ZOI.

Air quality monitoring and management have improved over the years at Ekati but there are still issues with the ambient air quality monitoring program that continue to be plagued by calibration errors and equipment failures resulting in poor or unusable data. There also has been no stack testing conducted on the new incinerators. We recognize that the company has reduced plastic use which is an important step. The modifications to the incinerators to allow for stack testing should be done as quickly as possible and an updated waste management plan should be prepared.

The Agency was disappointed with the lack of progress on closure and *reclamation* at Ekati. The widening of the Panda Diversion Channel (PDC), important to ensure continued operation of this water body at closure, was not completed as the company had previously committed. Scheduled *reclamation* research has slipped by 1-2 years and there has been little *progressive reclamation* carried out at site. With the mine scheduled to close in 2019, we expect to see much more significant progress on *reclamation* research in the near future.

Lastly, the Agency appreciated the improved documentation of community site visits that took place in 2011-12. We were disappointed that the company did not maintain this practice in 2012-13 and we encourage DDEC to pick this up again. ■

Fox Pit.





# FINANCIAL STATEMENTS

## Management Responsibility Statement

The management of Independent Environmental Monitoring Agency is responsible for preparing the financial statements, the notes to the financial statements and other financial information contained in this annual report.

Management prepares the financial statements in accordance with Canadian generally accepted accounting principles. The financial statements are considered by management to present fairly the management's financial position and results of operations.

The organization, in fulfilling its responsibilities, has developed and maintains a system of internal accounting controls designed to provide reasonable assurance that management assets are safeguarded from loss or unauthorized use, and that the records are reliable for preparing the financial statements.

The financial statements have been reported on by MacKay LLP, Chartered Accountants, the Agency's auditors. Their report outlines the scope of their examination and their opinion on the financial statements.



---

**Jaida Ohokannoak,**  
**Secretary Treasurer**  
May 31, 2013

### Independent Auditors' Report

#### To the Directors of Independent Environmental Monitoring Agency

We have audited the accompanying financial statements of Independent Environmental Monitoring Agency, which comprise the statement of financial position as at March 31, 2013, and the statements of operations, changes in net assets and cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

#### Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

#### Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial

statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditors consider internal control relevant to the organization's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the organization's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

#### Opinion

In our opinion, the financial statements present fairly, in all material respects, the financial position of Independent Environmental Monitoring Agency as at March 31, 2013, and the results of its operations and its cash flows for the years ended March 31, 2013 in accordance with Canadian accounting standards for not for profit organizations.



---

Chartered Accountants  
Yellowknife, Canada  
May 31, 2013



## STATEMENT OF OPERATIONS

For the year ended March 31

	2013	2012
<b>REVENUE</b>		
Core funding – BHP Billiton Diamonds Inc.	\$ 608,181	\$ 589,914
Separate fund – BHP Billiton Diamonds Inc.	40,000	40,000
NWT payroll tax refund	–	4,186
Interest income	2,037	2,000
	<b>650,218</b>	<b>636,100</b>
<b>EXPENSES</b>		
Advertising and promotion	1,261	372
Amortization	4,689	5,106
Auditing and accounting fees	16,233	17,635
Board support		
– honoraria	117,870	131,430
– travel, meals and accommodation	47,862	61,865
Community consultation		
– annual general meeting	22,791	16,816
– annual report	57,708	58,228
– community visits	41,595	15,460
– environmental workshop	–	16,994
Consultants	12,500	(4,033)
Equipment lease	–	484
Insurance	5,131	5,057
Office rent and maintenance	32,795	32,336
Office supplies	10,744	10,279
Postage and courier	1,397	1,508
Professional development	400	7,633
Separate fund		
– honoraria	38,419	14,802
– travel and administration	2,300	1,057
Staff recruitment	12,675	7,708
Staff travel	3,171	3,057
Telephone and fax	6,642	5,584
Wages and benefits	201,774	192,074
	<b>637,957</b>	<b>601,452</b>
<b>Excess of revenues over expenditures before other items</b>	<b>12,261</b>	<b>34,648</b>
<b>Transfer to contributions repayable</b>		
Unspent funding – core	12,261	10,507
Unspent funding – separate fund	–	24,141
	<b>12,261</b>	<b>34,648</b>
<b>Excess of revenues over expenditures</b>	<b>\$ –</b>	<b>\$ –</b>

## 40 | FINANCIAL STATEMENTS

### STATEMENT OF CHANGES IN NET ASSETS

For the year ended March 31

	2013	2012
General operating fund, beginning of year (note 3)	12,685	12,685
Excess of revenues over expenditures	—	—
General operating fund, end of year	12,685	12,685

### STATEMENT OF FINANCIAL POSITION

For the year ended March 31

	March 31, 2013	March 31, 2012	April 1, 2011
<b>ASSETS</b>			
<b>Current</b>			
Cash	\$ 152,946	\$ 196,903	\$ —
Term deposits (note 4)	15,001	250,024	150,523
Accounts receivable	4,395	4,395	—
Prepaid expenses	5,318	5,659	4,905
	177,660	456,981	155,428
<b>Tangible capital assets (note 5)</b>	6,644	11,333	16,439
	\$ 184,304	\$ 468,314	\$ 171,867
<b>LIABILITIES</b>			
<b>Current</b>			
Bank indebtedness	\$ —	\$ —	\$ 45,306
Accounts payable and accrued liabilities	124,651	96,831	113,817
Deferred revenue	—	324,091	—
Contributions repayable (note 6)	46,968	34,707	59
	171,619	455,629	159,182
<b>FUND BALANCES</b>			
General operating fund	12,685	12,685	12,685
	\$ 184,304	\$ 468,314	171,867

Commitments (note 7)  
Subsequent event (note 10)

Approved on behalf of the board:



William A. Ross, Director



Jaide Ohokannoak, Director



STATEMENT OF  
CASH FLOWS

For the year ended March 31

ASSETS	2013	2012
<b>Cash provided by (used for)</b>		
<b>Operating activities</b>		
Excess of revenues over expenditures	\$ —	\$ —
Item not affecting cash		
Amortization	4,689	5,106
	4,689	5,106
	4,689	5,106
Change in non cash working capital items		
Accounts receivable	—	(4,395)
Prepaid expenses	341	(754)
Accounts payable and accrued liabilities	27,820	(16,986)
Deferred revenue	(324,091)	324,091
Contributions repayable	12,261	34,648
<b>Increase (decrease) in cash</b>	<b>(278,980)</b>	<b>341,710</b>
<b>Cash, beginning of year</b>	<b>446,927</b>	<b>105,217</b>
<b>Cash, end of year</b>	<b>\$ 167,947</b>	<b>\$ 446,927</b>
<b>Cash consists of:</b>		
Cash	\$ 152,946	\$ 196,903
Term deposits	15,001	250,024
	<b>\$ 167,947</b>	<b>\$ 446,927</b>

### NOTES TO THE FINANCIAL STATEMENTS

March 31, 2013

#### 1. Nature of operations

Independent Environmental Monitoring Agency ("the Agency") is a not-for-profit organization incorporated under the *Societies Act* of the Northwest Territories. It is exempt from income tax under Section 149(1) of the *Income Tax Act*.

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

#### 2. Significant accounting policies

These financial statements are prepared in accordance with Canadian accounting standards for not-for-profit organizations. The significant policies are detailed as follows

##### (a) Cash equivalents

Cash and cash equivalents consist of cash on hand, bank deposits and GICs.

##### (b) Tangible capital assets

Tangible capital assets are recorded at cost. The Agency provides for amortization using the declining balance method at rates designed to amortize the cost of the tangible capital assets over their estimated useful lives. Amortization is calculated by the declining balance method at the annual rates set out in note 5.

##### (c) Deferred revenue

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

##### (d) Revenue recognition

The Agency follows the deferral method of accounting for contributions. Restricted contributions are recognized as revenue in the year in which the related expenses are incurred. Unrestricted contributions are recognized as revenue when received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured. Endowment contributions are recognized as direct increases in net assets.

Restricted investment income is recognized as revenue in the year in which the related expenses are incurred. Unrestricted investment income is recognized as revenue when earned.

Investment income includes dividends and interest income as well as realized and unrealized investment gains and losses. Unrealized gains and losses on available-for-sale financial assets are included directly in net assets or deferred contributions as appropriate. Unrealized gains and losses on held-for-trading financial assets are included in investment income and recognized as revenue in the statement of operations, deferred or reported directly in net assets depending on the nature of any external restrictions imposed on the investment income.

##### (e) Financial instruments – Recognition and Measurement

###### Initial measurement

Financial assets originated or acquired or financial liabilities issued or assumed in an arm's length transaction are initially measured at their fair value. In the case of a financial asset or financial liability not subsequently measured at its fair value, the initial fair value is adjusted for financing fees and transaction costs that are directly related to its origination, acquisition, issuance or assumption. Such fees and costs in respect of financial assets and liabilities subsequently measured at fair value are expensed.



## NOTES TO THE FINANCIAL STATEMENTS

March 31, 2013

### Subsequent measurement

Financial assets measured at amortized cost include cash and accounts receivable. Financial liabilities measured at amortized cost include accounts payable and accrued liabilities, and repayable contributions. The Board has no financial instruments measured at fair value.

### Impairment

At the end of each reporting period, management assesses whether there are any indications that financial assets measured at cost or amortized cost may be impaired. If there is an indication of impairment, management determines whether a significant adverse change has occurred in the expected timing or the amount of future cash flows from the asset, in which case the asset's carrying amount is reduced to the highest expected value that is recoverable by either holding the asset, selling the asset or by exercising the right to any collateral. The carrying amount of the asset is reduced directly or through the use of an allowance account and the amount of the reduction is recognized as an impairment loss in net income. Previously recognized impairment losses may be reversed to the extent of any improvement. The amount of the reversal is recognized in net income.

### (f) Use of estimates

The preparation of financial statements requires management to make estimates and assumptions that affect the reported amount of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amount of revenues and expenses during the reporting period. These estimates are reviewed periodically, and, as adjustments become necessary, they are reported in earnings in the period in which they become known.

## 3. Impact of the change in the basis of accounting

Effective April 1, 2012, the Agency elected to apply the standards in Part III of the CICA Handbook – Accounting Standards for Not for Profit Organizations (ASNPO). This framework is in accordance with Canadian GAAP.

These are the first financial statements prepared in accordance with this new framework which has been applied retrospectively. The accounting policies set out above have been applied in preparing the financial statements for the year ended March 31, 2013, the comparative information for the year ended March 31, 2012, and in the preparation of an opening balance sheet as at April 1, 2011, which is the Agency's date of transition.

The Agency previously issued financial statements for the year ended March 31, 2012 using generally accepted accounting principles prescribed by Part V of the CICA Handbook.

The adoption of ASNPO has had no impact on the previously reported assets, liabilities and net assets of the Agency, and accordingly, no adjustments have been recorded in the comparative statement of financial position, statement of operations and statement of cash flow. Certain of the Agency's presentation and disclosures included in these financial statements reflect the new presentation and disclosure requirements of ASNPO.

## 4. Term deposits

Short-term investments consist of guaranteed investment certificates maturing on November 8, 2013 and earning interest at 0.85% per year. The certificates are transferable on demand to the Agency's bank account.

## NOTES TO THE FINANCIAL STATEMENTS

March 31, 2013

### 5. Tangible capital assets

	Rate	Cost	Accumulated amortization	2013 Net book value	2012 Net book Value
Equipment	20%	\$ 12,180	\$ 11,833	\$ 347	\$ 1,589
Website	30%	15,120	8,823	6,297	8,996
Computer equipment	30-55%	7,307	7,307	–	748
Computer software	100%	2,543	2,543	–	–
		\$ 37,150	\$ 30,506	\$ 6,644	\$ 11,333

### 6. Contributions repayable

	2013	2012
BHP Billiton Diamonds Inc.		
Core funding 2012	\$ 10,507	\$ 10,507
Core funding 2011	59	59
Separate fund 2012	24,141	24,141
Core funding 2013	12,261	–
	\$ 46,968	\$ 34,707

Contributions repayable arising from one fiscal year are normally deducted from contributions provided by BHP Billiton Diamonds Inc. in the following fiscal year.

### 7. Commitments

As at March 31, 2013 the Agency has an operating lease for office space expiring December 31, 2013. The payment for the next year based on the existing contract is \$23,625.

### 8. Economic dependence

The Agency receives 99% (2012 – 99%) of its revenue from BHP Billiton Diamonds Inc. Management is of the opinion that operations would be significantly affected if the funding was substantially curtailed or ceased. The funding arrangement with the owners of the mine is governed by a legally binding agreement.



**NOTES TO THE  
FINANCIAL STATEMENTS***March 31, 2013***9. Financial instruments**

The Agency is exposed to the following risks in respect of certain of the financial instruments held:

**(a) Interest rate risk**

Interest rate risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market interest rates. The Agency's interest-bearing financial instruments include a fixed rate GIC. The fair values of fixed rate financial instruments fluctuate as market rates of interest change. The cash flows resulting from variable rate financial instruments fluctuate as interest rates applicable to the instruments change. The Agency does not employ derivative financial instruments to hedge its exposure to interest rate risk.

**(b) Credit risk**

Credit risk is the risk that one party to a financial instrument will cause a financial loss for the other party by failing to discharge an obligation. The Agency's exposure to credit risk relates to accounts payable and accrued liabilities and arises from the possibility that a debtor does not fulfil its obligations. Management believes this risk is minimized through only entering into transactions with credit worthy organizations. The Agency performs continuous evaluation of its financial assets and records impairment in accordance with the stated policy.

**10. Subsequent event**

On April 8, 2013, the sale of the Ekati diamond mine was finalized between BHP Billiton Diamonds Inc. to Dominion Diamond Corporation. As the funding agreement with the Agency relates to the property rather than the parent organization, funding to the Agency will not be impacted going forward.



Agency visit to Whati, September 2012.

# SUMMARY OF WORK PLAN AND CORE BUDGET 2013-14 AND 2014-15

The Agency's work plan is based on the direction and feedback received from our Society Members at our annual general meeting in December 2012 and the Agency's own initiatives.

With the 'Resolution Agreement' from January 2006, the Agency's core budget is now fixed at \$560,000 per year as of April 1, 2005 with automatic increases tied to the Consumer Price Index (CPI) for Canada.

For 2013-14 Dominion Diamond Ekati Corp (DDEC), as the new owner of the Ekati Mine, will contribute approximately \$651k to the Agency, and in 2014-15 approximately \$658k (assuming a 1.0% increase in CPI).

The second year of the work plan will be refined and modified based on direction received during next year's annual general meeting, and any changes or modifications to the project.

## Major Activities

### Board Meetings and Conference Calls

The major means of fulfilling our mandate is through Board meetings that are held approximately every three months. Agency board meetings provide an opportunity for directors to discuss, review and make recommendations on recent, ongoing and anticipated initiatives. Guests are invited to meetings to provide updates and receive input on their specific activities. The company, WLWB staff and the AANDC inspector are regular guests.

**Proposed Activities:** Annually, three board meetings (not including one in a community).

### Review of Reports, Plans and Programs, and Implementation of the Environmental Agreement

Directors review and make recommendations on the major reports, programs, studies and plans required under the *Environmental Agreement*, water licences and other regulatory approvals.

**Proposed Activities:** The Agency expects to deal with the following in 2013-14:

- The regular environmental monitoring reports for 2013 if received in

time (AEMP, WEMP, and PDC);

- Various management plans and updates including the Waste Rock and Ore Storage Management Plan (WROMP), Wastewater and Processed Kimberlite Management Plan (WPKM), Wildlife Management Plan (WMP) and the Waste Incineration Management Plan (WIMP);
- ICRP annual progress report and LLCF pilot revegetation design;
- 'Pit Lakes Water Quality Report,' and LLCF water model; and
- DDEC's 'Ekati Annual Environmental Report.'

There are also now two meetings per year for DDEC, GNWT, AANDC and the Agency to better coordinate implementation



Agency Director Tony Pearce.



Table 6: Core Budgets 2013-14 and 2014-15

ACTIVITY	FORECASTED 2012-2013	PROPOSED 2013-2014	PROPOSED 2014-2015
Board Meetings	50,284	93,375	94,308
Review of Documents	59,294	42,650	43,077
Separate Fund	44,545	40,000	40,000
Communications	176,080	181,250	183,063
Outside Contracts	12,500	10,000	10,000
Mgmt and Admin	282,739	284,000	286,840
<b>TOTAL</b>	<b>625,442</b>	<b>651,275</b>	<b>657,288</b>
<b>(APPROVED)</b>	<b>647,625</b>	<b>651,422</b>	<b>657,936</b>



of the *Environmental Agreement*.

The same workload is expected in 2014-15, although the focus may shift with more work on closure planning.

#### Separate Fund Activities

As a result of the most recent mediation, the March 2008 Resolution Agreement sets out that the Agency is entitled to allocate expenses up to \$40,000 per year for matters where a public hearing is reasonably assured as indicated in approved work plans or budgets, or as confirmed by a regulatory body.

**Proposed Activities:** For 2013-2014, the Agency expects to review the draft water licence and to review the final water licence and Reasons for Decisions.

For 2014-2015, the Agency expects there could be a possible public hearing on other matters.

#### Consultation and Communication

Consultation and communications with northern communities and the general public is an important part of the Agency's mandate.

**Proposed Activities:** The Agency will maintain its visits to communities, and upon invitation, will host one board meeting and open house a year in a community. The Agency will continue to attend workshops and meetings relevant to its mandate. The Agency will maintain

its website (including the Timeline project covering development of the mine, regulatory events and environmental issues) and public registry. The Agency will continue to produce two annual reports, one in plain language and one technical. The Agency will also be implementing other parts of our communications plan including printed material and possibly video files in Aboriginal languages.

The same activities are anticipated in 2014-15.

#### Outside Contracts

On occasion, the Agency turns to other experts to help analyze reports, studies and plans.

**Proposed Activities:** It is difficult to predict what, if any, outside expertise the Agency may commission but aspects of closure and reclamation may require some outside expertise.

#### Management and Administration

The Agency provides the majority of its management and administrative services through its Yellowknife office and staff of one Executive Director and one Communications and Environmental Specialist. The Agency manages its own office space and equipment.

**Proposed Activities:** Maintain current staff and benefit levels. ■

**Back row, Left to Right:** Jessica Simpson, Arnold Enge, Bill Ross, Tony Pearce, and Kim Poole.  
**Front Row, Left to Right:** Laura Johnston, Kevin O'Reilly, Jaida Ohokannoak, and Tim Byers.

# ACRONYMS

**AANDC** – Aboriginal Affairs and Northern Development Canada, previously known as “Department of Indian Affairs and Northern Development (DIAND)” and “Indian and Northern Affairs Canada (INAC)”

**AEMP** – Aquatic Effects Monitoring Program

**AQMP** – Air Quality Monitoring Program

**BCMOE** – British Columbia Ministry of Environment

**BHPB** – BHP Billiton Canada Inc. (“the company”)

**CAAQO** – Canadian Ambient Air Quality Objective

**CCME** – Canadian Council of Ministers of the Environment

**CIMP** – Cumulative Impact Monitoring Program

**CKRSA** – coarse kimberlite rejects storage area

**CPI** – Consumer Price Index

**DDEC** – Dominion Diamond Ekati Corporation

**DELT** – deformities, eroded fins, lesions and tumours

**DFO** – Fisheries and Oceans Canada (also known as “Department of Fisheries and Oceans”)

**DIAND** – See AANDC

**DNA** – deoxyribonucleic acid

**EC** – Environment Canada

**EDC** – endocrine disrupting compound

**EIR** – Environmental Impact Report

**ENR** – Department of Environment and Natural Resources (NWT), previously known as “Department of Resources, Wildlife and Economic Development (RWED)”

**GNWT** – Government of the Northwest Territories

**ICRP** – Interim Closure and Reclamation Plan

**INAC** – See AANDC

**KIA** – Kitikmeot Inuit Association

**KPSF** – King Pond Settling Facility

**LKDFN** – Łutsel K'e Dene First Nation

**LLCF** – Long Lake Containment Facility

**MVLWB** – Mackenzie Valley Land and Water Board

**NSMA** – North Slave Métis Alliance

**NWT** – Northwest Territories

**PDC** – Panda Diversion Channel

**PK** – processed kimberlite

**PM** – particulate matter

**PSD** – Pigeon Stream Diversion

**SNP** – Surveillance Network Program

**SSWQO** – Site-Specific Water Quality Objective

**TK** – Traditional Knowledge

**TOC** – total organic carbon

**TSP** – total suspended particulates

**TSS** – total suspended solids

**WEMP** – Wildlife Effects Monitoring Program

**WLWB** – Wek'èezhìi Land and Water Board

**WPKMP** – Wastewater and Processed Kimberlite Management Plan

**WROMP** – Waste Rock and Ore Storage Management Plan

**WRRB** – Wek'èezhìi Renewable Resources Board

**WRSA** – Waste Rock Storage Area

**YKDFN** – Yellowknives Dene First Nation

Photo: Rivière la Martre, near Whati.





# GLOSSARY

**Adaptive Management** – A management system with continual monitoring so that if initial mitigation measures are ineffective, additional or alternative mitigation is applied to keep the impact within acceptable levels.

**Benthos** – The sediments and mud at the bottom of rivers, lakes and ponds that can contain living organisms (e.g., benthic invertebrates). Benthic invertebrates such as mosquito larvae are an important food source for small fish.

**Chloride** – Salt resulting from the combination of the gas chlorine with a metal. Fish and aquatic communities cannot survive in high levels of chlorides.

**Cladocera** – An order of small crustaceans (i.e., zooplankton) that live in water (commonly called water fleas).

**Consultation** – (i) The provision, to the party to be consulted, of notice of a matter to be decided in sufficient form and detail to allow that party to prepare its views on the matter;

(ii) The provision of a reasonable period of time in which the party to be consulted may prepare its views on the matter, and provision of an opportunity to present such views to the party obliged to consult; and

(iii) Full and fair consideration by the party obliged to consult of any views presented.

**Cumulative Effects** – The environmental changes that occur from a project or activity combined with natural factors and effects

from other past, present and future human activities.

**Dioxins and furans** – A type of organochlorine that can cause cancer and other health problems. A group of chemicals that mainly come from the burning of waste.

**Endocrine Disrupting Compound** – Synthetic chemical that, when absorbed into the body, either mimics or blocks hormones and disrupts the body's normal functions.

**Environmental Agreement** – Created as a legally binding instrument to provide monitoring and input into management practices not covered by other authorizations. Parties include BHPB and the federal and territorial governments. Akaitcho Treaty 8 First Nations (LKDFN and YKDFN), Kitikmeot Inuit Association, North Slave Métis Alliance and Tłıchǫ Government were involved in the negotiations.

**Fry** – Early life-stage of fish following absorption of yolk sac (i.e., alevin) stage.

**Hydrocarbons** – Organic compounds which contain only hydrogen and carbon. This includes fossil fuels (i.e., coal, petroleum and natural gas) as well as their derivatives, such as plastics, solvents and oils.

**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.

**Molybdenum** – A metal that can affect trout just after they hatch.

**Nitrate** – A nutrient, like a fertilizer, derived from nitrogen. Nitrate can affect the growth of baby fish if it gets too high.

**PCBs** – A type of organochlorine called polychlorinated biphenyl (PCB). A chemical used in electrical transformers as a coolant and insulating fluid. This chemical is dangerous for people's health and requires special handling.

**Phytoplankton** – Microscopic plants (e.g., algae) found in freshwater and ocean environments. They are an important food source for zooplankton.

**Processed Kimberlite** – The waste material and water mixture that is left over after the mill removes the diamonds from the ore. Also referred to as “tailings”.

**Progressive Reclamation** – Reclamation that can be carried out during the construction and operation phases of a mine prior to final closure (e.g., rock waste dumps).

**Reclamation** – The recovery to viable ecosystems of areas of land and water bodies that have been disturbed during mining.

**Slave Geological Province** – Area between the City of Yellowknife and the Arctic coast.

**Tailings** – See “Processed Kimberlite”.

**Total Suspended Particulates** – The fraction of airborne particulates that will remain airborne after their release in the atmosphere.

**Total Suspended Solids** – Concentration of total suspended material in a waterbody as determined by an analysis of a

representative subsample of an entire collected water sample.

**Valued Ecosystem Component** – Environmental element of an ecosystem that is identified as having scientific, social, cultural, economic, historical, archaeological or aesthetic importance.

**Waste Rock** – Rock containing diamonds but too low in grade to be mined or processed economically. Also other rock that must be removed to access kimberlite pipes.

**Waste Rock Seepage** – Water that drains over the waste rock piles. This water may pick up contaminants as it touches the waste rock and may enter the receiving environment.

**Wastewater** – Water that contains wastes from the mining process, including sewage and chemicals from explosives.

**Zone of Influence** – Area of reduced caribou occupancy.

**Zooplankton** – The small, mostly microscopic animals that live suspended in freshwater (and ocean) environments. Zooplankton feed on phytoplankton and small particles in the water. They are an important food source for small fish.



Flowering heather at Ekati.





# TECHNICAL ANNUAL REPORT 2012-13

A PUBLIC WATCHDOG FOR ENVIRONMENTAL MANAGEMENT AT EKATI DIAMOND MINE™



## INDEPENDENT ENVIRONMENTAL MONITORING AGENCY

### DIRECTORS

#### BILL ROSS

Chairperson  
269 Edgebank Circle  
Calgary AB T3A 4V8  
Phone: (403) 547-0415  
E-mail: ross@ucalgary.ca

#### TIM BYERS

Vice-Chairperson  
P.O. Box 1049  
Teulon MB R0C 3B0  
Phone/Fax: (204) 886-4642  
E-mail: byerses@escape.ca

#### JAIDA OHOKANNOAK

Secretary-Treasurer  
P.O. Box 2366  
Cambridge Bay NU X0B 0C0  
Phone: (867) 983-2153  
E-mail: jaida@polarnet.ca

#### ARNOLD ENGE

5124 Forrest Drive North  
Yellowknife, NT X1A 2N4  
Phone: (867) 873-4812  
E-mail: arnoldenge@gmail.ca

#### LAURA JOHNSTON

611-16th Avenue North  
Creston BC V0B 1G5  
Phone: (250) 402-0036  
E-mail: laurajo@shaw.ca

#### TONY PEARSE

663 Wilkes Road  
Mayne Island BC V0N 2J1  
Phone: (250) 539-3015  
Fax: (250) 539-3025  
E-mail: tpearse@godoroja.com

#### KIM POOLE

1918 Shannon Point  
Nelson BC V1L 6K1  
Phone: (250) 825-4063  
Fax: (250) 825-4073  
E-mail: kpoole@aurorawildlife.com

### HOW TO REACH US

#### IN PERSON

Suite 203  
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

monitor1@yk.com

#### OR VISIT OUR WEBSITE:

[www.monitoringagency.net](http://www.monitoringagency.net)

#### OFFICE HOURS

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

### OFFICE STAFF

**KEVIN O'REILLY**  
Executive Director

**JESSICA SIMPSON**  
Communications and  
Environmental Specialist

