Independent Environmental Monitoring Agency





HP DIAMONDS IN

Independent Environmental Monitoring Agency 1999-2000 Annual Report recommends:

On BHP Annual Report :

- 1. BHP's future annual reports should provide a more considered discussion of the findings of its monitoring and research programs, the significance of the results for environmental management, and describe how lessons learned have modified and will modify the individual programs and/or the Environmental Management System.
- 2. Future annual reports should also include an updated, consolidated and comprehensive summary of the mine development schedule, as currently planned, over the lifetime of the project, not just for the next year.
- 3. BHP should develop and institute Quality Assurance/Quality Control procedures for the collection of aquatic baseline data to ensure consistency and quality of data collected by different consultants. A review of past baseline surveys should also be made to demonstrate that they have been conducted under equivalent protocols.

On Operating Environmental Monitoring Program :

4. BHP should institute a process for evaluating the results of the separate plans and programs that comprise the Operating Environmental Monitoring Program. The evaluations could be conducted at regular intervals (say, every three years), and should be conducted by an independent evaluator. The results of the evaluations should be published in the annual report. On Traditional Knowledge:

- The Agency recommends that aboriginal organisations and BHP continue to collaborate in establishing an EKATI™ Traditional Knowledge Working Group. The Agency will assist and coordinate, as requested, with such initiatives.
- 6. The Agency recommends that BHP document the inputs of Elders and Lands and Environment Committees who collaborate with BHP personnel at the project site. Information provided to BHP from the Elders, the way the information is incorporated in the environmental management of the mine, as well as the comments, observations and recommendations put forward by the Elders during the site visits should be recorded in the management plan reports.

On Wildlife Effects Monitoring Program:

- 7. The Agency urges BHP to fully consider the concerns of Elders in adapting its wildlife monitoring program, especially the effect of mine dust on caribou food and the effect of haul roads on caribou migration.
- 8. The Agency recommends that changes in habitats (direct and indirect habitat losses, habitat reclamation) in the BHP claim block be based on the Landsat Imagery Habitat Classification System in order to keep a common approach from year-to-year and among industrial developments.

9. The Agency recommends that BHP fully implement the monitoring studies to evaluate the impact of major haul roads on caribou migration as described in the 1999 Operational Environmental Monitoring Plan.

For recommendation on the cumulative effect monitoring of the Bathurst caribou herd, please refer to the Cumulative Effects Section.

On Aquatic Effects Monitoring Program:

10. Initiate a study to determine relative contribution of nutrients and contaminants from various potential sources.

BHP suggested abandoning the Aquatic Effects Monitoring Program sampling program on Lac de Gras at the Aquatic Effects Monitoring Program Workshop, February 2000. The Agency recommends keeping the sampling program and possibly modifying it to better assess the effects of the EKATI™ Project separately from those of the up-coming Diavik Project.

On Special Effects Monitoring Program:

11. The Special Effects Monitoring Program for Kodiak Lake is scheduled to end with the 1999 studies, after which Kodiak Lake will, presumably, join the ranks of lakes included in the Aquatic Effects Monitoring Program. Our recommendation is that Kodiak Lake be given a special status, and assigned a level of study detail somewhere between these two monitoring programs, especially with regard to studies of nutrient loadings, sediment quality, primary production and fish.

On Lake Fish-Out Study:

12. DFO should analyze and report on the results and significance of the fish-out studies it required.

On Waste from the Mine:

- 13 .BHP should undertake the necessary further mineralogical and geochemical tests to better define and resolve the emerging water quality issues associated with the development of waste rock piles on site.
- 14 .The Mackenzie Valley Land and Water Board should not amend BHP's Class A Water Licence to accommodate the low pH values currently observed in waste rock seepage at the site. The causes of the poor quality drainage should be properly determined, and the implications for management properly considered, before contemplating an amendment to the licence.
- 15. BHP fulfill its commitment to implement the Operating Geochemical Testing Program as outlined in its Revised Waste Rock and Ore Management Plan (July 31, 1998). If an alternative program is considered in the future, it should fully meets the current program's objectives and the rigour of its methodology.

On Cumulative Effects:

16 .The Agency recommends that the Government of the Northwest Territories, in consultation with the Government of Nunavut, plans for a workshop for the development and implementation of a cumulative effects monitoring program for the Bathurst caribou herd.

Chairperson's Message

We are pleased to introduce the 1999-2000 Annual Report of the Independent Environmental Monitoring Agency. This report will provide a review of the Agency's activities from April 1st, 1999 to March 31st, 2000, give an assessment of current environmental management at the BHP mine, and make recommendations for improvements.

Our third year of operation included many changes. For the first time, the Agency negotiated its funding with BHP, as required by the *Environmental Agreement*. The Agency hired a Manager and a Communications Administrator. A consulting firm was contracted to evaluate the Agency in order to make recommendations on improving our overall performance within our mandate. As a part of this evaluation, our Society Members were interviewed and suggestions were made for improving the Agency's operations, administration and communications. This input will help the Agency refine its role and respond to our Society Members in the up-coming year.

The Agency also recognizes the potential need for regional cumulative effects monitoring. Growing mineral exploration and development activity in the Slave Geological Province may increase the potential for cumulative environmental effects. Not only has Diavik Diamond Mines Inc. acquired authorization for site preparation and construction as part of its diamond mine, but Winspear's Snap Lake project and the Jericho diamonds project in Nunavut are now being proposed. As a result, potential cumulative effects must be examined for the region as a whole.

Furthermore, the regulatory environment, in which the mine and Agency operates, has changed. The *Mackenzie Valley Resource Management Act* established new independent co-management boards, including the Mackenzie Valley Environmental Impact Review Board and the Mackenzie Valley Land and Water Board that are responsible for project screenings and the environmental assessment of proposed development projects in the Lac de Gras area. The Independent Environmental Monitoring Agency wants to work as effectively as possible with these boards, regulators, aboriginal society members, government and BHP managers to ensure that environmental management at Canada's first diamond mine remains a priority, and is carried out as comprehensively and efficiently as possible.

We trust that this report is informative and useful.

Respectfully,

Hederen

Red Pedersen, Chair March 31, 2000

Contents

Chairperson's Message1
Introduction2
1999-00 Year in Review5
Listening to Our Members8
Macleod Institute Evaluation Report10
Assessment of Environmental Management of the Mine12
Compliance Report for BHP's proposed Beartooth, Pigeon and Sable Extension Project12
BHP"s 1999 Annual Report13
The Operating Environmental Management Plan (OEMP)15
Assessment of Regulators16
Traditional Knowledge18
Wildlife Effects22
Aquatic Effects24
Waste from the Mine32
Waste Rock Management32
Tailings Management35
Kimberlite Toxicity37
Cumulative Effects
Project Expansion and Amendments40
Financial Statements42
Summary of 1999-2001 Work Plan and Core Budget48

Authorizations for the BHP Project:

In addition to the Environmental Agreement, BHP holds:

- A Class A Water Licence
- DIAND mining leases, land leases and land use permits
- Explosive Magazine Permit
- Harmful Alteration, Disruption or Destruction of Fish Habitat Authorization from the Department of Fisheries and Oceans.
- Fish Habitat Compensation Agreement
- Navigable Waters Protection Act Authorization
- Government of the Northwest Territories (GNWT) Hazardous Waste Generator Registration
- GNWT Wildlife Research Permit
- GNWT Archaeologists Permits
- Socio-Economic Agreement with the GNWT, Department of Resources, Wildlife and Economic Development.

Introduction

Welcome to the third Annual Report of the Independent Environmental Monitoring Agency (The Agency). This report describes the activities and involvement of the Agency from April 1st, 1999 to March 31st, 2000.

The Agency was established to serve as an independent watchdog for environmental management at BHP's EKATI[™] diamond mine. The mine is located at Lac de Gras in the central arctic barrens of the Northwest Territories, approximately 300 km northeast of Yellowknife and close to the Nunavut boundary. The mine became operational in October of 1998, and is expected to continue operating for roughly 20 years.

When the diamond mine was proposed by BHP, it was reviewed by a federal environmental assessment panel in 1996. The impacts of open pit mining of five kimberlite pipes and associated construction, transportation, operation, waste disposal and reclamation on the environment were predicted. Public hearings were held to discuss potential impacts on aquatic life, wildlife, terrestrial ecosystem (the land), permafrost, the climate, traditional based economies, among others. Ways to protect the environment were proposed and evaluated in order to determine the possible extent of these potential impacts and whether they could be lowered through monitoring and adaptive management over the life of the mine. Both science and traditional knowledge were considered in the assessment. The review panel recommended approval of the diamond mine provided that BHP met certain conditions. As part of the approval process, a legally binding *Environmental Agreement* was created between BHP, and the federal and territorial governments. The BHP *Environmental Agreement* establishes provisions for managing and monitoring the mine that are not covered in other authorizations. The provisions include the creation of the Agency. The Dogrib Treaty 11, the Akaitcho Treaty 8, the North Slave Métis Alliance, and the Kitikmeot Inuit Association have participated in the implementation of the BHP *Environmental Agreement* as a result of its traditional territories having the potential to be affected by the mine. BHP holds regulatory authorizations under various environmental legislation. (See list at left)



About the Agency

The Agency acts as a public watchdog for environmental management of EKATI[™] and provides information to the affected aboriginal organizations and public. It has a mandate to bring environmental concerns of aboriginal organizations and the public-at-large to BHP and federal and territorial governments.

The mandate of the Agency also involves reviewing the management of cumulative effects and promoting the integration of traditional knowledge of aboriginal peoples into BHP's environmental plans and programs.

The Agency's Board is independent; it is not controlled by BHP, nor is it part of the federal or territorial governments. The Agency was set up as non-profit society with membership from Akaitcho Treaty 8 (Yellowknives Dene First Nation and Lutsel K'e Dene First Nation), North Slave Métis Alliance, Kitikmeot Inuit Association, Government of the Northwest Territories, Department of Indian Affairs and Northern Development, Dogrib Treaty 11 and BHP. The Agency has a board of seven Directors who are appointed by these Society Members and is assisted by two staff: a Manager and Communications Administrator.



In order to meet its mandate, the Monitoring Agency:

V	Reviews all reports, technical information and maps about the environmental management and monitoring of the mine
V	Analyzes issues to identify, evaluate and make recommendations on environmental impacts
V	Participates in technical workshops involving environmental management at BHP
V	Reviews the activities of regulatory agencies on the Project
V	Reviews and comments on regulatory approvals sought by BHP that relate to environmental matters
1	Follows the progress of traditional knowledge studies funded by BHP and conducted by aboriginal organizations
•	Facilitates interaction between aboriginal organizations and BHP to promote the integration of traditional knowledge into BHP's management plan
V	Meets and corresponds regularly with its Society Members about environmental issues at the mine
V	Hosts an annual general meeting for its Society Members
V	Maintains a publicly accessible library of all materials regarding the environmental management of the mine
V	Publishes newsletters, a web site, a brochure, and annual reports



About Mining at EKATITM

BHP's diamonds are found in a very rare type of rock called kimberlite, which forms in narrow vertical "pipes." In the Northwest Territories, mining these kimberlite pipes is currently done by creating an open pit and may involve draining lakes to get to the kimberlite. Once the ground is exposed, it is blasted with explosives and large amounts of materials are hauled to be separated and crushed so that the diamonds can be extracted. Most of the rock is left behind on the surface of the land.

The BHP Diamonds Project has approval in principle to mine five kimberlite pipes over 25 years: Panda, Misery, Koala, Fox and Leslie. It is expected that over the life of the project one main building, an airstrip and permanent roads will be built, 1.08 million cubic metres of esker materials will be quarried and kimberlite tailings will be deposited into a containment area.

On-going reclamation, the restoration of the land and waters to their natural condition, is required over the life of the Project.

The mine has accommodation for 400 employees, although 600 - 850 people may be employed over a full-year's production. Currently, 69.8% of the mine's total workforce is northern resident and aboriginal. Northern aboriginal employment is 33.2 % of the total employment (BHP 1999).

To date, BHP is mining the Panda pipe and will begin developing Koala and Misery. Fox Pipe is expected to start within the year and Leslie is considered to be economically unfeasible to develop at this time. BHP's application to develop 3 new kimberlite pipes, called Beartooth, Pigeon & Sable, has been referred to the Mackenzie Valley Environmental Impact Review Board for approval and is undergoing an environmental assessment.

1999-2000 Year in Review

Over the past year, the Agency has spent considerable effort following the on-going environmental issues at the mine site. Changes to the Koala drainage basin have required that the on-site monitoring be followed closely. The Agency was actively involved in providing advice and recommendations to BHP on the Aquatic and Wildlife Effects Monitoring Programs, through reviewing research results and participating in annual technical workshops on these programs. Site-visits and on-going discussions with regulators and BHP on compliance with authorizations and the Environmental Agreement fostered an integrated and coordinated approach to jointly managing the mine. The Agency also facilitated discussions on the creation of the Traditional Knowledge Working Group. Through the Cumulative Effects Assessment and Management Workshop for the NWT in December 1999, the Agency was able to present ideas and contemporary approaches to cumulative effects assessment which, through coordination, can facilitate a more focussed approach to monitoring and managing cumulative effects



at the BHP site. The following list outlines the main activities of the Agency over the 1999-2000 fiscal year:

April 1999

- Director Berkes provided advice on traditional knowledge projects of Lutsel K'e Dene First Nation and the Dogrib Treaty 11, and had discussions with the North Slave Métis Alliance.
- Director Pedersen met with the President of the Kitikmeot Inuit Association.
- Director Pearse met with the Dogrib Treaty 11 Regional Council.
- Director O'Reilly met with the Yellowknives Dene First Nation.
- The 13th Board of Directors Meeting was held April 16th to 18th in Yellowknife. The Agency met with Environment Canada on the Kimberlite Toxicity Study, the Department of Fisheries and Oceans on the Fish Habitat Compensation Fund and Mackenzie Valley Environmental Impact Review Board on the environmental assessment process. The Department of Indian Affairs and Northern Development presented information on the Coppermine Cumulative Effects Monitoring Program and BHP updated the Board.

May 1999

- The Agency reviewed BHP's Annual Report under the *Environmental Agreement*.
- The Agency reevaluated the information exchange between the Agency, BHP and the regulators in order to make improvements.





June 1999

■ The Agency submitted its review of BHP's *Environmental Agreement* Annual Report for 1997.

July 1999

- Director Berkes provided assistance on the Lutsel K'e Dene First Nation traditional knowledge projects.
- The second Annual General Meeting of the Independent Environmental Monitoring Agency Society was held July 8th in Yellowknife. Past performance was reviewed and Society Members had input into future activities.
- The 14th Board of Directors Meeting was held from July 8th-IIth in Yellowknife. The Agency discussed communications and correspondence with the Society Members, Agency mine site visit, the BHP project extension and hiring staff.
- The Directors visited the mine site on July 9th.
- The second Annual Report of the Agency, covering the 1998-99 fiscal year, was released.
- The funding of the Agency reverted from federal, territorial and BHP sources to being solely from BHP as required by the *Environmental Agreement*.

August 1999

- The third issue of *The EKATI™ Monitor*, the Agency's newsletter, was published.
- The Agency prepared for an office move and conducted interviews for staffing the Agency.

September 1999

■ The office relocated from the Mackenzie Media Centre to the lower level of the 50-50 Mini Mall.

The 15th Board of Directors Meeting was held Sept. 12th -15th in Yellowknife. BHP, the regulators and the Agency met to discuss the BHP



Beartooth, Pigeon and Sable project extension, as well as the *Framework for Impact 2000*.

- The Agency hired a full-time Manager, Alexandra Thomson, and thanked GeoNorth Consulting for their services to the Board since its inception.
- The work plan and core budget was finalized, with the exception of contingency funding.

October 1999

- Director Bill Ross presented a paper on the Agency to the Office of Environmental Policy and Planning of the Government of Thailand.
- The Agency reviewed BHP's *Framework for Impact 2000* document.

November 1999

- The Manager met with BHP on November 2nd to discuss the status of Traditional Knowledge Working Group, as well as Society Members on their concerns regarding these studies.
- Director O'Reilly gave a presentation on the Agency to the GeoScience Forum, November 19th.
- The Agency attended public consultation meetings in Yellowknife and Lutsel K'e on the BHP project extension.

- The Agency submitted comments on the Mackenzie Valley Environmental Impact Review Board's Terms of Reference for the Beartooth, Pigeon and Sable Extension Project.
- The Agency hired a Communications Administrator, John Holman, to provide administrative and communications services to the Agency.
- Director O'Reilly met with a representative of the Akaitcho Treaty 8 Impact Benefit Agreement Office.
- Director Pearse met with the Dogrib Treaty 11 Land and Environment Committee.

December 1999

- Director Ross presented at the Cumulative Effects Workshop, with four other Directors in attendance.
- The 16th Board of Directors Meeting was held in Yellowknife, December 11th-12th. A researcher for the Dogrib Treaty 11 Phase II Traditional Knowledge Studies and representatives of the Akaitcho Treaty 8 Impact Benefit Agreement Office and Lutsel K'e Dene First Nation, as well as West Kitikmeot Slave Study presented information and discussed concerns with the Board.
- The Agency held a holiday open house for its Society Members, invited guests and the public.

January 2000

- The Agency submitted a report to the Mackenzie Valley Environmental Impact Review Board on BHP's compliance with the *Environmental Agreement*.
- Dr. Kevin Morin was hired by the Agency to complete a technical review of BHP's 1999 Waste Rock Area Seepage Survey.

February 2000

- Directors participated in workshops sponsored by BHP on the wildlife and aquatic effects monitoring programs.
- The Agency thanked Director O'Reilly for his dedication to the Agency. His appointment was rescinded as of February 13th. The Akaitcho Treaty 8 appointment has yet to be filled.
- The 17th Board of Directors Meeting was held in Rae and Yellowknife from February 12th-14th. BHP and EBA Engineering presented information on the tailings management. Dr. Kevin Morin presented his technical review of BHP's 1999 Waste Rock Area Seepage Survey.
- The Agency hosted a community dinner at the Rae Elders' Centre on February 13th.

March 2000

- Macleod Institute of Environmental Analysis conducted an evaluation of the Agency.
- The Agency submitted comments on BHP's application to amend their water licence in order to dewater Fox Lake and mine the Fox pipe.
- The 18th Meeting of the Board of Directors was held in Yellowknife from March 3lst - April 3rd. The Mackenzie Valley Land and Water Board made a presentation to the Agency on the new water licence and land use application processes.





Listening to Our Members

The Agency has had opportunities to work with our Members in a variety of ways. We have reviewed information, offered technical expertise, participated in meetings and workshops to develop consensus on management plans and monitoring programs, as well as brought people together to discuss issues of concern. The Agency has completed the following consultation with our aboriginal Society Members over the last year:

> Akaitcho Treaty 8 (Lutsel K'e and Yellowknives Dene First Nation): Director Kevin O'Reilly, Akaitcho Treaty 8 Appointee, met regularly with Akaitcho Treaty 8 to discuss concerns about the BHP project.

Lutsel K'e also requested that the Agency provide technical expertise on fish habitat restoration. Director Pete McCart reviewed ideas for fish habitat compensation projects. Yellowknives Dene First Nation and Lutsel K'e Dene First Nation met the Agency directors to discuss concerns over the creation of the Traditional Knowledge Working Group. The Agency met with BHP in order to find ways to meet these challenges. Akaitcho Treaty 8 representatives have since been meeting with BHP in order to develop the Group.

Dogrib Treaty 11: Director Tony Pearse met the Dogrib Treaty 11 to discuss specific environmental concerns and update the Regional Council and Land & Environment Committee on the Agency's activities. The Agency hosted a community dinner at Rae Edzo Friendship Centre on February 11th as part of their 16th Board of Directors meeting in Rae. The Agency was also requested to provide technical expertise on fish habitat restoration. Director Pete McCart reviewed ideas for fish habitat compensation projects.

North Slave Métis Alliance: Director Fikret Berkes, the North Slave Métis Alliance Appointee, met with representatives of the North Slave Métis Alliance during his visits to Yellowknife on Board business or otherwise. Staff discussed possible opportunities to provide assistance on reviewing technical information in the future, as well as traditional knowledge studies.

Kitikmeot Inuit Association: Director Red Pedersen is in regular contact with Kitikmeot Inuit Association and attends meetings in order to brief the association on Agency activities. At the request of Kitikmeot Inuit Association, the Agency has offered its Lands Manager assistance by providing technical expertise to review documentation and increase the Inuit understanding of the Project.

Government: The Agency meets regularly with government through the Inter-Agency Coordinating Team and as required when other issues arise. The Agency also receives regular information including federal site inspection reports, water and weather data.

BHP: BHP regularly updates the Directors about the mine's environmental management at the Agency's board meetings and monthly, through the Inter-Agency Coordinating Team meetings. BHP has also brought in its

We have reviewed information, offered technical expertise, participated in meetings and workshops .





consultant, EBA Engineering, to further explain its waste water treatment design, and has hosted the Directors in a site visit. Other opportunities may arise for informal interaction from time to time to discuss specific issues, such as budget negotiations, information flow, up-coming meetings, etc.

Evaluation of the Agency

This past year has been a time of reflection for the Agency. The Agency recognizes that communication through written correspondence, newsletters, annual reports and our website is often not enough to reach out to those people who need and want to know about the environmental management of the diamond mine. It is for this reason that the Agency sought the assistance of its Members to help develop ways that the Agency could better serve its clients, as required under the BHP Environmental Agreement. The Agency hired an independent consulting firm, Macleod Institute for Environmental Analysis, to interview Society Members, regulators, and other stakeholders, and to conduct an evaluation of the Agency's performance to date. Macleod Institute identified the Agency's strengths and weaknesses, areas of improvement and some of the internal and external challenges that face the Agency. Macleod Institute provided its guidance in meeting these challenges by offering the following recommendations and Executive Summary.

The Agency receives regular information including federal site inspection reports, water and weather data from the site.



INDEPENDENT ENVIRONMENTAL MONITORING AGENCY Macleod Institute Evaluation Report

Executive Summary

The Macleod Institute for Environmental Analysis was hired on March 7, 2000 to conduct a performance evaluation of the Independent Environmental Monitoring Agency's programs. The evaluation will serve as a basis for developing plans to improve the effectiveness of the Agency's internal management and its service in the interests of the public and other parties with respect to environmental management of the EKATI[™] Diamond Mine. The Institute examined the Agency's activities, outputs and outcomes in the context of the Environmental Agreement signed on January 6, 1997. In all, 29 interviews were conducted and included individuals from BHP, the governments of Canada and the Northwest Territories, the Dogrib Treaty 11 Council, the Akaitcho Treaty 8. the North Slave Métis Alliance, the Kitikmeot Inuit Association, current and former Agency Directors and current and former Agency Staff. Various documents were also reviewed.

The Institute designed five research questions to focus its program evaluation of the Agency's performance:

- I. Is the Agency's mandate clearly understood?
- 2. Do the parties and stakeholders believe that their desired outcomes are being achieved?

- 3. Are the activities designed in the best interest of achieving the Agency's mandate?
- 4. Do the chosen activities result in expected outputs or outcomes (results) as anticipated?
- 5. Are there factors influencing the Agency's ability to deliver on its mandate?

The Institute gave the Agency a positive rating in some areas, but identified a number of other areas which need improvement.

The Agency's technical (scientific) contributions are generally well accepted. A number of Society members expressed a real feeling of comfort that the Agency is ensuring that BHP's licence conditions are being met. Overall, the Agency has succeeded in:

- identifying several relevant issues, thereby improving environmental management of the EKATI[™] mine (phosphorous levels at Kodiak Lake is one example);
- facilitating the introduction of BHP's annual environmental effects monitoring workshops and convening Traditional Knowledge workshops; and
- establishing facilities such as a public access library, frequent newsletters and a website.

However, the Agency has been less successful in providing a conduit of information to and from the public and aboriginal communities. Society members anticipated that the Agency would be independent of inappropriate influence from the company and regulators. They did not expect that the Agency would operate in what many see to be isolation from the parties and stakeholders. The Agency needs to build a stronger liaison function, and improve its relationship with the communities.

The Agency has primarily used technical and passive methods of communicating information to its stakeholders. This communications style has not been entirely effective. For example, one respondent said, "Our people wanted information back to the communities. This does not happen by writing technical letters." Another made the comment that "All we see is piles of written books. We'd like to see more people who could explain this stuff simply to us." At the same time, however, others said "we are too busy and have many other priorities to address anyways". The Institute found that several factors have influenced the Agency's ability to deliver on its mandate: ■ a carry over of previously existing challenges. For instance, many stakeholders had hoped the Agency, an innovation created for the purpose of responding to community concerns about the new EKATI[™] Diamond Mine, would help address long standing concerns about the availability and integration of Traditional Knowledge.

- a carry over of tensions from the BHP hearing process. For example, one interviewee observed that the Agency's "ability to deal with the DIAND/BHP complicity is essential." Although everyone noted a general improvement in relations over the past three years, many expressed a desire to see the Agency adopt a more solution-oriented approach in its public watchdog role.
- the Environmental Agreement itself sets up some conflicts.
 - One Society member commented that "We wanted a watchdog. But the watched [BHP] controls the budget — the negotiations over budget have diluted [the Agency's] role."
 - The Agreement calls for ecosystem-based approaches, yet it focuses only on the Project.
 Differences have therefore arisen over the handling of cumulative effects.
- the speed at which current events are seen to be overtaking the Agency. The number and pace of new diamond mine and other proposals are demanding a change in environmental monitoring strategies to consider the effects of all projects in the region.

The Institute also examined the Agency's internal management systems, and suggested that improvements be made to provide more strategic focus for the Agency's work, and to establish a "single voice" for the Agency. The Institute concluded its evaluation by making nine recommendations which included looking at the Agency's future role (especially as it relates to the Diavik Environmental Monitoring Advisory Board), developing better communications, finding a better mechanism for establishing

Recommendations

In order to develop plans to improve the effectiveness of the Agency's internal management and its service in the interests of the public and other parties with respect to the environmental management of BHP's diamond mine, the Institute recommends that:

- I. the Agency's Directors initiate a dialogue with Society members to address the Agency's future role, given additional resource developments in the North. The Agency may wish to explore a number of options such as establishing an alliance with Diavik's Environmental Monitoring Advisory Board, maintaining the Agency's focus on scientific review or incorporating community-based liaison and Traditional Knowledge expertise into the Agency's operations.
- the Agency work collaboratively with aboriginal communities and members of the public to identify simple and realistic tools and processes to meet its clients' communications and information needs in a realistic manner. Independence must not result in isolation from stakeholders.
- the Agency's Directors initiate a dialogue with Society members to find more efficient mechanisms for establishing Core Budgets to be funded by BHP.
- 4. the Agency explore ways in which it could adopt solution-oriented approaches when exercising its role as a public watchdog, and identifying environmental problem areas. Put another way, the Agency needs to be more constructive in its monitoring and advisory roles.
- the Agency take a broad view of environmental management in order to ensure that the appropriate level of cumulative effects is addressed.

Core Budgets being funded by BHP, adopting solutionoriented approaches, ensuring that cumulative effects and Traditional Knowledge are appropriately integrated into BHP's environmental management systems, and improving the Agency's own management processes.

- 6. the Agency work with all Society members to help BHP integrate appropriate Traditional Knowledge into its environmental management and monitoring programs.
- 7. the Agency establish a strategic planning process in order to develop a common level of expectation and understanding of how its mandate will be delivered, and include discussions with and among all Society members as part of the process.
- 8. the Directors establish a clear line of managerial authority within the Agency, to allow for effective delegation, increased outreach and communications, and participation with strategic partners. The Agency must have a "single voice" when required.
- 9. the Agency implement appropriate internal management performance indicators.

Assessment of Environmental Management of the Mine

Compliance Report for BHP's Proposed Beartooth, Pigeon and Sable Extension Project

On February Ist 2000, the Agency provided both BHP and the Mackenzie Valley Environmental Impact Review Board with the BHP *Environmental Agreement Compliance Report* as directed by the terms of reference for the Beartooth, Pigeon and Sable Extension Project's environmental assessment. The compliance report related to regulatory authorizations, but focused upon compliance with the *Environmental Agreement*. The Agency was not able to comment on instances of non-compliance that were still under investigation, since the relevant information was not yet public, nor available to the Agency at the time.

The Agency concluded that "BHP's environmental management and compliance has, to date, been good and improving. BHP, the regulatory authorities, the Aboriginal organizations and the Agency contribute to the on-going improvement of the environmental management at EKATI[™]. The company has made efforts to comply with the terms of its authorizations, as is evident from the available inspection reports. Overall, BHP has responded well to facing the challenges of being the first operating diamond mine in the North. The Inter-Agency Coordinating Team meetings, annual workshops, regular meeting among stakeholders and Elders' visits have contributed



BHP's environmental management and compliance has, to date, been good and improving.

significantly to meeting these challenges, especially related to aquatic effects and wildlife.

"More opportunities exist for creating better partnerships with aboriginal peoples, especially with respect to incorporating traditional knowledge into environmental plans and programs. The Agency would welcome the opportunity to interact with the Traditional Knowledge Working Group, should it be created.

"In time, a more formalized mechanism to share information will arise and facilitate the early identification of environmental problems. A systematic means of addressing potential problems will develop and the impacts of the project will be better understood. By streamlining the process and fostering cooperation, more effort can then be directed towards the education of the communities and the public on the environment impact of EKATITM and its mitigation."



BHP's 1999 Annual Report

BHP's 1999 Annual Report deals with the requirements under both the water license and the *Environmental Agreement*. As in past years, the Agency reviewed this report and provided detailed comments concerning the merits and deficiencies of the report so as to aid in its overall improvement in future years. The following comments summarize the main findings from our review of the 1999 report.

Overall, the report generally does an adequate job of summarizing the events of the preceding year. There are, however, several significant deficiencies. One shortcoming of the report is the lack of critical analysis of issues that arose during the past year, and how these matters have informed on-going environmental management at the site. Greater emphasis is needed on

explaining the meaning of results and how BHP is learning (adapting) from the monitoring and management activities being undertaken. Experience with, and learning from, unpredicted events

can make an especially valuable contribution. For example, BHP's 1999 surveys of waste rock seepage showed low pH (i.e. acidic) in drainage from the granite waste rock and coarse kimberlite reject dumps. This finding was not predicted in the original environmental assessment in 1996 and therefore was not fully considered in the mine's management and planning. Further discussion of the

More opportunities exist for creating better partnerships with aboriginal peoples, especially with respect to incorporating traditional knowledge into environmental plans and programs.

BHP Annual Report Recommendations:

- 1. BHP's future annual reports should provide a more considered discussion of the findings of its monitoring and research programs, the significance of the results for environmental management, and describe how lessons learned have modified and will modify the individual programs and/or the Environmental Management System.
- 2. Future annual reports should also include an updated, consolidated and comprehensive summary of the mine development schedule, as currently planned, over the lifetime of the project, not just for the next year.
- 3. BHP should develop and institute Quality Assurance/Quality Control procedures for the collection of aquatic baseline data to ensure consistency and quality of data collected by different consultants. A review of past baseline surveys should also be made to demonstrate that they have been conducted under equivalent protocols.

possible causes, including alternative interpretations, is necessary. We comment on this issue further under 'Waste Rock Management' section of this report.

The 1999 Annual Report also states, among its conclusions regarding Kodiak Lake, "Metals concentrations currently are far below freshwater aquatic guidelines criteria" (p. 66, Annual Report). This is somewhat misleading since, though it is true for most metals, it is not true for either total aluminum or total copper. Concentrations of total aluminum occasionally exceeded the guidelines set by the Canadian Council of the Ministers of the Environment, especially in spring when pH is low. Total copper concentrations exceed these guidelines for most samples taken during the open water season and for all samples taken under ice. In open water, the difference is small and in the winter, it is relatively large. Though sewage may have been a factor in increasing total copper concentrations, airborne blasting residues and seepage from waste rock and coarse tailings piles may also be possibilities.

The Agency is of the view that BHP's annual report is the company's best opportunity to describe its latest version of the project, particularly since the mine sequence continues to change. Although the basic requirement to summarize next year's operations has been met, an updated, consolidated description of the company's overall mine development plans for the project is important. Furthermore, there is no mention of planned 1999 activities for the Fox pipe development, or of the development work being undertaken at Sable, Beartooth and Pigeon pipes. Nor is there any mention of on-going exploration work elsewhere in the claim block.

Finally, a useful feature of the annual report is an annotated bibliography of all the environmental reports



on the project published by the company. We note that a number of reports have been prepared over the years regarding the collection and analysis of aquatic baseline data for various streams and lakes. Several different consulting firms have been employed in this task. Since the production of an accurate baseline is critical to effective impact monitoring over the lifetime of the project, consistency and rigour in procedures for collecting the data are important.



Operating Environmental Management Plan

The current Operating Environmental Monitoring Program was produced in 1998, and a revision is expected in the spring of 2000. In its 1999 Annual Report, BHP briefly identifies the individual plans and programs that comprise the Operating Environmental Monitoring Program, but provides no or little assessment about how they were implemented and what success they achieved. Rather, BHP states that "by basing our improvements on the results of various monitoring programs, environmental studies, research programs and input from (various stakeholders), we continue to ensure the efficacy of our Environmental Management System." No discussion or examples are presented to demonstrate how this occurs.

For reasons of trying to better understand how adaptive management is being applied at the site, the Agency has previously recommended that BHP provide greater detail regarding its Environmental Management Systems. In response to our 1998 recommendation for greater transparency on the Environmental Management Systems, BHP took the position that the Environmental Agreement acknowledges that the company has sole responsibility for the management of the project, which includes the Environmental Management Systems. It has stated: "BHP has not chosen to, nor do we intend to, share this right and responsibility with the Agency." Without knowing how the Environmental Management Systems works, it becomes difficult to understand how experience at the mine actually informs the management system. More openness about Environmental Management Systems is also an opportunity for BHP to promote its effectiveness.

Furthermore, the 1999 annual report notes that BHP itself conducts environmental audits for some of its programs but, unfortunately, no details are provided about these audits, how they are conducted, how deficiencies are detected and reported, or how management action is informed and the Environmental Management Systems modified. For example, the 1998 audit is cited as having

Operating Environmental Monitoring Program Recommendation:

4. BHP should institute a process for evaluating the results of the separate plans and programs that comprise the Operating Environmental Monitoring Program. The evaluations could be conducted at regular intervals (say, every three years), and should be conducted by an independent evaluator. The results of the evaluations should be published in the annual report.

Greater emphasis is needed on explaining the meaning of results and how BHP is learning (adapting) from the monitoring and management activities being undertaken. Conducting an independent evaluation of its environmental programs would avoid BHP's dilemmas of divulging proprietary information on its management protocols. alerted the company to the need for dust control on roads in the late winter, and the need for accelerating revegetation along the Panda Diversion Channel. No data or evidence are provided as to how these needs were detected, or why an audit, as opposed to routine operational monitoring, was needed to identify these situations. Since BHP considers its environmental management systems and internal audits confidential, conducting an independent evaluation of its environmental programs would avoid BHP's dilemmas of divulging proprietary information on its management protocols, and would satisfy our need for an in-depth appraisal of the effectiveness of BHP's Operating Environmental Monitoring Program.

Assessment of the Regulators

Regulators are responsible for ensuring that the environment is protected by making sure BHP is following environmental laws and the terms and conditions of its approvals. They also have a large role to play in ensuring that proper advice and assistance is given to BHP in order to guide the decision-making of the company on environmental matters. It is therefore important that regulators are well-informed, pro-active, and are able to effectively coordinate with other regulators, the company and the Agency. They should also be aware of the needs of the public and the aboriginal people that are affected by the Project.

In order to adequately respond to issues and regulate BHP



under its Environmental Agreement and authorizations, it is important that information is exchanged openly and in a timely manner to facilitate effective decision-making. In March of last year, BHP, in response to an Agency request for information, poled each regulator for the types and ways information would be exchanged among parties. Since the responsibilities have been defined, the Agency has noted a great improvement in the willingness of regulators to exchange information amongst each other, the company and the Agency. Environment Canada, the Department of Fisheries and Oceans, Yellowknife District Office. Water Resources and Environment and Conservation of the Department of Indian and Northern Affairs have regularly been in attendance at meetings and workshops related to BHP. Comments by Resources, Wildlife and Economic Development of the Government of the Northwest Territories in the Wildlife Effects Monitoring Program workshop, and Department of Fisheries and Oceans in the Aquatic Effects Monitoring Program workshop, were especially useful to the overall effectiveness of the programs for monitoring the environmental impacts of the mine.

BHPs requirements under its authorizations, as well as commitments under the various management plans and monitoring programs, are numerous. Besides BHP itself, regulators have the prime responsibility for making sure these requirements and commitments are implemented. The Agency would like to commend the Department of

Indian Affairs and Northern Development inspector for his dedication to environmental protection through the enforcement of BHP's water license and land use permits. Overall, the Agency is pleased with the efforts regulators have made this year to cooperate in order to strive for an integrated approach to environmental management and regulation at the mine. The Agency, however, is aware that the Operating Geochemical Testing Program was not fully implemented in 1999 and was not detected by the regulators. A more systematic system is needed to ensure delays in implementation are tracked and communicated to BHP on an on-going basis. We hope that this coordination continues to improve with the change in regulatory regime and welcome the opportunity to work with the new Mackenzie Valley Land and Water Board, as well as Mackenzie Valley Environmental Impact Review Board.



Changing Regulatory Environment:

Over the past year, the NWT has seen a change in the way land and resources are managed. The Mackenzie Valley Resource Management Act established the Mackenzie Valley Land and Water Board to screen project proposals for their potential environmental and socioeconomic impacts in and around the Lac de Gras area. The Board may issue both land and water authorizations, as per recommendations to the responsible Minister. *For those projects that require a more* thorough assessment and discussion of the issues, the Mackenzie Valley Environmental Impact Review Board may complete a more detailed environmental assessment, which could include a public hearing. Please refer to the appropriate Board or Act for more information on the roles and responsibilities under the legislation or other responsible authorities outside of the Lac de Gras area (i.e. Sahtu Land and Water Board, Gwich 'in Land and Water Board)

Arr Traditional Knowledge



Traditional Knowledge

Traditional knowledge (TK) is knowledge that derives from, or is rooted in, the traditional way of life of aboriginal people. It is the accumulated knowledge and understanding of the land, and is built up through generations of living in close contact with the environment. Traditional knowledge offers opportunities to help manage the impacts of the mine. Based on the experience in the Canadian North and elsewhere, there is potential for using TK and science together in complementary ways.

The Agency's Activities with Respect to Traditional Knowledge

The Agency's mandate requires it to "review, report, or make recommendations concerning ... the integration of traditional knowledge and experience of the aboriginal peoples into environmental plans and programs". (*Environmental Agreement*, Article IV.2).

In 1999-2000, the Agency carried out the following activities related to its mandate on traditional knowledge by:

1. Encouraging BHP and the aboriginal parties to carry out Phase II Traditional Knowledge studies as stipulated in the *Environmental Agreement*. Meetings have been held with representatives from the Lutsel K'e Dene First Nation, as well as the Dogrib Treaty 11 on TK initiatives. Staff have

discussed the status of the studies, and associated challenges, with aboriginal Society Members and BHP;

"BHP shall incorporate all available traditional knowledge in the environmental plans and programs, and shall give all available traditional knowledge full consideration, along with other scientific knowledge, as the environmental plans and programs are developed and revised." Environmental Agreement

2. Encouraging BHP and the aboriginal parties to carry out the recommendation of the TK Workshop of December 1998 (which was coordinated and facilitated by the Agency) that the EKATI[™] TK Working Group is established;

- 3. Providing technical assistance regarding TK studies to those aboriginal parties (North Slave Métis Alliance and Lutsel K'e Dene First Nation) which sought help from the Agency;
- 4. Acting as a repository of TK information, studies and cases. The Agency met with representatives of WKSS to receive information on TK-related studies;
- 5. Promoting the inclusion of TK and community considerations in BHP's wildlife and aquatic effects monitoring programs, and in the Operating Environmental Management Plan (OEMP) through the BHP Environmental Management Workshops, and sending a follow-up letter to BHP to support community involvement in monitoring, and;
- 6. Promoting the use of aboriginal knowledge and expertise in the routing of the Sable Road.

Phase II Traditional Knowledge Studies

Over the past year, the Agency met with various aboriginal members and BHP in order to review the status of the Phase II Studies and determine if there are ways that the Agency can be of assistance.

The Phase II Traditional Knowledge Studies are in various stages of completion. Although there have been no TK Phase II reports released in 1999-2000, progress has been made on the studies. The Kitikmeot Inuit Association is using computer mapping programs in order to organize and access knowledge gathered from interviews with Elders. The interviews are complete and the transcripts have been translated. According to BHP, the information was at the verification stage as of early 2000. Research assistants are being trained to enter the TK information into the computer program.

The preliminary version of the Yellowknives Dene First Nation report, entitled *Weledeh Yellowknives Dene:* A *Traditional Knowledge Study of Ek'ati* was released in 1997. The study was then withdrawn in March 1998 in order to complete revisions. A consultant is in the process of finalizing the study.

Potential areas for inclusion of TK include the following:

- holders of TK can provide information specific to a site;
- holders of TK can identify and assess potential impacts;
- holders of TK can help with mitigation measures;
- TK can produce a time-series of information to help with baseline information for monitoring;
- communities and TK holders can supply values and priorities for environmental management;
- communities and TK holders can carry out impact monitoring

Arr Traditional Knowledge



With regard to the Dogrib Treaty 11 TK report, BHP has reviewed preliminary data of the Dogrib land use and understanding of habitat types.

The Lutsel K'e Dene First Nation are in the progress of gathering information and have been considering the possibility of using similar computer technology as the Kitikmeot Inuit Association in order to organize the information gathered as a part of their TK Phase II study.

The Agency plays an on-going role of providing assistance to aboriginal parties for TK research; making published TK information available to the general public; getting updates on the WKSS on TK studies. The Agency encourages interested aboriginal organizations to benefit from the Agency's offer to assist in matters related to the collection and documentation of TK.

Traditional Knowledge Working Group

The EKATI[™] TK Working Group, which was recommended at the December 1998 meeting, has yet to come into existence. Efforts have been made by BHP, representatives of the aboriginal organizations, in particular the Akaitcho Treaty 8, and TK researchers to resolve issues of participation, funding and the terms of reference for the Group. Some society members indicate that external factors, such as the negotiations for the Diavik Project, have been a priority of the past year. It is hoped that the Working Group will finally come into existence in the next year.

Incorporating Aboriginal Experience in Monitoring Programs

BHP has made strides in the inclusion of TK in BHP's wildlife and aquatic effects monitoring programs by facilitating Elders' visits to the site in order to increase the interest and knowledge of mining at the mine site. BHP feels that these site visits have been a useful mechanism for the participation of Elders and the incorporation of TK in the environmental management of the mine, especially in relation to caribou movement.

Society Members and the Agency recognize that the incorporation of traditional knowledge in the environmental management of the mine is limited. BHP has indicated that it has incorporated traditional knowledge to better design roads in order to lessen the impacts to caribou, identify alternatives for keeping caribou off of the airport runway and track wolverine by hiring an experienced wolverine hunter to complete the wolverine survey. While these examples show modest improvement to the incorporation of TK in environmental management of the mine, more has to be done in the future.

Over the past year, the Agency has provided specific input into the inclusion of TK and aboriginal experience in BHP's annual monitoring program workshops, in the review of management plans, the framework for BHP's Impact 2000 report and the terms of reference for the environmental assessment of the Beartooth, Pigeon and Sable Project Extension.

The Agency commends BHP's initiative to provide first-hand information to the aboriginal groups and to start a dialogue for collaborative problem-solving. The initial meetings were no doubt important for building trust towards effective participation. However, if such a dialogue is to be more than a public relations exercise, careful documentation is now necessary to systematically record the suggestions and comments of these various groups. The results may be important to the identification, assessment, mitigation, and monitoring of the potential impacts of the project. Documenting the results of collaboration (what, where, when), and the record of action taken by BHP to make use of these inputs in BHP's Operating Environmental Monitoring Program and monitoring programs, will help both BHP and the Agency to fulfil their shared responsibility under the *Environmental Agreement*. It is also useful for other developments in the NWT, and elsewhere in



the Canadian North that are looking to the EKATI[™] experience for guidance.

The Agency intends to spend more time speaking with its members to find new ways to incorporate traditional knowledge and the experience of aboriginal people in the process and management of the mine.

Traditional Knowledge Recommendations:

- The Agency recommends that aboriginal organizations and BHP continue to collaborate in establishing an EKATI[™] Traditional Knowledge Working Group. The Agency will assist and coordinate, as requested, with such initiatives.
- 6. The Agency recommends that BHP document the inputs of Elders and Lands and Environment Committees who collaborate with BHP personnel at the project site. Information provided to BHP from the Elders, the way the information is incorporated in the environmental management of the mine, as well as the comments, observations and recommendations put forward by the Elders during the site visits should be recorded in the management plan reports.



Wildlife Effects Monitoring Program

The effects of mining development on wildlife and their habitat continue to concern the Agency and the aboriginal peoples. BHP has established a series of operational environmental procedures, such as speed limits on roads, to minimize impacts on wildlife. The purpose of BHP's wildlife effects monitoring program is to assess the effectiveness of mitigation measures, and to document new impacts that were not predicted initially. Therefore, the wildlife effects monitoring program is an important tool for adaptive management.



BHP initiated monitoring activities on wildlife in 1997. The monitoring in 1999 focused on seven valued species, or groups of species, and their habitats.

Findings for 1999

The direct impacts of the mine on wildlife continue to be limited. No caribou, grizzly bears, wolves or wolverines were killed at the mine site or on roads. Destruction of habitats due to mine development represents the most important direct impacts of the mine so far. A total of 690 hectares (6.9 km²) of habitat has been destroyed at the end of 1999. BHP restored to a more-or-less natural state 25 hectares of habitat in 1999.

Wildlife surveys were performed from April through October 1999 in order to assess potential indirect impacts to animals. Caribou were present in moderate number around the mine, especially during the spring migration and the mid-summer migration. The number of caribou within 14 km of the mine site never exceeded 7000 animals (2% of the Bathurst herd). Survey results suggested that the overall pattern of caribou distribution was not affected by the presence of the mine. However, groups of caribou cows with calves (nursery groups) were relatively less frequent close to the mine than farther away (>14 km).

Survey results suggested that the overall pattern of caribou distribution was not affected by the presence of the mine.

Field observations revealed that grizzly bears, wolves, and wolverine continue to use BHP claim block, apparently largely unaffected. The waste dump is monitored closely for presence of food stuff, as it may attract animals. Ground-nesting birds, loons, and raptors (e.g., hawks) do not seem to be affected by mining activities, except for direct loss of habitats.

Elders' Input

Elders actively participated in the February 9th-10th, 2000, workshop to discuss the results of the wildlife effects monitoring program. Elders expressed four important concerns that should be considered by BHP: the safety of the processed kimberlite containment area for caribou health and movements, the effect of mine dust on caribou food, the effect of Misery road (and traffic) on caribou migration, and the safety of caribou with respect to the electrical fence around the airport.

Agency's Assessment of the Wildlife Effects Monitoring Program

Overall, the Agency views the wildlife effect monitoring program as providing the necessary assurance to prevent and mitigate the impacts of the mine on wildlife and their habitats. However, three concerns have developed in 1999 that may decrease the value of the wildlife effects monitoring program, if uncorrected:

- In 1999, BHP used a method of habitat assessment that will not adequately permit regional analyses of cumulative effects.
- BHP did not fully implement the monitoring studies to assess the potential impacts of major haul roads on caribou migration, despite such a commitment in the 1999 Operational Environmental Monitoring Plan.
- The annual report of the Wildlife Effects Monitoring Program had numerous errors that affected the interpretation of the data being reported.

The agency has provided detailed written advice to BHP about these concerns. The Agency has offered to discuss with BHP additional ways to improve the value of the Wildlife Effects Monitoring Program.



Wildlife Effects Monitoring Program Recommendations:

- 7. The Agency urges BHP to fully consider the concerns of Elders in adapting its wildlife monitoring program, especially the effect of mine dust on caribou food and the effect of haul roads on caribou migration.
- 8. The Agency recommends that changes in habitats (direct and indirect habitat losses, habitat reclamation) in the BHP claim block be based on the Landsat Imagery Habitat Classification System in order to keep a common approach from year-to-year and among industrial developments.
- 9. The Agency recommends that BHP fully implement the monitoring studies to evaluate the impact of major haul roads on caribou migration as described in the 1999 Operational Environmental Monitoring Plan.

For recommendation on the cumulative effect monitoring of the Bathurst caribou herd, please refer to the Cumulative Effects Section.

Aquatic Effects

Glossary

For the following sections, a glossary is provided to explain technical terminology used on the facing pages.

Nitrate

A nutrient, like a fertilizer, derived from nitrogen.

Phytoplankton

Microscopic plants, such as algae, suspended in aquatic environments (e.g. oceans, rivers, lakes and ponds).

Zooplankton

The small, almost microscopic animals that live suspended in aquatic environments. Zooplankton feed on phytoplankton.

Benthic Macroinvertebrates

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

Aquatic Effects Monitoring Program

BHP studies show that the effects of mining have spread downstream to the lowermost reaches of the Koala Drainage. In comparison with the data collected before mining at the site, called baseline studies (1994–1997), 1999 data for Slipper Lake indicate that there have been



increases in a wide variety of water quality variables including: pH and total concentrations of arsenic, calcium, chromium and copper as well as two biological variables, *phytoplankton* biomass and *zooplankton* abundance. In Slipper-Lac de Gras stream, both *nitrate* and total calcium concentrations have increased.

None of these can be considered environmentally threatening at their present levels. However, they do indicate that project impacts have moved relatively rapidly downstream. The effects on aquatic ecosystems in the lower reaches of the drainage would be expected to increase as the project expands, especially the Fox Pit, which is not far upstream of Slipper Lake. Nitrate, for example, which has increased in Moose and Nema lakes will almost certainly increase in Slipper Lake once blasting (the major source of nitrogen compounds) starts in the Fox Pit.

Outline of the Studies

The Aquatic Effects Monitoring Program is designed to assess the effects of the BHP Diamond Mine on waterbodies in its vicinity. In 1999, the study sites (Figure 1 on next page) included:

- two external reference lakes (Nanuq and Counts);
- two internal reference lakes (Vulture and Grizzly);
- three potentially affected lakes within the Koala Watershed (Moose, Nema and Slipper);
- one potentially affected lake outside of the Koala Watershed (Cujo), and;
- three potentially affected lake sites in Lac de Gras (S1, S2, S3).
- Two baseline sites in Lac de Gras (M1, M2) were monitored, along with their respective outflow streams.

Aquatic Effects



Aquatic Effects Monitoring Recommendations:

10. Initiate a study to determine relative contribution of nutrients and contaminants from various potential sources.

BHP suggested abandoning the Aquatic Effects Monitoring Program sampling program on Lac de Gras at the Aquatic Effects Monitoring Program Workshop, February 2000. The Agency recommends keeping the sampling program and possibly modifying it to better assess the effects of the EKATI™ Project separately from those of the up-coming Diavik Project. The studies included an assessment of meteorology, hydrology, water quality, sediment quality, physical limnology, phytoplankton (periphyton in streams), zooplankton, *benthic macroinvertebrates*, and fish (Cujo Lake only). Data for 1999 were compared with those for previous years.

Effects of Mining on the Waterbodies Studied

While there have been increases in concentrations of a variety of water quality and sediment quality variables at sampling stations off the mouth of Slipper-Lac de Gras stream, it is not yet possible to distinguish these from natural variation. If, in time, the EKATI[™] Mine does have significant effects on nearby aquatic environments in Lac de Gras, they may be difficult to distinguish from those of the Diavik Project when it comes on-stream.

The sources of the materials causing changes in water quality are various: blasting, wind-borne contaminants, pit dewatering, pit drainage, seepage from coarse kimberlite and waste rock piles, sewage *effluent* disposal, and pumping from the fine kimberlite disposal area (Long Lake). At this time, it is not possible to assess the relative contributions of these sources to overall loadings within the Koala Basin, although knowing these contributions would be very helpful in order to mitigate any impacts.

Agency's Assessment of the Aquatic Effects Monitoring Program

The information available to date suggests that the project is having effects as far downstream as the Slipper Lake outlet in the Koala Drainage and possibly, the mouth of Koala drainage near Lac de Gras. None of the identifiable effects appears likely to have serious environmental effects at this time, but some are expected to increase as development within the Koala Drainage proceeds.

Special Effects Monitoring Program

From time to time, BHP is required to conduct special studies outside the framework of the Aquatic Effects Monitoring Program, called Special Effects Monitoring Programs. In order to mine the kimberlite pipes located underneath the Koala and Panda Lakes, the Panda Diversion Channel was built to divert water around the lakes before they were drained. The channel was also intended to

compensate for the loss of stream habitat resulting from the project. BHP was required to conduct the Special Effects Monitoring Program in order to study the effects and monitor the impacts of this development on water and fish in Kodiak Lake and as a result of the Panda Diversion Channel.

Kodiak Lake Sewage Effluent Study

A major effect of the project, was a change in the trophic status (primary productivity) of Kodiak Lake. due to the introduction of phosphorus rich sewage effluent from camps and eroded soil from the Panda Diversion Channel. What had been a relatively unproductive (oligotrophic) lake prior to 1994, when the project began, became a moderately productive (mesotrophic) lake by 1997. This process of increasing productivity is called eutrophication. One of the characteristics of eutrophication is a decline in lake oxygen concentrations, particularly during the winter. In late winter 1997-1998, oxygen concentrations in most of Kodiak Lake were low enough to be a threat to fish.

When the threat of declining oxygen concentrations was discovered, the company reacted quickly: first, by pumping oxygen into the lake, called aeration; and second, by diverting sewage effluents to Long Lake. Lake aeration began in March 1998 and has continued every winter since. The disposal of sewage effluents in the lake ended in January 1999.

The 1999 Kodiak Lake Sewage Effects Study assesses the continuing effects of eutrophication on Kodiak Lake. Its major conclusions are that, in 1999 as compared to 1998:

 Most physical and chemical variables were close to baseline levels during the open water season, but concentrations of nitrogen compounds, total arsenic and total copper have all increased. The nitrogen compounds are thought to have originated from blasting and been carried into the lake by the Panda



Glossary

Effluent

Waste water that flows into a receiving body of water.

Eutrophication

The addition of excessive amounts of nutrients (usually nitrates and phosphates) to water bodies which leads to a rapid growth of plants and decline in oxygen levels.

The information available to date suggests that the project is having effects as far downstream as the Slipper Lake outlet in the Koala Drainage

Aquatic Effects

Glossary

Phosphorous loadings

The addition of phosphorus from an outside source to a water body.

Diversion Channel. Though higher than baseline levels, total arsenic levels are still very low, about 100 times lower than the federal guidelines for the protection of aquatic life. In contrast, total copper concentrations sometimes exceed federal guidelines.

- 2. Primary productivity (as indicated by phytoplankton biomass) seems to have declined relative to the previous year.
- 3. Secondary productivity seems to have declined for zooplankton, but increased for benthic macroinvertebrates.
- 4. Winter oxygen deficits have been controlled by aeration, but sediment oxygen demand remains high and aeration will have to be continued for an unknown period of years to protect fish populations.
- 5. The fish community overall is increasing in biomass after having undergone a period of destabilization. There is no evidence of winterkill resulting from the oxygen deficits of the winter of 1997/1998.
- 6. Little Lake, which lies immediately downstream of Kodiak Lake (Figure 1) has also been affected by nutrient loadings from Kodiak Lake upstream, and is more productive and has lower winter oxygen concentrations than it had before development. This lake, like Kodiak Lake, is now being artificially aerated to maintain acceptable levels of dissolved oxygen.

Overall, *phosphorus loadings* and primary production seem to be declining in Kodiak Lake. The Kodiak Lake impact appears to have been successfully dealt with through adaptive environmental management. Monitoring results for dissolved oxygen were available, and indicated a problem (unacceptably low dissolved oxygen). Management was adjusted (through aeration and sewage diversion) to deal with the problem successfully. This interpretation, however, is largely based on a comparison of only two years, 1998 before effluent was diverted and 1999, after effluent was diverted, and the diversion channel was successfully stabilized. The apparent improvement in water quality and reductions in primary productivity may or may not continue at the same rate.

Panda Diversion Channel

In the spring of 1999, a snow jam formed in Panda Lake at the mouth of the Panda Diversion Channel. Exaggerated peak flow from melting did some minor damage to fish habitat structures in the diversion channel. BHP removed the snow jam by machine. It is the Agency's understanding

that, in future, BHP will try to ensure that snow blockages are cleared before water levels reach such excessive levels. During the open water, fish habitat improvement projects in the channel concentrated on restoring damage caused by high water flows.

Arctic grayling successfully spawned in the channel and young-of-the-year were more abundant than in 1998. Other species utilizing the channel in 1999 included lake trout, round whitefish, burbot, and slimy sculpin. A community of fish food organisms continued to develop in the channel during 1999. Overall, the channel seems to be providing fish habitat of good quality.



Special Effects Monitoring Recommendations:

11. The Special Effects Monitoring Program for Kodiak Lake is scheduled to end with the 1999 studies, after which Kodiak Lake will, presumably, join the ranks of lakes included in the Aquatic Effects Monitoring Program. Our recommendation is that Kodiak Lake be given a special status, and assigned a level of study detail somewhere between these two monitoring programs, especially with regard to studies of nutrient loadings, sediment quality, primary production and fish.

While the snow chemistry data indicate that mining operations are having an effect, it is not yet known how meltwater and surface runoff water quality might be affected.

Snow Core Chemistry

BHP's 1998 Air Quality Monitoring Report (BHP 1999) included an analysis of physical and chemical characteristics obtained from both control sites likely to be unaffected by mining operations and potentially affected sites closer to the mining and plant sites. Thirty-one variables were measured at three control, and six potentially affected, sites. In each case, sample size was three (N=3).

Five variables (ammonia, antimony, manganese, uranium and vanadium) were found in significantly higher concentrations at sites close to the mine than at control sites. For an additional sixteen variables, most of them metals, mean values were greater at potentially affected than at control sites. Among these, total dissolved solids, turbidity, aluminum and iron were most notably higher. There are problems with the presentation and, possibly, the statistical analysis of the snow chemistry data in BHP's 1999 report. The company should reassess these data and prepare a corrected version of the report, possibly as an appendix to their next snow chemistry report.

In light of the continuing expansion of mining activity, the company should reassess the distribution of sample sites. The revised plan should include clear rationale for assigning the status of control and potentially affected sites.

While the snow chemistry data indicate that mining operations are having an effect, it is not yet known how meltwater and surface runoff water quality might be affected.

Agency's Assessment of Snow **Core Chemistry**

Mining operations appear to be causing increases in the concentrations of nitrates and heavy metals in snow. It is not known whether the quality of meltwater and surface runoff is being affected.



BHP DIAMONDS INC

Lake Fish-Out Studies

Under the terms of its Authorization for Harmful Alteration, Disruption, or Destruction of Fish Habitat, BHP is required to conduct detailed "fish-out" studies of all lakes to be drained for mining or used for tailings disposal. To date, such studies have been conducted on seven lakes (Airstrip, Koala, Misery, Panda, Brandy, Nancy and Nilley lakes) and several cells within the Processed Kimberlite Containment Area (the former Long Lake). The results of these studies constitute a large and increasing body of potentially useful data that the Department of Fisheries and Oceans has not yet analyzed in detail.

Lake Habitat Compensation Fund

In order to compensate for the loss of lake habitat associated with its project, BHP entered into a Fish Habitat Compensation Agreement with the Department of Fisheries and Oceans. As part of the Agreement, BHP contributed \$1.5 million to a fund, which the Department of Fisheries and Oceans must manage for the enhancement and restoration of lake habitat.

Over the past year, an Advisory Committee, which has representation from the Akaitcho Treaty 8, Dogrib Treaty 11, Kitikmeot Inuit Association and North Slave Métis Alliance, was created to assist with the administration of the Fund. Aboriginal organizations within communities are being given the first opportunity to submit lake habitat enhancement and restoration project proposals that meet the goal of the Department of Fisheries and Oceans' *No Net Loss Policy*. A Request-for-Proposal was sent out to these organizations in March and closes May 1st 2000. The project proposals will then be assessed by the Department of Fisheries and Oceans using two sets of criteria: scientific and socio-economic. The Advisory Committee will assist with the proposal evaluation under the socioeconomic criteria. The Agency has offered its technical assistance for the review of any project proposals under the scientific criteria. Once the Department of Fisheries and Oceans has made its decision on which proposals meet the goals of the policy and should be funded, additional opportunities for funding more projects through a public call for proposals will be evaluated.

Lake Fish-Out Study Recommendation:

12. DFO should analyze and report on the results and significance of the fish-out studies it required.

Glossary

Waste rock

Rock too low in grade to be mined or processed economically.

Schist

Rock composed of layers of different minerals and splitting into thin, irregular pieces.

Toxicity of Kimberlite

The ability of the diamond bearing rock to cause harmful health effects to plants, animals and humans.

Waste From the Mine

Almost all of the rock brought to the surface during the mining of the kimberlite pipes ends up as waste material that has to be left on the surface in such a way that it is permanently safe and secure. This waste rock consists mostly of country rock (granites, schist, and other rock types) surrounding the kimberlite pipes, and the kimberlite itself after it has been processed to remove the diamonds. The country waste rock is deposited in large piles or 'dumps', while the processed kimberlite is deposited and contained, as mill 'tailings', within a former lake basin (Long Lake).

In terms of environmental management, the challenges for BHP are to ensure that both the waste rock dumps and the tailings are physically and chemically stable and secure from contaminating the environment. In this section we comment on three aspects of waste rock management at the mine: drainage from the waste rock dumps; the placement of tailings in Long Lake; and the unresolved question of *toxicity of kimberlite* waste water. While we discuss emerging or unresolved issues on these topics, it is important to note that there are, to date, no discernable environmental impacts arising from the issues described.

Waste Rock Management

Over the past year granite waste rock from Panda pit (BHP's first pipe to be mined) was deposited in the Panda waste dump, which now occupies about 100 hectares. In addition, the coarse fraction of kimberlite tailings from the mill continues to be stockpiled near the dump. When these dumps are rained or snowed upon, the water can seep through the piled rock and there is a potential for metals and other contaminants to leach into the runoff, and be carried away from the site into the receiving environment. Environmental management of waste rock dumps, therefore, must typically be concerned about the quality of this drainage, so that poor quality water can be



collected, treated if necessary, or somehow managed for downstream aquatic resources not to be adversely affected.

It is for this reason that the Class A Water Licence requires that BHP conduct a program for testing the operating geochemistry, in addition to sampling seepage from the waste rock dumps on the property. The first program includes an analysis of the rock as it is mined in the open pits, and provides a picture of whether the rock has acid generating potential. The second

program is to provide early warning of any undesirable mine water that may be developing on site, and to verify the geochemical predictions that have been made. The BHP water licence is the first time a requirement for sampling waste rock seepage has appeared in a NWT water licence, and the NWT Water Board is to be commended for having the foresight to require what may well turn out to be a valuable tool for managing mine drainage in the long-term.

In addition to these two programs, BHP is required to complete mineralogical and geochemical testwork on each mine rock type. In our previous annual reports, the Agency expressed concern that this water licence requirement has yet to be fulfilled. The Agency stresses the importance of these studies in order to improve the understanding of BHP's waste rock characteristics, which might be troublesome in the years ahead, and to better prepare itself for any contingency or closure measures that might be required to deal with poor drainage.

In the spring and fall of 1999, BHP analyzed seepage from its waste rock piles (Panda dump, till storage pile, and the coarse kimberlite rejects) being constructed on site. Following the first spring survey, the Agency was alerted to the low pH values. The spring data implied that, contrary to

Arr Waste from the Mine



predictions, acid drainage and metal leaching may be occurring as a result of geochemical reactions in the waste rock. Water quality samples showed that the seepage from some of the piles was unexpectedly acidic. Additionally, there may also be elevated levels of aluminum and zinc, although the pattern was, and still is, not clear from the data.

The subsequent fall survey data generally supported the trends seen in the spring survey. In its report on the 1999 seepage surveys, BHP interpreted the acidic nature of the waters forming from the waste rock as naturally occurring from the highly organic tundra water found in the vicinity of the mine site. The acidity was not considered an environmental concern since almost all of it would be contained by the Long Lake tailings impoundment, except in the case of the acidic drainage flowing from the north side of the Panda dump into the Beartooth watercourse. Run-off from this site could eventually escape into the receiving environment via the Panda Diversion Channel into Kodiak Lake. As part of its report, BHP requested that

the NWT Water Board lower the allowable pH levels in its licence.

The Agency subsequently contracted Dr. Kevin Morin of the Mine Drainage Assessment Group, an independent specialist, to review the 1999 findings. In his preliminary assessment Dr. Morin did not agree with the company's interpretation of the data, concluding instead that oxidation of sulphide minerals in the waste rock was the likely source of the acid drainage. Dr. Morin also concluded that the data were insufficient to determine whether metal leaching was occurring at the site.

The Agency filed Dr. Morin's report with the company, NWT Water Board and other regulatory agencies and, in a covering letter to the NWT Water Board, recommended that it was premature to amend BHP's regulated pH effluent range in order to bring the low pH levels into compliance. Further research was needed to resolve the cause of the poor quality drainage.

As for the required Operational Geochemistry Testing Program, it appears this commitment has yet to be fully implemented. BHP has submitted no data or results, nor is the program mentioned in the company's annual report for this year. Since this program is a key component of site water quality management, the Agency urges that this program be implemented without further delay.

The implications of acid drainage being generated by various waste rock types at the minesite may be significant. If the waste rock dumps are not environmentally friendly, then special management strategies will be required to manage the run-off and seepage during operations and after the mine closure. With the exception of the schist waste rock at Misery, waste rock was generally predicted to be geochemically inactive and not requiring any special management effort. If this turns out not to be the case, then, where run-off waters from various piles are not contained by the Long Lake facility, special collection (and, possibly, treatment) systems would be required for the construction of new waste rock piles on the property.

The causes of the acidic drainage from the mine's waste rock remain uncertain. However, to further advance understanding of this issue, the Agency organized a special workshop in April 2000 to enable BHP's environmental staff and consultants to meet with the Agency and other regulators to review the seepage study. The results of this review, and any subsequent developments, will be reported in next year's annual report.

As for Misery waste rock management, where poor quality drainage was predicted by BHP (because of a high percentage of sulphide-bearing biotite-schist), the Agency remains unconvinced that BHP's plans for managing the waste rock dumps and related drainage are adequate. In two previous annual reports we have recommended that further mineralogical tests are required for the company to better understand the causes of the predicted drainage, and help inform a more practicable waste rock management plan.

Tailings Management

While the coarse grain-size portion of the processed kimberlite is trucked to the coarse reject pile, about 60% of the total processed kimberlite (the fine grain-size portion) is pumped as a liquid effluent to Long Lake. Throughout 1999, these tailings were discharged into cell B at the upper end of the impoundment.

Waste from the Mine Recommendations:

- 13. BHP should undertake the necessary further mineralogical and geochemical tests to better define and resolve the emerging water quality issues associated with the development of waste rock piles on site.
- 14. The Mackenzie Valley Land and Water Board should not amend BHP's Class A Water Licence to accommodate the low pH values currently observed in waste rock seepage at the site. The causes of the poor quality drainage should be properly determined, and the implications for management properly considered, before contemplating an amendment to the licence.
- 15. BHP fulfill its commitment to implement the Operating Geochemical Testing Program as outlined in its Revised Waste Rock and Ore Management Plan (July 31, 1998). If an alternative program is considered in the future, it should fully meets the current program's objectives and the rigour of its methodology.

Glossary

Turbidity

Refers to the relative clarity of a water body. A measure of the extent to which light penetration in water is reduced from suspended materials (e.g. clay, organic matter, or plankton). For the most part, deposition of tailings last year occurred without incident. Problems with icing of tailings as they were being deposited on land caused a short-term problem in early 1999, resulting in the emergency re-routing of tailings deposition into cell C until the end of the discharge pipe could be relocated under water farther downstream in cell B. The buildup of glaciated tailings at the upstream end of cell B also resulted in a short-term overflow of liquid effluent into the Exeter Lake drainage during the spring melt. The vigilance of the Department of Indian Affairs and Northen Development inspector was a key factor in the detection of this event, and sampling of escaped drainage suggested that no water of unacceptable quality reached Exeter Lake.

Panda tailings in cell B appeared to be settling quickly throughout the year, with *turbidity* (cloudiness) of pond water in downstream cell C well within acceptable limits. BHP has reported that this aspect of the operation is proceeding as planned, and that predicted water quality in the downstream cells is being achieved.

BHP also met with the Agency to address a concern regarding the possibility that Long Lake Containment Area would not have enough room for the future disposal of Fox tailings. Earlier lab studies predicted settling rates for Fox-like tailings to be much slower than Panda-like tailings. The Agency was concerned that the slow settling Fox tailings would use larger than expected amounts of storage room in Long Lake and, potentially shorten the use or limit the availability of Long Lake to accommodate the scheduled deposition of tailings from the original five open pits. On the basis of the past year's sampling and analysis, BHP's consultants anticipate that Long Lake will easily be able to accommodate the scheduled

volumes of tailings, with perhaps as much as six years' capacity to spare. BHP has told us that tailings can also be placed in the mined-out Panda pit if so required.

The Agency notes that the field component of BHP's original tailings characterization studies, scheduled for the 1999 field season, was not carried out and is now scheduled for this year. We urge the company to do the work at the earliest practicable time, and to integrate these and other results into its Tailings Management Plan, and Abandonment and Restoration Plan.



Kimberlite Toxicity

Not much has changed on this topic since our last annual report. The issue of whether kimberlite tailings effluent is harmful to the aquatic environment is one that is not yet satisfactorily resolved.

The potential toxicity of kimberlite was a major concern of the intervenors during the 1996 environmental assessment and, accordingly, its investigation became a requirement of both the *Environmental Agreement* and the water licence. The *Environmental Agreement* called for a research program to



be conducted by the proponent, while the water licence stipulated only that a study be designed and undertaken. BHP carried out such a study in 1998, and we reviewed the product in our 1998 annual report.

BHP concluded from its 1998 study that the observed toxicity to rainbow trout was caused by suspended solids, and that the regulatory limit of 25 mg/L for suspended solids would be protective of all aquatic organisms. The Agency does not yet share that view, and we informed the company at the time of our assessment. DFO also expressed doubt as to whether suspended solids alone were responsible for the observed toxicity, whether the prescribed limit would be protective of all aquatic life, and recommended further research.

Since that time, Environment Canada has initiated field investigations (as part of a university thesis) in the Long Lake Containment Area, and plan further studies of this critical issue. The Agency has agreed that further research into the actual tailings liquids is the appropriate approach to take, and is appreciative of Environment Canada for having taken this initiative. While it is too early for any conclusive results to be produced, some early findings suggest that there are toxic effects from the effluent to small aquatic organisms in Long Lake, particularly cell B where kimberlite tailings and sewage are being deposited. Causes of the toxicity are not known at this point.

Cumulative Effects

It is important to identify and manage not only the effects of the mine, but also its cumulative effects - effects of the mine in combination with the effects of other human activities. As in previous years, we believe one of the most important potential cumulative effects of the mine may

be on the Bathurst Caribou herd. Other human activities that could affect caribou include construction currently under way for the newly approved Diavik Diamond Mine approximately 30 km southeast of the mine, the extension of the mine proposed by BHP (Sable, Pigeon and Beartooth kimberlite pipes) especially the proposed Sable road and other development projects within the region.

Generally, roads and related activities have the most significant effect on caribou. In 1999, there were some 26 km of roads in the claim block. The Misery Road will be approximately 29 km and the proposed Sable Road would add another 18 km. The potential cumulative effect of these activities is becoming a concern; we would like to know with greater certainty that the cumulative effects on caribou will not be significant.



Cumulative Effects: effects of the mine in combination with the effects of other human activities.

Last year, we recommended that several organizations hold a workshop for the purposes of identifying the key components of a caribou cumulative effects monitoring program. Such a workshop was not held, although a Bathurst Caribou Management Planning Committee is being considered. We believe that a caribou cumulative effects workshop in the up-coming year, hosted by the Government of Northwest Territories in consultation with the Government of Nunavut, would be both useful and timely.

There are also potential aquatic cumulative effects, especially with the construction of the Diavik mine in Lac de Gras and with the potential for the mine expanding to areas where drainage will enter basins other than the Kodiak system. While the impacts from the mine may be modest, it will be quite important to carry out a monitoring program that will identify any potential cumulative effects early and provide the information necessary for managing the effects where necessary. This is not to suggest we believe the cumulative effects will be significant, but rather that we believe long-term planning and precautions should be taken to avoid unnecessary problems in the future. This is especially important in the North where there is great uncertainty concerning what future developments are likely in the region, and hence what cumulative impacts will arise.

The Agency has frequently heard from Kitikmeot Inuit Association representatives that their main concern is with the quality of water in the Coppermine River, a source of drinking water for the community of Kugluktuk. For this reason, great care should be taken to avoid significant adverse aquatic impacts anywhere in the Coppermine drainage. We have concerns with water leaching through waste rock piles into water bodies not only at the present rock pile, but also at the proposed new pipes and from other sources such as the Diavik mine, other mines and the exploration sites (of BHP and others). There are also other means of contaminating water bodies (sewage, dewatering of lakes, etc.). So far, the water monitoring has not detected major problems. Again, we wish to be careful.

Cumulative Effects Recommendation:

16. The Agency recommends that the Government of the Northwest Territories, in consultation with the Government of Nunavut, plans for a workshop for the development and implementation of a cumulative effects monitoring program for the Bathurst caribou herd.

While the impacts from the mine may be modest, it will be quite important to carry out a monitoring program that will identify any potential cumulative effects early and provide the information necessary for managing the effects where necessary.

Area Project Expansion and Amendments



Project Expansion and Amendments

In 1999, BHP applied for an extension to its project, seeking approval to mine three new kimberlite pipes: Beartooth, Pigeon and Sable. The location of these pipes is indicated on the map on page 41. The application is currently under an environmental review by the Mackenzie Valley Environmental Impact Assessment Review Board. The Agency has participated in this review by providing advice to the Board for the guidelines it issued to BHP and by offering to work with BHP in developing the environmental impact assessment document. We have also prepared a compliance report to be included in their environmental assessment document, as requested by the Mackenzie Valley Environmental Impact Review Board (Appendix A of the Environmental Assessment Document of Beartooth, Pigeon and Sable Kimberlite Pipes, April 2000). The conclusions reached by the report are on page 12 of this document. The Agency will review

BHP's environmental assessment document carefully and participate fully in the review of the application.

As noted in the Cumulative Effects section of this report, the extension involves constructing an all-weather road to the Sable pit. The road crosses eskers commonly used by migrating caribou and thus may be more significant than the

existing roads and the Misery road now being constructed. The preliminary design of the Sable road is being carried out in a manner sensitive to the needs of caribou by having its sides low, with sloping shoulders to permit relatively easy crossing by caribou.

Aquatic effects involve waste rock piles in very close proximity to water bodies and therefore, there is a potential for water to be adversely affected. The drainage from the Sable pit will be into the Exeter Lake, a water system not previously affected by the Ekati[™] Mine project.

In addition, the Mackenzie Valley Land and Water Board is conducting a preliminary screening of BHP's application to amend their water licence in order to drain and mine the Fox kimberlite pipe (see Figure 2). Although mining the Fox pipe was considered as a part of the initial Panel review of

The road crosses eskers commonly used by migrating caribou and thus may be more significant than the existing roads and the Misery road now being constructed.

Project Expansion and Amendments

the Project, conditions for dewatering and mining Fox were not included in the water licence since the intention was to develop the pit much later on in the life of the Project. Unlike the original 1996 project description, BHP proposes to dewater Fox Lake in an innovative way. It will drain the lake as originally planned until it is no longer able to meet its water discharge standards. Then instead of using the conventional approach of a water treatment plant to meet standards, BHP proposes to pump the water onto land. This involves the expectation that much of it will evaporate, nutrients in the water will serve as fertiliser to promote plant growth and, by the time the water reaches the watercourse, it will meet the discharge standards. We believe this method shows promise, but have suggested that certain concerns need careful monitoring until the method is more clearly demonstrated to work well. Again, we have advised BHP and the regulator about the outstanding concerns and will participate in the regulatory process for the licence modification.

Proposed Development of Sable, Pigeon and Beartooth Kimberlite Pipes



Independent Environmental Monitoring Agency 41

Financial Statements

March 31, 2000

Management's Report42
Auditors' Report43
Statement of Operations and Fund Balances44
Statement of Financial Position45
Statement of Cash Flows46
Notes to Financial Statements46

Management's Report

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

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

The financial statements have been audited by the independent firm of MacKay & Partners, Chartered Accountants. Their report to the directors of Independent Environment Monitoring Agency, stating the scope of their examination and opinion on the financial statements, follows.

Mancour Messie

Secretary-Treasurer April 18, 2000

Auditors' Report

To the Directors of Independent Environment Monitoring Agency

We have audited the statement of financial position of the Independent Environment Monitoring Agency as at March 3I, 2000 and the statement of operations and changes in fund balances and the statement of cash flows, for the year then ended. These financial statements are the responsibility of the Monitoring Agency's management. Our responsibility is to express an opinion on these financial statements based on our audit.

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

In our opinion, these financial statements present fairly, in all material respects, the financial position of the Monitoring Agency as at March 31, 2000, and the results of its operations and cash flows for the year then ended in accordance with generally accepted accounting principles.

Yellowknife, Northwest Territories April 18, 2000

Mackay & Partners

Chartered Accountants

Statement of Operations and Fund Balances

For the year ended March 31, 2000

			2000	1999
	General Operating Fund	Investment in Capital Assets	Total	
CONTRIBUTION				
BHP Diamonds Inc.	\$493,600	\$ -	\$493,600	\$349,989
Government of Northwest Territories -				
Resources, Wildlife & Economic Developm	13 090	-	-	100,000
Government of the Northwest Territories -	10,909	-	D,909	-
"Training on the Job" program	3,375	-	3,375	-
Contributed Services (Note 2)	11,964		11,964	
	522,928	-	522,928	449,989
EXPENDITURE				
Accounting Fees	7.870	-	7.870	6.497
Advertising	597	_	597	
Amortization	-	2,406	2,406	1,354
Board Support		, -	, -	, -
Per Diem Fees	142,026	-	142,026	186,041
Service Charge	4,140	-	4,140	18,058
Travel, Meals, Accommodation	57,576	-	57,576	65,885
Contributed Services	20,420	-	30,420	20,518
Office Lesse	9401	_	9401	_
Equipment Lease	2,563	-	2,563	-
Equipment	11,134	-	11,134	-
Equipment Lease	2,179	-	2,179	5,126
Insurance	1,250	-	1,250	1,148
Moving	13,989	-	13,989	-
Office Lease	11,548	-	11,548	27,023
Office Management	80,806	-	80,806	119,160
Office Supplies	1,124	-	1,124	3,170
Outside Consultant	9,005	-	9,005	9,882
Postage and Ireignt	1,233	-	1,233	1,129
Training	40,000	-	40,000	30,620
Telephone and Fax	т,017 5.615		T,017	3.080
Travel and Accommodations	700	-	700	J,900 -
Wages and Benefits	50 328	-	50 328	-
hages and benefici	497,799	2.406	500.205	511,797
	25 120	(2.406)	22 722	(61 000)
EALESS CUMIKIBUIIUM (EAPENDITUKES)	23,129	(2,400)	12 944	(01,000)
	7,70 (11,12,4)	3,03 (11,12,4	13,844	(3,032
	(11,1.34)	11,134		
FUND BALANCE, End of the year	\$23,982	\$12,585	\$36,567	\$13,844

Statement of Financial Position

As at March 31, 2000

	2000	1999
ASSETS		
CURRENT		
Cash	\$54,407	\$36,236
Accounts Receivable	3,375	-
Prepaid Expenses		
	57,974	37,015
CAPITAL ASSETS (Note 3)	12,585	3,857
	\$70,559	\$40,872
CURRENT	\$22.00 2	¢27.020
Accounts Payable	\$33,992	\$27,028
NET ASSETS		
Investment in Capital Assets	12,585	3,857
General Operating Fund	23,982	9,987
	36,567	13,844
	#7 2 F6 0	¢ 40 070

Approved:

Mancoir Messien

François Messier, Director

Hederen

Red Pedersen, Director

Statement of Cash Flows

For the year ended March 31, 2000

Notes to the Financial Statements March 31, 2000

	2000	1999
CASH PROVIDED BY (USED IN) OPERATING ACTIVITIES		
Excess contribution (expenditures) Item not affecting cash	\$22,723	\$(61,808)
Amortization	2,406	1,354
Changes in non-cash operating working capital		
Contributions Receivable	(3,375)	-
Prepaid Expenses	587	(312)
Accounts Payable	6,964	2,957
Deferred Revenue		(100,000)
	29,305	(157,809)
INVESTING ACTIVITY		
Purchase of Capital Assets	(11,134)	(803)
Change in Cash Position	18,171	(158,612)
Cash position, beginning of the year	36,236	194,848
Cash position, end of the year	\$54,407	\$36,236

1. Accounting Policies

The Independent Environmental Monitoring Agency" the Agency" is a non-profit organization incorporated under the Societies Act of the Northwest Territories. It is exempt from income tax under Section 149.1(I) of the <u>Income Tax Act</u>

The mission of the Agency is to oversee environmental management of BHP Diamonds Inc.

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

(a) Financial instruments

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

(b) Capital assets

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

(c) Economic dependence

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

(d) Basis of presentation

The Agency follows the fund basis of accounting.

The general operating fund reflects activities with the Agency's day to day operations as specified in the contribution funding arrangements. The investment in capital asset fund reflects activities made available for the aquisition of capital assets.

(e) Revenue recognition

Revenue is recorded in the year specified in the funding agreement with BHP Diamonds Inc. It is the policy of the Agency to take any excess revenue into equity in the current year and if BHP Diamonds Inc. requests reimbursement it will be treated as a reduction of surplus in the year requested.

2. Non-monetary Transactions

In September 1999, the Agency moved to a new location. BHP Diamonds Inc. reimbursed the Agency for \$13,989 of moving expenses. The Agency has recorded this transaction at the fair market value. BHP Diamonds Inc. has directly paid for the office rent and equipment lease for the Agency. The monthly rent is \$1,343 and the equipment lease expense is \$1,282 quarterly. The Agency recognizes the contributed services at the fair market value of the services provided.

3. Capital Assets

				2000	1999
	Rate	Cost	Accumulated Amortization	Net Book Value	Net Book Value
Computer Office Equipment	30% 20%	\$9,700 7,398	\$3,045 1,468	\$6,655 5,930	\$2,183 1,674
		\$17,098	\$4,513	\$12,585	\$3,857

4. Inter Fund Transfer

During the year, funds were transferred from the general operating fund to capital asset fund for the acquisition of capital assets.

	2000	1999
Computer Office Equipment	\$ 6,032 5,102	\$ - 803
	\$ 11,134	\$ 803

5. Uncertainties - Year 2000 Computer Issue

Although January 1, 2000 has passed it is still not possible to conclude that all aspects of the Year 2000 Issue that may affect the entity, including those related to customers, suppliers, or other third parties, have been fully resolved.

Administration

The Agency staff handles correspondence, oversees a communications registry and a resource centre, arranges directors' meetings and community visits, and implements Board directives. The staff facilitates the production, or maintenance, of communication products and activities: annual report, Agency web site, newsletters, and others. Finally, the staff manages the Agency finances, including record management, preparation of financial statements and monthly budgets.

Summary of 1999-2001 Work Plan and Core Budget

The proposed work plan and budget recognizes that a greater effort is required on community interaction and public communication over the next two years; and at the same time, communication with BHP and regulators must continue to improve. It was expected that the workload would decline once the office was established and the EKATI[™] project was well under way this year; however, new project proposals and amendments to existing licences have exerted an extra demand on Agency resources.

The activities of the Agency mandate are as follows:

- a) As part of Article 1 of the *Environmental Agreement*, the Agency continually and regularly reviews BHP's environmental management system, activities of regulatory agencies, and government interactions with BHP. The Agency suggests solutions to problems, and reports them to the company, regulators, or Society Members.
- b) Serving as a public watchdog of the regulatory process and implementing the *Environmental Agreement* requires that the Agency keeps up to date with regulatory agencies, reviews and comments on regulatory approvals BHP seeks, and analyzes environmental reports and data.
- c) Compiling and analyzing environmental data in order to make recommendations on: the environmental effects programs at EKATI™; government compliance reports; environmental plans and programs; and the integration of Traditional Knowledge into environmental plans and programs, among other activities.
- d) Participating in regulatory and legal processes as an intervenor on environmental matters at BHP. The Agency will participate in the regulatory processes for BHP licence amendments and authorizations sought through the Mackenzie Valley Land and Water Board and Mackenzie Valley Environmental Review Board.
- e) Providing an accessible public repository of relevant environmental data, studies, and reports. The Agency is often called to provide information or copies of reports contained within its library, which has just over 400 documents (or individual sets of documents) related to BHP.
- f) Providing information to aboriginal peoples and the public about the Agency's mandate and activities by publishing an annual report, newsletter, web site, as well as meeting aboriginal organizations.
- g) Providing aboriginal people a way to bring their concerns to BHP and the general public about the monitoring and regulation of the project.
- h) Participating in dispute resolutions under the Environmental Agreement. No incidents of dispute resolution have occurred to date.

Core Budget

The following table summarizes the expenditures (rounded to \$1,000s) for the budget categories for the 1999-2000 fiscal year. The 2000-2001 core budget will be increased 2.5% where appropriate due to inflation.

A. Operations	1st Q	2nd Q	3rd Q	4th Q	1999-00	2000-01
1. Rent	6.5	4.3			10.8	
2. Insurance	0.5	0.5	0.5	0.5	2.0	2.5
3. Telephone, fax, internet	1.5	1.5	1.5	1.5	6.0	6.2
4. Rental-office equipment	2.0	1.1			3.1	
5. Office supplies, software	1.5	1.5	1.5	1.5	6.0	6.2
6. Postage, courier, freight	0.5	0.5	0.5	0.5	2.0	2.1
7. Bookkeeping	0.5	0.5	0.5	0.5	2.0	2.1
8. Auditing, accounting	0.0	0.0	0.0	4.5	4.5	4.5
Subtotal					36.4	23.6

B. Board Support	1st Q	2nd Q	3rd Q	4th Q	1999-00	2000-01
1. Travel	16.0	16.0	8.0	8.0	48.0	49.2
2. Accomodation	6.0	6.0	3.0	3.0	18.0	18.5
3. Meals	2.0	2.0	1.0	1.0	6.0	6.2
4. Honoraria (Note 1)	44.1	31.5	44.1	31.5	151.2	151.2
5. Service charges	4.2				4.2	
Subtotal					227.4	225.0

C. Communication / Consultation	1st Q	2nd Q	3rd Q	4th Q	1999-00	2000-01
1. Communication (Note 2)	28.0	1.0	1.0	1.0	31.0	31.8
2. Community consultation (Note	3) 8.0	8.0	8.0	8.0	32.0	32.8
Subtotal					63.0	64.6

D Staffing	1st Q	2nd Q	3rd Q	4th Q	1999-00	2000-01
1. Office Management Contract	42.2	40.0			82.2	
2. Manager			15.3	15.3	30.6	63.0
3. Administrative Assistant			10.0	10.0	20.0	41.0
4. Benefits & Payroll taxes			5.0	5.0	10.0	20.0
5. Outside experts	6.0	6.0	6.0	6.0	24.0	24.6
Subtotal					166.8	148.6
Total					493.6	461.9

1. Note

Based on six meetings/yr (3 days each) and 1.5 days/month/director for office work and participation in workshops. Meetings are planned in April, June (with AGM), August, October, December, and February (with workshops). Honoraria should not be increased by 2.5% inflation.

2. Note

Annual report (\$24k), three newsletters (\$4.5k), brochures (\$1.0k) and web site (\$1.5k)

3. Note

Extra cost for holding meetings in communities, and attendance/ presentations at Aboriginal assemblies. The Agency proposes holding one meeting per annum in the communities of Kugluktuk, Lutsel K'e, Rae Edzo, N'dilo or Dettah.

Submitted on behalf of the Board of Directors

Mancour Messien

Francois Messier, Secretary-Treasurer

Independent Environmental Monitoring Agency

How To Reach Us

Directors

In Person

5004 Franklin Avenue Yellowknife, NT

By Mail

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

By Telephone(867) 669-9141

By Fax(867) 669-9145

By E-Mail

monitor@yk.com

Website

www.monitoringagency.net

Office Hours

Monday to Friday 8:30 a.m. — 12:00 p.m. 1:00 p.m. — 5:00 p.m.

]

Bill Ross

Fikret Berkes

Natural Resources Institute, University of Manitoba, Winnipeg, MB R3T 2N2 Phone......(204) 474-6731 Fax......(204) 261-0038 E-mail berkes@cc.umanitoba.ca

Tony Pearse

C-9 Wilkes Road, Mayne Island, BC VON 2J0 Phone......(250) 539-3015 Fax(250) 539-3025 E-mail tpearse@gulfislands.com Peter McCart Box 78, Spruce View, AB T0M IV0 Phone/Fax.....(403) 227-6774 E-mail mccal02@attglobal.net

François Messier

Secretary-Treasurer

Office Staff

Alexandra Thomson Manager

John Holman

Communications Administrator