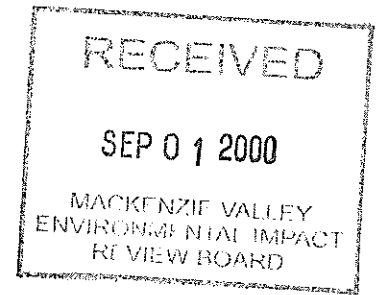




Northwest Territories Resources, Wildlife and Economic Development



September 8, 2000

Mr. Gordon Lennie
Chairman
Mackenzie Valley Environmental Impact Review Board
200 Scotia Centre (5102-50th Avenue)
BOX 938
YELLOWKNIFE NT X1A 2N7

Dear Mr. Lennie:

Government of the Northwest Territories Technical Review of BHP's Environmental Assessment Report for the Sable, Pigeon and Beartooth Kimberlite Pipes, Ekati Mine

Attached is the Government of the Northwest Territories technical review of BHP's environmental assessment report for its proposed three pipe development at the Ekati Mine. The review was conducted by the Departments of Transportation, Education, Culture and Employment, Health and Social Services, Resources, Wildlife and Economic Development and the Northwest Territories (NWT) Bureau of Statistics.

Our review of the assessment report has concentrated on the topics for which the Government of the Northwest Territories has responsibility or shared responsibility with the federal government.

Please do not hesitate to contact me should you have any questions concerning our submission.

Sincerely,

Kathryn Emmett
Director
Policy, Legislation and Communications

Attachment

- c. Mr. Robert McLeod
Deputy Minister
Resources, Wildlife and Economic Development



**TECHNICAL REVIEW OF THE ENVIRONMENTAL ASSESSMENT
REPORT FOR THE SABLE, PIGEON, AND BEARTOOTH PIPES,
EKATI MINE, NWT**

Submission to:

**Mackenzie Valley Environmental Impact Review Board
Yellowknife, NT**

Submitted by:

Government of the Northwest Territories

September 8, 2000

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1 INTRODUCTION

The Government of the Northwest Territories (GNWT) has conducted a technical review of BHP Diamonds Incorporated's (BHP or the "Proponent") Environmental Assessment Report (EAR) for the Sable, Pigeon and Beartooth Kimberlite Pipes, submitted on April 27, 2000 and subsequent responses to Information Requests dated July and August 2000. The review was conducted by the Departments of Finance, Education, Culture and Employment, Health and Social Services, Resources, Wildlife and Economic Development, Transportation and the Northwest Territories (NWT) Bureau of Statistics. The GNWT holds responsibility for the health and welfare of its citizens and shares the responsibility for managing and protecting the environment with the federal government and consequently, has reviewed the environmental assessment from this perspective.

The GNWT participated in the Panel Review of the original Ekati Mine proposal and is a signatory to the Environmental Agreement and Socio-Economic Agreement initiated as follow up measures to the review. The Socio-Economic Agreement establishes responsibilities for both BHP and the GNWT and annual reporting requirements. Additionally, the GNWT participates in the ongoing review of activities required under the Environmental Agreement. The GNWT, therefore, is familiar with the operations and environmental management of the Ekati Mine.

The project under consideration includes the development of three new kimberlite pipes (Sable, Pigeon and Beartooth) within the Ekati Claim Block. These pipes were not included in the original mine plan reviewed during the initial Panel Review. The three new pipes will be mined by the same open pit methods currently used at the Panda pit. In addition to the site-specific infrastructure required to support development at each of the three new pipes, approximately 25 km of new all-weather access roads are proposed. The ore will be delivered to the existing central processing plant on site and processed kimberlite will be disposed of at the existing Long Lake Containment Facility. The Leslie Pipe, included in the original mine plan, was found to be uneconomic and was removed from the mine plan in 1997. The removal of the Leslie Pipe decreased the operating life of the mine from 25 to 15 years. The addition of the Sable, Pigeon and Beartooth Pipes will provide an additional 3 years of reserves at the 18,000 tonne per day (tpd) rate, extending the current mine life from 15 to 18 years. Ongoing exploration activities within the claim block may result in further increases to the mine life.

The EAR was initially reviewed to determine its conformity to the Environmental Assessment Terms of Reference issued by the Mackenzie Valley Environmental Impact Review Board (MVEIRB or "Board"). The GNWT's conformity analysis was submitted to the Board on May 31, 2000. This submission documents the GNWT's technical review of the environmental assessment report and subsequent responses to requests for additional information. As a result of our technical review, the GNWT has concluded that no significant adverse social, economic or environmental impacts are likely to occur with the implementation of effective mitigation measures. However, the GNWT has several concerns with the environmental assessment, which are presented for consideration by the MVEIRB. The GNWT supports the sustainable development of natural resources that contribute to the social and economic well being of northerners. Sustainability implies that development activities are conducted in an environmentally sound and responsible manner so that present uses do not jeopardize potential future uses of the land and the health of our communities. The GNWT recognizes that BHP has provided significant economic benefits to the NWT through its existing operations while attempting to reduce impacts to the northern environment and society. It is expected that BHP's commitment to northern social and economic development and environmental protection will continue unabated during the development of the three new pipes under consideration.

2 SOCIAL, ECONOMIC AND CULTURAL ENVIRONMENT

The GNWT acknowledges the efforts made by the Proponent to mitigate potential negative effects and enhance the positive effects of the current project through commitments established in the Socio-Economic Agreement, the Environmental Agreement, Impact and Benefit Agreements with Aboriginal organizations and through regulatory approvals. The GNWT, however, must ensure that development activities contribute to the well being of territorial residents, taking into full consideration impacts on the social, cultural and economic environment of the NWT. Accordingly our review of the environmental assessment examines the assessment methodology and data used, analysis of data and conclusions, and provides recommendations for consideration by the MVEIRB.

2.1 General Methodological Comments

2.1.1 *Impact Attribute Definitions, Spatial and Temporal Boundaries, Assessment Criteria*

Terms of Reference

The developer was directed to consider, describe and evaluate the environmental impacts of the proposed development for all phases, including post-closure (ToR Lines 259-262).

Spatial boundaries were to be based on the maximum zone of influence of the proposed development for each valued ecosystem component that BHP is monitoring (ToR Lines 253-257).

Residual impacts were to have been described in terms of: magnitude, geographic extent, timing, duration, frequency, irreversibility of impacts, ecological resilience, probability of occurrence and confidence level, distinguishing between ecological parameters and social / cultural parameters (ToR Lines 274-286)

The environmental assessment of impacts associated with the proposed development, shall to the extent possible, build upon the 1995 Environmental Impact Statement and subsequent environmental management and monitoring commitments (ToR Lines 190-193). Lastly, any changes from the context of the 1995 EIA or the Socio-Economic Agreement were to be reported (ToR Lines 483-485).

Approach Used

Table 2.1 summarizes the assessment criteria outlined on page 4-170 Section 4.7.2 – of the EAR.

**Table 2.1
Impact Attribute Definitions for Socio-economic Components**

| Geographic Extent | Duration | Frequency | Reversibility | Probability | Future Capacity (Sustainability) | Increasing Potential Effect |
|---|-------------------------------------|-----------------------------------|---------------|-------------|----------------------------------|-----------------------------|
| Local Study Area Rae-Edzo, Wha Ti, Rae Lakes, Wekweti, Dettah, N'dilo, Lutsel K'e, Kugluktuk, Yellowknife | Short-term < 30 years | Low one-time occurrence | n/a | n/a | n/a | Minor |
| Regional Study Area Other NWT Communities | Medium-term 30 – 60 years | Medium occasionally | n/a | n/a | n/a | Moderate |
| Greater than Regional Area Federal | Long-term > 60 years | High regularly | n/a | n/a | n/a | Major |

Summary of Concerns

Spatial Boundaries

The spatial boundaries identified on page 4-170 of the EAR include the communities of Rae-Edzo, Wha Ti, Gameti (Rae Lakes), Wekweti (Snare Lake), Dettah, N'dilo, Lutsel K'e, Kugluktuk and Yellowknife. The spatial boundaries established for the project during the initial environmental assessment included Hay River in addition to the above communities.

The Proponent has stated that the terms of reference did not require Hay River to be included in the assessments (BHP Information Request response, August 2000). However, the GNWT believes that the inclusion of the Town of Hay River and the Hay River Reserve within the spatial boundaries would have benefited the socio-economic assessment and provide consistency with the 1995 Environmental Impact Statement (EIS). With this exception, spatial boundaries for the socio-economic assessment are generally found to be adequate.

Temporal Boundaries

The original 25-year mine plan reviewed during the initial environmental assessment was reduced to 15 years with the removal of the Leslie Pipe. The proposed addition of the Sable, Pigeon and Beartooth pipes will allow the mine plan to increase from 15 to 18 years of production. While the Terms of Reference for the Assessment defined the scope of development under consideration as the development of the three new pipes it would have been beneficial if temporal boundaries were established to reflect the revised 18-year life of the mine for fiscal and economic information, rather than addressing only the three years accounted for by the three pipe expansion. However, once the decision was made that the development simply represents a three-year expansion, most socio-economic information adequately encompassed predicted impacts over the three-year period.

For some socio-economic components, however, it was felt that longer temporal boundaries should have been recognized in the impact analysis. This is the case for some of the social well-being effects, the effects of which could potentially be felt for three generations. A longer temporal boundary would also have been appropriate in the discussion of economic diversification and sustainability.

General Criteria

The Proponent states on page 4-170 of the EAR that the classification of the magnitude of effects is based on geographic extent, duration, and frequency. However, in some instances, there appears to be some inconsistency in how the Proponent has related the criteria in Table 2.1 to the eventual assessment of the magnitude of effects. For example, the Proponent concludes employment will be a major and positive impact of the development. However, on page 4-170 of the 2000 EAR, the Proponent states that "effects are classified as minor, moderate and major if the effect duration is short, medium, or long term. This suggests that effects are considered major only if they endure over the long term (more than 60 years). If this interpretation of the wording of the EAR is correct, two difficulties arise.

First, the significance of an impact may have little relation to its duration. When contemplating a development of the magnitude of Ekati Mine, a significant alteration in the lifestyle and well being of NWT residents, positive or negative, could certainly occur in less than one generation and may be irreversible. Requiring that an effect endure for more than 60 years to be considered "major" could lead to an underestimation of the magnitude of the effect.

Second, by this method economic impacts at Ekati Mine would likely be considered minor; lasting less than 30 years. Employment is among the most significant impacts of the development¹, it will endure only for the life of the project, 18 years. By the Proponent's definition of what constitutes a major, moderate and minor impact, employment could only be considered minor, as it lasts less than one generation. Clearly the employment and income impacts of the existing Ekati Mine, or the proposed expansion are of greater than minor significance to the NWT.

Similarly, the Proponent concludes that the project will have a moderate positive impact on business opportunities and diversification. A moderate impact is defined as one that lasts between 30 and 60 years². Business opportunities arising from the project are unlikely to last more than 18 years, which would make the impact minor, according to the definitions employed by the Proponent.

Assessment criteria such as frequency, reversibility and probability are generally not covered in the EAR discussion of predicted socio-economic impacts. Only cursory reference is made to the issue of future capacity and sustainability. There appears to be no consistent relationship between the criteria established for that determination and the eventual conclusions in instances where significance was more than minor.

¹ See, for example, pages 4-203 – 4-205, 2000 EAR; Table 4.7-13 — Socio-Economic Effects from Sable, Pigeon and Beartooth Development

² BHP, 2000 EAR, page 4-170.

2.2 Description of Existing Environment

Terms of Reference

The Terms of Reference directed BHP to provide sufficient information on the existing environment, as it pertains to the proposed development, including the existing mining operation, to give a brief but clear picture of the existing environment and its use (ToR Lines 230-232).

Baseline data in existing reports was to have been referenced (ToR Lines 235-236). BHP was to have described the following environmental components (ToR Lines 236-252): human health; economy; employment, education and training; infrastructure; government revenues and cost; and social and cultural resources.

Summary of Concerns

The description of the existing environment presents standard socio-economic indicators for the NWT, First Nation impact communities, Yellowknife, and Kugluktuk. The indicators selected include population demographics, health and well being, education, employment, income, structure of the economy and infrastructure. In assisting BHP with the collation of its baseline data, the GNWT was asked to prepare a much broader set of indicators, which was cited but not used in the report. Although there are some differences between the indicators used in this EAR and those monitored under the Socio-economic Agreement or under existing community monitoring programs, the indicators used provide sufficient detail. The EAR uses the most recent available data drawn from a variety of government sources, including NWT Labour Force Surveys, Census, and Statistics Canada. These data are sufficient to describe the current status of the socio-economic indicators discussed. Existing operations at the mine were described in general terms only.

While the data presented was considered adequate for analysis, several instances where additional data could have been provided were identified. For example, in sections 3.9.2.1 (First Nations communities) and 3.9.3.1 (Yellowknife) of the EAR, there is no mention of languages spoken although use of Aboriginal languages is mentioned in demographic profiles of the NWT (Section 3.9.1.1) and West Kitikmeot (Section 3.9.4.1). A second example is the lack of information on the impacts of the project to date on employment in the NWT, particularly on local study area communities. This has been addressed elsewhere in the technical review. Although the Socio-economic Agreement provides for project-specific data through an attitudinal survey which could provide baseline data, the initial survey has yet to be conducted.

The EAR identifies trends occurring in the existing environment, and suggests explanations for those trends. Reported trends are identified based on professional observation, rather than on quantitative data. In some cases, changes occurring in the existing environment may be influenced by factors not identified in the EAR. For example, the increased student success noted on page 3-186 paragraph 2, could be due to schooling being a productive choice under the Income Support Program. Section 3.9.2.3 of the EAR notes, "declining school enrolment is contrary to overall trends in the NWT and may be attributed to more students attending school outside their home community". It may also be that there was a large increase in students due to grade extensions and that enrolments have now leveled off because that backlog of students has graduated. BHP suggests "the reasons for increasing levels of unemployment may be related to greater employment expectations, the requirement for higher levels of skills, or the availability of employment"³. Increasing unemployment

³ BHP, 2000 EAR, Section 3.9.2.4

levels could be explained by employable or employed people moving to larger centers, or could be related to a lack of childcare.

Finally, there is some inconsistency in the treatment of Kugluktuk and the West Kitikmeot Region. The discussions of population increases and education describe the West Kitikmeot Region, not just Kugluktuk (Sections 3.9.4.1 -- demographics, and 3.9.4.3 – Education), but Kugluktuk is separated out in the discussions of labour force activity (Section 3.9.4.4) and Income (Section 3.9.4.5).

2.3 Assessment Approach & Scope of the Development

Terms of Reference

The proposed development was referred to environmental assessment partly for cumulative impact considerations with the existing BHP Ekati Mine and the proposed Diavik Diamond Mine (ToR Lines 11-13). The environmental assessment of impacts associated with the proposed development, shall to the extent possible, build on the 1995 Environmental Impact Statement (ToR Lines 190-193).

BHP was also asked to describe certain environmental components as they relate to the proposed development, and all changes to the approved Ekati Mine as a result of the proposed development (ToR Lines 236-252). The reporting of development impacts was to have provided readers with a summary and comparative understanding of those impacts (ToR Lines 288-293).

The assessment was to have noted any changes from the context of the 1995 EIS or the BHP Socio-Economic Agreement, including the effects of changes to the pace and scale of the development (ToR Lines 483-485). In Item 5 of its conformity letter to BHP, the MVEIRB also instructed the Proponent to assess the impact of a reduced mine life on the economy.

Summary of Concerns

As a result of the removal of Leslie Pipe from the mine plan, confirmed by the Proponent in a letter of July 4 to the MVEIRB, the expected mine life of Ekati Mine was shortened from 25 to 15 years. The discovery of Beartooth, Sable, and Pigeon Pipes allowed the mine life to be extended for three years, providing a new expected mine life of 18 years. This represents a change to the scale of the development, and its consequences should have been reported.

In its EAR, the Proponent's methodological approach to the three pipe development is that the economic impacts are simply those associated with another three years of production at the 18,000 tpd production level. The EAR presents employment, GDP impacts, business opportunities, and so on, as the sum of three years of project expenditures at the 18,000 tpd production level. The approach that the three pipe development is simply an incremental expansion allowing three more years of production does not provide reviewers with a clear picture of how the economic impacts of an eighteen year mine life differ from the economic impacts of a 25 year mine life, which was the premise for the predictions made in the 1995 EIS.

Page 4-169 of the EAR states,

The addition of the Sable, Pigeon and Beartooth pipes to the Ekati Mine mine plan will not change the pace or scale of the current or planned operations at the mine. ...In general, the analysis and predictions outlined in the EIS are still valid and form a significant part of the current analysis.

Although the GNWT recognizes figures 2.2-14 and 2.2-15 provide information on ore and waste movement in tonnes per year, the EAR does not provide a comprehensive picture of the socio-economic impact of the revised mine life. Further, there are some differences between the 1995 EIS and the EAR project descriptions that introduce some uncertainty regarding the scope and pace of planned operations. For example, although the 1995 assessment based a simplified analysis on two representative production levels, the 1995 EIS described Project production levels as ranging from 6.5 tpd to 18,000 tpd⁴. The Project Description indicates the 18,000 tpd level would only be reached in year-21, required to maintain economic viability when mining the Leslie pipe⁵. Another example relating to differences in scope and pace, is the difference in planned mining schedule for specific pipes.

Lastly, although 'Project' under the Socio-economic Agreement has a broader meaning than the integrated project currently under review, the variance between predicted and reported person years is roughly 50%. In addition, purchase levels reported in the 1999 Socio-economic Report are almost five times higher than EIS predictions. The GNWT does not feel the explanation given for variances in employment and purchasing levels reduce the uncertainty associated with these issues. The Proponent was asked to discuss the uncertainty of predictions regarding its mining operations and the range of values that may occur. Reviewers also provided a summary chart format they felt would afford them a clear understanding of the implications of the project under review. At this point in time, that summary information has not yet been provided.

Sufficient data was not presented to allow a full comparison between the life of mine impacts predicted in 1995, and the expected life of mine impacts including the three new pipes. As a result of the concerns noted above, the GNWT believes that the differences in the new mine plan can not be adequately discerned from the original mine plan discussed in the 1995 EIS. Neither from the EAR, nor from the Conformity Response can one glean a comprehensive comparison between the socio-economic impacts that were predicted in 1995, and those that can now be expected from the revised Ekati Mine project.

Recommendation

There is uncertainty with regard to differences and similarities between the economic impact predictions in the 1995 and 2000 assessment reports. It is therefore recommended that the Proponent revise its economic predictions based on a base 15 year mine plan (with Leslie pipe removed) and added to this the incremental impacts associated with the proposed new three pipe development, rather than analysis based on the 25 year mine plan originally considered in the EIS.

⁴ BHP, 1995 EIS; Volume I – Project Description, page 2-37 – 2.4.2, Mine Production Schedule.

⁵ Ibid, page 2.19.

2.4 Mitigation Measures

Terms of Reference

BHP shall describe each impact identified and the proposed mitigation measure(s) for all phases of the proposed development (i.e., construction, operation, care and maintenance, closure and post-closure) (ToR Lines 270-272).

Summary of Concerns

The Proponent identifies the existence of mitigation in the form of preferential hiring and procurement policies. Impacts, identified mitigation, and expected residual impacts are summarized on pages 4-203 to 4-205 of the EAR. BHP stated that business mitigation efforts are reported to Government, public, and IBA partners annually and at liaison meetings. Page 2-13 of the EAR also notes that under the Socio-economic Agreement, each party is responsible for preparing an annual report that monitors its progress in meeting its respective responsibilities as set out in the Agreement.

Both parties to the Agreement have committed to undertake a series of mitigative efforts. However, only three written reports are required under the Agreement, which then become public documents. These reports are:

1. a BHP report comparing actual employment against targets;
2. a BHP report comparing actual procurement against targets; and
3. a GNWT report monitoring the state of community health and well being.

While there is no mechanism in place requiring either party to report on its mitigation efforts, specific mitigation efforts are committed to in the Socio-economic Agreement.

For the most part, mitigation measures are clear, particularly since the Socio-economic Agreement attempted to thoroughly capture social, business and employment commitments made in the 1995 EIS and its supplementary documents. There are a few specific cases where GNWT technical reviewers concluded that mitigation measures in place are insufficient or unclear. Those cases are outlined under the Discussion of Specific Environmental Components.

2.5 Wage Economy

2.5.1 Wage Economy – Direct Employment

Terms of Reference

The Proponent was asked to assess the impact of the proposed development on the economy, giving consideration to:

- wage and salary employment by skills category over the life of the proposed development, including estimates of local and Aboriginal participation;
- barriers to employment ; and
- availability and use of skilled workers in the NWT to meet job requirements (ToR Lines 482-502).

BHP was also asked to describe its corporate policies designed to encourage contractors to hire northerners (ToR Lines 649-659).

Summary of Concerns

In both the EIS and in the EAR, employment is identified as among the most significant impacts of the development⁶. BHP expects this will be particularly true in the Aboriginal communities, which experience much higher unemployment than the NWT as a whole, and where a small number of employees could have a significant impact on community labour income. In the small local communities, economic benefits will be almost exclusively restricted to employment, since opportunities for business development with the project are limited; BHP's Annual Report on Local Purchases for 1999 shows that only 0.1% of all northern purchases were made outside of Hay River and Yellowknife. Geographic distribution of employment is therefore a central concern in the analysis of effects.

In the EIS, the Proponent made detailed predictions of community employment. Table 4.3-28 of the EIS report presented community level labour force information from the 1994 NWT Bureau of Statistics Labour Force Survey (LFS), along with several derived measures: 'interest factor', 'success rate' and 'improve factor'. The measures were applied to the LFS information to estimate potential hires from communities within the spatial boundary. A very general explanation relating to the three measures: interest factor, success rate and improve factor was outlined in the EIS⁷. As a result of these calculations, the Proponent predicted a decline in unemployment in small local communities from 40% to 30% with 82 people from those communities hired by the Project in the first year of operations⁸.

The Proponent states that employment predictions from the 18,000 tpd production level identified in the EIS will continue to apply for the proposed three pipe expansion. The Proponent states the three-pipe development will sustain 633 annual person-years of employment of NWT residents for three years. Of these predicted person years of employment, half are expected to be filled by Aboriginal people⁹. The Proponent points to achievement of the northern and Aboriginal employment targets established in the Socio-economic Agreement as evidence that it has been successful in overcoming to some extent the barriers to employment identified in the EIS¹⁰. These statements form the foundation for the conclusions of the 2000 EAR that employment will continue to be a major positive impact of the project.

The number of positions noted in the EAR are predicted NWT-resident positions and do not capture Nunavut employment impacts or other employment impacts outside the NWT. The GNWT would have been interested in reviewing a comparison between expected NWT employment and that predicted to accrue to extra-territorial workers.

The most recent available GNWT data indicate that between the start of Ekati Mine construction in 1996 and 1999, the unemployment rate in small local communities increased from 29.2 per cent to 39.7 per cent¹¹. The possible reasons for this increase could have been included in the discussion included in the EAR.

⁶ BHP, 2000 EAR, pp. 4-172 – 4-173.

⁷ BHP, 1995 EIS, pages 4.88 to 4.92.

⁸ BHP, 1995 EIS, pages 4.132 and 4.91.

⁹ BHP, 2000 EAR, page 4-173.

¹⁰ BHP, 2000 EAR, page 4-189.

¹¹ GNWT Community Health and Wellness Report, 1999; pages .20-21.

Both the EIS and the EAR predict that labour income in small local communities would increase significantly as a result of the development¹². An analysis of what has occurred to date would be useful to evaluate these predictions. This analysis could provide empirical data to confirm or modify the 1995 predictions and provide an empirical basis for predicting the anticipated impact in these communities of the three new pipes. Information available to the GNWT reviewers did not address the question of what impact the development has had and is expected to have in the small local communities. In addition, as the population of Aboriginal people is increasing relative to the non-Aboriginal population, it may be reasonable to project a higher rate of Aboriginal employment in the future.

An Information Request issued August 3, 2000, requested BHP to update Table 4.3-28 of the EIS, to reflect the predicted employment associated with the three new pipes. BHP was also requested to identify if there had been any change to the interest factor, success rate, and improve factor. The Proponent replied that for the first year of operations the labour force is comparable and in many cases higher than identified in Table 4.3-28 of the 1995 EIS, and therefore those employment predictions remain as the basis of predicted distribution of potential hires in northern communities. However, using previous estimates may overestimate the number of potential hires in communities. It may also be advisable to recalculate the three measures – interest factor, success rate and improve factor – to reflect the recent entry of other employers (e.g., Diavik, Oil & Gas Industry). The community level information from the 1994 and 1999 Labour Force Surveys on the unemployed, the discouraged unemployed, willingness to take rotational employment and education levels would have assisted with estimating the number of potential hires.

Mitigation

The EAR makes several references to preferential hiring and purchasing policies. Mitigation described in the EAR appears consistent with mitigation measures proposed in the EIS.

BHP was requested to describe the hiring procedures it follows after IBA commitments have been fulfilled. Specifically, the Proponent was asked to provide a discussion of the following:

- (a) steps taken to notify northern residents of project employment opportunities, including a discussion of:
 - length of advance notice
 - sequence of events and timing
 - publications, media, venues used whether these mitigation efforts are reported; if so, where and how often;
- (b) procedures and criteria used to encourage northern hire, particularly with regard to standard clauses in tender documents and contracts;
- (c) frequency of occurrence; for example, whether all above steps and procedures are followed in the case of every direct hire; and
- (d) mitigation commitments during the life of the three pipes under review.

BHP indicated that all of its contracts contain clauses to encourage Aboriginal and northern hire as per its requirements under the Socio-economic Agreement. BHP also provided contractual wording used to ensure its employment commitments extend to contractors and sub-contractors. This wording is acceptable and should be used in all contracts. Unfortunately items such as the timing and frequency of job advertisements in northern newspapers, were not addressed in the company's

¹² BHP, 2000 EAR, page 4-174.

response. An important mitigative measure resulting from the initial environmental assessment was a commitment from BHP to provide employees free transportation to the Mine from the following communities: Rae-Edzo, Wha Ti, Rae Lakes, Wekweti, Dettah, N'dilo, Lutsel K'e, Yellowknife, Hay River, Fort Resolution, Fort Smith, Deline, Inuvik, Norman Wells, Fort Simpson, Kugluktuk and Cambridge Bay¹³. The effectiveness of this mitigation measure would be reduced if job opportunities were not advertised in these northern communities.

Uncertainty

The most recent available data from the small local communities included in the analysis indicate that the predicted decline in unemployment rates has thus far failed to materialize, and in fact, unemployment rates have increased.¹⁴ Although it is too early to make firm conclusions, this suggests some uncertainty associated with the analysis of employment contained in the EIS.

The 1995 EIS predicted 9,000 tpd employment levels of 664 jobs and 18,000 tpd employment levels of 932 jobs¹⁵. The BHP Annual Report on Northern and Aboriginal Employment, 1999 Operational Phase represents the first opportunity to report one full year's operations. Page 5 of that report indicates 897.7 person-years were used in the first year of operation, representing a total of 1,492 people moving on- and off-site. There is almost a 50% variance between predicted and actual 1999 employment levels which should be discussed in the context of employment predictions related to the development of the three new pipes.

The absence of a detailed methodology behind the derivation of the three measures— an interest factor, success rate and improve factor — obviates GNWT ability to comment on appropriateness and soundness of the measures.

The analysis of employment impacts to small local communities would have benefited by the provision of information on actual 1999 employment by community of residence in the format used in Table 4.3-28 of the EIS. Had this information been available it would have offered some substantiation of the EIS predictions.

The Proponent concludes that employment will be a major positive impact of the development. While the GNWT acknowledges that employment from the proposed development is a significant positive impact, according to the criteria established on page 4-170 of the EAR the duration of employment benefit does not meet the criteria to be considered major.

Monitoring

The EIS for the Ekati Mine Project contained both predictions and commitments related to employment.

¹³ BHP-GNWT Socio-economic Agreement, Article 4.5.7

¹⁴ GNWT Community Health and Wellness Report, 1999; pp.20-21.

¹⁵ BHP, 1995 EIS, Volume IV page 4.200; Table 4.14-6 — Northern Employment and Wages During Mining Operations

Tables 4.3-2, 4.3-28, 4.3-45, and 4.3-56 of the EIS presented information using certain variables relating to in-migration and northern employment. The EIS described BHP commitments as follows:

The Operator... is committed to giving employment preference, dependent on the applicant's skill level, to Aboriginal people from the Northwest Territories, then to non-Aboriginal Northwest Territories residents, and then to other Canadians¹⁶.

Full-time employment during operations is expected to result in some in-migration. If existing NWT residents fill 303 of the 638 NWT based positions, 335 positions will have to be filled by people from outside the Northwest Territories. Of this number a total of 95 could choose to move to the Northwest Territories once they are employed by the project ...¹⁷

The EIS also predicted the magnitude of intra-territorial migration between NWT communities:

Since there is a strong attachment to family and community in the NWT, it is not likely that many people would trade their home community for Yellowknife or Hay River, but possibly a maximum of 10 people could move to Yellowknife and about five to Hay River.¹⁸

The Proponent was asked to describe the databases and data fields that it and its contractors and sub-contractors use to track the above predictions and commitments from the EIS. BHP was also asked to describe verification procedures and the extent of any information gaps. Lastly, BHP was asked to confirm whether these collection and verification procedures will continue to be followed in the future.

BHP replied that its database is in Excel spreadsheet format. BHP tracks northern residency, Aboriginal and non-Aboriginal, job category by skill level, gender participation by type of role at Ekati Mine. Contractors and consultants are required on a monthly basis to provide this same information to BHP Human Resources, which then verifies and enters the data. Procedures for verification were not described. BHP stated it then compiles and reports the data monthly to its senior management. By monitoring these figures monthly, it is able to hold its contractors accountable.

BHP described a verification process for its own employees. New hires to BHP are required to sign a form that identifies their place of residency and cultural ethnic background. Employees that move are responsible for notifying BHP of this.

BHP was also asked to provide 1999 employment data by community, so that there could be an empirical basis to support predictions made regarding community employment benefits and the geographic extent of impacts. Provision of more detailed information with respect to persons employed, directly and indirectly, in each of the local communities would have enabled a better evaluation of predictions in the EIS and more confidence in predictions in the current EAR. This information would also assist the GNWT with policy and program interventions in partnership with those communities, should this data reveal that predicted employment benefits have not materialized to date. The GNWT understands that the Board has requested this information in confidence by BHP. While the GNWT would be interested in obtaining this information, it recognizes that the Proponent

¹⁶ 1995 EIS, Volume I – Project Description, page 2.194

¹⁷ 1995 EIS, Volume IV, page 4.93

¹⁸ 1995 EIS, Volume IV page 4.120, section 4.4.3.4 — NWT Resident Moves

does not want to release the information publicly for a number of reasons. The Board has requested this data from BHP in confidence and should use it to evaluate the accuracy of predictions in the EIS.

Recommendation

Consistent with the Proponent's commitment to "aggressive recruitment and advertising for job opportunities at Ekati Mine in Aboriginal and northern communities..."¹⁹, it is recommended the Proponent be required to advertise all job opportunities in all NWT newspapers once IBA notification procedures have been fulfilled. It is also recommended that to the fullest extent possible, job ads be placed in NWT newspapers before being placed in southern newspapers.

Section 4.7.8 of the 2000 EAR states, "It is anticipated that as the mine life progresses, more Aboriginal and northern residents will be hired and promoted into higher skill levels. IBA hiring, recruitment, training and advancement provisions will also improve Aboriginal participation at all skill levels"²⁰. It is also recommended that BHP set targets for northern and Aboriginal participants in higher skill level employment to demonstrate this commitment.

2.5.2 Wage Economy — Direct Mine Purchases

Terms of Reference

The Proponent was asked to assess the impact of the proposed development on the economy, giving consideration to direct, indirect and induced economic effects through opportunities for local, regional and territorial businesses to supply goods and services (ToR Lines 482-502).

BHP was also asked to describe its corporate policies on contracting and procurement, including those which promote local sourcing, participation of local businesses and opportunities for northern businesses (ToR Lines 649-659).

Summary of Concerns

In 1995, the Proponent presented a thorough assessment of the potential of northern businesses to meet its procurement needs. This was based on a listing of the requirements for goods and services at the mine, compared with an assessment of the capabilities of the northern business community. This resulted in predictions that at the 9,000 t/d level, annual northern purchases would be \$56 million, increasing to \$78 million at the 18,000 t/d level²¹.

These predictions were carried forward to commitments under the Socio-economic Agreement that northern purchases would total 70% of total annual purchases at Ekati Mine. BHP Annual Reports indicate these commitments are being surpassed.

The methods described by the Proponent in the EIS are proper for establishing an estimate of northern business opportunities. These flow from the value of project-related purchases made in the north. However, the basis for the Proponent's predictions that northern expenditures will be in the

¹⁹ 1999 BHP Environmental Assessment Report, page 4-185

²⁰ BHP, 2000 EAR, page 4-187.

²¹ BHP, 1995 EIS; Table 4.3-48, page 4-107.

order of \$78.3 million²² is questionable. The absolute level of northern purchases for 1999 is reported to be more than \$280 million. This far exceeds predicted northern purchases of \$78 million at the 18,000 t/d level. Total 1999 purchases were \$356 million. Although there are some inconsistencies in the EIS data, 1999 purchases clearly exceeded the 1995 prediction of \$86 million at the 9,000 tpd production level²³. Given that expenditures at the 9,000 t/d level have been almost five times higher than those predicted in 1995, provision of some rationale for continuing to use the predictions set out in 1995 for the 18,000 t/d level would be reasonable.

Mitigation

The Environmental Assessment Report makes several references to preferential purchasing policies. The following are cited as examples:

“BHP is committed to northern-preference ... purchasing policies ...”²⁴

“... BHP has instituted preferential purchasing opportunities ... Among other services, air charter, catering and janitorial services, are tendered in unbundled contracts...”²⁵

BHP stated in the 1995 EIS, Section 4.5.8— Mitigation / Enhancement, that “... to take advantage of project purchase opportunities, the business community requires ... advance notice of requirements ... The NWT Diamonds Project could provide this ... via the various Chambers of Commerce across the NWT and advertisements in local newspapers.” BHP noted the business community would also require “ ... breaking contracts into smaller components...” to take advantage of opportunities²⁶.

BHP was asked to describe the procedures followed after IBA notification commitments have been fulfilled. Specifically, the Proponent was asked to provide a discussion of the following:

- (a) steps taken to notify northern businesses of project purchase opportunities, including a discussion of:
 - length of advance notice
 - sequence of events and timing
 - publications, media, venues used
- (b) procedures and criteria used to encourage northern business sub-contracting, particularly with regard to standard clauses in tender documents and contracts;
- (c) frequency of occurrence; for example, are all of the above steps and procedures followed in the case of every purchase;
- (d) mitigation commitments during the life of the three pipes under review.

BHP replied that its commitments are for the life of the mine, which includes the development and subsequent mining of the Sable, Pigeon and Beartooth kimberlite pipes. BHP confirmed that additional pipes in the mine plan would not change its commitments, policies or existing agreements.

²² 1995 BHP EIS, Volume IV page 4.107; Table 4.3-48 — NWT Diamonds Project Purchase of Goods & Services – Year 2007.

²³ 1995 BHP EIS, Volume IV pages 4.205-4.206, Table 4.14-9 — Mining Operating Costs by Region of Spending (\$000).

²⁴ 2000 BHP Environmental Assessment Report, page 4-172.

²⁵ 2000 BHP Environmental Assessment Report, page 4-179

²⁶ Quotes are from page 4.134, Section 4.5.8 -- Mitigation / Enhancement, Volume IV – Impacts and Mitigation, 1995 BHP EIS.

BHP noted that competitive bidding is initiated for products or services that are available in the north and longer term contracts may be awarded. Where goods or services are not available in the north, BHP encourages businesses in the south to form partnerships, utilize existing established businesses as distributors or to set up their company as a branch in the NWT.

The Proponent states that IBA contacts and northern businesses are verbally informed, and where practical, tender documents are sent. Through requests from businesses, general meetings and verbal information flow, BHP adds new businesses to its database, which enables those businesses to participate in future opportunities. Contracts are unbundled where possible, to enable local businesses to compete.

Uncertainty

As noted above, the predictions made by the Proponent in 1995 regarding the level of northern and total purchases have been dramatically exceeded. In light of this fact, there is some uncertainty surrounding its prediction that future purchases can be expected to be in the range of \$78 million. The GNWT would be interested in a discussion of the observed variance in northern purchases, and a rationale for continuing to use 1995 estimates to predict future values, in light of that variance.

Nevertheless, this variance does not necessarily alter the overall conclusions regarding expected effects. The Proponent concludes the development will have a moderate positive impact on business opportunities. Based on the reported success of northern businesses in supplying the mine's requirements, this is a reasonable conclusion. It is reasonable to expect that the NWT business community will continue to be able to satisfy at least 70% of the mine's goods and services at the 18,000 t/d level, if it has already exceeded those amounts and no changes to the structure of the goods and services required by the mine are anticipated.

However, if the magnitude of expenditures is dramatically underestimated, the actual effect could be raised to 'major'. Conversely, if predicted impacts are accurate, the northern business community will experience a marked reduction in demand, which should be predicted in the EAR.

Monitoring

The Proponent has been reporting the value of purchases by community and type of purchase. Monitoring of this activity is considered to be satisfactory.

Recommendation

It is recommended the Proponent document the reasons for the difference between its EIS predictions and 1999 reported volume of goods and services supplied by northern businesses and review expenditure estimates to reflect the higher levels that could be anticipated in the future.

2.5.3 Wage Economy — Indirect and Induced Economic Effects

Terms of Reference

The Proponent was asked to assess the impact of the proposed development on the economy, having regard to direct, indirect and induced impacts on income and employment. Opportunities for local, regional and territorial businesses to supply goods and services both directly to the proposed development and to meet the demand created by the expenditure of contractors and new employees were also to be considered (ToR lines 482-492).

Summary of Concerns

The Proponent's response to an Information Request of June 21, 2000 provided a brief and general description of the processes underlying most input/output (IO) models. While more current models (including the IO models of Statistics Canada, the NWT Bureau of Statistics and several other provinces) have updated and improved their structures - based on the 1997 historical revision of the input output accounts - models based on the previous structure remain adequate.

While the IO model represents the engine in the production of economic impact estimates, it is the data - embodied in the form of IO tables - that represents the essential fuel needed to produce estimates. The IO tables comprised the following:

- output table
- input table
- final demand table
- margin tables
- tax tables
- employment vector

The IO models used by the NWT Bureau of Statistics and other provincial and territorial statistical agencies rely on IO tables and margin and tax tables developed and provided by Statistics Canada. Statistics Canada develops these resources by consolidating information from hundreds of data sources including surveys and administrative records. The final product - the IO tables and the margin and tax tables - contain a high degree of confidential information, and are only made available to provincial/territorial statistical agencies through strict data sharing agreements.

While the data sources and the methodological foundation of the IO tables of provincial/territorial statistical agencies are well documented, this is not the case with privately developed IO tables. For the GNWT to fully assess the economic impacts produced by the IO model used in the EAR, it would require a detailed description of the methodology used to develop the IO tables. This would include the:

- 1996 control totals obtained from Statistics Canada
- basis for allocation of the control totals to the detailed structures
- methodology used to narrow the scope of the IO tables to the spatial boundary
- sources and methods used in updating information from the IO tables most recently released by Statistics Canada.

The Proponent's response to the Information Request provides an adequate representation of the limitations associated with input output modeling.

Uncertainty

An input output model is a complex and detailed accounting model that represents a point-in-time inter-industrial structure of an economy - a structure that can be considered stable in the short and medium term. While IO model simulations results are cost-effective to produce and unambiguous to interpret, there are a number of *caveats* that must be considered, including:

- there are no limits on input supply and therefore no bottleneck can occur in a model
- relative prices are not considered in the model, therefore there is no economic behavior responding to scarce resources
- IO models make no consideration of the ability of an economy to respond to increases in production over short periods of time
- IO models do not capture technological spin-offs or negative externalities

The Proponent is correct when stating that "Due to the nature of input-output models it is not possible to assign with any certainty the degree of reliability". However, it should be noted that the underlying data sources of the IO tables have a significant impact on the reliability, and degree of certainty, of resulting economic impacts.

2.5.4 Wage Economy — Inflation & Cost of Living

Terms of Reference

The Proponent was asked to assess the impact of the proposed development on the economy, giving consideration to inflation and cost of living impacts (ToR Lines 482-502).

Summary of Concerns

The Proponent states in the EIS that it was unable to predict the direction and magnitude of inflationary impacts with certainty. The development could result in higher costs due to in-migration and the presence of a large number of well-paid workers, or could lower prices through a general expansion of market volume²⁷.

The Proponent examined trends in inflation over the last year, observing that inflation in Yellowknife, as measured by the Consumer Price Index (CPI), has been lower than both the national average and for the City of Edmonton. BHP concludes there is no evidence to suggest that the proposed expansion at Ekati Mine would lead to inflation in Yellowknife or the NWT.

The assessment is limited by the fact that it data was available for Yellowknife only and not for the other impact communities. Therefore, it would be reasonable to for the Proponent to confine its conclusion to Yellowknife only. Further, although the EIS stated that conclusions could not be made with regard to cost of living impacts due to both cost pull and wage push inflation, the evidence offered subsequently in the EAR shows that there has been no cost pull inflation. A discussion of the potential for the competition for skilled labour to drive up wages, which could lead to an inflationary effect would benefit the analysis of potential effects on inflation and the cost of living.

Based on the information available, the Proponent is reasonable to conclude that no inflationary effect is expected as a result of the three-pipe development. None has occurred to date, and if the three

²⁷ BHP, 2000 EAR, page 4-192.

pipe expansion will not add to demand for workers or goods and services, future project induced inflation is unlikely.

Uncertainty

Inflationary data is only available for Yellowknife, not all impacted communities. Data for Yellowknife may not be representative of data for all impacted communities, therefore the limitations of available data present a level of uncertainty in the reported conclusion.

2.6 Cultural Environment — Traditional / Subsistence Economy and Activities

Terms of Reference

The Proponent was asked to assess impacts of the proposed development on the use of land, water and renewable resources, including impacts on hunting and trapping (ToR Lines 470-474, 477).

The MVEIRB also directed BHP to consider the following when examining the economic impact of the proposed development:

- activities such as harvesting,
- impacts on the subsistence economy, and
- impacts to hunters and trappers (ToR Lines 482-502).

Summary of Concerns

Numerous statements are made in the EAR regarding the effect of the development on the traditional/subsistence economy and activities. These statements are supported only by anecdotal evidence and indirect sources in the EAR.

Pages 4-192, 196, 203, 219 of the EAR include statements predicting that jobs, income and rotational work schedules for Aboriginal employees at Ekati Mine will maintain, support and/or enhance the traditional/subsistence economy, reinforce traditional connections to the land, or have negligible residual effects on the traditional/subsistence economy. These are summarized with the following statements: "The [1995] EIS prediction of negligible residual effects on the traditional economy from employment and income will remain the same. Likewise, the potential residual effects ... on harvesting (sustenance hunting) ...resulting from the ... development are expected to remain negligible, as predicted in the EIS."²⁸

With respect to residual effects the EAR summarizes them as: "Opportunities will continue for Aboriginal [people] ... to participate in the mixed economy. Work rotations allow hunting, trapping and fishing ... while [Ekati Mine employment] income generates new purchases of recreational and hunting equipment. ...EIS predictions on potential residual effects of ... the development on the traditional economy [and] harvesting ... will remain negligible."²⁹

²⁸ Page 4-192.

²⁹ Page 4-219.

Page 3-203 of the EAR states that "As described in the EIS [1995], the economy of these [Aboriginal] communities is mixed. ... Most families pursue hunting and fishing activities which are important to offset the high cost of living in these communities."

Referring back to the EIS, page 4.1 of Volume 2 states "The territorial economy can be described as two different and not always compatible economies, a traditional economy based on subsistence activities, and a more modern economy based on resource extraction and government." Page 4.8 of Volume 2 states "The two economies co-exist with limited linkages;" this statement is based on one reference (Stabler 1989)³⁰.

Stabler has an arguably polarized view on the value of traditional/subsistence activities and the extent of linkages between the two economies. One can easily find other research to suggest the links were strong³¹. Since the EIS, more recent work indicates the traditional/subsistence economy remains healthy³², which implies the links also remain strong. In fact, the statement quoted above, from page 3-203 of the EAR, on the importance of hunting and fishing to most families to offset high costs, implies strong links between the two economies since traditional/subsistence harvesting activities are not undertaken without access to expensive equipment like snowmobiles, boats and firearms. With respect to the affected Dogrib communities, page 4.63 of Volume 2 of the 1995 EIS states that, "many residents ... still hunt, fish and trap. Again, the statistics are not very reliable for a number of reasons. However, some material is available, and it leads to the conclusion that more fishing and hunting is actually taking place than is recorded."

Unpublished research by RWED compares the replacement food value of caribou by community to total Aboriginal personal incomes by community for the year 1990/91. For the affected NWT Aboriginal communities, the replacement food value of caribou is estimated at 30% or more of total personal incomes. If other species also harvested for food were included, these percentages would increase.

During the 1994 and 1999 Labour Force Surveys, the NWT Bureau of Statistics surveyed NWT households on the extent of country food consumption in 1993 and 1998. Results indicated that half or more of the food consumed in 27% (1993) and 30% (1998) of households was country food. A further 29% (1993) and 47% (1998) of NWT households indicated that some but less than half of the food consumed in the household was country food.

Most of the work that is referenced above to indicate the continuing importance of traditional/subsistence activities has been done since the original EIS. As noted on page 2-1 of the EAR, the regulatory environment has changed since the EIS with the enactment of the *MVRMA* and its "increased emphasis on social, economic and cultural factors in the assessment process." In a December 1995 response to an EARP request for more information on the significance of the land-

³⁰ Stabler, J.C. 1989. Dualism and development in the NWT. *Economic Development and Cultural Change* 37:805-839.

³¹ Berger, T. 1977. Northern frontier, northern homeland: the report of the Mackenzie Valley Pipeline Inquiry. Supply and Services Canada, Ottawa.

Rushforth, Scott. 1977. Country Food. Pages 32-46 in Mel Watkins (ed.). *The Dene Nation: the colony within*. University of Toronto Press, Toronto. 189pp.

³² Beckley, T.M. & B.H. Hirsch. 1997. Subsistence and non-industrial forest use in the lower Liard Valley. *Nat. Resour. Can., Can. For. Serv., North. For. Cent.* Edmonton, Alberta. Inf. Rep. NOR-X-352. 42p.

North Slave Metis Alliance. 1999. Can't live without work. North Slave Metis Alliance environmental, social, economic and cultural concerns: a companion study report to the comprehensive study report on the Diavik Diamonds Project. 300pp.

Parlee, Brenda. 1998. Annual report: community-based monitoring. Traditional knowledge study on community health: community-based monitoring (cycle one). Submitted by Lutsel K'e Dene First Nation to the West Kitikmeot Slave Study Society. 56pp + appendices.

based economy, BHP rejected the economic valuation of country food³³ to Aboriginal people and stressed its cultural importance.³⁴ However, neither this nor other references to the economic or cultural importance of country food is included or referred to in the EAR.

Page 4-191 of the EAR includes an anecdotal statement taken from an article in the *Native Journal* (appendix E), and is the only reference presented for predicting that jobs, income and rotational work schedules for Aboriginal employees at Ekati Mine will have a positive effect on the traditional/subsistence economy.

Mr. Charlo, the subject of the *Native Journal* article³⁵, mentions that adjusting to the rotational work was difficult, because of the time spent away from home. But he was able to adjust and now spends time with his family and pursues traditional/subsistence activity during his two weeks off. While Mr. Charlo has been successful in overcoming the difficulty of the rotational work schedule, is this common among BHP's Aboriginal employees? Perhaps they will curtail their traditional/subsistence activities so that during their 2 weeks off, they spend their time with their families in the community, since during the school year children are expected to be in school most days. This may limit the time that a mine worker can be with family and pursue traditional/subsistence activities. It is not known if any former or current employees are not successful in their employment with Ekati Mine because of a conflict between spending time with family and pursuing traditional/subsistence activity during their two weeks off.

The Proponent's response³⁶ to a request for further information on the prediction of Ekati Mine employment supporting the traditional/subsistence economy addressed the impact of the Ekati Mine work rotation schedule on traditional/subsistence activities. It did not address the impact of income on those activities. While the response referenced interviews with Aboriginal employees at Lupin mine to support the schedule, it also referenced Appendix IV-C5 of the EIS, which is based on non-Aboriginal employees' views of rotation schedules. The degree to which such findings can be transferred to Aboriginal mine employees is not well known.

While the Ekati Mine work rotation schedule gives employees the option to maintain their employment at Ekati Mine and pursue traditional/subsistence activities in their time off, the extent to which this actually occurs is not known.

Uncertainty

The lack of direct information on the effects of employment at Ekati Mine on the traditional/subsistence economy, along with the absence of monitoring, makes it difficult to draw conclusions regarding the impact on the traditional/subsistence economy. A sample of one anecdotal reference (taken from the article in *Native Journal*) is included in the EAR, however, empirical data is not available from which to draw conclusions.

³³ BHP. 1995. NWT Diamonds Project Environmental Impact Statement Additional information response. December 1995. Pages 10.4-10.6.

³⁴ BHP. 1995. NWT Diamonds Project Environmental Impact Statement Additional information response. December 1995. Pages 10.1, 10.2, 10.3, 10.4, 10.8.

³⁵ Ulusuk. 1999. BHP providing opportunities to Aboriginals. *Native Journal*. February 1999:34.

³⁶ BHP Diamonds Inc. Information requests response. August 2000. Page 87.

The question of the impact of employment from non-renewable resource exploration and extraction on traditional/subsistence activities has been asked often in the North³⁷, but there is little current information on which to draw. In 1982, Usher stated that "the hypothesis that wage income from industrial employment is increasingly what finances the harvesting sector ... remains to be tested."³⁸ Nearly 20 years later, this remains the case as the North Slave Metis Alliance³⁹ considered the assumption that income from rotational mining work supports the traditional/subsistence economy. Personal interviews with members and reference to work in Lutsel K'e supports their doubt about the general validity of this assumption. This suggests the EAR would have benefited by a more complete discussion of the relationship between traditional/subsistence activities and wage employment.

Monitoring

Pages 1-2 and 4-240 of the EAR noted that the EARP review of 1996 concluded an expansion of Ekati Mine would be unlikely to have negative socio-economic impact. However, the Panel also stated, "continued socio-economic monitoring would still be required to determine actual effects and to ensure that any negative or cultural effects are identified and mitigated...". The socioeconomic follow-up program embodied in the Socio-economic Agreement between BHP and GNWT does not monitor impacts on the traditional/subsistence economy.

Monitoring the effects of jobs, income and rotational work schedules on Aboriginal employees' traditional/subsistence activities would provide data that does not now exist. This will provide information for mitigation, for the assessment of future developments and will provide critical information for cumulative effects assessment.

Recommendation

The GNWT recommends the Board consider a follow-up program to monitor economic and cultural impacts of the project on traditional/subsistence activities and economy.

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- ³⁷ Baffin Regional Inuit Association. 1979. Socio-economic impacts of the Nanisivik mine on north Baffin region communities. A study conducted by the Baffin Regional Inuit Association for Nanisivik Mines Ltd., the Government of the NWT, and the Government of Canada. 428pp.
Berger, T. 1977. Northern frontier, northern homeland: the report of the Mackenzie Valley Pipeline Inquiry, volume 1. Supply and Services Canada, Ottawa. 213pp.
Government of the NWT. Technical Review of the Diavik Diamonds Project: Environmental Assessment Report. Submission to DIAND, DFO and NRC. March 8, 1999. 89 pp.
Graf, Ron. 1983. Changes in harvest patterns resulting from increased industrial development. Government of the NWT submission to the Beaufort Sea Environmental Assessment Panel, September 1983.
Hobart, Charles W. 1981. Impacts of industrial employment on hunting and trapping among Canadian Inuit. Pages 202-218 in Milton M.R. Freeman (ed.). Proceedings First International Symposium on Renewable Resources and the Economy on the North, Banff, Alberta, May 1981. Association of Canadian Universities for Northern Studies. 268pp.
Hobart, Walsh and Associate Consultants Ltd. 1980. Rotational employment of Coppermine Inuit men: effects and community perspectives. INA Publication No. QS-8160-036-EE-A1. Indian Affairs and Northern Development Canada, Ottawa. 233pp.
Usher, Peter J. 1982. Assessing the impact of industry in the Beaufort Sea Region: a report prepared for the Beaufort Sea Alliance. Arctic International Wildlife Range Society, Energy Probe, Yukon Conservation Society.
- ³⁸ Usher, Peter J. 1982. Assessing the impact of industry in the Beaufort Sea Region: a report prepared for the Beaufort Sea Alliance. Arctic International Wildlife Range Society, Energy Probe, Yukon Conservation Society. Page 47.
- ³⁹ North Slave Metis Alliance. 1999. Can't live without work. North Slave Metis Alliance environmental, social, economic and cultural concerns: a companion study report to the comprehensive study report on the Diavik Diamonds Project. Page 151.

2.7 Social Stability And Community Wellness

Terms of Reference

The Terms of Reference required an analysis of potential impacts on human health, including death and disease rate, and psychological, emotional, spiritual or mental health and wellness (ToR Lines 509-513). The Proponent was to build on the 1995 EIS as much as possible (lines 190-192).

Summary of Concerns

The EAR discussed some, but not all, of the potential impacts identified in Volume IV of the 1995 EIS. Potential impacts not discussed in the EAR included:

- acceleration of value changes;
- increase in drug trafficking;
- staff turnover (resulting from social problems, alcohol abuse and marriage disruption), and specifically staff turnover among Aboriginal employees;
- change in leadership structure;
- development of factions on site.

In response to an information request, BHP acknowledged these factors continue to be potential impacts. The socioeconomic follow up program was not designed to monitor these potential impacts.

Indicators in the Socio-economic Agreement include crimes where alcohol was a factor, but do not include drug trafficking crimes. The Attitudinal Survey asks about alcohol use but does not ask self-incriminating questions. However, the 1999 GNWT Report under the Socio-Economic Agreement notes the following:

In addition to the social problems identified in the EIS, the RCMP has identified other anticipated problems. These include theft and smuggling, often the result of organized crime; outlaw motorcycle gangs; money laundering and stock fraud.⁴⁰

Although the RCMP scan does not specifically mention drug trafficking, it highlights the possibility of an increasing range of criminal activity.

The EIS identified staff turnover resulting from social problems, alcohol abuse and marriage disruption as a possible negative impact and specifically, staff turnover among Aboriginal employees. In the EAR BHP states its employee turnover has been very low at 10%. This turnover rate is used as an indication employment objectives will be met and exceeded. It has been identified that almost 1500 different employees contributed to the roughly 900 person years BHP reported in 1999. The turnover rate for Aboriginal employees during this period is not known. The methodology used to determine turnover rates for the Ekati Mine is not known. In research specifically on the issue of labour turnover in the non-renewable resource sector Veit⁴¹ notes several research papers on turnover methodologies plus her own research findings and concludes, "[Comparisons between] ...

⁴⁰ 1999 RCMP Environmental Scan, prepared by Strategic Planning and Projects Branch, RCMP Headquarters, Ottawa, Ontario. Page 10, "Diamond mines." As cited in GNWT, 1999 Annual Report on Community Health and Well Being, April 2000, page 24.

⁴¹ Suzanne Veit and Associates, "Labour Turnover and Community Stability: Implications for Northeast Coal Development in British Columbia." A Report Prepared for the Federal-Provincial Manpower Subcommittee on North East Coal. Project No. 270060-3, Community Centred Work Force Turnover Study, February 1978.

companies would require a knowledge of the formulae used.” Veit demonstrates with a hypothetical example, that reported turnover could range from 35% to 60% depending on methodology. Other research⁴² indicates it may be too soon to draw conclusions about turnover after one year of operation.

The Attitudinal Survey could be expanded to capture impacts such as acceleration of value changes and development of factions on site. At this time, however, impacts such as these would appear to be beyond the scope of the Socio-economic Agreement.

With regard to changes in leadership, it would seem that community-based monitoring could capture changes in leadership structure. This potential impact is not formally monitored under the Agreement. However, in the Diavik Comprehensive Study Report the possibility of impacts such as this was seen to highlight the importance of secondary industry opportunities.

In the EAR, BHP identified the potential effects being tracked under the Socio-economic Agreement. Both BHP and the GNWT acknowledge it is too soon to identify trends that suggest residual effects of Ekati Mine employment on community health and well being.

2.8 Net Effects On Government

Terms of Reference

The Board directed the Proponent to address the economic impact of the proposed development considering federal and territorial revenues and costs, plus local government finances (ToR Lines 482-502). BHP was also to report other fee structures/costs it will incur such as quarry royalties, changes to security deposits, and incremental abandonment and restoration costs resulting from the proposed development (ToR Lines 515-520). Lastly, the Proponent was required to assess impacts on services, facilities and infrastructure (ToR Lines 522-525).

Summary of Concerns

The Proponent predicted a major positive impact on government revenues, at both the territorial and the federal levels. Table 4.7-13 predicts a positive economic benefit to the NWT government [pages 4-203 – 4-205, Table 4.7-13 -- Socio-Economic Effects from Sable, Pigeon and Beartooth Development] of over \$1 billion. The text of the EAR reports an estimated \$114 million net benefit to the GNWT over the three year project life (p. 4-178).

The Proponent estimates that revenues will accrue to the federal and territorial governments as a result of taxation on corporate profits, worker income, royalties, and a variety of other taxes. Added to these are estimated social envelope savings as a result of increased employment. Finally, estimated incremental government costs relating to the development of the project are subtracted to estimate the net benefits of the project.

Although changes to taxation rates have occurred since the 1995 EIS was prepared, the use of the revised rates would be unlikely to substantially affect revenue predictions. Savings in GNWT Social Assistance and housing costs are based on hiring estimates in the EIS. Unfortunately data is not

⁴² See, for example, Abele, Frances. Gathering Strength. Komatik Series, Number 1. The Arctic Institute of North America of the University of Calgary, 1989, page 118.

provided to substantiate the assertion of reduced unemployment. The EAR predicts a reduction in grants and other assistance without acknowledging the potential for increased demand for business assistance and training support. The unpredictable net effect of population movement on the Formula Financing Grant and government expenditures lends further uncertainty to the EAR's conclusions. Predicted fiscal revenues appear somewhat optimistic, however, without knowledge of how the estimates were derived it is not possible to comment on their accuracy. The assessment could have benefited from comparison with predictions in the EIS.

It would also be helpful to know how many employees have moved within the NWT to understand potential impacts on schools and other public facilities.

2.9 Sustainable Development

2.9.1 Economic Diversification

Terms of Reference

The Terms of Reference instructed BHP to consider economic impacts, taking into account the potential for economic diversification (ToR Lines 482-502).

Summary of Concerns

BHP's examination of economic diversification is primarily focused on industry developed to directly support the mining operation. BHP has stated the significance of the development's residual effect will not change from the EIS prediction. BHP expects the effects of the proposed development on opportunities for diversification to be short term, frequent and primarily local.

In assessing the impact of the operation on economic diversity, it was expected BHP would outline the impacts stated in its original EIS, clearly stating developments and changes since the EIS, and then provided an analysis of those developments and changes. It was expected BHP would discuss impacts on opportunities for economic diversification not only in areas previously addressed in the EIS, but also in areas developed since the EIS, specifically downstream value-added opportunities.

Unfortunately longer-term negative impacts on business that support the operation, downstream opportunities and impacts both positive and negative, and mitigation, were not discussed by the Proponent. Further, BHP failed to adequately discuss or assess the operation's impact on economic activity downstream and did not clearly state how it will support this area. Based on this limited analysis it is not possible to adequately assess the effects of the development on opportunities for diversification and the significance of the residual effects. This has resulted in uncertainty about the impacts of the operation on the economy of the NWT, specifically with regard to economic diversification.

BHP has outlined how the development will benefit larger centres by providing opportunities for economic diversification, but has not examined the potential impact on the development of the economies of smaller communities. Additionally, measures to mitigate potential negative impacts on the small local communities, are not documented.

BHP has outlined how the operation will have short-term effects in building certain sectors of the economy but has failed to examine the impacts on these sectors at the time of mine closure.

Although the operation can provide significant opportunities to build business and can support primary industry, the lifetime of primary industry is finite. An economy dependent on this primary industry is at significant risk of collapse as mine operation winds down. If this happens, the result is a large pool of unemployed skilled workers and businesses that fold. It is uncertain how significant these impacts would be. Opportunities to diversify downstream in areas that would insulate against these potential impacts could have been examined and support for diversification documented.

Page 4-183 of the EAR states that BHP has entered into arrangements to supply three Yellowknife-based companies with rough diamonds for cutting and polishing in the NWT. Once fully operational, these local operations are expected to process about 10% of the value of total production from the Ekati Mine." The EAR states these agreements do not change the EIS predictions; however, analysis to support this conclusion is not provided in the EAR. These developments may influence the predictions that BHP made in terms of duration of benefits and their distribution.

An August 3, 2000, Information Request asked BHP to provide further information concerning its support to the value-added sector so that longer-term impacts associated with economic diversification could be reviewed. The response by BHP indicates that support of the value-added industry is not considered a mitigative measure. BHP's support for economic diversification measures is uncertain.

BHP committed to sort and sell rough diamonds from its facility in Yellowknife in the EIS. BHP was asked to indicate, "the terms and condition of sales to NWT manufacturers.... including where goods are sorted, assortments created and sales occurred." BHP replied that as sorting expertise increases in the NWT these functions will move to that facility and that "this transfer is gradually happening now." BHP has not provided a schedule as to when it will start sorting at the Yellowknife facility.

BHP was also asked to address how the proportion of its supply of rough for manufacturing would increase with the addition of the three new pipes and what the duration of supply would be. BHP stated in its response that it currently has "...approximately 10-12%, by value, of product from the Panda pipe contracted to manufacturers in the NWT. In accordance with our understanding with the GNWT regarding support for value-added business, this quantity was deemed sufficient for the initial development of sustainable manufacturing operations,..."

Page 4-183 of the EAR states, "Once fully operational these operations are expected to process about 10% of the value of total production from the Ekati Mine". BHP's statement that the agreed supply was 10-12% of the Panda pipe and not 10-12% of total production is a clear shift from the initial understanding. This change creates a significant level of uncertainty as to how BHP intends to support manufacturing and its intentions regarding further opportunities for increased manufacturing.

The August 3rd Information Request sought clarification on BHP's plans to pursue downstream activities and how this would impact northern manufacturers. BHP has indicated that although options for branding and manufacturing are being investigated, no activity would impact on the supply of rough under the current arrangements. There is no indication of how these actions would impact the businesses operating in the NWT if they were pursued, nor that actions would not impact the current supply after the term of the current understanding ends.

Uncertainty

There is uncertainty as to how the Ekati Mine will impact small local communities. The project may draw out key skilled persons from the communities, people who the communities depend on to build a healthy diversified economy, and will centralize industry and human resources in larger centers. One result may be decreased economic diversification in the smaller communities. Means of mitigating and monitoring this potential impact should be considered.

It is clear that there is a high level of uncertainty regarding how BHP's operation will impact secondary industry in the NWT and the opportunity for economic diversification.

The Proponents conclusion that effects on diversification will continue to be short term, frequent and primarily local requires further analysis. There is a level of uncertainty in the effects BHP has predicted. Significant changes and developments since the EIS are not addressed. More specifically, adequate consideration of the potential for value-added developments to diversify the economy is not included in the assessment. The Proponent has not provided certainty regarding its support for the value- added industry or assurances that it will maintain these opportunities for long-term sustainable economic diversification.

Recommendation

It is recommended that:

1. BHP and the GNWT develop a means to more closely monitor and report on the operation's effect on economic diversification, particularly in the downstream value-added sector.
2. BHP formalize its understanding with the GNWT on the supply of rough diamonds for manufacturing in the NWT, to provide a greater level of certainty that economic diversification will be maximized and negative impacts will be mitigated.

2.10 Socio-Economic Cumulative Effects Assessment

Terms of Reference

The proposed development was referred to environmental assessment partially for consideration of cumulative impact with the existing BHP Ekati Mine Mine and the proposed Diavik Diamond Mine (ToR Lines 11-13). The cumulative effects assessment was to include cumulative impacts in relation to the social, economic and cultural environment (ToR Lines 559-566). The Environmental Assessment Report was to document assumptions, models, information sources, information limitations and uncertainty (ToR 570-575).

Approach

Table 4.1 summarizes the description of assessment criteria outlined on page 4-238 of the EAR. Probability is defined in the EIS. Frequency, reversibility and future capacity do not appear to have been defined for socio-economic components. Ecological / social context was included in EIS assessment criteria, but does not appear to have been a factor in the 2000 Environmental Assessment Report.

**Table 4.1
Cumulative Impact Attribute Definitions for Socio-economic Components⁴³**

| Geographic Extent | Duration | Frequency | Reversibility | Probability | Future Capacity (Sustainability) | Predicted Residual Effect |
|---|-------------------------------|-----------|---------------|---|----------------------------------|---|
| group of community individuals affected | Short but unspecified period | n/a | n/a | High: same impact from similar types of projects indicated | n/a | Negligible assumed to be no cumulative effect |
| a group of people in a community | < 30 years | n/a | n/a | Moderate: possible same impact from similar types of projects | n/a | Minor |
| community | Long-term > 30 years | n/a | n/a | Low: small likelihood of that impact from similar types of projects occurred | n/a | Moderate |
| entire NWT population affected | Long-term several generations | n/a | n/a | Unknown: There is insufficient research / traditional knowledge / experience to indicate impact from similar types of projects. | n/a | Major |

The EAR concludes the predicted socioeconomic residual effects for the three-pipe expansion are the same as those predicted in the EIS. Residual effects of negligible importance were not carried forward into the cumulative effects assessment.⁴⁴ Only cumulative effects that were considered minor, moderate or major and that had also changed since the EIS, were addressed in the EAR. As a result, no socio-economic residual effects were carried forward into the cumulative effects assessment. BHP's description of possible cumulative effects is outlined in Table 4.2 below.

⁴³ Based on description of significance in 2000 EAR, page 4-238.

⁴⁴ BHP, 2000 EAR page 4-238.

Table 4.2 Cumulative Socioeconomic Effects Assessment⁴⁵

| Potential Cumulative Effect | Cumulative Effects Attributes | | | | | | |
|---|-------------------------------|-----------------------------------|--|---|-------------|---|--|
| | Geographic Extent | Duration or Frequency | Reversibility | Ecological or Social Context | Probability | Future Capacity of Renewable Resources and Sustainable Development | Significance of Cumulative Effects |
| increased employment | NWT communities | project life (25 year) and beyond | low; possibility of temporary mine closure | income and training | high | high; will benefit communities | major positive |
| community tensions due to income disparity | NWT communities | project life (25 year) | low; possibility of temporary mine closure | 1999 EAR; would depend on availability of social services and community stability | moderate | high; depends on social services and community stability | minor negative |
| increased overall economic development | NWT | project life (25 year) and beyond | low; possibility of temporary mine closure | increased NWT government revenues | high | high; depends on NWT planning and development | major positive |
| improved social services | NWT | project life (25 year) and beyond | low; possibility of temporary mine closure | increased NWT government revenues | high | high; individuals and communities should be able to integrate both ways of life | major positive |
| integration of traditional life styles with rotating work schedules | communities of mine employees | project life (25 year) | high | could benefit Aboriginal communities | high | high; individuals and communities should be able to integrate both ways of life | moderate positive |
| Disturbance or relocation of outfitting | | | | | | | minor negative |
| land use conflicts | NWT | project life (25 year) | moderate | dissatisfaction | moderate | moderate; may depend on resolution of land claims | moderate negative |
| availability and use of NWT skilled workers | | | | | | | available; based on DSEER (n/a) |
| barriers to employment (job / education aspirations) | | | | | | | available labour force, based on DSEER (n/a) |
| government expenses and revenue | | | | | | | expenses insignificant, based on DSEER (negligible negative) |
| human health and community well-being | | | | | | | negligible negative |

BHP states it used the same Local Study Area for cumulative effects assessment in the EAR and the EIS. BHP based its determination of impact on a combination of duration and geographic extent.

⁴⁵ Table 5.7-1 — Cumulative Effects Assessment Matrix, 1995 EIS, updated to reflect cumulative effects assessment discussion on pages 4-238-239, 2000 Environmental Assessment Report.

Where BHP refers to a “community” in its description of geographic extent, the GNWT has assumed this refers to communities in the local study area.

The EAR identified the following areas with potential for interactive cumulative effects with the Lupin Mine, Diavik Diamonds, the Echo Bay Winter Road and other future developments:

- Employment and income;
- Opportunities for local, regional and territorial businesses, and economic diversification;
- Availability and use of NWT skilled workers;
- Barriers to employment (job/education aspirations);
- Government expenses and revenue; and
- Human health and well-being.

Potential cumulative effects surrounding labour availability were discussed in relation to the Lupin and Diavik projects and were not considered significant. BHP commits that monitoring systems established through regulatory instruments and agreements will be used to address any potential cumulative effects during the proposed development as well as during the life of the mine.

Summary of Concerns

As noted previously, page 4-238 of the EAR states “where a proposed development has a negligible socio-economic residual effect, it is not a contributor to cumulative socio-economic effects. Page 4-221 of the EAR further states that “the approaches presented in the Canadian Environmental Assessment Agency Cumulative Effects Assessment Practitioners Guide ... were used as a framework for examining the potential cumulative effects of the ... development.” However, that same Practitioners’ Guide states that “A cumulative effect on a VEC [which includes socio-economic components] may be significant even though each individual project-specific assessment of that same VEC concludes that the effects are insignificant. This is a fundamental principle in the understanding of cumulative effects.”⁴⁶ The GNWT believes that including negligible effects would have resulted in a more thorough cumulative effects assessment.

BHP’s cumulative effects assessment relating to competition for available labour force and infrastructure impacts relies on the Diavik Socioeconomic Effects Report (1998). The GNWT found Diavik’s employment predictions to be optimistic and further analysis indicates that the future existence of other diamond mines and developments will lead to recruitment and retention challenges despite BHP’s continued commitment to IBAs and to the 1996 Socio-Economic Agreement with the GNWT.

Some potential cumulative effects – increased employment and social indicators of family and community well-being – are being tracked through the socio-economic follow-up program. Based on initial monitoring reports, there is no reason to conclude that available social services will be positively affected, or that human health impacts will be negligible.

As there has been no follow-up program to determine effects on traditional / subsistence activities and economy, there is no basis on which to conclude that cumulative effects will be moderate and positive as referenced on pages 4-239 and 4-253 of the EAR.

⁴⁶Hegmann, G., C. Cocklin, R. Creasey, S. Dupuis, A. Kennedy, L. Kingsley, W. Ross, H. Spaling & D. Stalker. 1999. Cumulative Effects Assessment Practitioners Guide. Prepared by AXYS Environmental Consulting Ltd. and the CEA Working Group for the Canadian Environmental Assessment Agency, Hull, Quebec. Section 3.5.2, page 61.

In general, substantiation for the determination of significance is not adequate to independently lead GNWT reviewers to the BHP conclusion. It is unclear how assessment criteria have been used to arrive at conclusions. Additionally, full consideration of the multi-generation consequences or irreversible nature of some potential cultural and human health impacts may change the determination of significance. In some cases the GNWT would not concur with the Proponent's determination of potential impacts.

2.11 Follow Up Program – Monitoring and Adaptive Management

Terms of Reference

Terms of Reference instructions were to describe reporting/feedback procedures under the environmental impact monitoring program. The intent was to ensure remedial action would be taken if the results of a monitoring program deviate from predicted impacts (ToR Lines 593-597). The Proponent was also to describe adaptive management practices already undertaken (ToR Lines 599-605).

2.11.1 Monitoring

In response to a request for further information regarding the distribution of Ekati Mine employment by NWT community, BHP stated, "The Socio-economic Agreement superceded the 1995 EIS, thereby setting the most relevant criteria for reporting set out by both the GNWT and BHP." However, Article 10.16 of the BHP-GNWT Socio-economic Agreement states:

Article 10.16 Environmental Impact Statement

Nothing in this Agreement shall lessen, or otherwise remove any obligation or commitment undertaken by BHP in the proposal to operate the diamond mine as fully described in the Environmental Impact Statement prepared by BHP dated July 24, 1995 as well as the Additional Information Request dated December 19, 1995, an Update dated December 15, 1995 and the Environmental Baseline Study, all of which were submitted to the Environmental Assessment Review Panel

Therefore, although the BHP-GNWT Socio-economic Agreement has been designed as a follow-up program to the 1995 EIS, it does not supercede that document as the point of departure for environmental assessment.

In several places, the 1995 BHP EIS recognized that the severity of project impact in a community – whether positive or negative – is directly linked to the level of project employment in that community.

For example, page 4.54, Volume IV of the 1995 EIS stated,

Employment and income have been selected as the major indicators for this assessment since there is a direct relationship between these indicators and many of the other social and economic impacts. ...The estimates developed for these prime indicators establish the Proponent's potential level of expenditures in the Northwest Territories, which in turn establishes the potential level of socio-economic impact in the Northwest Territories.

The link between socio-economic impact and geographic distribution of NWT employment was also highlighted in the 1999 socio-economic follow-up program report (attached). For example, in

reporting on the Employment indicator, the Report concluded, "More data on point of hire and employment by community would be needed to examine the effect of the Ekati Mine on NWT employment levels.⁴⁷" The Report made the same conclusion for the income indicator. In reporting its findings with regard to Social Assistance, the GNWT Report noted, "As no BHP employment by community data [is] available, it is not possible to examine whether Ekati Mine employment is affecting social assistance levels.⁴⁸" In the case of the Spousal Assault Complaints indicator, the Report noted, "... Data [on] employment by community over time and results from the Attitudinal Survey would be needed to investigate these trends further.⁴⁹"

The GNWT is responsible for monitoring and assessing the impact of the Project using agreed-upon indicators⁵⁰. However, without employment data by community of residence, it is not possible to fully understand the effects (positive or negative) that either the existing or proposed development will have on various NWT communities.

A review of wording from the Socioeconomic Agreement might lead to the conclusion that certain areas of the Agreement were left open for refining over time by the two Parties. For instance:

SECTION 8.0 — MONITORING

Article 8.1

BHP and the GNWT agree that monitoring the results of this Agreement is important and they will mutually work toward the adoption of programs and policies to improve the monitoring in accordance with the principles as set out in Schedule "H".

Schedule "H" -- Principles for Monitoring

Monitoring activities provide mechanisms whereby both Parties can objectively and systematically measure the degree to which obligations arising from this Agreement are met. Monitoring will be carried out in a manner which will ... assist the Parties in carrying out their respective responsibilities.

To guide the monitoring process the Parties will:

- Develop common approaches to improving the quality ... of information (Item 9.0);
- Establish working groups, when necessary, to discuss matters related to monitoring and reporting (Item 10.0).

These Articles in the Agreement could lead one to conclude that monitoring program details were left open, to be worked out and revised as necessary over time. However, BHP stated, "The Socio-economic Agreement (SEA) has been negotiated, agreed on and implemented as the follow-up mechanism to track the hiring commitments in the EIS. Data reported to the Government of the Northwest Territories on an annual basis is provided pursuant to the Socio-economic Agreement. ... Any information in addition to what is already being reported is outside of the agreement."

The BHP-GNWT Socioeconomic Agreement is a life-of-mine agreement, and the GNWT is committed to taking whatever steps are necessary to make the Agreement work. The GNWT is prepared, for example, to work with BHP to develop common approaches to improving the quality of information, so that monitoring can assist the Parties in carrying out their respective responsibilities.

⁴⁷ Annual GNWT Community Health and Wellness Report, BHP-GNWT Socio-economic Agreement, April, 2000. Appendix A, summary of observations, pages 31-33.

⁴⁸ Ibid.

⁴⁹ Ibid.

⁵⁰ BHP-GNWT Socioeconomic Agreement, Article 5.2.1.

2.11.2 Adaptive Management

Terms of Reference

Approach

Section 5.3 of the EAR, "Adaptive Management" discussed the strengths and weaknesses of BHP environmental management, and provided a series of examples of adaptive management steps. Unfortunately this section is silent with regard to adaptive management of impacts to the social, cultural or economic environments.

BHP's Operating Environmental Management Plan (OEMP) and its components are discussed. Although BHP has committed elsewhere that the Socioeconomic Agreement is a life-of-mine agreement that would apply to this expansion, the OEMP discussion does not recognize the role of the Socioeconomic Agreement in an adaptive management program. However, BHP has referred to socioeconomic mitigation elsewhere in the EAR and its supporting documents. BHP made three statements about mitigation measures under the Socioeconomic Agreement.

The Socio-economic Agreement states that if residual effects of Ekati Mine activities on community wellness / human health are identified, there are provisions for BHP and the GNWT to collaborate in supporting communities in meeting their needs⁵¹.

... GNWT monitoring of community wellness indicators throughout the life of mine will allow for identification of residual effects and create opportunities to maintain or increase mitigation if necessary⁵².

... the Socio-economic Agreement provides the following guidelines for residual effects as they occur: ... BHP and the GNWT working closely to encourage the effective and integrated use of community resources in responding to negative socio-economic impacts from the project⁵³.

The stated intent of the Socio-economic Agreement is to allow for mitigation of unforeseen impacts. The Agreement includes general wording and commitments to this effect:

Preamble, Article H.

It is in the interests of the Parties to jointly provide for a framework to ... minimize any adverse social impacts of the Project;

Article 2.1.4 – Purpose of the Agreement

[to ensure] The regular monitoring of socio-economic impacts are undertaken, and ... unforeseen events or impacts, or impacts the scope or significance of which are greater than foreseen, are addressed and dealt with in accordance with the spirit and intent of this Agreement;

⁵¹ BHP, 2000 EAR, page 4-200.

⁵² BHP, 2000 EAR, page 4-201.

⁵³ BHP, Response to Information Request, August 2000.

Article 4.3.3

If, at any time after the end of the first two years of the Operation Phase, BHP has failed to employ Northern Residents in the manner set forth in ... this Agreement, and if there were sufficient qualified and interested Northern Residents to fill available positions, then BHP shall take further steps to actively encourage a Northern Resident workforce consistent with the targets identified...

Schedule "D" -- Indicators of Community Health and Wellness

The Parties agree that the Project will impact on the socio-economic conditions of the "Point of Hire" communities. ... Information gained from the monitoring process will be used, in cooperation with communities, to identify activities which strengthen benefits and mitigate negative impacts of social change.

The strength of these provisions may depend on the specificity of the wording and the effectiveness of the monitoring program in identifying impacts requiring mitigation.

2.11.3 Summary

The purpose of a follow-up program is to

- verify predicted impacts,
- confirm whether commitments are being met and are effective,
- allow adaptive management of unexpected effects⁵⁴.

BHP is responsible for verifying predicted employment and purchasing impacts; summary data is reported. The Socio-economic Agreement is essentially silent with regard to cultural or resource-use effects. The GNWT is responsible for verifying the remaining predicted socio-economic effects, but has stated that its ability to assess local study area effects is reduced without employment data by NWT community.

Under the Socio-economic Agreement, reporting of local study area effects is meant to be supplemented by project-specific data from the Attitudinal Survey. BHP is responsible for data collection for the survey, while the GNWT is responsible for data compilation and analysis. Survey results can only be included in GNWT annual reports if sample sizes and survey procedures meet nationally accepted standards for statistical surveys.

Both parties to the Socio-economic Agreement — BHP and the GNWT have made several commitments, so that training, employment and business opportunities are made available to northern residents, and so that negative social impacts of the Project can be minimized. Although the Socioeconomic Agreement provides for reporting against targets and reporting of socioeconomic data, it does not specifically provide for reporting of efforts to meet agreed-upon commitments.

⁵⁴ Source; Diavik CSR, RA Conclusions? page ??

2.12 Human Health – Effects of Noise

Terms of Reference

The Proponent was directed to assess the impact of the proposed development on the environment resulting from changes to ambient noise levels, continuous exposure versus acute exposure and the effect of these changes on humans and wildlife (ToR Lines 527-529).

Summary of Concerns

Section 4.3.2 details the effects of noise from aircraft, mining operations, haul roads, and blasting. Noise levels and effects were considered for each of the four noise sources previously listed. Computer modeling, empirical calculations, and noise level contours were used to predict the impacts of noise from activity around the Sable, Pigeon and Beartooth Pipes. The EA concluded that no adverse effects on humans from noise are anticipated. From the suggestions in the 1995 BHP EIS, noise mitigation measures were implemented and Ekati Mine buildings were designed to mitigate and attenuate jet aircraft noise. The Department of Health and Social Services is satisfied with the predictions made in section 4.3.2, but would like to see some monitoring of noise levels resulting from the mining operations, haul roads, blasting and any increased air traffic associated with the Sable, Pigeon and Beartooth Pipes.

Recommendations

Monitoring of the noise levels resulting from mining operations, blasting, haul roads and any increase in air traffic associated with the Sable, Pigeon and Beartooth Pipes is recommended. Monitoring will allow comparisons with predictions made in section 4.3.2, as well as protect the health and wellbeing of those individuals living and working at the mine. If the predictions and conclusions of section 4.3.2 are found to be incorrect, future mitigation measures should be considered.

2.13 Human Health – Potential Developmental Impacts

Terms of Reference

BHP was requested to analyze the potential developmental impacts on human health as they relate to the proposed development and identify toxicological risks to human health (ToR Lines 504-513).

Summary of Concerns

Section 4.7.11.1 detailed the biophysical effects on human health. Land use other than mining within the development area was identified, as were the biophysical factors which may subsequently effect human health. The biophysical factors included air quality, water quality, vegetation, and wildlife. The Department is satisfied with the assessment detailed in section 4.7.11.1 of the EA report for Sable, Pigeon, and Beartooth Pipes.

Section 4.7.11.2 details accidental hazards or spills and how these may effect human health. Workers at BHP were identified as those who would be at risk. A list of hazardous materials and description of spill contingency plans are not included in this section. This information is available through other sources such as the BHP water license. The Department of Health & Social Services

is satisfied that as long as the BHP Site and General Spill Contingency Plan and Waste Management Plan are effective and adhered to, the human health hazard from accidental spills will be minimal.

Recommendations

Mitigation measures should be used when at all possible to minimize effects on the biophysical factors, which may subsequently effect human health, such as, wildlife, air quality, water quality and vegetation. Long term adaptive management plans should be established to monitor any impacts on air quality, water quality, wildlife and vegetation. To minimize any health risks associated with exposure to hazardous materials, effective management plans are needed, such as the BHP Site and General Spill Contingency Plan, Materials Management Plan and Waste Management Plan.

2.14 Heritage Resources

Terms of Reference

The Proponent was directed to describe the potential impacts of the proposed development on cultural and heritage resources.

Summary of Concerns

BHP has maintained an active archaeological impact assessment and monitoring program since the beginning of the project. This work has resulted in the recording of 150 new archaeological sites, adding significantly to the understanding of human occupation of the region. Based on our review of the environmental assessment report we are confident that the research methodology employed by Points West Heritage Consulting Ltd., under contract to BHP, conforms with current standards, and has been undertaken ethically and with respect to public concerns regarding the heritage of the NWT. As part of this ongoing program, BHP has identified a need to conduct further archaeological studies at the waste rock storage sites for the proposed Sable pit, and the road route between the Pigeon and Beartooth pits.

As these areas exhibit potential for locating heritage resources it is imperative that an heritage resource impact assessment be undertaken before development proceeds in these areas. If the assessment records archaeological sites in these areas, then a mitigation plan will need to be submitted, approved, and carried out before development takes place.

Recommendation

It is recommended that approval should include conditions requiring the Proponent to complete a heritage resource impact assessment for the areas identified. Should heritage sites be uncovered then an approved mitigation plan will need to be exercised before development occurs.

3 PHYSICAL AND BIOLOGICAL ENVIRONMENT

3.1 Effects of Roads on Caribou: Substantiation of Current Mitigation Practices

Terms of Reference

The environmental assessment report shall provide an analysis of the proposed development's impacts, (both direct and indirect), on wildlife and wildlife habitats. The analysis should include: ... disruption, blockage, impediment and sensory disturbance, of daily or seasonal wildlife movements (e.g. migration, home ranges, etc.) ... (ToR Lines 453-454). The report should assess the implication of these impacts on the overall health of wildlife populations, communities, and ecosystems (ToR Lines 465-466).

Summary of Concerns

1. The analysis of ecosystem data is incomplete.
 - a) The question as to whether the pattern of ecosystem units is similar for the vicinity of the proposed roads and three pits to the pattern for the Ekati Mine site and Misery Road is not addressed. Yet the pattern and extent of ecosystem units is a factor in caribou distribution.
 2. Data analyses to predict the likelihood of caribou encountering the proposed pits and roads are inadequate.
 - a) Only 1 year's observations of caribou numbers were available (Page 4-154) for the Sable haul road corridor. This does not provide sufficient information on potential caribou activity in the area given the high annual variation in caribou numbers at Ekati Mine. In 1997, 12 000 and in 1998, 80 caribou were in the Ekati Mine area (Table 4.6-4). The Proponent could have bolstered the baseline data by using the satellite data on caribou movements and habitat information (maps of habitat and recorded caribou activity by habitat type) to project the likelihood of caribou encounters with the proposed developments especially the Sable haul road.
 - b) The Proponent does not use the data from surveys of Misery Road compared to the routine aerial surveys to develop a model for the likelihood of caribou encountering a road in any ecosystem unit.
 - c) There is no description of existing caribou trails along the proposed route of the roads which would reveal patterns of caribou use relative to landscape features. In the absence of those data and information on how similar data were used for the Misery road mitigation, statements that "The potential for the disruption of caribou movement will be mitigated proactively by careful planning of road routes and construction design," (Page 4-161) are unsubstantiated.
 - d) Although the Proponent describes caribou travelling on the roads, there are no data presented on whether those observations lead to more informed road construction practices. There are no data on, for example, how often caribou used roads and how often was "the application of BHP's adaptive traffic management approach that adjusts traffic while caribou are present" (Page 4.214).
3. Description of the effects of roads and pits is inadequate
 - a) The behavioral data do not allow assessment of the data's variability and thus uncertainty in the predicted responses.
 - b) The various sources of uncertainty (environmental, technical, statistical) are not addressed nor their effect on the potential effects on caribou. Worst case scenarios and accidents are not discussed.

4. Inconsistencies between statements and data

For example, the text (Page 4-135 and Figure 4.6-1) acknowledges that the greatest caribou behavioral responses are to low-flying aircraft and slow-moving trucks. The statement is inconsistent with Page 4-153 "Caribou appear comfortable with roads, passing trucks . . .".

The conclusions in the assessment report are inadequately supported by data analyses and data presentation. Sources of uncertainty in the analyses are not given appropriate recognition in the conclusions.

Recommendations

It is recommended that:

- 1) The Proponent analyze existing data to refine projections about the likelihood that caribou will encounter the proposed structures (roads and pits).
- 2) The Proponent use existing data to identify and describe the sources of uncertainty in their projected effects of the structures on caribou.
- 3) The Proponent establish a monitoring program to assess the accuracy of projected encounter rates and projected effects.
- 4) The Proponent report on the use of and the effectiveness of mitigative practices.

3.2 Fugitive Dust Emissions – Effects of Dust on Vegetation and Indirect Habitat

Terms of Reference

Report the impacts of the proposed development on air quality. ... The analyses shall also include: ...iv) impact on biological receptors such as vegetation and wildlife; and v) potential environmental impacts from particulate matter deposition should be addressed, e.g., dust emissions from road traffic and construction (ToR Lines 323-325). The EAR shall analyze impacts of the proposed development on: iii) long term, direct and indirect, habitat loss or alteration.

Summary of Concerns

Methodology – Methodology to predict and monitor the indirect habitat changes along roads and rock piles due to the effects of dust is inadequate.

1. Information on dust levels along the roads and rock piles is lacking. The Environmental Effects Assessment states (Page 4-25) that the annual TSP (Total Suspended Particulate) concentration along the proposed haul roads and three pits is expected to be similar to that predicted from a model for the existing operation. But the Environmental Effects Assessment does not report any monitoring data on fugitive dust emissions for the existing pit (after 1994) or haul roads to compare with the 1995 model predictions. The only measure of fugitive dust is for airborne particles using high volume air samplers at two locations (based on Table 3.1-10) and not dust loading on vegetation along roads or rock piles. Table 3.1-10 reports TSP (Total Suspended Particulate) 1994 baseline data and monitoring data only for the Accommodations Complex.

2. The predictions for fugitive dust (Page 4-25) rely on the 1995 model predictions rather than actual measurements and conclude that (Page 4-27) most smaller particles settle within 2-3 km but Fig 4.3-2 predicts 5 km diameter oval despite prevalence of NW and E winds. These discrepancies need to be explained and perhaps reflect uncertainties in the model, which then needs explanation.

3. The effects of the dust on the vegetation along the road and rock piles have not been described for Ekati Mine and is based on literature. The measured effect on vegetation is at 6 locations within the mine (within 8 km) and thus unlikely to document the effects of dust, which the report states are most likely within 100-200 m of the roads and rock piles.

4. The area of potentially affected vegetation was not estimated and nor are there references to support the contention that the changes in plant community composition are reversible over any stated time frame (Page 4-51).

5. The assessment does not address implications of the 1998 vegetation study on lichens. In 1998, the study reported that levels of some trace metals had already increased in lichens at the Ekati Mine site compared to reference areas during the construction phase. Increased levels of Mo and Sr (p 4-24) is an effect that is dismissed as 'probably not biologically relevant' – but it is undocumented as to why not relevant and as to why "long-term residual effects negligible (p 4 – 33) – more accurate to rate effects as unknown / uncertain – also basis for statement that precipitation will remove dust from surrounding vegetation is not referenced. If the washed out dust collects in roadside seeps and pools, what happens to it then in terms of elevated trace metals?

The Proponent's conclusion that the effect of dust on vegetation is negligible does not incorporate uncertainty given the inadequate collection of data.

Recommendations

It is recommended that:

- 1) The effect of fugitive dust on vegetation along roads and rock piles should be rated as uncertain.
- 2) The Proponent should be requested to design and implement studies to measure dust deposition gradient and their effects along the roads and rock piles and use the information to validate the effectiveness of dust suppression mitigative measures.

3.3 Cumulative Impacts for Caribou – Inconsistencies and Uncertainty in Prediction of Effects

Terms of Reference

The environmental assessment report shall provide an analysis of the proposed development's impacts, (both direct and indirect), on wildlife and wildlife habitats,... The analysis of development should include: vii) disruption, blockage, impediment and sensory disturbance, of daily or seasonal wildlife movements (e.g., migration, home ranges, etc.) (ToR Lines 453-454). The report shall assess the implication of these impacts on the overall health of wildlife populations, communities and ecosystems (ToR Lines 465-466).

Summary of Concerns

1. The Proponent presents data that some caribou are responding to activities at the Ekati Mine site, however, there are inconsistencies between the data and generalized statements in the text. On page 4-138, the Proponent states that "The conclusion was that caribou responded negatively to mine disturbance in 1997 and 1998." But the summary reads that "mine-related activities *may* alter caribou behavior and activity budgets." (Page 4-214).

More cows and calf groups were observed further than 14 km from the mine in 1999 and caribou spent 15% less time feeding at the mine site than at control sites in 1997 and 1998 although not in 1999 (Page 4-138). Those results could suggest that the caribou are responding to the mine site even before the Misery Lake pit and haul road are active and any further developments occur. (Although the Proponent suggests that is the distribution of habitats and not behavioral avoidance that explains the apparent avoidance by cow-calf pairs of the area within 14 km of Ekati Mine in 1999 they did not present any analysis in support).

2. Given that construction and operational activities will be increasing and that caribou responses including reduced feeding time have been documented, it is premature to state (Page 4-163) "Such effects [of mine-related activities] will be minimal" without clarifying the uncertain nature of such predictions. (Although predictive uncertainties are acknowledged in Table 4.6-7, their sources and levels of contribution are not described in the text).

3. The assessment does not deal with uncertainties: those uncertainties imposed by the variable environment, technical uncertainties from limitations in data, statistical uncertainties and how they affect assessing caribou responses. Worst case scenarios and mitigative responses to them are not mentioned.

4. The measure of stress was whether the caribou moved but in view of the energetic approach taken for cumulative effects, it is more useful to measure interruption to foraging time rather than distance moved. It is misleading to call feeding or lying 'comfort' behavior as caribou are strongly motivated to feed and lying is part of feeding behavior (caribou chew their cud when lying). Conventionally, lying and feeding are grouped as maintenance rather than the euphemistically 'comfort' behavior. It is also unreported as to the ecological circumstances for the annual comparisons of behavioral responses (Table 4.6-3).

5. Consideration is not given to the change in the shape (vs area) of the mine's footprint relative to the main axis of caribou spring and especially postcalving migration.

6. The cumulative effects assessment relies too much on reporting Diavik's analyses rather than using the same methodology to examine rather than assume the cumulative effects from the proposed Sable-Pigeon development.

7. The assessment does not acknowledge that it is an unknown as to how much of an increase in annual energetic costs the caribou cows can accommodate before their fat levels decrease and pregnancy rates – the connection between energetics, fat reserves, pregnancy and herd increase/decrease is not explained. It is those connections or current concepts such as resilience (how much change can be buffered) that are more revealing than, for example, what proportion of the total herd is exposed. Reporting the number of caribou at Ekati Mine as a percentage of the herd (Page 4-139) as the basis for the statement that "Relatively few caribou were exposed during 1997, 1998, or 1999 (Table 4.6-4)" is misleading if the element of time is introduced. For example if the mean proportion of the herd exposed between 1997 and 1999 is 4%, then almost $\frac{3}{4}$ of the herd could

be exposed during the 18 years of the mine's life (assuming a different proportion is exposed each year - the data from the satellite collared cows could be used to estimate the likelihood of caribou returning annually to summer ranges). Reporting the projected habitat loss for cumulative land use as 0.01% of the annual range is questionable. At a minimum the comparison should be for the annual spring and summer ranges rather than the entire cumulative range for the herd and should be weighted by rates of habitat use (using BHP's data) as ecosystem units are not evenly used by the caribou. For example, the mid-June to August area used by the satellite-collared cows 1996-99 is 109,430 km² which is marginally more informative than comparing to the cumulative annual range of 250,000 km². The importance of postcalving and summer range is not adequately explained in the text. The effort in tabulating the loss of habitat by ecosystem units is disproportionate to the effort in assessing the ecological importance of those losses.

8. The assessment does not discuss the linkage between caribou activity patterns (foraging), physical condition, pregnancy, changes in herd size and thus sustainability.

The assessment significance rating of "minor" is appropriate as it recognizes that there is low prediction confidence on some effects.

Recommendation

Given that the Proponent acknowledges the importance of caribou and the low prediction confidence on some effects, their approach to cumulative effects assessment should be refined. While it is not anticipated that this will suggest significant cumulative effects from the project, it is essential that the approach be sound, use existing data and ensure adequate data collection for improving prediction confidence for future cumulative effects assessments.

3.4 Baseline Information and Impacts to Wildlife and Wildlife Habitat from Development of Eskers

Terms of Reference

The Proponent is required to provide sufficient information on the existing environment, as it pertains to the proposed development ... BHP shall clearly and succinctly describe the following environmental components, as they relate to the proposed development, and all changes to the approved Ekati Mine as a result of the proposed development: iv) wildlife and wildlife habitat, including migratory birds, v) vegetation and plant communities (ToR Lines 243-245). The environmental assessment report shall provide an analysis of the proposed development impacts, (both direct and indirect), on wildlife and wildlife habitats, ... The analysis of development should include: i) impact of loss of terrestrial habitat, and the quality of lost habitat for relevant species that was not covered in the 1995 EIS, ii) habitat loss or alteration (e.g., fragmentation, connectivity) (ToR Lines 446-448).

Summary of Concerns:

While eskers provide granular material for development they also provide important wildlife habitat. The GNWT raised initial concerns about the lack of baseline information and inadequacies in the

assessment of potential wildlife and habitat impacts from the development of the Exeter and Ursula eskers. BHP has responded with additional information including the following:

- 1) BHP will not use the Exeter esker as a granular quarry source (EAR, 2000);
- 2) BHP has withdrawn its intention to use the Ursula esker as a granular material source.

Assessment issues pertaining to the Exeter and Ursula eskers have been resolved given that BHP will not be quarrying at these eskers as part of this development. No recommendation is required.

3.5 Reclamation - Reclamation of Disturbed Areas

Terms of Reference

Describe, report and evaluate, in relation to the proposed development, the level of confidence associated with implementing and or amending or modifying the following: i) salvaging soils (volume and type) and lake bottom sediments, ii) re-establishing plant communities and a productive landscape (ToR Lines 172-176).

Summary of Concerns

The additional information response provided by BHP in July 2000 included information on habitat loss from the original Ekati Mine development and the proposed Sable, Pigeon and Beartooth expansion. BHP calculates that it can recover 16.3 million m³ of overburden from the three new kimberlite pipes. Based on an application rate of 0.3 metres of overburden, total surface area which could be covered is 1630 hectares. Given that the predicted area of disturbance is 494 hectares, the amount of overburden which can be salvaged for reclamation purposes is significant.

Recommendation

It is recommended that:

- 1) Revegetation research is continuing at Ekati Mine with long-term revegetation success largely unknown. Given the substantial amounts of lake bottom sediments and overburden that can be salvaged, BHP should make every effort possible to use this material for revegetation and restoration purposes to produce a productive landscape.
- 2) Annual reporting of habitat loss by BHP should include the three new kimberlite pipes. For regional cumulative effects monitoring of habitat loss, BHP should use RWED's land cover classification for reporting purposes.

3.6 Revegetation – The Need for Quantitative Goals for Success

Terms of Reference

Describe, report and evaluate, in relation to the proposed development, the level of confidence associated with implementing and or amending or modifying the following: ii) re-establishing plant communities and a productive landscape, iii) reclamation of containment areas, iv) reclamation of the waste (country) rock piles, v) reclamation of all-weather haul roads, vi) reclamation of the dikes (ToR Lines 176-180).

Summary of Concerns

The Environmental Assessment Report discusses ongoing revegetation research and planned approaches for revegetation and restoration. Much of what is presented in the EA Report is qualitative and therefore does not provide specific goals (i.e. quantitative goals) for revegetation success. The use of terms such as “as suitable” or “where appropriate” does not provide confidence that assisted revegetation will be carried out. Without specific targets for revegetation, its success will be difficult to measure.

Recommendation

BHP should develop specific goals for the revegetation program. The goals should be quantitative in nature to allow future monitoring to determine a measure of success.

3.7 Grizzly Bears – Predicted Impact of Roads

Terms of Reference

The environmental assessment report shall provide an analysis of the proposed development's impacts, (both direct and indirect), on wildlife and wildlife habitats,... The analysis of development should include: vii) disruption, blockage, impediment and sensory disturbance, of daily or seasonal wildlife movements (e.g., migration, home ranges, etc.), viii) rare, vulnerable, threatened or endangered species as outlined in the COSEWIC, as well as species of international significance, ix) direct wildlife mortality, x) indirect wildlife mortality, xi) reduction in wildlife productivity, xiii) displacement impacts (ToR Lines 438-463).

Summary of Concerns

1. Volume and patterns of traffic on the Sable Road

In 2009, peak haul truck volumes on the Sable road will be 99 loads/day (Page 4-144). This represents 198 one-way trips per day, or about 8.3 vehicles per hour, which excludes non-haul traffic such as buses, maintenance vehicles and other light trucks. Since traffic volume will likely vary over the course of a year, peak volumes will undoubtedly be even higher. There is no data provided on whether traffic volumes will vary at different times of the day, or during different parts of the year. Reference is made to possibly adopting a "convoying" strategy for hauling ore in some situations (Page 4-152), although no detail is provided.

In August, RWED submitted an Information Request (IR) asking BHP for additional information on: a) projected patterns of vehicle use during the construction (mid 2001 - late 2002) and during operation of the Sable road; and b) whether data obtained during construction of the Misery road might be used to predict impacts on wildlife resulting from the construction phase of the Sable road. The IR response provided little additional information to aid the analysis.

2. Have alternative strategies for hauling ore from Sable pit been fully explored?

An IR submitted by the Independent Environmental Monitoring Agency in July asked BHP to assess the viability of a winter road alternative to Sable pipe. Although the environmental benefits are significant, BHP indicated that a winter road is not economically viable. Another alternative might be to regulate the amount of seasonal traffic to Sable pit on an all weather road. For example, consideration might be given to concentrating the ore hauling activity to the 6 winter months (Nov.-April), when most of the Bathurst caribou are located to the south of Lac de Gras, and when most grizzly bears are in their dens. Not only would there be a direct benefit to wildlife, but most of the fugitive dust generated during the summer months by truck traffic would be largely avoided along the 18.4 km stretch of road linking Pigeon to Sable. Similarly, consideration might be given to scheduling the construction phase of the Sable road to the winter months in order to minimize environmental disturbance.

3. Additional cumulative effects research is needed.

In its review of the literature, the report indicates that no study has investigated the reaction of grizzly bears to large volumes of haul traffic (page 4 -147). The report points out that "avoidance of disturbance related traffic on the Sable Road has the potential to interrupt movements of resident grizzly bears and consequently force a reconfiguration of their home ranges" (page 4-158). At projected levels of use, the combined use of the Misery and Sable roads, extending 40 km in length, will likely impact the movement of wildlife, and perhaps even act as a barrier. However, there is no analysis offered to address the cumulative impact of the Sable road to resident bears.

Despite these knowledge gaps, no new research initiatives are being offered which could potentially mitigate future development. Since BHP may eventually require additional road and pit developments within their claim block, it would seem prudent for the Proponent to take a more proactive role in collecting data needed to input into cumulative effects models. In an effort to improve our understanding of how grizzly bears make use of available habitat and respond to roads, RWED recently deployed two GPS collars within BHP's claim block. GPS collar data will assist to describe activity patterns and can be used in developing mitigation to reduce the impact of vehicular traffic on resident grizzly bears.

Recommendations

It is recommended that:

- 1) The Proponent explore a range of hauling options on the proposed Sable road, in terms of daily and seasonal traffic patterns, in order to minimize impacts on grizzly bears.
- 2) The Proponent develop impact predictions and analyze the potential cumulative effects of the Sable and Misery road developments on the grizzly bear population.
- 3) The Proponent participate with the GNWT in cumulative effects research and monitoring that will address uncertainties related to the impacts of vehicular traffic on grizzly bears.

3.8 Aircraft Activity – Impact on Wildlife

Terms of Reference

The environmental assessment report shall provide an analysis of the proposed development's impacts, (both direct and indirect), on wildlife and wildlife habitats,... The analysis of development should include: iii) disturbance of feeding, nesting, denning or breeding habitats, vii) disruption, blockage, impediment and sensory disturbance, of daily or seasonal wildlife movements (e.g., migration, home ranges, etc.), viii) rare, vulnerable, threatened or endangered species as outlined in the COSEWIC, as well as species of international significance, ix) direct wildlife mortality, x) indirect wildlife mortality, xi) reduction in wildlife productivity, xiii) displacement impacts. The report should assess the implication of these impacts on the overall health of wildlife populations, communities and ecosystems (ToR Lines 438-460).

Summary of Concerns

Additional data and analysis is required to assess the potential impact of aircraft (small fixed-wing and helicopter) traffic on wildlife. The information describing aircraft traffic (Table 4.3-6) focuses on routine scheduled flights. No reference is made to other aircraft (small fixed-wing or helicopter) also operating within Ekati Mine's regional study area for other purposes (i.e. exploration, monitoring, tours) which may also impact wildlife.

In August, RWED submitted an Information Request (IR) asking BHP for additional information on the frequency and nature of small aircraft traffic operating within the regional study area. The Proponent primarily focused on the larger scheduled aircraft that land at Ekati Mine. The response did concede, however, that between May and September "helicopters generally fly on a daily basis, with the number of flights a function of the number of site visits and tours, active monitoring programs, elders surveys, and the level of caribou migration". It is this form of low level aircraft activity that needs to be quantified and analyzed as part of the assessment.

Recommendation

BHP should be required to include all forms of aircraft activity (i.e. scheduled and non-scheduled flights) in their assessment of wildlife impacts.

3.9 Wolf Dens – Effects of Sable Road on Denning Wolves

Terms of Reference

Follow up programs should focus on addressing any new concerns and environmental management questions that arise from the proposed development. Proposed follow-up programs shall be clearly described (ToR Lines 589-591).

Provide information on any proposed environmental management plans or amendments to existing environmental management plans such as air quality, water quality, materials management, wildlife, traffic, aquatic life, waste, quarry and environmental monitoring, and social, economic and cultural monitoring as required (ToR Lines 607-610).

Summary of Concerns

The proposed Sable Road passes 500m from the existing wolf den on Ursula esker. The Environmental Assessment (EA) report (page 4-159) states that because wolves are known to be sensitive to disturbance at their dens, it is possible that development of the Sable road will preclude further use of the den. However, den abandonment is likely. BHP's Conformity Response (July 2000) provides further detail on the quarry options for the Ursula esker, the additional road alignment for quarrying and its 24-hr/day operation. However, from the Information Requests and Responses report (August 2000, p.45), it is understood that the quarry options for Ursula esker have been withdrawn from consideration under this EA. The EA report also refers to the wolf pack using another den in 1999 but it did not mention that this "other" den is 7 km west of the proposed Sable pit and what potential impact might occur there.

The proposed Sable Road is expected to support 11 years of mine operation and a winter road alternative is not technically or economically feasible. However, with 121 kimberlite pipes reportedly discovered on the claim block so far and with even a small fraction of these having economic potential, there is a reasonable probability that the Sable Road could remain in service much longer. Consequently, the issue of cumulative effects of future development on the claim block can be addressed further.

BHP's EA report did not mention specifics with regard to monitoring wolves, except to refer to their adaptive management plan and that it is a "living document" which is expected to change as the need arises. Although the potential impacts to wolves are thought to be minor, there is still a dearth of information for tundra environments.

Recommendations

The following monitoring procedure outlined here is an attempt to document potential impacts of this proposed development on denning wolves. BHP's Wildlife Effects Monitoring Program (WEMP) contains some of these provisions already but consideration should be given to expanding the program if this additional development proceeds. The following procedures and rationale, presented here in chronological order for a given year, should be at least for BHP's Local Study Area (WEMP boundary), if not for their Regional Study Area (BHP claim block boundary).

- 1) Determine arrival times of wolves to den sites. Many wolves are present at their den sites by May 1st, so monitoring 1-2 weeks before then would be required. Previously active den sites can be revisited. Although den sites may not be limiting to wolves, selecting the natal den site appears important. Den sites preferred by wolves should be selected first. If dens in the Sable Road area (i.e., Zone of Influence) are selected at all, they may be occupied at somewhat later dates, assuming constant road activity.
- 2) Map wolf den site selection. Mapping den sites that wolves use will help quantify the Zone of Influence of all weather haul roads. The frequency of specific den site selection by wolves on a yearly basis will also help measure their site fidelity. Given that the number of active wolf dens in the claim block will not likely exceed 5 dens in any given year and that wolves are subject to mortality elsewhere, only major disturbances are likely to be documented (e.g., repeated occurrences of no active den sites).
- 3) Counts of pups and adults. If counted at set time intervals, estimates of pup production and wolf density on the claim block can be obtained. An early July pup count would allow an estimate of

pup production while an early September pup count would be best to estimate recruitment of pups to the pack. However, it may be difficult to locate the wolf pack at this time, so an early to mid-August pup count would be a reasonable alternative. Demonstrating that wolves can successfully raise pups on the claim block would indicate any potential impacts of mine development and operation are likely minimal. Although only 2 parents are generally required for successful pup rearing, the presence of additional adult wolves at den sites is common in the central arctic and would lend support to a claim of a healthy environment in the BHP claim block area. Keeping track of numbers of adults and coat colors also helps in identifying packs should they re-locate to another den.

- 4) Determine den site abandonment. This is difficult to do, especially for unmarked individuals, because the presence of wolves in late summer is related to the occurrence of caribou in the area. However, recent research on wolves in the BHP claim block area indicates that wolves often occupy the same den until early September. Documenting an early den site re-location or perhaps 2 or more re-locations in a single season would suggest disturbance.

If radio-collared wolves are present on the claim block then greater certainty can be obtained in the data. BHP can capitalize on this in their monitoring for den site re-locations and documenting rendezvous sites. A bi-weekly radio-tracking effort should be sufficient when these conditions exist. Locating radio-collared wolves will reveal a spatial distribution of wolf dens on the claim block that can be monitored or surveyed as in items (1) & (2) once the radio-collars are no longer present. Radio-collared wolves on the claim block and later legally harvested elsewhere can help elucidate inactive dens in successive years.

The EA report acknowledges the uncertainty of whether esker surrogates suitable for denning by wolves can be created. Consequently, impact mitigation might be problematic in this instance of supplanting wolves from their den sites unless some new information becomes available. However, mitigation in terms of route selection can be applied should future development on the claim block continue. BHP leaves this option open when they gave notice to withdraw the quarry options for the Ursula esker for this specific development.

3.10 Atmospheric Dispersion of Air Emissions

Terms of Reference

Report the impacts of the proposed development on air quality. The analysis shall include a discussion of measures considered to minimize the release of air contaminants (dust, particulate exhaust fumes and other air contaminants) The analysis should also include i) atmospheric dispersion of emissions on a local and regional scale, v) potential environmental impacts from particulate matter deposition should be addressed, e.g., dust emissions from road traffic and construction (ToR Lines 314-325).

Summary of Concerns

Air emissions from the Ekati Mine were evaluated in the 1995 Environmental Impact Statement using computer dispersion modeling. The evaluation predicted that the effects of gaseous pollutants from fuel combustion (SO_x, NO_x and CO) would be negligible. Dust from various activities was considered to be the primary concern with respect to air quality at the site. Dispersion modeling of air emissions for the proposed development was not conducted for the EAR. BHP stated that modeling done in 1995 included the increased emissions from fuel consumption as additional pits are mined. The proposed development is not considered by BHP to significantly change the earlier dispersion modeling results.

BHP monitors dust levels at two stations on the Ekati Mine site. At the main accommodations building at the mine, dust levels (measured as Total Suspended Particulate or TSP) have risen above the NWT 24 hour TSP standard on two occasions over the three years that dust monitoring has been conducted. TSP levels measured at the Grizzly Lake pumphouse are much lower and are close to baseline levels.

A snow survey was conducted by BHP in the spring of 1998 to assess if air emissions were being deposited to the ground around the mine. Samples collected four to six kilometres from the main camp had higher levels of total suspended solids than in background samples collected ten to twelve kilometres from the camp indicating that most of the dust from the mine is deposited within close range. The acidity of the snow samples was within the normal range, indicating that significant quantities of gaseous pollutants are not being deposited on the ground.

Although significant environmental effects caused by dust from the Ekati Mine have not been detected by BHP's monitoring program, dust does remain highly visible at the site. As BHP notes, the dust is generated by mining operations, blasting, roads and wind erosion of waste rock storage piles. These processes create particles which are relatively large so they settle out of the atmosphere close to the source. BHP expects that some effects to vegetation from dusting will likely occur within about 100 metres of these activities. These predicted localized effects have not been monitored.

A number of dust suppression methods have been tried by BHP but problems with dust continue, especially between April and August. Watering is the method that has proved most effective, but it requires frequent applications. Longer lasting dust suppressants are commercially available. BHP has been investigating these products but have not found one that meets their requirements. A number of factors have been identified by BHP that restrict the suitability of many commercially available dust suppressants.

Recommendations

The proposed expansion will result in additional dust emissions from traffic along the new haul roads. Although dust from the Ekati Mine is very apparent, air quality is generally good for people at the mine site. The snow survey that BHP conducted in 1998 indicates that some dust travels at least as far as four to six kilometres from sources of activity. Dust is expected to affect vegetation growing along the roadways.

Mitigation of dust along the new haul roads will make use of the same methods used on other roads at the mine. There is very little precipitation at the mine site and watering of roads is the primary dust suppression method being used at present. BHP is trying to find better methods of dust suppression. BHP has indicated that access to additional source lakes along roads would make it easier for them

to apply water more frequently. It is recommended that BHP should report regularly on the success of their dust suppression efforts, including an evaluation of the methods used.

Monitoring of dust currently conducted by BHP provides limited information for decision making. Deposition of dust has not been measured along haul roads where damage to vegetation is expected. The lack of information limits the ability to assess the effectiveness of various dust suppression methods. It is recommended that BHP increase the number of sample sites in the snow survey to better define where dust is being deposited and that snow surveys be conducted every year until effects from dust are better understood.

3.11 Greenhouse Gas Emissions

Terms of Reference

Report the impacts of the proposed development on air quality. The analysis shall include a discussion of measures considered to minimize the release of air contaminants (dust, particulate exhaust fumes and other air contaminants) The analysis should also include ii) greenhouse gas emissions including, but not limited to NO_x and SO_x (ToR Lines 314-319).

Summary of Concerns

Greenhouse gas emissions associated with the proposed Sable, Beartooth and Pigeon Expansion have been estimated at about 56.9 kilotonnes of carbon dioxide (CO₂) a year. Overall, the CO₂ emissions from Ekati Mine will not change due to the Sable, Pigeon and Beartooth development because production and associated emissions from opening the new pits replaces production from other pits that had been included in the mine plan in the 1995 Environmental Impact Statement.

The current 107.9 kilotonnes of CO₂ a year from the Ekati Mine represents approximately ten percent (10%) of the estimated total of 1090 kilotonnes emitted in the Northwest Territories (not including Nunavut) during 1996 (The first for which an NWT emissions inventory was calculated) Ekati Mine emissions will rise in future years, as increased production results in increased fuel consumption. Increased emissions are also expected from other sectors in the Northwest Territories.

BHP has stated that it believes that a conservative and proactive approach to reducing global emissions of greenhouse gases is appropriate. BHP is a member of the Steering Committee for the Strategy to Control Greenhouse Gas Emissions in the Northwest Territories and will participate in implementation of the strategy to limit greenhouse gases in the Northwest Territories.

At this time, initiatives to control greenhouse gas emissions in the Northwest Territories and the rest of Canada are voluntary. BHP is encouraged to take what steps it can to control emissions and to participate actively in implementation of the Strategy to Control Greenhouse Gas Emissions.

4 SUMMARY OF RECOMMENDATIONS

The Ekati Mine provides substantial economic benefits to the NWT through employment, business opportunities and taxes. The proposed development of the Sable, Pigeon and Beartooth pipes will extend the Ekati Mine's life by three years. The GNWT supports the development of natural resources on a sustainable basis which contributes to the social and economic well being of present and future generations. The proposed development will result in three more years of benefits to the NWT.

The EAR for the proposed development builds on the previous EIS and provides an assessment of potential impacts resulting from the proposal. While the GNWT finds the EAR to be acceptable there are uncertainties with some predictions. Consequently recommendations are offered to increase the understanding of potential impacts, improve the mitigation of negative impacts and enhance positive benefits of the proposed development. The GNWT will continue to work with BHP through the Socioeconomic Agreement and other forums to ensure maximum benefits accrue to the NWT while minimizing potential negative impacts.

The GNWT's recommendations contained within this submission are summarized below.

Socioeconomic Recommendations

1. There is uncertainty with regard to the differences and similarities between the economic impact predictions in the 1995 and 2000 assessment reports. It is therefore recommended that the Proponent revise its economic predictions based on a base 15 year mine plan (with Leslie pipe removed) and added to this the incremental impacts associated with the proposed new three pipe development, rather than analysis based on the 25 year mine plan originally considered in the EIS.
2. Consistent with the Proponent's commitment to "aggressive recruitment and advertising for job opportunities at Ekati Mine in Aboriginal and northern communities..."⁵⁵, it is recommended the Proponent be required to advertise all job opportunities in all NWT newspapers once IBA notification procedures have been fulfilled. It is also recommended that to the fullest extent possible, job ads be placed in NWT newspapers before being placed in southern newspapers.
3. Section 4.7.8 of the 2000 EAR states, "It is anticipated that as the mine life progresses, more Aboriginal and northern residents will be hired and promoted into higher skill levels. IBA hiring, recruitment, training and advancement provisions will also improve Aboriginal participation at all skill levels⁵⁶." It is also recommended that BHP set targets for northern and Aboriginal participants in higher skill level employment to demonstrate this commitment.
4. It is recommended the Proponent document the reasons for the difference between its EIS predictions and 1999 reported volume of goods and services supplied by northern businesses and review expenditure estimates to reflect the higher levels that could be anticipated in the future.
5. The GNWT recommends the Board consider a follow-up program to monitor economic and cultural impacts of the project on traditional/subsistence activities and economy.

⁵⁵ 1999 BHP Environmental Assessment Report, page 4-185

⁵⁶ BHP, 2000 EAR, page 4-187.

6. BHP and the GNWT develop a means to more closely monitor and report on the operation's effect on economic diversification, particularly in the downstream value-added sector.
7. BHP formalize its understanding with the GNWT on the supply of rough diamonds for manufacturing in the NWT, to provide a greater level of certainty that economic diversification will be maximized and negative impacts will be mitigated.
8. Monitoring of the noise levels resulting from mining operations, blasting, haul roads and any increase in air traffic associated with the Sable, Pigeon and Beartooth Pipes is recommended. Monitoring will allow comparisons with predictions made in section 4.3.2, as well as protect the health and wellbeing of those individuals living and working at the mine. If the predictions and conclusions of section 4.3.2 are found to be incorrect, future mitigation measures should be considered.
9. Mitigation measures should be used when at all possible to minimize effects on the biophysical factors, which may subsequently effect human health, such as, wildlife, air quality, water quality and vegetation. Long term adaptive management plans should be established to monitor any impacts on air quality, water quality, wildlife and vegetation. To minimize any health risks associated with exposure to hazardous materials, effective management plans are needed, such as the BHP Site and General Spill Contingency Plan, Materials Management Plan and Waste Management Plan.
10. It is recommended that approval should include conditions requiring the Proponent to complete a heritage resource impact assessment for the areas identified. Should heritage sites be uncovered then an approved mitigation plan will need to be exercised before development occurs.

Biophysical Environment Recommendations

1. It is recommended that:
 - The Proponent analyze existing data to refine projections about the likelihood that caribou will encounter the proposed structures (roads and pits).
 - The Proponent use existing data to identify and describe the sources of uncertainty in their projected effects of the structures on caribou.
 - The Proponent establish a monitoring program to assess the accuracy of projected encounter rates and projected effects.
 - The Proponent report on the use of and the effectiveness of mitigative practices.
2. It is recommended that:
 - The effect of fugitive dust on vegetation along roads and rock piles should be rated as uncertain.
 - The Proponent should be requested to design and implement studies to measure dust deposition gradient and their effects along the roads and rock piles and use the information to validate the effectiveness of dust suppression mitigative measures.

3. Given that the Proponent acknowledges the importance of caribou and the low prediction confidence on some effects, their approach to cumulative effects assessment should be refined. While it is not anticipated that this will suggest significant cumulative effects from the project, it is essential that the approach be sound, use existing data and ensure adequate data collection for improving prediction confidence for future cumulative effects assessments.

It is recommended that:

- Revegetation research is continuing at Ekati Mine with long-term revegetation success largely unknown. Given the substantial amounts of lake bottom sediments and overburden that can be salvaged, BHP should make every effort possible to use this material for revegetation and restoration purposes to produce a productive landscape.
 - Annual reporting of habitat loss by BHP should include the three new kimberlite pipes. For regional cumulative effects monitoring of habitat loss, BHP should use RWED's land cover classification for reporting purposes.
4. BHP should develop specific goals for the revegetation program. The goals should be quantitative in nature to allow future monitoring to determine a measure of success.

5. It is recommended that:

- The Proponent explore a range of hauling options on the proposed Sable road, in terms of daily and seasonal traffic patterns, in order to minimize impacts on grizzly bears.
- The Proponent develop impact predictions and analyze the potential cumulative effects of the Sable and Misery road developments on the grizzly bear population.
- The Proponent participate with the GNWT in cumulative effects research and monitoring that will address uncertainties related to the impacts of vehicular traffic on grizzly bears.

6. BHP should be required to include all forms of aircraft activity (i.e. scheduled and non-scheduled flights) in their assessment of wildlife impacts.

7. The following monitoring procedure outlined here is an attempt to document potential impacts of this proposed development on denning wolves. BHP's Wildlife Effects Monitoring Program (WEMP) contains some of these provisions already but consideration should be given to expanding the program if this additional development proceeds. The following procedures and rationale, presented here in chronological order for a given year, should be at least for BHP's Local Study Area (WEMP boundary), if not for their Regional Study Area (BHP claim block boundary).

- Determine arrival times of wolves to den sites. Many wolves are present at their den sites by May 1st, so monitoring 1-2 weeks before then would be required. Previously active den sites can be revisited. Although den sites may not be limiting to wolves, selecting the natal den site appears important. Den sites preferred by wolves should be selected first. If dens in the

Sable Road area (i.e., Zone of Influence) are selected at all, they may be occupied at somewhat later dates, assuming constant road activity.

- Map wolf den site selection. Mapping den sites that wolves use will help quantify the Zone of Influence of all-weather haul roads. The frequency of specific den site selection by wolves on a yearly basis will also help measure their site fidelity. Given that the number of active wolf dens in the claim block will not likely exceed 5 dens in any given year and that wolves are subject to mortality elsewhere, only major disturbances are likely to be documented (e.g., repeated occurrences of no active den sites).
 - Counts of pups and adults. If counted at set time intervals, estimates of pup production and wolf density on the claim block can be obtained. An early July pup count would allow an estimate of pup production while an early September pup count would be best to estimate recruitment of pups to the pack. However, it may be difficult to locate the wolf pack at this time, so an early to mid-August pup count would be a reasonable alternative. Demonstrating that wolves can successfully raise pups on the claim block would indicate any potential impacts of mine development and operation are likely minimal. Although only 2 parents are generally required for successful pup rearing, the presence of additional adult wolves at den sites is common in the central arctic and would lend support to a claim of a healthy environment in the BHP claim block area. Keeping track of numbers of adults and coat colors also helps in identifying packs should they re-locate to another den.
 - Determine den site abandonment. This is difficult to do, especially for unmarked individuals, because the presence of wolves in late summer is related to the occurrence of caribou in the area. However, recent research on wolves in the BHP claim block area indicates that wolves often occupy the same den until early September. Documenting an early den site re-location or perhaps 2 or more re-locations in a single season would suggest disturbance.
 - If radio-collared wolves are present on the claim block then greater certainty can be obtained in the data. BHP can capitalize on this in their monitoring for den site re-locations and documenting rendezvous sites. A bi-weekly radio-tracking effort should be sufficient when these conditions exist. Locating radio-collared wolves will reveal a spatial distribution of wolf dens on the claim block that can be monitored or surveyed as in items (1) & (2) once the radio-collars are no longer present. Radio-collared wolves on the claim block and later legally harvested elsewhere can help elucidate inactive dens in successive years.
 - The EA report acknowledges the uncertainty of whether esker surrogates suitable for denning by wolves can be created. Consequently, impact mitigation might be problematic in this instance of supplanting wolves from their den sites unless some new information becomes available. However, mitigation in terms of route selection can be applied should future development on the claim block continue. BHP leaves this option open when they gave notice to withdraw the quarry options for the Ursula esker for this specific development.
- 8 The proposed expansion will result in additional dust emissions from traffic along the new haul roads. Although dust from the Ekati Mine is very apparent, air quality is generally good for people at the mine site. The snow survey that BHP conducted in 1998 indicates that some dust travels at least as far as four to six kilometres from sources of activity. Dust is expected to affect vegetation growing along the roadways.

Mitigation of dust along the new haul roads will make use of the same methods used on other roads at the mine. There is very little precipitation at the mine site and watering of roads is the primary dust suppression method being used at present. BHP is trying to find better methods of dust suppression. BHP has indicated that access to additional source lakes along roads would make it easier for them to apply water more frequently. It is recommended that BHP should report regularly on the success of their dust suppression efforts, including an evaluation of the methods used.

Monitoring of dust currently conducted by BHP provides limited information for decision making. Deposition of dust has not been measured along haul roads where damage to vegetation is expected. The lack of information limits the ability to assess the effectiveness of various dust suppression methods. It is recommended that BHP increase the number of sample sites in the snow survey to better define where dust is being deposited and that snow surveys be conducted every year until effects from dust are better understood.