

EA-SnapLake

gjt- Rec'd via
e-mail Feb 14/03

From: Janet Hutchison [jhutchison@nucleus.com]
Sent: Friday, February 14, 2003 12:31 PM
To: Colleen English; EA-SnapLake; Tim Byers
Cc: Bridgette Larocque; 'Buddy Williams (E-mail)' (E-mail); 'CARC (E-mail)' (E-mail); 'Chamber of mines ED (E-mail)' (E-mail); 'Chris (E-mail)' (E-mail); 'Chuck. Blyth (E-mail)' (E-mail); 'CPAWS (E-mail)' (E-mail); 'Dawn' Kelly (E-mail); 'Dennis Bevington (E-mail)' (E-mail); 'DFO David (E-mail)' (E-mail); 'DFO Marc Lange (E-mail)' (E-mail); 'Doug Soloway (E-mail)' (E-mail); 'Ecology North (E-mail)' (E-mail); 'Eric Denholm (E-mail)' (E-mail); 'Fairman Fraser (E-mail)' (E-mail); 'Football Adeline (E-mail)' (E-mail); 'Galbraith Empson (E-mail)' (E-mail); 'Gavin More (E-mail)' (E-mail); 'General MVLWB (E-mail)' (E-mail); 'Glenda Fratton (E-mail); 'Golder Green Leslie (E-mail)' (E-mail); 'Golder Machtans Hillary (E-mail)' (E-mail); 'Government Akaitcho (E-mail)' (E-mail); 'Health Canada 2 (E-mail)' (E-mail); 'J. Michael Thoms NSMA (E-mail)' (E-mail); 'Jagtar Sandhu (E-mail)' (E-mail); 'Jason Lepine (E-mail); 'Jason McNeill (E-mail); 'Jennifer Keith (E-mail)' (E-mail); 'Joan Freeman (E-mail)' (E-mail); 'John Donihee (E-mail)' (E-mail); 'John Donihee (E-mail2)' (E-mail); 'John McConnell; 'John Ramsey (E-mail); 'Judy Langford; 'Julie Dahl (E-mail)' (E-mail); 'Kevin LeDrew; 'Letha MacLachlan letha (E-mail)' (E-mail); 'Lisa Best (E-mail); 'LKDFN Wildlife Lands Environment Cttee (E-mail)' (E-mail); 'Lutsel K'e Dene First Nation (E-mail)' (E-mail); 'Lutselk'e Agatha (E-mail)' (E-mail); 'Mark Dahl (E-mail)' (E-mail); 'Mary Tampsell (E-mail)' (E-mail); 'Matt Bender (E-mail)' (E-mail); 'Mike Fournier [Yel] (E-mail)' (E-mail); 'Morison Steve (E-mail)' (E-mail); 'Nick Lawson (E-mail)' (E-mail); 'NSMA Bob Turner (E-mail)' (E-mail); 'Nunavut Impact Review Board (E-mail)' (E-mail); 'Rachel Crapeau (E-mail); 'Rae-Edzo Metis Local #64 (E-mail)' (E-mail); 'Robin Johnstone; 'Roland Semjanovs; 'Roy Ellis (E-mail)' (E-mail); 'S. Kristyn (E-mail)' (E-mail); 'Sierra Legal Defence Fund (E-mail 2)' (E-mail); 'Stephen Harbicht (E-mail)' (E-mail); 'Steve Mathews (E-mail)' (E-mail); 'Steve Wilbur (E-mail)' (E-mail); 'Sue I. (E-mail)' (E-mail); 'Tamara Hamilton (E-mail)' (E-mail); 'Tony Pearse (E-mail)' (E-mail); 'Vern Christensen, Executive Director; 'Wha Ti First Nation (E-mail)' (E-mail); 'William (Bill) Carpenter (E-mail)' (E-mail); 'WWF - Peter J. Ewins (E-mail)' (E-mail); 'WWF Tony Y. (E-mail)' (E-mail)
Subject: NSMA Technical Reports - 51163-JLH



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Ms. Hutchison asked me to forward the two technical reports being submitted by the NSMA. If there are any difficulties receiving these reports, please contact me directly at 780-423-3661 ext. 232, as Ms. Hutchison will be in meetings for the remainder of the afternoon.

Thank you,

Angela Bourne
Legal Assistant

-----Original Message-----

From: Colleen English [mailto:colleen.english@ca.debeersgroup.com]
Sent: Friday, February 14, 2003, 10:11 AM
To: 'EA-SnapLake'; Tim Byers
Cc: Bridgette Larocque; 'Buddy Williams (E-mail)' (E-mail); 'CARC (E-mail)' (E-mail); 'Chamber of mines ED (E-mail)' (E-mail); 'Chris (E-mail)' (E-mail); 'Chuck. Blyth (E-mail)' (E-mail); 'Colleen English; 'CPAWS (E-mail)' (E-mail); 'Dawn' Kelly (E-mail); 'Dennis Bevington (E-mail)' (E-mail); 'DFO David (E-mail)' (E-mail); 'DFO Marc Lange (E-mail)' (E-mail); 'Doug Soloway (E-mail)' (E-mail); 'Ecology North (E-mail)' (E-mail); 'Eric Denholm (E-mail)' (E-mail); 'Fairman Fraser (E-mail)' (E-mail); 'Football Adeline (E-mail)' (E-mail); 'Galbraith Empson (E-mail)' (E-mail); 'Gavin More (E-mail)' (E-mail); 'General MVLWB (E-mail)' (E-mail); 'Glenda Fratton (E-mail); 'Golder Green Leslie

(E-mail) ' (E-mail); 'Golder Machtans Hillary (E-mail) ' (E-mail);
 'Government Akaitcho (E-mail) ' (E-mail) ' (E-mail); 'Health Canada 2
 (E-mail) ' (E-mail); 'J. Michael Thoms NSMA (E-mail) ' (E-mail);
 'Jagtar_Sandhu (E-mail) ' (E-mail); 'Janet Hutchison (E-mail) (E-mail) '
 (E-mail); Jason Lepine (E-mail); Jason McNeill (E-mail); 'Jennifer Keith
 (E-mail) ' (E-mail); 'Joan Freeman (E-mail) ' (E-mail); 'John Donihee
 (E-mail) ' (E-mail); 'John Donihee (E-mail2) ' (E-mail); John McConnell;
 John Ramsey (E-mail); Judy Langford; 'Julie Dahl (E-mail) ' (E-mail);
 Kevin LeDrew; 'Letha MacLachlan letha (E-mail) ' (E-mail); Lisa Best
 (E-mail); 'LKDFN Wildlife Lands Environment Ctte (E-mail) ' (E-mail);
 'Lutsel K'e Dene First Nation (E-mail) ' (E-mail); 'Lutselk'e Agatha
 (E-mail) ' (E-mail); 'Mark Dahl (E-mail) ' (E-mail); 'Mary Tampsell
 (E-mail) ' (E-mail); 'Matt Bender (E-mail) ' (E-mail); 'Mike Fournier
 [Yel] (E-mail) ' (E-mail); 'Morison Steve (E-mail) ' (E-mail); 'Nick
 Lawson (E-mail) ' (E-mail); 'NSMA Bob Turner (E-mail) ' (E-mail);
 'Nunavut Impact Review Board (E-mail) ' (E-mail); Rachel Crapeau
 (E-mail); 'Rae-Edzo Metis Local #64 (E-mail) ' (E-mail); Robin
 Johnstone; Roland Semjanovs; 'Roy Ellis (E-mail) ' (E-mail); 'S. Kristyn
 (E-mail) ' (E-mail); 'Sierra Legal Defence Fund (E-mail 2) ' (E-mail);
 'Stephen Harbicht (E-mail) ' (E-mail); 'Steve Mathews (E-mail) '
 (E-mail); 'Steve Wilbur (E-mail) ' (E-mail); 'Sue I. (E-mail) '
 (E-mail); 'Tamara Hamilton (E-mail) ' (E-mail); 'Tony Pearse (E-mail) '
 (E-mail); Vern Christensen, Executive Director; 'Wha Ti First Nation
 (E-mail) ' (E-mail); 'William (Bill) Carpenter (E-mail) ' (E-mail); 'WWF
 - Peter J. Ewins (E-mail) ' (E-mail); 'WWF Tony Y. (E-mail) ' (E-mail)
 Subject: WTP Alternatives Selection and Comparison

I am forwarding this report on behalf of Glenda Fratton, MVEIRB, as she is experiencing problems with her e-mail. My apologies to those of you who receive this twice as I only sent it to half the distribution list last time.

Please see attached, and call if you have any questions.

Thank-you,
 Colleen English
 Environmental Scientist
 De Beers Canada Mining Inc.
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 Fax: (867) 766-7347

and

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14 February 2002

**Re: NSMA's Technical Report on Social, Cultural, and Economic Issues
Prepared by J. Michael Thoms**

The North Slave Métis Alliance (NSMA) requested I review the DeBeers' EAR and related Information Responses (IRs) to identify the social, cultural, and economic impacts the NSMA is predicted to experience and assess the certainty that DeBeers' proposed mitigation measures will offset these effects. I am a social science researcher with experience conducting research about aboriginal social, health, economic, and cultural issues through funding from various First Nations, Health Canada, Corrections Canada, and DIAND.

I must stress that many of the issues I identify are not questions of interpretation of specific datasets, but represent concerns with De Beers' fundamental methodology, and in most cases, the complete absence of data. My comments also contain general references to the duty to consult. I expect the latter issue will be more fully canvassed by the NSMA's legal counsel.

As requested, I present each issue in the format suggested by the MVEIRB. These issues are:

- 1) Cultural and heritage resources
- 2) Facilitation and collection of NSMA TK
- 3) The NSMA's existing subsistence economy
- 4) The NSMA economy
- 5) NSMA housing
- 6) NSMA infrastructure
- 7) NSMA language use
- 8) Mine production rate
- 9) Public consultation
- 10) Resource use, spatial boundaries, cumulative effects

The attached pages contain my comments on all issues identified.

J. Michael Thoms

Specific comment # 1.**1. Reference 2.7.1 Culture and Heritage Resources. ToR line #438-441.****Developer's Conclusion**

At the MVEIRB pre-technical hearing on 8 November 2002, De Beers acknowledged before officers of the MVEIRB that it erred when it did not consider potential impacts of the project on Métis archeological resources. De Beers also acknowledged that it did not consider whether the artifacts located at the site represented Métis heritage and history in the NWT. At this meeting, De Beers committed to a re-analysis of the artifacts to determine if they contribute to knowledge about Métis heritage in the NWT.

My conclusion

Potential contributions to knowledge about Métis heritage have not been assessed. De Beers' has not fulfilled this ToR requirement or its commitment made on 8 November 2002. It is impossible to assess the impacts on the NSMA's cultural resources without this data.

Evidence

The evidence is De Beers' own acknowledgement.

Recommendation

De Beers re-analyze the artifacts for its potential contributions to knowledge about Métis heritage. De Beers commit to NSMA participation in ongoing and future archeological work related to its project. These actions must be taken immediately so that the NSMA can make informed decisions about project impacts on their heritage. Failure to act on these requirements will create considerable uncertainty about these impacts on the NSMA.

Specific comment # 2.**2. Reference 2.2.2. Facilitation and Collection of NSMA TK. ToR line #45-55.****Developer's Conclusion**

At the MVEIRB pre-technical hearing on 8 November 2002, De Beers acknowledged before officers of the MVEIRB that it did not facilitate the NSMA's collection of TK. At this meeting, De Beers committed to the establishment and funding of a TK program with the NSMA.

My conclusion

The NSMA first identified this issue on 13 April 2002 in its report on "De Beers' conformity with the ToR". The NSMA in collaboration with the MVEIRB again identified this issue in IR 3.11.2. On 8 November 2002, Beers' acknowledged its failure to complete this ToR requirement and committed to immediately fund the NSMA efforts to collect this information. De Beers' failure to act promptly has prevented the NSMA from contributing TK to the project design as required in the ToR. Continued failure will prevent the NSMA from: 1) making TK contributions to ongoing environmental predictions, 2) contributing to the knowledge base for monitoring the mine's impacts over time.

Evidence

The evidence is De Beers' own acknowledgement.

Recommendation

De Beers implement its commitment to facilitate and fund the NSMA's collection of their TK.

Specific comment # 3**3. The NSMA's existing subsistence economic environment. ToR line #471****Developer's conclusions**

The developer provided data on the traditional land use of Lutsel K'e (EA 5-51), Gameti (5-56), Rae-Edzo (5-61), Wha Ti (5-66), Wekweti (5-71), Dettah (5-75), and Yellowknife and N'Dilo (5-79). De Beers made no effort to provide comparable data regarding the NSMA (5-81). Although De Beers provided some basic data on other aboriginal communities, it did not analyze this data. De Beers does not, for instance, attempt to explain factors that account for higher subsistence harvesting in some communities than others. This analysis may inform mitigation and enhancement strategies. De Beers does not outline factors that may positively or negatively impact the subsistence economy of the NSMA. De Beers provides no concrete plans on how to work with the NSMA to ensure that its subsistence economy is enhanced and protected from negative impacts.

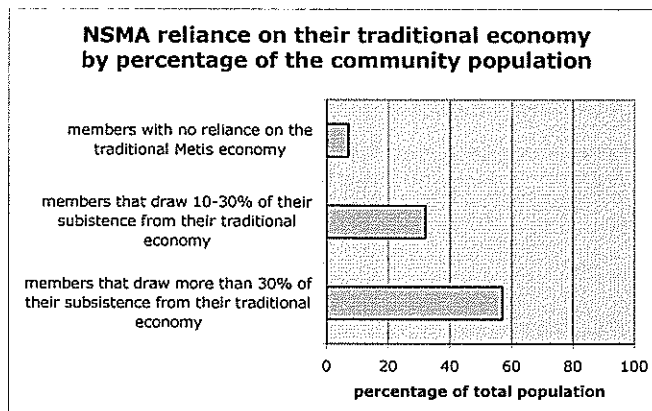
My conclusion

The NSMA has a strong subsistence economy and participation rate in traditional land use activities (see evidence below). The NSMA wants to protect this economy and traditions. In the SEIA literature, there is no reliable evidence that aboriginal subsistence economies can be blended successfully with wage-based, rotational work schedules. My conclusion is that the impact on the wage employment impacts on subsistence economic activity is uncertain. De Beers has not conducted sufficient analysis of the available data to determine how aboriginal subsistence economies can best be protected from negative impacts or how the impacts will be monitored.

Evidence

The NSMA has a vibrant traditional subsistence economy. In addition to the fact that many members hunt and fish for their family's subsistence, cultural norms in the community dictate that catches are shared within the community. The NSMA actively manages aspects of this economy with harvester subsidies. It also organizes community hunts after which food is processed and stored for distribution to elders, persons with disabilities, and others, to ensure these members supplement their nutrition with country foods.

The NSMA surveyed a representative sample of total community population regarding their land use activities and reliance on the traditional Métis subsistence economy. Fifty-seven percent of the community obtains over 30% of its subsistence foodstuffs from this economy. Only 7% of the community has no reliance on the traditional economy.



In terms of land use, 88% of the sample reported that they participate in traditional land use activities throughout a single year. These activities include hunting, fishing, drying and curing food, berry-picking, and trapping. Forty-two percent of the sample reported that they spend over 2 months on the land during the year. Sixty-two percent reported over one month of land use during a year.

De Beers has not analyzed this type of data. De Beers needs to understand how this informal economy functions and ensure that it will not be impacted. Questions need to be answered. What happens when community hunters exit their traditional economy to pursue wage work? What will be the effects on Métis health if this economy collapses? What will be the effect on Métis spiritual and emotional health if land use activities decrease? How might increased land use improve Métis community “healing” from adverse social and cultural impacts experienced during the 20th century?

My conclusion is that De Beers has not analyzed or tried to understand the NSMA traditional economy and its links to community health and wellness. De Beers is therefore unable to predict effects and propose concrete mitigation measures if necessary.

Failure to understand the Métis’ traditional economy could lead to impacts on cultural survival, individual health, and stresses on the wage economy and social cohesion of the community.

Recommendation

Further analysis is necessary to create certainty that the wage economy will not negatively impact the NSMA's traditional economy, social cohesion, and member health and wellness. De Beers possesses sufficient data on the traditional activities of many aboriginal nations and now must analyze it, predict impacts, propose mitigation measures if necessary, and establish reliable monitoring protocols to determine if this economy changes over time.

Specific comment # 4**4. NSMA Economy, ToR lines 229, 459-470****Developer's conclusions**

Here, I review De Beer's conclusions and commitments to understanding the NSMA's current employment, skill, and education levels. This knowledge is important for three reasons. First, that a recruitment program be developed specific to the NSMA to create certainty over what numbers of members are qualified for employment. Second, that training and education programs be initiated for members so that they are skilled and qualified for employment before trained southerners are sought for employment. Third, that a baseline of knowledge on the current employment, education, and skill levels of the community be developed before the mine is approved so that changes in the baseline economic conditions of the NSMA community can be traced over time.

On 27 February 2001, the NSMA requested De Beers "carry out a survey to identify who would be interested in working in underground mining and then train them." De Beers committed: "comprehensive recruitment and training programs are being developed (EAR appendix IV.1-23)."

Also on 27 February 2001, the NSMA informed De Beers: "Many of our people want to work for you. De Beers needs a more aggressive training program, so that we can compete with southerners. Training should be started during, and as part of the operation phase." Again, and remember this was two years ago, De Beers confirmed it was developing recruitment and training programs (EAR appendix IV.1-23).

Also on 27 February 2001, De Beers acknowledged the NSMA's "concern expressed about youth becoming involved in the project, in terms of education, training and employment." De Beers committed to work with the NSMA on these education and training needs for youth (EAR appendix IV.1-23).

Despite the NSMA identification of the need for a survey of its existing members skills, education, and employment potential, prior to the release of the EAR, De Beers did not describe the existing wage economy, skills, and barriers to employment of the NSMA in its EAR (EA 5-81). The ToR required this information (line 229).

In its EAR, De Beers repeated its committed to the optimization of each community's capacity to make the most of potential economic opportunities, through the identification of each community's skill levels, educational needs, and identification of barriers to employment from which recruitment, training, and business programs could be developed with each community. De Beers committed that it would start this work in the "next months" after the release of its EAR. De Beers has yet to do any such work with the NSMA.

De Beers' failure to survey the NSMA community and understand its employment, education, and skill levels to date has caused the loss of 2 years of time in which NSMA members could have been training for work at the mine and be prepared to compete with southerners.

In terms of monitoring, De Beers concluded that it will: "monitor socio-economic indicators that pertain to the areas of socio-economic effects..." (EAR section 5.3.6). De Beers' failure, however, to describe the existing economy of the NSMA (ToR line 229) means that De Beers is unable to monitor and trace impacts on the NSMA economy over time.

Over the last year, the NSMA provided De Beers with community-based economic data to assist De Beers with the development of recruitment and training programs designed to meet the unique economic conditions of the NSMA (the data presented to De Beers is replicated below on pages 9 to 12). The data reveal that the NSMA's economic environment differs in key respects from other aboriginal communities, emphasizing the fact that a generic recruitment and training program will not optimize economic opportunities, mitigate harm, or increase community capacity unless it is specific to the circumstances of each community. De Beers has made no effort to analyze this data and work with the NSMA to develop community-specific programs, mitigation measures, and monitoring protocols.

My conclusion

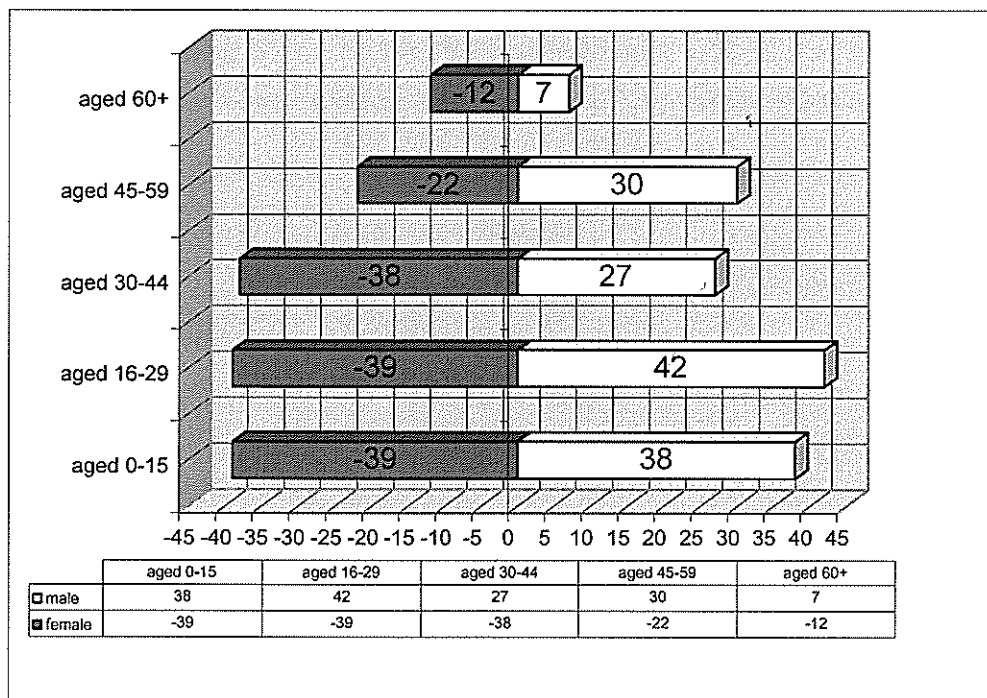
It is essential that De Beers understand the existing employment skills, and education levels of the NSMA community so that accurate predictions of employment levels can be made. More importantly, De Beers must assess the skills and education levels in the

community in order to implement training programs immediately to fulfill its commitment to hire as many northern workers as possible and increase skill capacity within the NSMA community. Only once this data is collected and analyzed can education, recruitment, and training programs be developed and create certainty that De Beers will meet its commitment to hire aboriginal workers and increase community capacity.

Evidence

The NSMA surveyed the total population of the NSMA community (n= 294) to collect the following economic data.

Figure 1: sex and age distribution of the total NSMA population

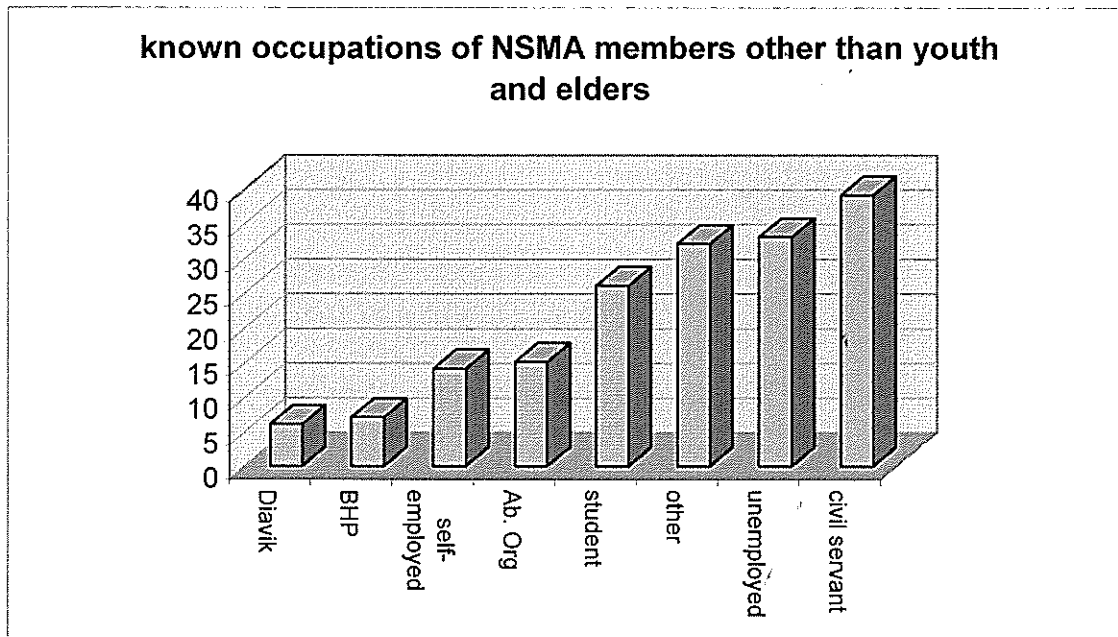


Overall, the NSMA population is young. Over a quarter (26%) of the population is under the age of 15. It is clear that this sector of the population requires information on employment opportunities at the mine and that counseling programs be offered regarding career choices and educational needs so that this youth can make informed decisions about their future opportunities within the NWT.

Half the NSMA population is between the ages of 16 and 29. Once again, this number represents a large potential workforce who require potential career information and access to education and training programs so that, if they desire, they can be prepared for employment at the mine before competition opens to southerners.

Figure 2 illustrates the current occupations of NSMA members other than elders, and youth.

Figure 2



Current occupations:

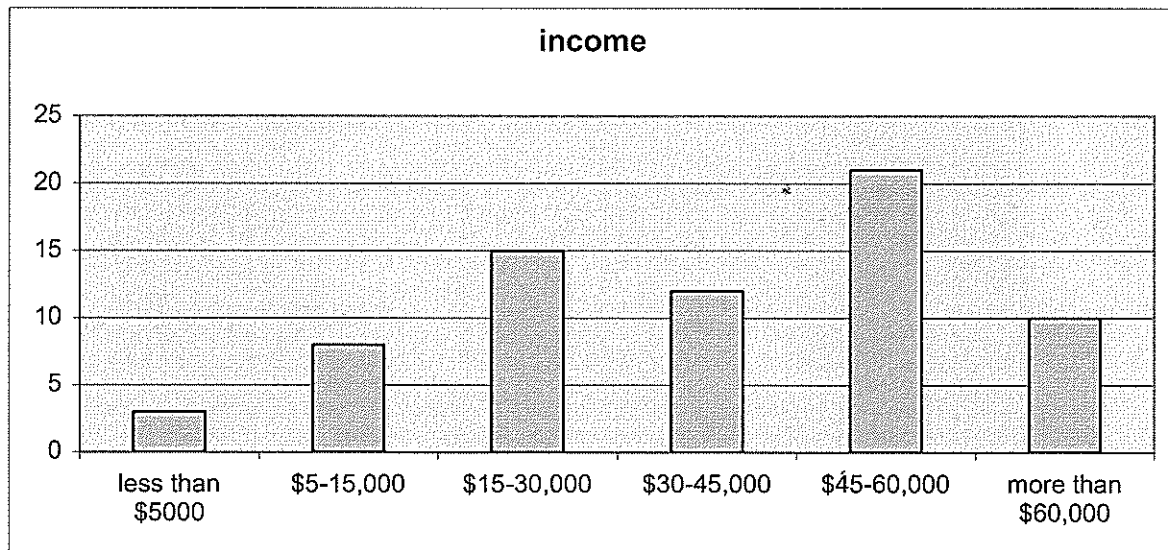
Twenty-eight percent of the NSMA population is employed in the civil service and 11% work for aboriginal governments. De Beers EAR focuses on labour employment, yet the data suggest a large number of NSMA members possess managerial and office-based skills. It is unknown what types of managerial skills are available to NSMA members at De Beers and what types of training and education upgrades will De Beers provide? De Beers will also need to assess the impacts on community capacity if its members employed in aboriginal government seek employment with the mine.

BHP and Diavik employ 9% of the NSMA membership.

Ten percent of NSMA members are self-employed and possess welding, carpentry, aviation, electrical, and food preparation skills. De Beers has not assessed if these skills can be transferred to their operations if it is desired.

Is this employment adequate?

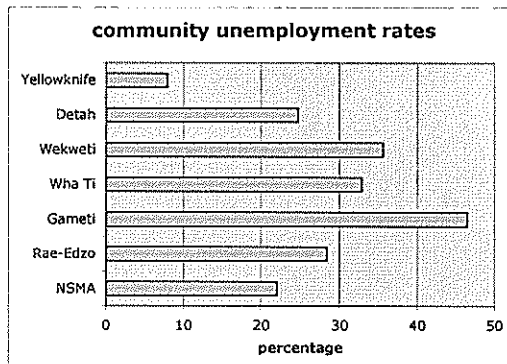
Forty-three percent of NSMA households are dependent on a single income. The next figure shows that average NSMA family incomes are low and inadequate.



The majority of NSMA members earn between \$45 and \$60,000 a year. A significant number of families report that their current income fails to meet their financial needs. Developing employment with an adequate income is important to the NSMA community and family well-being.

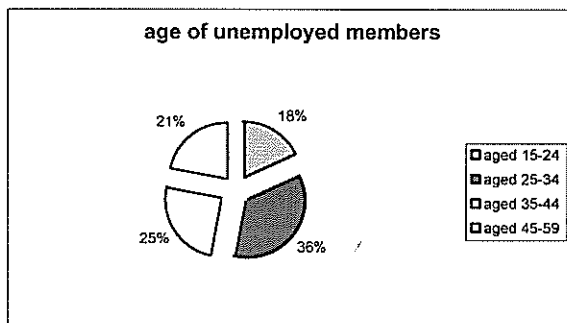
Unemployed membership

Twenty-two percent of the NSMA population is unemployed. This number is significantly higher than the national average and the average for Yellowknife. The next figure compares this number to other affected communities.



Based on this employment and occupation data, it is clear that the NSMA has an unemployment level (22%) significantly higher than the national average. Developing employment opportunities for this segment of the NSMA population is critical to its well-being.

The next figure breaks down the age of unemployed members of the NSMA. Thirty six percent are between the ages of 25 and 34. This number suggests that many unemployed members may be interested in training and education opportunities to build a career with De Beers. In terms of gender, 45% are women and 55% are men. New employment opportunities should therefore consider jobs for both NSMA men and women.



It is important to consider whether NSMA members find their employment adequate and personally satisfying? A representative sample of NSMA members were asked about their job satisfaction. The data suggest that few members find their

employment to be “very” satisfying, while majority are satisfied or describe their work as “acceptable”



The sample was also asked about their satisfaction with employment opportunities in their region. Half the sample was “satisfied”, but an almost equal portion were dissatisfied or very dissatisfied.



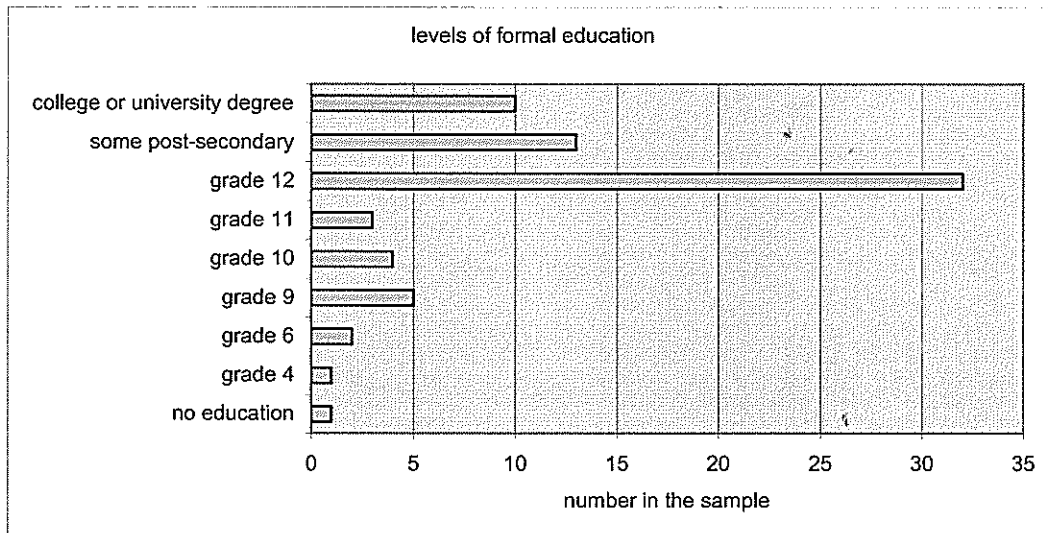
Job satisfaction is important for community and individual wellness.

It is critical that mine related jobs be satisfying or members of the community will seek employment outside of the NWT. All members of the NSMA have close ancestral ties to the North Slave Region, but for a variety of reasons, especially the search for employment or an education, 61% of the sample left the region for a period of time. Members reported that they returned to the region because they wanted to be closer to their family. The message is clear. Members prefer to find employment in the region as it is their homeland and place of their relatives, but satisfactory employment / career opportunities are lacking.

De Beers has not explained how it will determine factors of job satisfaction to keep skilled aboriginals in the North. How will De Beers provide satisfying employment?

Education

The NSMA surveyed the education levels of a representative sample of the population.



The data reveal that a significant majority of the NSMA membership completed grade 12 and that a significant portion have attended or completed a university or college degree. The lowest levels of educational achievement are reported among elders and persons born before 1948. Attaining a formal education appears to be very important to Métis. Only 4% of the sample is "very satisfied" with their education. 37% are satisfied and 29% felt their formal education achievement was "acceptable". A full 32% are "dissatisfied" or "very dissatisfied" with their education.

Barriers to employment

Most members sampled indicate that they would enroll in further educational programs to build their skills and acquire a preferred form of employment. There are, however, significant barriers to Métis educational upgrading. 46% of the sample reported that finances or small children prevented them from accessing the education services they desire. It is crucial that any training and education opportunities related to the mine include funding programs and culturally appropriate and affordable daycare.

Students:

Nineteen percent of the NSMA membership is enrolled in school. Nearly half of these students are between the ages of 15 and 24 while the other half is between the ages of 25 and 34. A large majority of the students are women (65%).

Developing meaningful employment for these students, once they graduate, is critical to the community's well being. The mining industry presents many new and important opportunities for Métis employment. Currently, 10% of NSMA workers are employed in the diamond industry. The NSMA expects to develop meaningful employment for the 45% of its population under the age of 25, especially those under the age of 18 who can enroll in university and college training programs to develop skills necessary for such employment. The identification of future satisfying employment opportunities with the mining industry and development of training and education programs is critical to meeting this goal.

Recommendation

It is my conclusion that: to meet the requirements of the ToR, its own commitments, and create certainty regarding the economic effects of the project on the NSMA community.

De Beers must:

- 1) use the NSMA's community-based data to develop the necessary training, education, and recruitment programs that meet the specific needs of the community.
- 2) work with the NSMA to ensure that proper baseline data is in place and monitoring protocols are developed before the project is approved so that deviations in the NSMA economic baseline may be traced.

Specific comment # 5**5. NSMA Housing, ToR line 228****Developer's conclusion**

De Beers recognizes there is a chronic housing shortage and high levels of overcrowding in aboriginal communities (EAR: 5-52, 5-57, 5-63, 5-67, 5-72, 5-76, 5-80). De Beer's recognizes that housing conditions are linked to individual and community health (EAR section 5.2.2.5). De Beers states that housing upgrades are required and more housing units are needed within the affected communities (5-102). De Beers did not describe the existing housing environment of the NSMA community. De Beers produced no data on housing conditions and crowding in the NSMA community.

My conclusion

Without baseline data on the adequacy of housing and levels of crowding in the NSMA community, it is impossible to understand the existing housing environment of the NSMA. This data gap makes predictions about impacts on individual and community health impossible. No baseline data exists for monitoring changes in the NSMA housing environment and for the analysis of links between housing conditions and individual health and community wellness.

Evidence

There is no NSMA housing data in the EAR (section 5.2.3.9)

Recommendation

De Beers and the NSMA immediately develop a survey of existing housing conditions in the NSMA using universally accepted indicators. The absence of this data makes it impossible to determine what the adverse impacts on NSMA housing conditions will be. Once data is collected, how will the adequacy of NSMA housing be mitigated, if necessary?

Specific comment # 6**6. NSMA infrastructure, ToR line 231****Developer's conclusions**

De Beers does not describe the existing infrastructure environment of the NSMA as required in the ToR line 231.

My conclusion

The NSMA represents an indigenous Métis community that delivers services and holds the same governmental responsibilities as other aboriginal communities in the NWT. Unlike other communities, the NSMA receives no core funding from government. This critical variable requires analysis. It appears likely that the NSMA will not be able to adapt to changes on the same plane as other communities because it does not possess the same resources and infrastructure. De Beers has not determined how this infrastructure variable regarding the NSMA affects the community's resiliency and ability to adapt. De Beers' predictions about positive community impacts are uncertain in the case of the NSMA given this key variable.

Evidence

There is no review of NSMA infrastructure in section 5.2.3.9 of the EAR.

Recommendation

De Beers and the NSMA determine how the capacity of the community can be equalized to other communities to ensure the NSMA has the same resiliency and ability to adapt to change. The absence of this data makes it impossible to determine what the NSMA resiliency and ability to adapt to change is. Once data is collected, how will the adequacy of NSMA infrastructure be mitigated, if necessary?

Specific comment # 7**7. NSMA language use, ToR line 441****Developer's conclusions**

De Beers reached no conclusion about anticipated or possible changes to the NSMA's use of their indigenous Métis language: *Michif*.

My conclusion

The NSMA represents an indigenous Métis community. The indigenous language of this unique culture is *Michif*. *Michif* is an endangered language in all Métis homelands across Canada. The anticipated or possible changes in the NSMA's use of *Michif* are unknown and must be assessed.

Evidence

The NSMA surveyed a representative sample of the NSMA community to determine the level of *Michif* use in the community. The language is well known and spoken by NSMA elders but due to residential schooling, cultural shame induced by non-Native racism, the absence of modern *Michif* language schooling, and the absence of *Michif* in the workplace, the language has not passed successfully to younger generations. The NSMA survey found that 15% of the community currently speaks *Michif*. This number is low and the retention of the language is threatened.

Recommendations

De Beers needs to determine the anticipated or possible changes to the NSMA's use of *Michif* as a result of their project. The absence of this data makes it impossible to determine what the adverse impacts on NSMA language use and retention will be. Once data is collected, how will the issues of *Michif* protection be mitigated, if necessary? A significant majority of NSMA members indicate a strong interest in learning *Michif*. I recommend the NSMA and De Beers develop a *Michif* language program as part of De Beers mitigation protocols regarding affects of the project on NSMA heritage.

Specific comment # 8**8. mine production rate, ToR line 195****Developer's conclusion**

I understand De Beers recently committed to a production rate of 3000 tpd at Day 1 of the technical sessions in order to ensure a mine life of 25 years or more.

My conclusion

I agree with the conclusion of Gartner Lee Limited that "changes to the production rate have impacts on the mine life, socio-economic of the project and the proposed mine site facilities" (GLL report to MVEIRB 1 November 2002). I therefore agree that a 3000 tpd should not be deviated from.

Evidence

The NSMA, GLL, DIAND, and GNWT all expressed concern that mine production rates be confirmed. GLL stated: "confirmation of the production rate will provide more certainty and less conjecture to the components of the project being considered in the EA" (ibid). Any potential for De Beers to change mine rates during production jeopardizes all predictions and mitigation measures in the EAR.

Recommendation

The Board state De Beers' tpd commitment of 3000 tpd and impose a condition on approval that this tpd not be exceeded.

Specific comment # 9

9. public consultation, ToR line 23-41

Developer's conclusion

In its EAR, De Beers described its consultation methodology and claimed that it was implemented successfully.

My conclusion

In my pre-technical report of 13 November 2002, I identified concerns about whether De Beers adhered to its consultation methodology. I also have concerns about whether government and De Beers are meeting their obligations pursuant to the duty to consult. I understand that the NSMA's legal counsel will deal more comprehensively with the issue of the failure to consult

Evidence

I provided my evidence in my 13 November 2002 report (issue #5).

Recommendation

The Board must require De Beers and government fulfill their obligation to properly consult with the NSMA before approving this project.

Specific comment # 10

10. Resource use (ToR line 442-455), Spatial boundaries (ToR line 235-240), Cumulative Effects (ToR line 546-550)

Developer's conclusions

De Beers concluded that there will be no impact on NSMA fisheries in the regional study area (RSA).

My conclusion

De Beers has not properly established the maximum zone of influence of its project on Métis fisheries proximal to Yellowknife. I outlined these issues in my pre-technical report of 13 November 2002 (issue #7). There is evidence that the mine's development will negatively affect NSMA fisheries outside of the RSA with corresponding effects on fisheries and the Métis' culture, land use, economy, health, aboriginal rights, and spiritual and cultural practices.

Evidence

I outlined the evidence in my pre-technical report of 13 November 2002 (issue #7),

Recommendation

De Beers assess the resource use of the NSMA, determine the maximum zone of influence of its workforce on local fisheries, and determine both direct and cumulative effects. If it is found that there is probability of an impact, De Beers must develop mitigation measures with the NSMA. The absence of this data makes it impossible to determine what the adverse impacts on NSMA fisheries and associated economy, cultural, spirituality, community health, and rights will be. Once data is collected, how will impacts on these fisheries be mitigated, if necessary?

Rec'd via email
FEB 14/03 agf



**NORTH-SLAVE METIS ALLIANCE
DEBEERS SNAP LAKE DIAMOND
PROJECT EAR REVIEW**

TECHNICAL REPORT

Prepared for:

North Slave Metis Alliance

Prepared by:

Stantec Consulting Ltd.

February 2003
1-08-59528

DEBEERS SNAP LAKE DIAMOND PROJECT EAR REVIEW

Summary

FISHERIES

De Beers has stated that nutrients (phosphorus and nitrogen) will be released into Snap Lake as a result of the project. This nutrient release will result in an increase in the amount of phytoplankton (algae) in the lake. The issue is that the EAR has not adequately addressed the effects that an increase in algae will have on the food web in Snap Lake as required in the ToR (*lines 358-362, 368, 370, 371, 395-408*). A second issue is that an aquatic monitoring program has not been developed as required in the ToR (*lines 573-577*). The affected Aboriginal communities including the NSMA should be consulted and participate in the monitoring program.

HYDROGEOLOGY

There is a very limited understanding of the hydrogeological conditions in the area of Snap Lake. No groundwater level data were available (except for two monitoring wells) and no consideration was given to the potential control that fracture zones and faults may have on the groundwater flow regime. Limited data are available for hydraulic conductivity, seepage volumes and groundwater quality. Virtually no data are available to characterize the hydraulic behaviour of fracture zones and faults. There is a great deal of uncertainty in the estimated values for groundwater velocity. There is a need to obtain groundwater data to validate the conceptual groundwater flow model and improve the understanding of the hydrogeology in the area of Snap Lake. (*ToR lines 172-174, 177-178, 221, 225, 251-254, 256, 337-338, 345-355, 372, 381*)

WILDLIFE

Impact Ratings: In response to scrutiny on wildlife baseline data collection and analysis, DeBeers stated that they will think about it. Such thinking should have occurred while preparing the EAR. Currently the ability to predict impacts and prepare for monitoring is limited (*ToR lines 174, 244, 252-254, 257*).

Linking Data Collection and Impact Analysis: There is general a disconnection between the baseline information collected and the questions that were actually asked. Data collected do not relate to analyses of Key Questions W-2 and W-3. Impacts on wildlife movements cannot be assessed (*ToR lines 173, 176-179, 427-429*).

Interpretation of Impact Criteria: DeBeers interpreted the loss of bird habitat as a low environmental consequence. The NSMA re-evaluated the scoring of the impact

DEBEERS SNAP LAKE DIAMOND PROJECT EAR REVIEW SUMMARY

and, using DeBeers' definitions and results, concludes that the environmental consequence is moderate to high (*ToR lines 251-253*).

Traditional Knowledge: Not all available TK was used to make impact predictions. The requirements under the ToR to collect traditional knowledge oblige the proponent to determine what TK exists and to use all available information to minimize uncertainty of impact predictions (*ToR lines 45-55*).

Monitoring Program: Contrary to the ToR, no monitoring program exists at this time. Stakeholders are not assured that mitigation effectiveness can be measured. Without monitoring programs, it is impossible to evaluate how, if at all, mitigation will be successful (*ToR lines 418-420; 573-577*).

Cumulative Effects: It is not clear whether an adequate assessment of cumulative effects has been conducted. Re-evaluating cumulative effects analyses and applying published information, the NSMA concludes that some cumulative effects could be of high environmental consequence (*ToR lines 186, 526-559*).

Cultural Impacts: The consultation process is incomplete and the concerns regarding trap lines and traditionally used areas are not explicit. In absence of information on traditional resource use and the resource base, the communities are at a serious disadvantage when entering in any IBA negotiations that require information on lost harvesting opportunities (*ToR lines 233, 438-455; MVRMA s.115 [ToR p. 29]*).

DEBEERS SNAP LAKE DIAMOND PROJECT EAR REVIEW

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DEBEERS SNAP LAKE DIAMOND PROJECT EAR REVIEW

1.0 Introduction

The North Slave Métis Alliance (NSMA) has raised concerns about DeBeers' proposed Snap Lake project as it may impact resources traditionally used by the NSMA. Our conclusions and recommendations are a result of our review of the Environmental Assessment Report (EAR), development Information Requests (IRs) submitted to the Mackenzie Valley Environmental Impact Review Board (MVEIRB), DeBeers' responses to our IRs and to IRs of other parties, and our discussions (and those of other parties) with DeBeers during the Technical Sessions. We have reviewed the following environmental components, required under the Terms of Reference (ToR) lines 221 to 223:

- II. surface and ground water quality and quantity;
- III. aquatic organisms and habitat; and
- IV. wildlife and wildlife habitat, including migratory birds.

We have reviewed the EAR with an emphasis on issues in respect of which there is insufficient information to determine whether or not an impact will be significant and adverse. Insufficient information can be based either on:

- lack of baseline data,
- inadequate analysis,
- inappropriate tools used for data collection and analysis,
- omission of information that could be made available, or
- any combination of the above.

Specific comments on fisheries, hydrogeology and wildlife are presented in Sections 2, 3 and 4 respectively.

2.0 Fisheries – Specific Comments

2.1 SURFACE WATER QUALITY – NUTRIENT INPUTS TO SNAP LAKE

Reference: ToR lines 358-362, 368, 370,371, 395-408

Developer's Conclusion:

De Beers stated (Technical Sessions, Day 4) that chlorophyll *a* in Snap Lake could increase by up to 40% and total phosphorus concentrations could decrease by up to 60% from baseline conditions as a result of water and wastewater discharge to the lake (Section 9.4.2.2.4, EAR). Potential impacts of certain parameters were based on hazard concentrations (HC) that represent the percent of the species in the aquatic community that could be affected by long-term exposure. This approach was taken where toxicological endpoints were known. For phosphorus, which is not toxic to aquatic life, potential changes were predicted if the phosphorus concentrations in the water released were more than 10% of baseline conditions. Because there are no general or site-specific water quality guidelines for an increase in the primary productivity of water bodies, the impact of nutrient additions could not be classified.

Based on simulations of the eutrophication model described in the EAR, the trophic status of Snap Lake would change from oligo-mesotrophic to mesotrophic as a result of nutrient additions related to the project. De Beers stated in Section 9.4.2.2.1 of the EAR that there is no generally accepted guideline or benchmark for assessing the impact of changes in the trophic status of a lake.

Our Conclusion:

The impacts of nutrient (phosphorus and nitrate) release into Snap Lake are not fully addressed. The fact that phosphorus in Snap Lake will be decreased by 60% with a concurrent increase in phytoplankton suggests that the lake will serve as a treatment basin for phosphorus removal. The current nitrogen:phosphorus ratio is 25:1 which will be increased to 1 000:1 as a result of the project (Technical Sessions, Day 4). DFO's response to this statement was that nutrient additions to oligotrophic lakes in British Columbia caused a change in phytoplankton and zooplankton communities. Further, they stated that when the nitrogen/phosphorous ratios is changed as much as is predicted, it is difficult to justify the conclusion in the EAR that there will be no overall change. We concur with this statement and believe that the impacts of nutrient release have to be reassessed to include food web linkages.

DEBEERS SNAP LAKE DIAMOND PROJECT EAR REVIEW

FISHERIES - SPECIFIC COMMENTS

The design specifications of the wastewater treatment plant indicate that 98.7% of the total phosphorus will be removed from water and wastewater prior to release into Snap Lake. Although, from an engineering perspective, this removal efficiency can be achieved, it is very dependent upon the skill and training of the operators of the treatment plant. The predicted end-of-pipe maximum average concentration of total phosphorus of 0.2 mg/L appears to assume that the wastewater treatment plant is operating at 100% efficiency. Concerns were raised (Technical Sessions, Day 3) about the operating efficiency of the Diavik wastewater treatment plant. It appears that no conservatism was built into the model predictions for phosphorus release, which could potentially alter the conclusions reached regarding impacts of nutrient discharge on the productivity of Snap Lake.

Nutrient enrichment in freshwater ecosystems is well documented. Consideration should have been given to conducting chronic toxicity testing, focusing on the potential stimulatory effects of wastewater discharge rather than inhibitory effects.

Overall De Beers has not provided adequate information and documentation to determine the significance and potential for adverse impacts nor is there sufficient information to determine the magnitude and extent of adverse impacts.

Our Rationale / Evidence:

Observations by the NSMA indicated that currently, the discharge of treated wastewater to wetlands southeast of the Service Complex might be responsible for an increase in primary productivity in these wetlands. With the development of the project, the magnitude and scale of these effects may increase resulting in major changes to the productivity of Snap Lake. Additionally, shifts in the nutrient balance of the lake can lead to the proliferation of toxic cyanobacteria.

Although the EAR does address the requirement of the ToR (lines 398-399) regarding the productive capacity of aquatic systems, it does not fully address the requirements outlined in the ToR (lines 406-408) regarding food webs.

Recommendation:

The whole issue of nutrient addition to Snap Lake has to be reassessed in light of the uncertainties regarding wastewater treatment efficiencies and potential food web effects in Snap Lake. The prediction that the trophic status of the lake will change with the project has to be reevaluated in ecological terms regardless of the lack of water quality guidelines.

2.2 AQUATIC RESOURCES – MONITORING PROGRAM

Reference: ToR lines 573-577

Developer's Conclusion:

In Section 9.4.2.2.8 of the EAR, De Beers states that it is committed to monitoring water quality in Snap Lake during construction, operations, and closure. The monitoring program would include biological and water chemistry sampling. A detailed aquatic effects monitoring program will be developed for Snap Lake as a condition of the water license for the project.

Our Conclusion:

The Terms of Reference are clear regarding the development of a monitoring program for the project. The EAR states that seasonal monitoring will be done to verify impact predictions related to changes in water quality in Snap Lake. Additionally, fish habitat use around inlet and outlet structures in Snap Lake will be monitored after construction. No further information is presented describing the approach, objectives, and proposed methodologies that will be used in these programs.

Our Rationale / Evidence:

Monitoring is essential in order to determine whether impact predictions are accurate and as a safeguard to the aquatic ecosystem of the project area. In the absence of sufficient baseline information, there is a need to know how monitoring programs will be developed to show scientific validity and rigor, locally and regionally, and how Traditional Knowledge and local communities will be involved in monitoring design.

Recommendation:

The monitoring program must be developed prior to construction of the project. The program must include specific objectives, proposed approach and methodologies that will be used. Consultation with affected Aboriginal communities must be done to ensure that these programs address their interests. The NSMA and other affected Aboriginal communities should be active participants in the monitoring programs.

2.3 SUMMARY OF RECOMMENDATIONS

- Further assessment of the impacts of nutrient release into Snap Lake is needed. The addition of both phosphorus and nitrate can have dramatic effects on the primary and secondary productivity of the lake. The conclusions drawn in the EAR are not supported by the data presented in the EAR nor by subsequent Information Requests or information presented at the Technical Sessions.
- Trophic status changes in the lake may be significant over time. Development of the project will compress the time frame in which the trophic level of the lake changes compared to the natural cycle. The ecological implications of these changes must be more fully discussed prior to development of the project.
- Monitoring programs have to be developed prior to construction and in consultation with affected Aboriginal communities, including the NSMA.

3.0 Hydrogeology – Specific Comments

3.1 HYDROGEOLOGY - LIMITED GROUNDWATER DATA

Reference: ToR lines 172-174, 177-178, 221, 225, 251-254, 256, 337-338, 345-355, 372, 381

Developer's Conclusion:

DeBeers considers the available groundwater data as reasonable for the purposes of the EAR.

Our Conclusion:

There is a very limited understanding of the hydrogeological conditions in the area of Snap Lake.

The deep groundwater flow regime presented by DeBeers is conceptual in nature and it has been largely postulated. The available hydrogeological data for the site is very limited and is not adequate to validate the conceptual regional groundwater flow model. No groundwater level data were available (except for two monitoring wells) and no consideration was given to the potential control that fracture zones and faults may have on the groundwater flow regime.

Limited data are available for hydraulic conductivity, seepage volumes and groundwater quality. Virtually no data are available to characterize the hydraulic behaviour of fracture zones and faults. There is a great deal of uncertainty in the estimated values for groundwater velocity.

In our view, there is a need to obtain groundwater data to validate the conceptual groundwater flow model and improve the understanding of the hydrogeology in the area of Snap Lake.

Our Rationale / Evidence:

The issue of limited data has been brought up in a number of IRs and has been summarized by the MVEIRB in items 1.1.3 and 1.1.4 of the "Rationale of Technical Issues" document. Although the Technical Sessions provided a forum for discussions and understanding of the methodology used in the EA, it did not provide or reveal any additional data to validate the conceptual models.

DEBEERS SNAP LAKE DIAMOND PROJECT EAR REVIEW

HYDROGEOLOGY - SPECIFIC COMMENTS

Regional Groundwater Flow System

The regional groundwater flow regime was based only on the water level elevations of the neighbouring lakes in the area. In a general sense, this conceptual model is reasonable, because groundwater flows from higher elevation sources to lower elevation areas. However, there are limited groundwater data to confirm the conceptual model:

- actual groundwater elevations for the deep system are known only at two monitoring well locations, one located within 50 m of the Snap Lake shore and the other within 50 m of the North Lake shore¹. A third monitoring well, BH-24, was installed on the northwest peninsula, but water levels were not readily available.
- the thickness of permafrost is known in only a few locations;
- the presence of taliks is based on the Diavik's three dimensional permafrost model study that indicated that lakes have to be wider than 400 m to 600 m to develop a talik deep enough to connect the lake with the deep groundwater system;
- lake water levels were surveyed only for Snap Lake and North Lake (the water levels for the other lakes — Cansell, Capot Blanc and Northeast — were estimated from topographic maps where the accuracy for topographical contours in 1:50,000 NTS maps² is 10 m). and
- the hydraulic role that faults may have on the regional groundwater system was not considered.

The limited data leave the conceptual model open to possible alternative interpretations. It has been postulated that groundwater flows from Snap Lake to the North Lake and Northeast Lake because of the difference in water levels. The model presented³ by DeBeers assumes that a portion of the groundwater flow leaving Snap Lake would upwell and discharge to the North Lake (or Northeast Lake), while a portion would flow straight underneath the North Lake (or Northeast Lake). Further, the model also considers that, while one end of North Lake is being recharged by the deep groundwater, the other end of the lake is supplying water to the deep

¹ Distances estimated from Figure 4.1 Golder (2002) report.

² http://maps.nrcan.gc.ca/cgi-bin/kira_in.cgi?number=75M&number50=*&language=english&form_type=CTI-FORM

³ Refer to Figure 2.1.5-1 (provided with the response to IR 2.1.5) and Slide No.7 of DeBeers Presentation on 27 November 2002 (file "1 and 2 Flow directions and quantity and groundwater quality-.pdf" posted on the MVEIRB web site)

DEBEERS SNAP LAKE DIAMOND PROJECT EAR REVIEW
HYDROGEOLOGY - SPECIFIC COMMENTS

groundwater system⁴. A possible alternative interpretation could assume that there is no upwelling of deep groundwater to the North Lake and that, instead, the entire North Lake is recharging the deep groundwater system. This alternative interpretation would appear to be supported by the water level measurements in monitoring well MW02-03 and North Lake, as shown in Table 4.3 of the North Lakes Program report (Golder, 2002). Since the North Lake water level (439.35 m AMSL) is higher than the water levels measured in monitoring well MW02-03 (439.14 to 439.30 m AMSL), there is the potential for downward migration of water in the talik of North Lake (upstream end). A similar scenario, i.e., downward vertical hydraulic gradient, may be also present at the upstream end of the Northeast Lake, but there are no data to support or refute this scenario.

It is interesting to note that the difference in water levels between monitoring well MW02-03 and the North Lake ranges from 0.05 to 0.21 m. This difference would appear to be small compared to the distance between the bottom of the North Lake and the measuring point of monitoring well MW02-03, which is approximately 200 m. It is not clear whether the difference in water levels could be associated with 1) good hydraulic connection between the bottom of the lake and the tip of the monitoring well; or 2) a nearly hydrostatic distribution of vertical pressures. The latter case would lead to purely horizontal groundwater flow conditions at the location of monitoring well MW02-03.

A somewhat similar situation can be observed with the water levels in monitoring well MW02-05, which was installed near Snap Lake. The vertical distance from ground level to the tip of this monitoring well is approximately 129 m. According to Table 4.3 of the North Lakes Program report (Golder, 2002), the water level for Snap Lake is 444.09 m AMSL, while the water level for monitoring well MW02-05 ranges from 443.53 to 444.15 m AMSL. It is worth noting that since the water level of 444.15 m AMSL for the monitoring well is higher than the lake level, this could lead to the interpretation that groundwater flow in the talik of Snap Lake is vertically upward. Would this be possible? Considering that Snap Lake is the higher elevation lake in the area⁵, the answer would be no. The variations in water levels in monitoring well MW02-05 could probably be attributed to the difficulty in monitoring water levels under permafrost conditions and, perhaps, to variations in barometric pressure. Variations in water level aside, the important point is that the groundwater level at depth is very similar to the lake level, as previously noted for the North Lake. If the water levels were virtually the same, this would mean that vertical groundwater flow is nearly zero and that there is limited recharge from Snap Lake to the deep groundwater system. But it could also mean that the fractures have good hydraulic connection to the lake (a higher fracture hydraulic conductivity would lead to lower

⁴ pg. 49, "Snap Lake Diamond Project, 2002 Environmental Information, North Lakes Program", Report prepared by Golder Associates Ltd. for DeBeers Canada Mining Inc. File No. 022-6659-8000, October 2002.

⁵ pg. 9-31, EAR

DEBEERS SNAP LAKE DIAMOND PROJECT EAR REVIEW

HYDROGEOLOGY - SPECIFIC COMMENTS

hydraulic head losses). In the latter case, because of higher fracture hydraulic conductivity, larger groundwater flows would be possible. There are two concerns with this scenario: one is that the relationship between Snap Lake and the deep groundwater system is poorly understood; and the other is that if the underground mine intercepts a fracture zone with high hydraulic conductivity, large inflows could be expected. In relation to this second concern, we are satisfied with DeBeers proposed mitigative measures to restrict mine inflows and their commitment that all groundwater collected in the underground mine workings will be processed through the water treatment plant prior to discharge to Snap Lake. Although we are satisfied with the operation measures proposed by DeBeers to control mine inflows, we are not satisfied with the level of hydrogeologic knowledge.

Groundwater Velocity

There is a great deal of uncertainty in the determination of the groundwater velocity. Initial estimates provided in the EAR⁶ indicated a groundwater velocity in the order of 25 m/yr between Snap Lake and North Lake. When estimating the groundwater velocity between Snap Lake and Northeast Lake⁷, a higher hydraulic conductivity was used leading to a velocity in the order of 63 m/yr. The reason for the higher hydraulic conductivity was the incorporation of horizontal anisotropy into the groundwater modelling. The model assumed a higher hydraulic conductivity in the north-south direction than in the east-west direction. Based on a mass balance assessment for Snap, North and Northeast Lakes, and revised groundwater modelling⁸, Golder (2002) concluded that the groundwater flow velocities would be lower than initially predicted by a factor of 5 to 10 times, leading to groundwater velocities in the order of 6 to 12 m/yr. However, based on the tritium analysis, groundwater flow velocity could still be lower than the above estimates. Considering that groundwater at monitoring well MW02-05 was inferred to be older than 50 years⁹ and considering that the vertical distance from the tip of the well to the bottom of Snap Lake is in the order of 120 m, the vertical groundwater velocity within the talik of Snap Lake would be expected to be lower than 2.4 m/yr. Presumably, the horizontal velocity of deeper groundwater flow would also be expected to be lower than 2.4 m/yr, but there are no other data to corroborate this hypothesis.

Fractures and Faults

An important question to answer is: if there is uncertainty in the estimation of groundwater velocity, which parameter would contribute the most to this uncertainty: hydraulic conductivity, hydraulic gradient or porosity? It is difficult to say, based on the data available. One concern is that the fracture network has been approximated

⁶ pg. 9-57, EAR

⁷ pg. 59, Golder (2002)

⁸ pg. 60, Golder (2002)

⁹ pg. 42, Golder (2002)

by a porous media equivalent. This ignores the fact that fractures may be poorly connected, which would lead to longer, tortuous flow paths and lower hydraulic gradients. Because fractures may be poorly connected, not all fractures will conduct water and a few fractures may conduct most of the flow (Stripa mine, Sweden).

Another feature that affects the groundwater flow is the presence of faults. Faults can act either as a barrier or a conductor. Stober and Bucher (2000) report that, at the Äspö Hard Rock Laboratory in Sweden, faults in the crystalline bedrock (granite) are the dominant water conducting features on the scale of tens of meters and larger (regional). However, on the scale of less than tens of meters, fractures became relevant water conducting features.

It is possible that the regional, deep groundwater flow system in the Snap Lake area may also be controlled by faults. If this were the case, then, on one hand, the overall bulk hydraulic conductivity (for a porous media equivalent model) of the bedrock would be lower than estimated and, on the other hand, the path would be longer than estimated. This would lead to lower groundwater velocities. Applying the Äspö model to the Snap Lake area, the apparently higher hydraulic conductivity obtained through shut-in tests could possibly be associated to fracture networks that are relevant at small scales.

The EAR provided some information on the characterization of fractures and faults, but this information was generally limited to the area of the proposed mine (see for example Figure 5.4 of Golder, 2002). Section 9.2.1.4.2 indicates that fracture zones associated with the Snap and Crackle Faults, and the north-south trending fracture zones, yielded hydraulic conductivity on the upper end of the experimental range. It is worth noting that DeBeers has committed to additional hydraulic testing of the Snap and Crackle Faults in 2003 (Golder, 2002, pg.50).

It would appear, therefore, that the equivalent porous media concept may be too simplistic to account for the complexity of the fracture/fault system, particularly at the larger (kilometer) scale required to predict impacts to neighbouring lakes.

Mine Inflow Volumes

There is uncertainty in the prediction of groundwater volumes that would be collected in the underground mine works. As discussed previously, DeBeers has committed to process all of the groundwater collected in the mine workings through the water treatment plant before it is released into Snap Lake. DeBeers has explicitly assumed all of the risks that inflows could be larger than predicted. However, the water treatment plant will not remove the dissolved minerals and metals present in the groundwater. Impacts to the quality of the Snap Lake water should be expected.

Geochemical Processes

There is uncertainty as to how geochemical processes may alter the quality of groundwater impacted by the cement paste backfill, after mine-affected groundwater leaves the underground workings (post-closure scenario). Golder (2002) described possible processes that might attenuate predicted elevated concentrations of nitrate, total aluminum, total chromium, total copper and total molybdenum, and also elevated pH. No data have been provided to support the attenuation processes, but none of these processes have been incorporated in the analyses. DeBeers has committed to conducting leachate tests on the cement paste backfill and also on the native granite material to determine with more confidence the quality of the groundwater impacted by the cement paste backfill and the possible attenuation mechanisms that may influence the quality of the mine-affected groundwater as it moves away from the mine. DeBeers has also committed to assess, at a preliminary screening level, possible amendments that might be applied to the processed kimberlite to limit the release of chemicals.

Recommendations:

We find it important that groundwater data be collected to validate DeBeers' conceptual model of deep groundwater flow. These data are required to provide the confidence level that predicted impacts will be manageable.

DeBeers has already committed to a number of initiatives to provide additional information. We recommend that the MVEIRB take the necessary measures to ensure that the additional information is properly collected, reviewed and any follow ups completed. In particular, we strongly advise the MVEIRB to require DeBeers to collect groundwater data to validate the conceptual groundwater flow model and improve the level of hydrogeological understanding. This can be accomplished through a properly developed groundwater monitoring program. The NSMA and other affected Aboriginal communities should be active participants in the monitoring programs.

The following measures are recommended:

- Survey water levels in all lakes at the same time.
- Install deep monitoring wells as proposed in response to IR 1.50. We recommend that three additional monitoring wells be installed as follows: one between Snap Lake and Lac Capot Blanc; one between Snap Lake and Cansell Lake; and one near the shore of Northeast Lake, similar to MW02-03. These monitoring wells should be installed as soon as possible, preferably prior to starting construction/operation. Based on the water level data, review the adequacy of the conceptual deep groundwater flow model.

DEBEERS SNAP LAKE DIAMOND PROJECT EAR REVIEW

HYDROGEOLOGY - SPECIFIC COMMENTS

- DeBeers should consider the use of environmental geochemistry to determine probable bounds for the horizontal groundwater velocity.
- Process all groundwater collected from the underground workings through the water treatment plant (DeBeers commitment).
- Complete the leachate test of cement past backfill (DeBeers commitment)
- Complete the leachate tests of native granite rock (DeBeers commitment)
- Complete the assessment, at a preliminary screening level, of possible amendments that might be applied to the processed kimberlite to limit the release of chemicals (DeBeers commitment).
- Complete the hydraulic testing of Snap and Crack Faults (DeBeers commitment)
- Conduct periodic assessments of seepage volumes and groundwater quality as per response to IR 3.10.8 (a).
- Provide annual reports to the MVEIRB discussing the locations, volumes and quality of groundwater inflows to the underground workings as well as measures taken to reduce mine inflows. The reports should also include a section on the effects of the mine on groundwater levels.

References:

- Golder Associates Ltd., 2002. "Snap Lake Diamond Project, 2002 Environmental Information, North Lakes Program", Report prepared for DeBeers Canada Mining Inc. File No. 022-6659-8000, October 2002.
- Stober, I. and K. Bucher, 2000. Hydrogeology of Crystalline Rocks. Published by Kluwer Academic Publishers, Dordrecht, Netherlands. 275 pp.

4.0 Wildlife – Specific Comments

4.1 WILDLIFE – IMPACT RATINGS

Reference: ToR lines 174, 244, 252-254, 257

Developer's Conclusion:

After mitigation (i.e. as a residual impact), DeBeers assumed that the number of individuals lost from a population due to project-related activities would likely be similar to or less than the accidental death of animals from natural causes (i.e., fall within the natural range of variation in baseline conditions)(Response provided under IR 4.11.17). The range of natural variation for each species' abundance was based on professional judgment and current knowledge.

The magnitude of the residual impact considered both cultural/societal perception and scientific knowledge (baseline data, information from other projects, COSEWIC listed species, and professional judgment).

As to resilience used for impact ratings, in our opinion, resilience had limitations that outweighed the benefits and we therefore excluded it. Any proponent has the option of which tools to use. Better or high-quality tools, when utilized appropriately, could lead to more robust predictions. Instead of using resilience we used reversibility.

Our Conclusion:

A central issue in the DeBeers EAR is the ability to assess impacts using impact definitions that are based on poor measurability of benchmarks such as natural variation in ecosystem parameters in general and population demography in particular.

Referring to Tables 10.1-3 or 10.4-12 of the EAR, the NSMA questions the definition of impact ratings: magnitude of impacts is defined as either below, at, or above the range of natural variation. However, the natural variation in almost all measures presented is not known. Hence, conclusions such as the following cannot be drawn because the range of natural variation in habitat availability is completely unknown:

"Based on estimates of home range size, the fraction of suitable habitat lost from an individual's home range due to the Snap Lake Diamond Project is expected to be negligible to low for caribou, grizzly bears, wolves, raptors, wolverines, foxes, and waterfowl (Table 10.4-8). Therefore, the magnitude of the impact of habitat loss or

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alteration on VEC species is predicted to be low." (EAR, section 10.4.2.2.4, p. 10-161)

The responses provided to IRs (4.11.17 and 4.11.22) so far, and the discussion on Day 6 of the Technical Sessions do not provide any clearer understanding of this issue than before because neither the number of animals dying due to natural causes nor the number of animals dying as a result of the project is actually known. The latter could be quantified only if the numbers of animals in a given habitat unit were known. DeBeers also points to "social values" and population parameters, terms even less defined and less clear than those in the original EAR.

The ToR (line 267) asks for resilience to be assessed, and consequently used, for both impact ratings and monitoring. During the Technical Sessions on Day 6, RWED demanded an explanation as to why resilience was not used. The NSMA supports this demand because an estimate of resilience may be a more powerful tool in measuring impacts and in monitoring than the range of natural variation, which is even less well documented than resilience.

Our Rationale / Evidence:

Natural variation and population parameters are currently unknown, and may, in fact, not even be measurable. The lack of measurability is an obstacle to objective impact statements. However, while professional judgment may have been applied to rating the impacts, the lack of measurability is even more detrimental to the development of monitoring programs. This is because quantified benchmarks are lacking against which success of mitigation measures, or accuracy of predictions, could be compared.

How can stakeholders be assured that the predicted low magnitude of impacts has indeed been achieved during the operation of the project, if the prediction is not measurable? Without measurable parameters built into definitions, impacts cannot be predicted and monitoring programs cannot test the accuracy of the initial prediction.

DeBeers' response to NSMA's Question Two ("Can new impact definitions reflect the measurements actually taken in the field?") during the Technical Sessions on Day 6, afternoon, indicated that DeBeers, if they need to clarify their definition of impact ratings, would leave it up for discussion and cannot respond further at this stage. In response to RWED's concerns, stated at the end of Day 6 of the Technical Sessions, in regards to how impact ratings affect the uncertainty in predictions, DeBeers stated: "We will take your thoughts and think about it". The NSMA feels that such thinking should have occurred before and during the preparation of the EAR. There appears to be a serious neglect in how baseline information was used in first predicting

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impacts and subsequently preparing for monitoring during construction and operation phases of the project.

Recommendation:

It may be better to use quantifiable benchmarks, such as a given percentage of population abundance or habitat availability (comparable to the definitions used in ecological land classification or biodiversity of the respective EAR sections), than natural variation. Although the percentage thresholds would be arbitrary, they provide benchmarks against which the accuracy of predictions and the environmental performance of the operation could be tested.

4.2 WILDLIFE - LINKING DATA COLLECTION AND IMPACT ANALYSIS

Reference: ToR lines 427-429; and lines 173, 176-179

Developer's Conclusion:

[from IR 4.11.23] Data on the travel direction and historic movement corridors for wildlife species other than caribou was not available, and consequently, the impact assessment for movement and corridors of other VECs was qualitative. Potential impacts on the movement of wildlife was assessed through Key Question W-2.

[From Technical Sessions, Day 6] Question: Is DeBeers willing to make commitments to gather TK information before work begins? DeBeers' response: We can't make a specific commitment. It depends on the abilities and interests of the communities.

Our conclusion:

The idea of measuring movements in order to assess whether movements will be affected (i.e. Key Question W2) seems to be rejected by DeBeers in the response to IR 4.11.23, by simply stating that information was not available. Key Question W2 (What Impacts Will the Snap Lake Diamond Project Have on Wildlife Movement and Behaviour?) remains unanswered; impacts to wildlife movements, other than by theoretical judgments, cannot be assessed.

Without adequate knowledge of wildlife movements, a key component of the Terms of Reference is unfulfilled. This conclusion supports the statement by MVEIRB ("Rationale of Technical Issues" p. 27) that baseline information of movement needs to be presented in order to make impact predictions.

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Movement corridors and preferred habitat of more than just caribou need to be mapped in order to a) evaluate potential impacts, b) design mitigation measures, and c) develop monitoring programs.

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Our Rationale / Evidence:

The low densities of wildlife populations impose logistical challenges to measuring animal movement and corridors. However, as per the ToR, (lines 176-179) quantitative information should be sought to the extent possible. The challenges can be overcome by a combination of field survey methods and the collection of traditional knowledge to provide much of the information needed to make impact predictions before a qualitative judgment would be used. Recent studies have effectively used snow tracking techniques to assess population abundance (Ball et al. 2000), population trends (Wabakken et al. 2001), and the effects of disturbances on habitat use (Crooks 2002). Tracking studies have also been used by Parks Canada to evaluate the composition of mammal communities (Ross 1994). Alternatively, radio telemetry can be applied for detailed, albeit longer term studies. Traditional knowledge can assist in identifying preferred routes used by furbearers.

In general, there is a disconnection between the baseline information collected and the questions that were actually asked. For example, data were collected on wolverine tracks, grizzly bear den locations, and bird distributions, but none of these data related to analyses of Key Questions W-2 and W-3. The data do not address questions of potential movements (Key Question W-2) and they provide only marginal relevance to abundances of wildlife (Key Question W-3).

References:

- Ball, J. P., K. Danell, and P. Sunesson. 2000. Response of a herbivore community to increased food quality and quantity: An experiment with nitrogen fertilizer in a boreal forest. *Journal of Applied Ecology* **37**:247-255.
- Crooks, K. R. 2002. Relative sensitivities of mammalian carnivores to habitat fragmentation. *Conservation Biology* **16**:488-502.
- Ross, I. 1994. Wildlife tracking program 1992-1994: Jasper Townsite Area, Jasper National Park. Prepared by Associated Resource Consultants Ltd. for Parks Canada, Western Region Office.
- Wabakken, P., H. Sand, O. Liberg, and A. Bjarvall. 2001. The recovery, distribution, and population dynamics of wolves on the Scandinavian peninsula, 1978-1998. *Canadian Journal of Zoology* **79**:710-725.

Recommendation:

DeBeers should investigate and apply economically-viable methods to gather baseline information on movements of animals other than caribou. A combination of snow tracking and analysis of traditional knowledge may be an effective approach to finding answers to Key Question W2, and hence comply with the Terms of

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Reference. For tracking surveys, clear stratification, sample size requirements, and efficiency of statistical analyses should be provided, taking into account local knowledge of tracking. Sampling designs should be reviewed in monitoring proposals.

4.3 WILDLIFE – INTERPRETATION OF IMPACT CRITERIA

Reference:: ToR lines 251-253

Developer's Conclusion:

We try to quantify and be transparent in the way we describe impact characteristics. We want impact assessment parameters to be consistent with other projects. Changing definitions does not change the impacts. We focused on measurable parameters that will give us meaningful information (Technical Sessions, Day 6, afternoon).

Our conclusion:

The measurements of migratory birds are the only exception in wildlife baseline to the otherwise unsatisfactory quantification of baseline conditions. Even so, the interpretation of the results is confusing and the weighting of the results may be questioned. Table 10.4-12 presumably features impacts in the LSA. If so, how can impacts be low to moderate if habitat units that are high in biodiversity (see p.10-98 of the EAR) will be reduced by almost 50% for the duration of the mine operation? Surely, this exceeds baseline conditions and results in "a detectable change beyond the range of natural variation" (Table 10-16). As such, it would be of high magnitude. Similarly, it is predicted that 52 birds may be lost as a result of habitat clearing (p. 10-159), which is interpreted as a low environmental consequence.

Our Rationale / Evidence:

The loss of 52 breeding birds quite certainly exceeds "natural variation", not only in the LSA but likely in the RSA. Therefore:

- the magnitude is high (15 points);
- the effect is local through site clearing but the effect on the population in the RSA is measurable (5 points);
- the effect is medium term i.e. lasts during the mine operation (5 points); and
- the effect is reversible in the long term (5 points).

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Hence, the environmental consequence is moderate to high at the LSA level.

Recommendation:

Where baseline conditions and impact predictions are quantified adequately, DeBeers should make realistic predictions showing "what those impacts mean for future generations" (ToR line 253). It does not serve either the regulators or the stakeholders if they need to re-evaluate and interpret the results on their own to verify the conclusions.

4.4 WILDLIFE – TRADITIONAL KNOWLEDGE

Reference: ToR lines 45 to 55

Developer's Conclusion:

DeBeers collected information on wildlife VECs during community consultation and presented the relevant information integrated with scientific measurements. However, in terms of more detailed information, DeBeers cannot make a specific commitment. "It depends on the abilities and interests of the communities. We can't make commitments before we know what kind of traditional knowledge (TK) exists. There would also need to be a process for flow of information and we don't know what the communities' timelines are at this point." (statement by DeBeers, Technical Sessions, Day 6).

Our Conclusion:

Although some traditional knowledge has been collected and integrated into the EAR, local knowledge, if collected in a consensus-building approach, would likely reduce numerous information gaps. Traditional knowledge can provide valuable guidance in developing mitigation and monitoring programs. Techniques of gathering traditional knowledge, in particular consensus building approaches, should have been taken as seriously as approaches based on western science. This is especially important in light of the difficulties of measuring baseline information, notably in regards to wildlife movements (Key Question W2).

Unless DeBeers significantly improves the information gaps, which are exemplified in the IRs 3.10.21, 3.10.22, 3.10.23, 3.10.26, 3.10.27, 4.11.17, 4.11.22, 4.11.23, 4.11.25, 4.11.26 and in the points raised by RWED and others during Day 5 and 6 of the Technical Sessions, it is difficult to know exactly how monitoring programs will be developed to show scientific validity and rigour, locally and regionally, and how traditional knowledge and local communities will be involved in monitoring design.

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The YDFN stressed that they would like to partake in any traditional knowledge gathering session and to provide input on how to solve situations. This input will be particularly critical during monitoring and adaptive management. The NSMA offered

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to pull elders of the communities together (Technical Sessions, Day 5, afternoon). Both the YDFN and the NSMA expressed concern about how traditional knowledge was gathered and processed by DeBeers (Technical Sessions, Day 9, morning, and Day 10, afternoon).

Our Rationale / Evidence:

In light of the logistical difficulties of gathering detailed baseline information within the timeframe of an impact assessment, traditional knowledge is a valuable tool for reducing information gaps and improving on accuracy of predictions. Monitoring plans, in particular, will benefit from the integration of traditional knowledge. Traditional knowledge was required under the Terms of Reference to be given equal weight to western science, which in the present EAR does not appear to be the case.

It is acknowledged here that the collection of baseline information presents a great challenge in terms of providing the detailed knowledge that is required to make robust impact predictions. However, the NSMA feels that not all available knowledge has been utilized. In addition to RWED's finding that not all available literature was used to make impact predictions (in "Wildlife and Wildlife Habitat Technical Issues"), the NSMA points out that not all available TK was used. DeBeers' assertion that they cannot make commitments before they know what kind of TK exists appears to be circular: the requirements under the ToR to collect traditional knowledge oblige the proponent to determine what TK exists. Discussions are now underway with DeBeers to conduct a TK study, but it remains to be seen how TK information will be collected to alleviate some of the information gaps. Analyses of traditional knowledge have shown that TK can provide robust information on wildlife population trends, regional distributions, and movement patterns. Most notable and relevant examples are studies on caribou on Baffin Island (Ferguson and Messier 1997) and on beluga whales in the Bering Seas (Huntingdon 1999 and 2000). The application of traditional knowledge in environmental assessments has been advocated for the NWT in general (Usher 2000) and for the scoping and monitoring of diamond mines in particular (Mulvihill and Baker 2001). Techniques of collection and analysis of TK information are presented in these studies:

References:

- Ferguson, M. A. D., and F. Messier. 1997. Collection and analysis of traditional knowledge about a population of Arctic Tundra Caribou. *Arctic* **50**:17-28.
- Huntington, H. P. 1999. Traditional knowledge of the ecology of beluga whales (*Delphinapterus leucas*) in the Eastern Chukchi and Northern Bering Seas, Alaska. *Arctic* **52**:49-61.
- Huntington, H. P. 2000. Using traditional ecological knowledge in science: methods and applications. *Ecological Applications* **10**:1270-1274.

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Mulvihill, P. R., and D. C. Baker. 2001. Ambitious and restrictive scoping: case studies from Northern Canada. *Environmental Impact Assessment Review* 21:363-384.

Usher, P. J. 2000. Traditional ecological knowledge in environmental assessment and management. *Arctic* 53:183-193.

Recommendation:

By collecting traditional knowledge, using proven techniques, DeBeers should integrate the best available information from western science and TK to strengthen impact predictions and to build a foundation upon which a monitoring program could be established credibly.

4.5 WILDLIFE – MONITORING PROGRAM

Reference: ToR lines 418-420; and lines 573-577

Developer's Conclusion:

DeBeers continues to be committed to monitoring programs and adaptive management as per ISO 14001. During the technical sessions, Day 6, DeBeers committed to developing a monitoring program in conjunction with the communities and with RWED. DeBeers noted that stakeholder requests for monitoring were not specific enough and that issues were not identified so as to be able to develop a monitoring program at the present time. DeBeers further stated that "Monitoring activities will continue after the EAR as long as communities and regulators identify it as an impact" (Technical Sessions, Day 6, morning).

Our Conclusion:

As to monitoring programs, the Terms of Reference are unequivocal: "DeBeers shall describe the approach, objectives, and proposed methodologies that will be used in any proposed monitoring program(s)" (ToR line 576). The NSMA notes that, contrary to the ToR, no monitoring program exists at this time and stakeholders are not assured that effects, if any, can be accurately measured to assess mitigation effectiveness. With respect to Section 10.1.3 of the EAR, the ability of DeBeers to collect data that provide answers to key questions is of concern to stakeholders as many of the Key Questions in respect of VECs remain unanswered. If DeBeers cannot collect data pertinent to the key questions of the EAR, how will stakeholders be assured that DeBeers can collect future data that will be pertinent to the questions on mitigation success as part of monitoring plans?

This question goes beyond the one related to the development of an environmental management system (EMS) as part of ISO 14001 certification (see also IR 3.5.15 or

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3.9.1), because the certification will address procedural requirements, but not evaluate required data quality. In other words, similar to the Terms of Reference for the EAR, the EMS will provide a format for asking questions but may fail in evaluating the quality of answers. We support RWED's concern when they stated: "It seems that you are asking us to take a lot on trust and that you are telling us the details will all be worked out, instead of presenting a plan, like Diavik did." (Technical Sessions, Day 6, morning).

Our Rationale / Evidence:

Without monitoring programs, it is impossible to evaluate how, if at all, mitigation measures will be successful. Developing monitoring programs and adaptive management plans is the only way to counter the lack of scientific certainty associated with impact predictions. This is particularly important in systems where predictive accuracy is poor. Contrary to DeBeers' statement that the issues are not identified and that stakeholders need to bring forward more specific and concrete concerns, the NSMA points to the following sources that list specific issues and concerns:

- IRs by RWED, NSMA, Entrix, and MVEIRB list specific issues relating to the ability to measure baseline and predict impacts:
 - 2.2.12, 13;
 - 2.5.15, 18, 19, 21, 22, 33;
 - 2.6.11;
 - 3.5.1;
 - 3.10.22, 23, 24;
 - 4.11.19, 21, 22, 23, 24, 25, 26, 27.
- NSMA monitoring proposal in "Can't Live Without Work";
- Community (traditional) knowledge provided to DeBeers during community consultations;
- YDFN concern stated early on Day 6 of the Technical Sessions: "When the re-vegetation programs begin, will you have protocols in place to determine what is successful reclamation?... How will success be measured?".
- Environment Canada request to include mitigation measures regarding migratory birds issues, referring to the Migratory Birds Convention Act (Technical Sessions, Day 6, morning);

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- Comments by all parties, particularly RWED, during the Technical Sessions (Day 5 and 6) regarding information gaps and approaches to measuring and monitoring.

Various parties, including RWED, the NSMA, and the YDFN, offered during the Technical Sessions to cooperate on monitoring programs. The local communities emphasized that they would like to be involved in, and aware of, mining activities.

We conclude that there is no lack of specific issues or requests for collaboration on monitoring programs. DeBeers has adequate information and support to develop proper monitoring programs. We further conclude that impacts need to be predicted by DeBeers, not by the communities nor the regulators, and that DeBeers, not the communities or regulators, needs to take an active, leading role in developing and continuing monitoring activities.

In the Terms of Reference (p.28): a **Follow-up program** - means a program for evaluating

- the soundness of an environmental assessment or environmental impact review of a proposal for a development; and
- the effectiveness of the mitigative or remedial measures imposed as conditions of approval of the proposal.

We conclude that, at present, a plan for such a follow-up program does not exist.

Recommendation:

On Day 6 of the Technical Sessions, DeBeers stated that a reclamation plan, as well as a monitoring plan, will be developed to assure sustainability. The NSMA recommends that a plan be developed, acceptable to all stakeholders, clearly outlining how sustainability goals will be achieved and how communities will be involved in measuring and evaluating mitigation success. Moreover, stakeholders need to be assured that impact predictions, including reclamation goals, will be verified. The monitoring program must be present before construction begins because the impacts of construction need to be monitored.

4.6 WILDLIFE – CUMULATIVE EFFECTS

Reference: ToR line 186 and lines 526-559

Developer's Conclusion:

[from IR 4.11.25] The spatial boundary for analysis of cumulative effects was defined separately for each component (Section 12.1.5: page 12-11 of the EAR). The

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boundary for wildlife was defined as the annual home range of the Bathurst caribou herd (Section 12.7.1, p.12-111). The spatial boundary for assessing cumulative effects on wildlife includes all projects within the annual home range of the Bathurst caribou herd, but the zone of influence (geographic extent) of an effect from a particular project on a species does not cover the entire range of the Bathurst caribou herd. Cumulative effects occur as a result of a species with large home ranges (like caribou, wolves and grizzly bears) contacting the zone of influence from one or more projects during their daily, seasonal and annual movements.

[from IR 4.11.25] For all components, except socio economics and air quality, the zone of influence from the EKATI™, Diavik, Tahera and Lupin mines does not extend into the RSA for the Snap Lake project. This is because the distance between Snap Lake and the other projects is too great relative to the geographic extent of an effect on most components.

[from Technical Sessions Day 5] We don't yet know the zone of influence for Snap Lake. We are not going to know it until we've built the mine and monitored (post construction) to establish the zone of influence. We have estimated a similar zone of influence to BHP but our zone has a smaller footprint and it is likely that the zone will be smaller.

Our Conclusion:

The concept of cumulative effects (CE) assessment on wildlife is still not clarified (IR 4.11.25). DeBeers appears to evade the question of where exactly the zone of influence (ZOI) might be. It is unclear why DeBeers feels that the ZOI cannot be predicted at this point in time, given that the details of project design are known and both models and empirical evidence from mines in the region can assist in predicting the ZOI.

The statements that CE occur when home ranges of large mammals contact the ZOI of several projects and that the ZOI of the projects need to extend into the ZOI of Snap Lake are puzzling. CE can impact a regional population, whether the home ranges of individuals overlap with several projects or not. Given that the CE study area has been defined as the home range of the Bathurst caribou herd, the populations of any wildlife VECs, or the available habitat, should have been quantified within that study area. Contrary to its own definition, which states that the CE study area is delineated by the home range of the Bathurst caribou population (p.12-111 of the EAR), DeBeers adjusted the CE study area for each VEC to its home range size. Incidentally, this adjustment of study areas to the requirements of a VEC is believed to be more representative of cumulative effects, because an overly large study area could dilute effects on small species. However, a rationale was not presented and parameters such as home range, population, area footprint of project, and footprint on available habitat, are used inconsistently.

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The concept of population is defined by DeBeers. However, impact assessments do not always demonstrate the effects on populations. The treatment of study areas, populations, and home ranges in relation to regional effects is confusing and inconclusive. The NSMA therefore shares the view with RWED ("Rationale of Technical Issues") that it is not clear whether an adequate assessment of CE has been conducted. Moreover, on Day 6, late morning, DeBeers responded to Chris O'Brien that "estimation on impacts of the mine on the regional wolverine population" was done in the EA. The answer appears to be untrue as there is no evidence in the EAR for such an estimate.

Our Rationale / Evidence:

The disturbances from mines and other developments in the CE study area include habitat loss, reduced abundances, and barriers to movement. DeBeers concluded that habitat loss, as a proportion of an individual home range, appears to be of low environmental consequence from CE of the developments in the CE study area for wide-ranging mammals. The proportion of habitat lost increases for mammals with smaller home ranges; the wolverine then, can lose up to 31% of one home range as a result of the Diavik, Ekati, Snap Lake, and Winter Road projects (Table 12.7-8 of the EAR). Information on densities is limited for wolverines but is roughly one per 100 km². Home ranges of several wolverines overlap.

There are at least two approaches which DeBeers could have used to estimate effects on wolverine populations. First, given the estimated variability of 126-400 km² size of home ranges and the calculated cumulative habitat loss of 10-31%, the habitat of roughly one wolverine will be lost (varying between, say, 0.1 to 5, depending on actual densities and home range sizes in the area). Evidently, the estimated range of impact is high pointing to a relatively high degree of uncertainty, but it provides an upper and a lower limit as well as a testable, expected number. Second, the value of 57 km² of direct area lost can be adopted from Table 12.7-4, not including the ZOI, which would result in a wolverine loss of 0.57. RWED may be able to provide the range of expected wolverine densities which, as in the first approach, could provide an upper and lower limit of estimated impacts.

In addition, based on the 16 wolverines lost in four years at four mine camps in the region, one wolverine is lost per year, per camp. Consequently, with Snap Lake included, 5 wolverines could be lost per year in the CE study area plus a permanent (during the operation of the mine camps) reduction of the population by one wolverine. As per definitions in Tables 10.1-3 and 10.1-4, the Environmental Consequence receives a score of 35 because:

- the magnitude is high, i.e. mortality rate likely exceeds "natural variation" (note that DeBeers correctly cautions of mortality in mammals with low reproductive rates, see IR 4.11.17);

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- the effect is regional by definition in a cumulative effects analysis;
- the effect is medium term i.e. lasts during the mine operation;
- the effect is reversible in the long term.

A score of 35 is interpreted in the DeBeers EAR as a high environmental consequence.

Similar calculations could, and should, have been done for other wildlife VECs, to more clearly present the possible CE scenario. (Note that the above calculations do not include effects of other developments in the region such as outfitters and new roads.) Only through such calculations could effects on populations be estimated. Such calculations are the responsibility of the proponent, not the stakeholders. While DeBeers' responses to IR 4.11.25 and 4.11.17, as well as discussions during the Technical Sessions, provided some clarification on the choice of study boundaries and DeBeers' understanding of the ZOI, it appears that the calculations of CE were not carried through to the point where all available information was applied.

The NSMA agreed with DeBeers (and other participants) during the Technical Sessions that there is a great deal of uncertainty associated with the impact predictions that are based on inadequate baseline information. However, the NSMA believes that the baseline information should have been applied more rigorously in the analysis followed by the assessment of confidence in the results as per ToR line 268. Moreover, the above calculation of wolverine mortality relies on the knowledge of population parameters. The calculation was presented here based on the repeated statement by DeBeers in the EAR (e.g. "A key aspect of linking the wildlife VECs with CE from the Snap Lake Diamond Project was to delineate the population..."; p.12-116) and in IRs (eg. 4.11.17) that population parameters and demography were used in the impact analysis). By contrast to these statements, the CE analysis focused on the loss of habitat (in fact, only the loss of total area within a home range was presented; an appropriate assessment of habitat loss would have focused on the habitat units lost that are relevant for the species in question). The contrasting statements and procedures are the source of some confusion and lead to increased uncertainty in the interpretation of results.

Regardless of approach, whether calculating mortality rates or habitat units, uncertainty is inherent in all impact predictions, particularly in CE. This realization would have been supported by a clear statement of confidence in the impact predictions. We agree with MVEIRB ("Rationale of Technical Issues" p. 9) that the impact analysis lacks a rigorous explanation of the scientific certainty in the data. A statement of confidence would have also further underlined the need for a regionally-coordinated monitoring and adaptive management plans, that could be reviewed and agreed to by stakeholders. Currently, such a plan is merely a promise.

Recommendation:

All available knowledge should be used to quantify impacts, particularly CE. If population size and dynamics are unknown, and habitat loss is used as an arguably acceptable surrogate for evaluating the effects on populations, then the analysis should take advantage of habitat models and actually quantify habitat units lost (and reclaimed). It is stressed here that habitat units should be calculated as opposed to simply the total area lost. Because it is unlikely that a "natural variation" of habitat units will be known in the foreseeable future, an arbitrary (but justifiable) cut-off for the classification of impact magnitude should be used instead of natural variation. This would not only allow for a quantification of impacts and an appropriate statement of assessment confidence (as per ToR lines 177 and 556), it would also allow for a clear formulation of measurable goals in any proposed monitoring plan.

4.7 WILDLIFE – CULTURAL IMPACTS

Reference: ToR lines 233 and 438-455; MVRMA s.115 (ToR p. 29).

Developer's Conclusion:

Statements by DeBeers, addressing the YDFN, Technical Sessions, Day 10:

The De Beers fund would be designed to address issues (for all communities of the north) you've touched on. It is a social investment managed by a local committee who influences how the money is spent. We would like to see the funds go towards the charities you choose.

We are interested in working to further resolve issues to provide information in a format appropriate to your elders and Land and Environment Committee. We look forward to meetings (with the YDFN and at the caribou session) and we are happy to discuss a date to continue the process.

Compensation for lost opportunities with respect to hunting and fishing due to the mine would be considered if brought up as part of IBA negotiations.

Our conclusion:

We concur with other parties who expressed concerns during the Technical Sessions on how limits to development will be determined (Technical Sessions Day 10, comments by NSMA, YDFN, and Chris O'Brien). What are the limits on what the natural environment can take? While DeBeers is willing to negotiate social investment programs, the issue on compensation of lost opportunities in wildlife harvest as per ToR line 440 and 455 is currently only hypothetical. This is because no clear information was presented on current and future trapping and hunting that might be affected. Worse yet, even if information on hunting and trapping was clear,

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the lack of baseline information on wildlife abundance and movement in the study area (whether local or regional) does not allow for an analysis of lost opportunities.

As to the review of the information in the EAR, the NSMA feels that the structure of the review process is not sensitive to the needs of aboriginal communities. There is not an adequate amount of time to obtain community feedback. Prior planning should take place to allow time for consultation at the community level. We hope that flexibility is added to this process and that a work plan and deadlines will meet the needs of aboriginal communities.

Our Rationale / Evidence:

The NSMA concurs with LDFN and YDFN that the duty to consult is an important issue. We need to be able to understand the potential impacts of the project in order to make good decisions. Aboriginal communities agree that the community consultation process as conducted by DeBeers was not adequate. People currently trapping have not confirmed the trapping information that De Beers has presented.

We emphasize that the consultation process is incomplete and that the concerns regarding trap lines and traditionally used areas need to be explicit. This is not simply a request to comply with the Terms of Reference. Rather, in absence of a clear understanding of traditional resource use and given the lack of information about the resource base (see our concerns above), the communities are at a serious disadvantage when entering into any IBA negotiations. As per the ToR, the onus of providing such information is on DeBeers, not on the stakeholders. Stakeholders have the right to review the information provided and use it for the protection of their cultural and community wellbeing in light of a proposed mine.

Recommendation:

DeBeers should establish an Aboriginal consultation program that will address the concerns of the communities in regards to their traditional resource use. The program should be a two-way stream of information: on one hand, adequately informing the communities about the details of the project (this could assume that baseline information is satisfactorily analyzed), and on the other hand, properly consulting with the communities to gather information on resource use and to evaluate the potential loss of resource use opportunities as a result of the mine. In order to achieve its environmental planning objectives any consultation program must yield results before the project goes ahead. An effective consultation program would also alleviate numerous shortfalls in baseline information as discussed above.

4.8 WILDLIFE – INFORMATION REQUEST ISSUES

The NSMA submits the above concerns in addition and as a follow-up to previously submitted IRs and comments. Responses and information received from DeBeers thus far were insufficient to make final conclusions as to whether or not impacts by the proposed Snap Lake project will have significant and adverse effects.

4.9 WILDLIFE – SUMMARY OF RECOMMENDATIONS

1. To determine impact ratings, it may be an improvement to use measurable or quantifiable benchmarks, such as a given percentage of population abundance or habitat availability, rather than "natural variation" which is unknown for most baseline parameters. Although the percentage thresholds would be arbitrary, they would provide benchmarks against which the accuracy of predictions and the environmental performance of the operation could be tested and evaluated. At present, the application of baseline information for impact predictions leaves Key Questions unanswered.
2. DeBeers should investigate and apply economically-viable methods to gather baseline information on movements of animals other than caribou. A combination of snow tracking with the analysis of traditional knowledge may be an effective approach to finding answers to Key Question W2 and hence complying with the terms of reference. For tracking surveys, a clear stratification, sample size requirements, and efficiency of statistical analyses should be established and provided, taking into account local knowledge of tracking. At present, impacts on wildlife movements other than for caribou have not been predicted.
3. Where baseline conditions and impact predictions are adequately quantified, DeBeers should make predictions demonstrating "what those impacts mean for future generations" (ToR line 253). It does not serve either the regulators or the stakeholders if they need to re-evaluate and interpret the results on their own to verify conclusions. At present, the evaluation of impact magnitude is unconvincing, forcing stakeholders to re-evaluate.
4. By collecting traditional knowledge, using proven techniques, DeBeers should integrate the best available information from western science and TK to strengthen impact predictions and to build a foundation upon which a monitoring program could be credibly established. At present, traditional knowledge has not been utilized to the extent possible.
5. On Day 6 of the Technical Sessions, DeBeers stated that reclamation and monitoring plans will be developed to assure sustainability. The NSMA recommends that plans be developed that are agreeable to all stakeholders, clearly outlining how sustainability goals will be achieved and how communities

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WILDLIFE - SPECIFIC COMMENTS

will be involved in measuring and evaluating mitigation success. Moreover, stakeholders need to be assured that impact predictions, including reclamation goals, will be tested. Any monitoring program must be in place before construction begins as the impacts of project construction need to be monitored (ToR lines 573-577). At present, no wildlife monitoring plan exists.

6. All available knowledge, including traditional knowledge, should be used to quantify impacts, particularly of cumulative effects. Because it is unlikely that the "natural variation" of habitat units, as applied in DeBeers' EAR, will be known in the foreseeable future, an arbitrary, yet rationalized, cut-off value for the classification of impact magnitude should be used instead (eg. 10% lost = low magnitude; 20% lost = moderate magnitude; etc.). This would not only allow for a quantification of impacts and an appropriate statement of assessment confidence (as per ToR lines 177 and 556), it would also allow for a clear formulation of measurable goals in any proposed monitoring plans. At present, cumulative impacts on wildlife have not been credibly predicted.
7. DeBeers should establish an Aboriginal consultation program that will address the concerns of the communities in regards to their traditional resource use (ToR line 440). The program should be a two-way stream of information: on one hand, adequately informing the communities about the details of the project (this could assume that baseline information is satisfactorily analyzed), and on the other hand, properly consulting with the communities to gather information on resource use and to evaluate the potential loss of resource use opportunities as a result of the mine. In order to achieve its environmental planning objectives any consultation program must yield results before the project goes ahead. At present, DeBeers has not submitted an adequately informed view of traditional land and resource uses by the communities.

5.0 Stantec Quality Management Program

This report, entitled "**North Slave Metis Alliance, DeBeers Snap Lake Diamond Project EAR Review, Technical Report; Prepared for: North Slave Metis Alliance; Prepared by: Stantec Consulting Ltd.; February, 2003**" was produced by the following individual(s):

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