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~~Mackenzie Valley Environmental Impact Review Board~~ Nunavut Impact Review Board
~~P.O. Box 2379~~ Nunavut Water Board
~~Cambridge Bay, NU X0B 0C0~~ P.O. Box 119
~~938, 200 Scotia Centre, 5102 50th Avenue~~ Gjoa Haven, Nunavut X0B 1J0
~~Yellowknife, NT X1A 3T1~~

Attn: Stephanie Briscoe, Ex. Director Philippe di Pizzo, Ex. Director
Nunavut Impact Review Board Nunavut Water Board
Louie Azzolini, Environmental Assessment Officer
Submitted by e-mail (to: EA01@mveirb.nt.ca sbriscoe@polarnet.ca and pdipizzo@polarnet.ca)

Re: Review of BHP Environmental Assessment Report for Sable, Beartooth and Pigeon Kimberlite Pipes, BHP Project Description, and Preliminary Design of Water Control Structures Request For Amendment To KIA Land Use Permit Use Licence KTL399C028 and to Water Licence NWB2HOP0207 - Exploration Decline - Doris Hinge Project

The following are comments provided by the Kitikmeot Inuit Association (KIA) is pleased to provide MVEIRB with our comments on the above proposed expansion of the Ekati Project, NWT to NIRB regarding the above request for amendment to the existing land use permit and the existing water licenses at Doris Lake, Nunavut. The review was conducted by Feisal Somji, MBA (KGL), James Slater, R.P.Bio. (KGL), and Stephen Wilbur, Ph.D., P.Geo. (Entrix Inc).

Most our review has focused on water issues identified in the April 2000 Environmental Assessment Report (EAR), as these are the major concerns of Kitikmeot residents. These issues are generally related to the potential impacts that construction and operation of the proposed mining facilities would have on the Exeter Lake and Lac de Gras drainages and associated downstream waters. Other areas of focus include climate and air quality, fish / aquatic habitat, wildlife, and socioeconomic / cultural issues. Additional comments on the October 1999 Project Description, and the Preliminary Design of Water Control Structures are also provided.

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~~“Editorial” comments (i.e., language, typos, formatting, etc.) are minimal, as the report is already very well written and edited. The Project Description was reviewed within the context of the EAR. Comments on the Preliminary Design of Water Control Structures are provided at the end of this report, and also within the context of the EAR review. This review begins with general comments, followed by specific comments categorized under section headings.~~

~~BHP ENVIRONMENTAL ASSESSMENT REPORT FOR SABLE, BEARTOOTH AND PIGEON KIMBERLITE PIPES~~

~~General Comments~~

~~Although the EAR appears to be comprehensive in scope and breadth, there are some essential deficiencies that need to be addressed. Further, from a water perspective there appear to be fundamental differences in how to approach the new development.~~

~~In general, the hydrology and related sections appear to be no more than revamped sections from the 1995 EAR with little new data. There is a general lack of baseline data for the new impacted watersheds, and too much reliance on water quality and streamflow data from the Koala watershed. Even so, critical data from the Koala Watershed is not provided in the text nor in the appendix, only some summary statistics are given. There is a general assumption that the drainages in the Exeter drainage will have the same characteristics as those observed in the Koala, but this conclusion is presented without any descriptions of, for example, channel substrate, channel geometries, landforms, lake density or soil conditions.~~

~~There will be impacts to the Exeter watershed from new pits, new waste rock piles, water management structures, new roads and other facilities. All these will require new water management plans based on site specific water balances, water quality conditions and hydrologic responses to handle pit water, stream diversions, and lake dewatering, etc. Critical data is apparently not available to adequately characterize baseline conditions and make these plans.~~

~~The methods for describing the effects from the development are in the context of area wide and long term (i.e., chronic), and are discussed as residual (i.e., meaning lasting after mining). Summary tables describe the residual effects only and grade them negligible or minor. This system appears to avoid the direct, local or short term effects (i.e., acute) which can be locally very significant (i.e., the permanent or temporary losses of lakes, streams, and wildlife and aquatic habitat).~~

~~Reclamation of the Sable Pit will take place over a fairly long period of time (> 25 years). Based on the data presented, there is the possibility of ARD being generated. Also the hydrology data from the Sable, Two Rock and Horseshoe Lake watersheds is not adequate to predict accurate water balances. How can assurances be made that water quality will not be degraded over the mining and reclamation period? With the available information, can assurances be made that the gain of only three additional years of mine life is worth the number and magnitude of impacts that will occur with the development of the Sable Pit in the new watershed?~~

In general, much required data is not presented, only some summary information is presented. In many cases, it is not obvious how much of the summary data was derived because the data is not available in the appendix or the original references are not readily available.

~~BHP has applied for a Class B water licence, stating that the majority of the water issues will be covered under their existing Class A water licence. However, two of the proposed new pipes (Sable and Pigeon) are some distance away from the existing operation, and are located within the Exeter Watershed, which is separate from the Koala Watershed (although both are within the much larger Coppermine River Drainage Basin). In light of the fact that the Exeter Watershed is currently undeveloped, we recommend that a public forum be held on this issue.~~

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~~The apparent lack of focus on collecting or presenting data may be a result of the expectation that the new development can occur in the new watersheds under the existing water licence as a Class B. However, what should be required for assessing development in the new watersheds is the same level of assessment that would be conducted for a Class A water licence.~~

~~The reason why a Type B Water Licence and not a Type A Water Licence is being applied for does not appear to be justified or explained in adequate detail in this report. The Northwest Territories Waters Regulations (SOR/93-303) set out criteria for classifying licences. Generally, type A licences apply to major undertakings such as mines, while type B licences apply to smaller undertakings such as water supply and sewage disposal. Since there will be new mines developed, and some lakes will be taken permanently out of production, it would appear that a Type A Licence would be required. This in turn would involve a more comprehensive environmental review process, public meetings and possibly public hearings.~~

~~1. Introduction~~

~~1.3 Integration of Traditional Knowledge~~

~~Paragraph 6: "A similar process [removing fish] will be implemented at Sable, Two Rock, Big Reynolds and Beartooth Lakes prior to mining." Does Pigeon Pond support fish? It is noted in Section 2.1.1.3, paragraph 5, that "the proposed development will disrupt the fish habitat of Pigeon Pond..." but does not state specifically whether Pigeon Pond supports fish or simply constitutes fish habitat. If Pigeon Pond does contain fish, then should not a fish removal program be implemented for it as well?~~

2. Scope of Development

2.1 Development Setting

2.1.1.1 Mackenzie Valley Resource Management Act and Environmental Assessment

References to <http://users.internorth.com/~mveirwg> should be changed throughout to <http://www.mveirb.nt.ca>, as the website address has been changed.

2.1.1.3 Required Regulatory Instruments for Sable, Pigeon and Beartooth Development

The reason why a Type B Water Licence and not a Type A Water Licence is being applied for does not appear to be justified or explained in adequate detail. The Northwest Territories Waters Regulations (SOR/93-303) set out criteria for classifying licences. Generally, type A licences apply to major undertakings such as mines, while type B licences apply to smaller undertakings such as water supply and sewage disposal (http://www.parl.gc.ca/36/1/parlbus/chambus/house/bills/summaries/c6_e.htm#F_Part_4).

2.2 Development Description

2.2.1 Introduction

Paragraph 3: "...turbid water from Sable will be stored in a reservoir until it meets criteria for discharge to the environment." What pathway will the discharge take, i.e., names of the downstream watercourses and lakes?

2.2.2 Mining Plan

Paragraph 5: "To accelerate flooding of the exhausted Sable and Pigeon pits, water will be pumped from a large water source within close proximity of each respective site." What are the names of these large water sources, and will any fish habitat be affected by the removal of water that are not already addressed in this report? The Project Description (4.1.7 Sable Pipe, Reclamation and Fisheries Replacement) give Mink Lake as a possible source for filling in the pit more quickly. Is this potential source mentioned in the Environmental Assessment Report?

2.2.2.2 Pigeon Pond

Paragraph 1. Pigeon Pond apparently contains fish, as noted above in Section 2.1.1.3, paragraph 5. Will the fish in this lake be harvested? (Note: this is addressed in Section 4.5.1.1 Lake Dewatering but it is not stated explicitly here that Pigeon Pond will be fished out; suggest this be clarified). Does Little Reynolds Pond support fish, and if so, will these also be harvested prior to mine development?

2.2.2.3 Beartooth Pipe

It is not mentioned here, although it is in Section 1.3, that fish will be harvested from this lake also. Suggest that this be mentioned here, as it is in the section for Sable Pipe (2.2.2.1).

2.2.2.4 Site Access Roads

Paragraph 3: “The road will be constructed in such a manner to minimize the need for safety berms, which would not only trap snow but also obstruct caribou migration.” This is not entirely clear. Does this mean it will be constructed so as to divert caribou to areas of “significant caribou movement,” as it seems to be referred to in the following sentence?

2.2.3.3 Waste Rock. A suite of drill core samples was selected for various analyses by BHP geologists to represent the range of rock types identified in each new pit. It would be helpful to know more about their sampling strategy. For example: Where were the samples selected? How well were the three new pits represented? Are the samples proportionate to abundance? Have a sufficient number of samples been taken of the rock types with low NP/AP ratios? The Sable Pit samples apparently exhibit a wide range in NP/AP—what will be the proportion of waste rock composed of the low NP/AP rock?

The statement at end of p 2-35—that there is minimal potential for net acid generation and “acid rock drainage,” appears to need some clarification with respect to the Sable Pit. What are the volumes of the low NP/AP rock types? Also since the Sable Pit will be in a new watershed, the potential impacts from ARD and metal leaching need to be more fully evaluated. Are there plans for addressing metal leaching (e.g., kinetic testing) prior to licensing?

Table 2-2-3. How were the values for groundwater input derived? Groundwater inflows should vary due pit size. The larger pit (Sable) will have more cross sectional area exposed, and so should have higher groundwater quantities. Have the runoff estimates been corrected for differences in lake density for each drainage area? Shouldn't the correction to precipitation be for snow under catch not “over catch,” and what is the basis for adding 10% to precipitation numbers to account for snow under catch (any references or basis)? How do the estimates shown in the table match the observed water balances for each pit?

Table 2-2-4. Are the changes to precipitation, evaporation and runoff reflective of assumed long term averages or are they based on just one year or data? The changes are fairly significant (11%, 28% and 24% increases, respectively). How does this affect long term water management planning for the various facilities, especially the Long Lake Containment Facility? For example, does it reduce its capacity or just increase the overall annual discharge to 9459 m³?

2.2.4 Water Balance. It appears that water balances for each pit have not been conducted. Water balances should be done to help predict changes to water quantities in downstream waters and for managing water quantities on site.

Page 2-42, 2nd sentence: Do not understand the statement: “The active life of the Long Lake Containment Facility has been reduced by three years, providing an additional three years of excess ... capacity.” How is excess capacity provided by reduced active life? Is the reduction in active life due more to the addition of more solids or more water or both? What is proportion of effect from adding more solids and more water?

2.2.4 Water Balance

Paragraph 1: “Water from Sable Pit will not flow into Long Lake and so does not affect the water balance.” A water balance *is* provided for Sable Lack in the Preliminary Design for Water Control Structures (Section 2.5); perhaps it should be referred to here (in the Environmental Assessment).

3.0 Description of Existing Environment

3.1 Climate and Air Quality

Figure 3.1.3. Why is only the data from August 1993 to January 1995 presented? Also, this figure does not equally represent the entire year. Why weren’t the last four years of data presented? (Equipment malfunction cannot explain four years of missing data.) Also, there is a different wind distribution shown on Figure 4.3.2. Is there an explanation for this?

Section 3.1.2.1, last paragraph. A calculated mean annual temperature of 10.8 C is given. How was it derived? Apparently only 59 months were used over a period of record extending from 1993 to 1999 (or approximately 72 months). Were some months excluded? Similar question with Table 3.1.3.

Table 3.1.4. The title should read Mean Monthly Precipitation not Monthly Total Precipitation.

Table 3.1.6. How were the return period events estimated for Ekati? Based on the precipitation data collected so far, it appears that with only 6-7 years of data, it is highly unlikely that two >25 year and one > 10 year events will have already occurred. Also the distribution doesn’t look right if it was based on the existing data set. Were these extrapolated from the Lupin Combined data set? How reliable are these estimates?

Section 3.1.2.2, top of p 3-11. “Further studies and more diligent monitoring of the Nipher snow gauge...will be conducted.” What is being performed under the current program, if the QA/QC has to be more “diligent,” or what was wrong with earlier data collection? Is the data flawed?

Section 3.1.2.3. Based on the data presented, there are no obvious prevailing wind directions; there are only 6 years of data shown that exhibit a high variability with no dominant wind pattern (compare Figure 3.1.3 with Figure 4.3.2—the “prevailing” directions are not the same). Perhaps there are seasonal patterns that are masked. Has the seasonality issue been addressed?

p 3-11 last paragraph, “...for the 15 months of data reported...” Why were just the 15 months in 1994 and 1995 reported?

Table 3.1.8. The means are not comparable; the pan data was calculated using 1994 through 1999 data, while the Penman data was calculated using only 1994, 1998 and 1999 data. Also, where is the data to support the calculations and statements in the following paragraph?

~~Table 3.1.9. Same comment as for Table 3.1.8, the means cannot be compared. The calculation should exclude 1995, 1996 and 1997, which appear to be wetter years than 1994, 1998 and 1999. The previous statement, “The rates compare favourably and are within 5% of each other,” is not accurate. For the same years of record (1994, 1998 and 1999), evaporation at Salmita was 14% greater than Ekati.~~

~~Why isn't evapotranspiration and sublimation discussed in Section 3.1?~~

~~Section 3.1.3.1st paragraph, “the air in the Lac de Gras region is free of any anthropogenic contamination,” should read “was” free. What is the evidence for the statement “...the air emissions are attenuated and quickly diluted by the ambient air...”? Is this conclusion based on air modeling results? Are there times when attenuation and/or dilution are inhibited by certain conditions (i.e., temperature inversions)?~~

~~Figure 3.1.4. TSP sampling appears erratic and incomplete; how representative are the data?~~

~~Also the statistics calculated and shown in Table 3.1.10 are based on unequally represented data (i.e., seasonally not adjusted, etc.)~~

~~Top of p 3-17, “Several of the TSP filters were analyzed for metals during the 1994 baseline program. It was concluded at that time that none of the metal concentrations in the airborne particulate were of concern.” This statement does not seem relevant here. More importantly, what has happened since then (during operations), and why haven't metals been addressed? Who concluded which metals were of no concern based on what guideline?~~

~~Are the concentrations given at end of p 3-17 normal (expected) for the area with no anthropogenic activity?~~

Section 3.2 Surficial Geology and Permafrost

~~Section 3.2.1, last paragraph on p 3-21, “...approximate 200 years of deglaciation.” What is the reference for this statement? This does not seem to be enough time to deglaciate the entire ice sheet.~~

~~Section 3.2.3.2. Is the depth of permafrost based on only one borehole? Where is the ground temperature data to support the permafrost description?~~

~~Was the thermokarst described at the bottom of p 3-28 (“Retrogressive thaw of massive ice near the lower slopes of eskers has resulted in arcuate thermokarst depression that sometimes give the eskers a scalloped appearance”) caused by natural processes or anthropogenic activities?~~

~~What is the distribution and abundance of the massive ground ice bodies (and other permafrost related patterned ground features) referred to in the second paragraph on p 3-28? Of these features, what is their degree of susceptibility to degradation related to development's activities?~~

General Comments on Sections 3.3 and 3.4

The Hydrology (section 3.3) and Water and Sediment Quality (section 3.4) sections require data summaries that are referenced to actual data in the appendix (neither the data summaries nor the appendix data is provided). The data summaries should include, for example, drainage area, lake density (and other important hydrologic related variables), periods of flow monitoring, type of data collection (i.e., point or continuous, weir versus discharge measurement, reliance on stage discharge ratings), mean daily and/or monthly flows, type of water sampling methods employed, summary of field parameters and lab results. In addition, maps are needed to show the locations of all monitored stations, and the drainage basins for each station depicted.

Section 3.3, 2nd paragraph. What is the drainage area of just the Exeter watershed? Why is the emphasis on the Yamba + Exeter when there is no development in the Yamba watershed? What is area of drainage from which all new affected areas will reside (i.e., including Horseshoe and Sable road area, etc.)?

Section 3.3, 3rd paragraph. Stations in the Koala watershed have been monitored for the past six years. Are there any monitoring stations in the new watersheds?

Table 3.3-1. With reference to the monitoring locations in Koala Watershed, is there a map that depicts these locations? It is difficult to assess the stations usefulness, representativeness and appropriateness without seeing their distribution.

Page 3-37, 1st paragraph. “The onset of freshet flows can generally be predicted by average daily temperature; furthermore, the magnitude of freshet flow is correlated with precipitation data.” The inferences made here are somewhat ambiguous. Does this statement assume winter precipitation and daily temperature during the freshet season?

Figure 3.3-3 and associated statement on page 3-37, 2nd paragraph, that “All peak freshet flows occurred on June 5.” What are the proximity of these stations to one another? Are they along same drainage route or in adjacent drainages? Do they have the same drainage area? Are these drainages representative of all drainages in the study area? It is hard to imagine that all the drainages were or will be as synchronized as implied, especially if they have different drainage areas.

The discussion of hydrology data in general is not thorough, nor accurate. For example, the following sentence on page 3-37, 2nd paragraph, “From the five monitoring locations, only the magnitude in peak freshet flows at Vulture Polar and Moose Nero deviated from the other locations...” In fact, the magnitudes are different for each station, but they were normalized by using unit area comparisons. Further, having only three out of five does not constitute a “trend,” especially with only one year of data presented. In addition, the apparent explanation of the ice dam can not be evaluated, because the locations, channel geometries and drainage configurations have not been presented. In any case, the effect of the ice dam could be checked by comparing total volumes of flow (i.e., rising stage due to ice dam will have lower velocity but increased cross sectional area of flow—but the same flux).

~~Table 3.3.2. Why does the Moose Nero basin apparently have significantly smaller minimum flows per unit drainage area? Also, it appears that in 1999 three of the streams had significantly higher base flows than in the previous two years, but the Moose Nero and Counts base flows were lower. What are the reasons for this variance? In general, the inability to demonstrate good correlations or well established trends indicates the need to develop site specific baseline data for affected watersheds. Reliance should not be made on data from the Koala watershed streams to characterize baseline conditions, estimate actual flow regimes, especially when developing water balance estimates, hydrology for design considerations, and developing contingency plans for water management.~~

~~Figure 3.3.2. Where is the data to evaluate how the means were calculated (i.e., are curves based on continuous or point data)? Also, why is only Slipper Lac de Gras shown? Is there data from any other streams?~~

~~Middle of page 3.40. How did Rescan refine and derive runoff depth estimates? The data cannot be evaluated without seeing the data or at least a summary of explanation. All pertinent data should be presented in summary table or in appendix so that this report stands alone.~~

~~Page 3.41, 1st paragraph, 2nd line. What is a “consolidated” relationship? What correlation between runoff depth and area is vice versa? What is being discussed here and what is the significance? What is being depicted by Figure 3.3.4? If the “runoff depth” was derived by dividing the total volume of flow by drainage area, why was it plotted versus drainage area? Wouldn’t it be better just to plot total volume versus drainage area? Where is the data to review and evaluate the derivation of data shown on Figure 3.3.4? The area versus discharge relationship is not well established. The poor correlation indicates significant differences in hydrologic responses (i.e., % lake area, soil type, role of permafrost, aspect if relief is apparent, etc.) need to be evaluated.~~

~~Page 3.41, 2nd paragraph. A comparison is made to the Indin Watershed, “information obtained from Indin River is in general agreement with that obtained from the Koala Watershed. It is therefore possible to extrapolate long term hydrological data from Indin River to the Koala Watershed, while considering a correction factor.” The implied use is for design of engineered structures. However, 1) the Indin Watershed is much larger. What part of the Indin River system is being compared and what is its drainage area. In general, it is not good practice to compare basins with large differences in drainage area; 2) the Indin River is located primarily in discontinuous permafrost terrain. Hydrological responses may be very different; and 3) Does this comparison appear to apply to only to the existing mine area, and not to new areas?~~

~~Page 3.41, 3rd paragraph. What is meant by “compatibility” in the following sentence: “The compatibility of hydrologic conditions within the Koala Watershed and those of the surrounding watersheds...” Does the content of the paragraph imply that because the temperature and precipitation are similar between the Koala Watershed and the new watersheds that the hydrologic responses will also be the same, and therefore data collection was not necessary? What about the other equally important factors causing variations in~~

hydrology (i.e., aspect, soil type, permafrost, lake density, vegetation cover, soil thickness, etc.)? As evidenced by the wide variation in runoff depths for the various discussed basins, there are other significant factors that still need to be addressed.

Section 3.3.2, 1st paragraph. “To date, no specific long term hydrological data are available for the Exeter Watershed. However, because the overall climatic and physical conditions are similar, data from long term monitoring of the Koala Watershed are useful for application on adjacent watersheds.” More accurately, there are no long term hydrological data available for any watershed in the Ekati area, including the Koala. Six years does not constitute long term. Even with the Koala data, there is significant variability and does not justify the lack of collecting good baseline data in the proposed developed areas. This is a major deficiency in planning. Reliance on only Koala watershed data at the omission of Exeter data is not justified.

In general, similarity in physical conditions has been assumed without any detailed comparisons. Although there are some obvious similarities, a comparison should address, for example, aspect, soil type (infiltration potential), percent organics (or other significant water storage terrain unit), permafrost distribution, lake density, vegetation cover, soil thickness, etc.

Page 3-41, last paragraph. Apparently three stations were monitored on Pigeon stream between June 2 and September 29, 1999. Where is the data to substantiate the statements that the “monitoring results showed similar hydrologic conditions...?”

3.4 Water and Sediment Quality

Section 3.4.1. Where is the water quality data to support statements regarding trends within Coppermine Basin, and what is the relevance to this report? These statements regarding the trends cannot be corroborated without knowing something about the data (i.e., years of record, seasons of record, what data is missing, type of streamflow and water quality data collected, where was data collected, how representative were station locations, etc.). Also, an Environment Canada (1988) study on historical streamflow was cited. Is there any newer or more relevant study addressing water quality?

3.4.2 Water Quality in the BHP Claim Block

Section 3.4.2. Where is the water quality data? Only a summary of pH data has been presented in Figure 3.4-1 (what is year of data on Figure 3.4-1?). How was the summary data derived? What was the basis for claiming the seasonality of the other parameters? The statements made on page 3-46 regarding, for example, low concentrations, exceptions and/or exceedances, cannot be evaluated without seeing the data.

Table 3.4-1. Where are the compared lakes located? Are they in proximity to anthropogenic activities? What is the relevance of the comparisons alluded to on the table without addressing what affects the data at each location? For example, one cannot justify the claim that headwaters are low in major ions with reference to the data on Table 3.4-1.

~~Table 3.4.2. This summary table should be supported by actual data in appendix; apparently data values do not represent means and standard deviation, but are single points and ranges, but this should be explained? How were the range of values for Two Rock and Ulu Lakes derived if only one sample was collected? Data collection strategy appears to have missed the seasonal variation, and is not sufficient to adequately describe range of variation. For example, phosphorous differed by over an order of magnitude in the two Sable Lake samples apparently due to winter exploration drilling. This is a very important parameter. Also, why omit other important nitrogen parameters (nitrite, ammonia, etc) in the table?~~

~~Tables 3.4.1 and 3.4.2. Were the lake samples collected from the surface only? Collection methods need to be described.~~

~~It would be helpful to provide CCREM guidelines for freshwater aquatic life selected water quality parameters, for example, in another column in Table 3.4.2, or in an appendix.~~

~~Section 3.4.3. There are similar deficiencies in this section that are in the previous section. Data is lacking and important concepts are not fully presented.~~

3.5 Aquatic Life

3.5.3.1.2 Fish Populations, Sable Lake

~~Paragraph 3: the reference to Scott and Crossman should probably read 1998 instead of 1990 (or vice versa), as this is how it is given in the reference section.~~

~~Paragraph 4: "...conditions factors for lake trout from Sable Lake were generally less than those from Koula watershed lakes." Suggest defining "condition factor" in the glossary. Condition factors are different for different species of fish. Suggest this should be noted.~~

~~Paragraph 5: "...it is apparent that the sampled fish [lake trout] were feeding [on chironomids] below the littoral zone. This has significance for the reestablishment of suitable conditions in Sable Lake following closure of the pit." Does this mean that it will not be possible to reestablish suitable habitat for lake trout prey species during reclamation of Sable Pit?~~

~~The population estimate for lake trout in Sable Lake was 99 fish, based on a 1997 mark-recapture program. Although no such program was conducted for Ulu and Two Rock lakes, is there no means to estimate fish populations using available data (e.g., CPUE, lake area, ratio of littoral to basin, etc.)?~~

~~If the estimated lake trout population of Sable Lake is only 99 (for fish susceptible to a 1.5-inch mesh), then it appears that the CPUE for July 16, 1997 would have fished out more than the total population in the lake (approx. 150 fish) using 100 m² of total net area over a 24-hr period. The total number of fish at Sable Lake caught is not given (assumed this is provided in the 1998 Rescan report, but it would have been helpful to provide the number here). While it is understood that the fish in the lake will be harvested, it appears that the sampling program reduced the existing population by a substantial amount.~~

~~Certain metal levels in Sable Lake were above CCREM guidelines. Will metal concentrations in fish tissue be analyzed before they are harvested, to ensure they are safe to eat?~~

~~DFO No Net Loss policy calls for 2 to 1 replacement of lost habitat. Does this policy apply to fisheries replacement strategies for the proposed expansion. This is not mentioned here or in the Environmental Management Section (5.5.8, Fisheries Replacement).~~

~~3.5.3.2.2 Fish Populations~~

~~Pigeon Stream, Paragraph 6: There is no map showing the reaches of Pigeon Stream.~~

~~Little Reynolds Pond: noted that attempts to sample fish populations in this lake were unsuccessful, and that it is unlikely to support any significant fish population. Would attempts still be made to fish this lake out?~~

~~Beartooth Lake, Arctic grayling, paragraph 2: Reference should be to Figure 3.5-21 instead of 3.5-20.~~

~~Population estimate is given for Arctic grayling and lake trout in Beartooth Lake. Were no population estimates possible for Pigeon Pond and Big Reynolds Pond? This is not explained. What method was used in determining the fish populations in Beartooth Lake—was there a mark-recapture program, or some other calculation?~~

~~Numbers of fish caught are provided in the charts for Pigeon Pond, Beartooth Lake, Big Reynolds Pond (e.g., n=68), but are not given in the charts Sable, Two Rock and Ulu Lakes. Is there a reason for this?~~

~~3.7 Wildlife~~

~~3.7.3 Grizzly Bear~~

~~Not mentioned whether grizzlies reuse their dens year after year (as is the case with foxes and wolves), or excavate a new den each year.~~

~~3.7.6.2 Raptors~~

~~Ravens are considered to be raptors by some wildlife biologists. Perhaps a definition of “raptor” is required.~~

~~3.9 Social, Cultural and Economic Environment~~

~~3.9.1.1 Demographic Profile~~

~~Paragraph 1: “In 1991, the NWT had 64,000 residents.... In 1996, the Canada Census counted 39,672 people in the NWT alone.” These two sentences do not appear to be logically consistent, nor do they appear to be correct. The 1996 Canada Census data indicate that in 1991, the population of NWT was 57,649 (including Nunavut); in 1996 the population~~

of NWT was 64,402 (including Nunavut). The statistic cited for the NWT in 1996 (39,672) was for the NWT *excluding* Nunavut (it is assumed this is what is meant by “the NWT alone”). In 1991, the population for the NWT *excluding* Nunavut was 36,405. Although the introduction in Section 3.9 attempts to explain this, further clarification is required, particularly with regard to the confusing and apparently inaccurate information provided in the first two sentences of Section 3.9.1.1.

3.9.1.2 Human Health and Well-Being

Paragraph 5: “For much of the past decade, the rate of violent crime in the NWT has continued to increase (Figure 3.9.4).” The figure referred to does not seem to agree with this statement. It appears that violent crime in the NWT decreased overall between 1993 and 1998, and only showed an increase between 1996 and 1998.

Paragraph 7: “This same report [NWT Health Status Report] describes the health of NWT residents by [sic] the main reasons [sic] that people are admitted to hospital.” Could not understand the meaning of this sentence.

There is no mention of the effect of proximity or access to hospitals on the overall health and well-being of the population, particularly among the elderly or those with chronic conditions or diseases requiring long-term care (e.g., kidney or heart disease). The remoteness of many communities makes it difficult for residents with conditions requiring regular treatment (such as kidney dialysis) to travel to these facilities, particularly when they involve many months or years of treatment. This has been identified as a health and social problem among Native people in northern Manitoba (where the same conditions apply), and should not be overlooked in this assessment.

A cross-comparison of socioeconomic factors in the NWT, Nunavut and Kitikmeot Region would be helpful in determining impacts. For example, the NWT has the lowest percentage of the population over age 15, while Nunavut, and in particular Kitikmeot, has the highest. The percentage for labour force, employment, and participation are all highest in the NWT and lowest in Kitikmeot. In addition, unemployment rates and those not in the labour force are also lowest in the NWT and progressively higher in Nunavut and Kitikmeot (1996 Census of Canada).

4.0 Environmental Effects Assessment

Section 4.2.1, 3rd paragraph. The proposed compliance monitoring will be based on the existing Type A water licence. Provisions should be made to re-evaluate or add to the licence conditions. Are the current monitoring criteria and other guidelines sufficient?

Section 4.2.2, p 47, 3rd paragraph, “...geographic extent and duration were often considered to be of greatest importance when assigning the significance rating to a residual effect.” This method appears to emphasize chronic effects and undervalue acute effects, and by using residual avoids the significance of more direct effects that occur during construction and/or operations.

~~Table 4.2.3. The probability column should also have a very likely (or will occur) category. For example, fugitive dust along roads will occur; also, terms in the frequency column should distinguish between regular (once per month) and regular (once per day).~~

~~Table 4.2.6. The duration column considers only long term (>10 years). Why are not shorter term, more acute impacts also considered? Also, the reversible column has <10 years but shouldn't there also be <1 year to distinguish between, for example, acute and chronic effects?~~

~~Figure 4.2.2. The Horseshoe watershed is listed as 11.3 km². This is incorrect and too small. Why is the Exeter drainage not considered separately? All the impacts from the proposed development not within the Koala watershed will occur there (includes Horseshoe, Pigeon and other areas draining directly to Exeter lake).~~

~~Section 4.2.2.4. There is reference to results of groundwater modeling conducted in 1995 and 1996. What modeling? Was this local modeling done for pits, or a more regional scale model? The statement is vague and without reference.~~

~~Section 4.3.1, 3rd paragraph. The SO₂ emission rates are higher than estimated and more than implied although the total is less (original estimate was 0.84 tonnes of emissions of diesel, actual use was 1.01 tonnes per m³ or 20% higher). Why was the total consumption lower but the consumption rate much higher than estimated? Was first estimate conservatively too high? These estimates become more important when mining operations increase in scale.~~

~~Section 4.3.1, 4th paragraph. Why is there is no mention of fugitive dust in addition to gaseous and particulate emissions, for vehicle traffic, mining operations and waste management considerations?~~

~~Section 4.3.1, 5th paragraph (top of page 4-19). From the following statement, "The integration of the Sable, Pigeon, Beartooth pipes...into the mine plan does not alter the air quality effects...as the overall air containment emission rates are essentially unchanged," appears to ignore the impacts of affecting a larger airshed. In fact, there may be more affected area for less proportionate gain and with higher overall emission rates (as noted above for the 3rd paragraph). Although the Leslie Pit is not being developed, the others are but with less overall production and a shorter mine life. Total process may be reduced, but fugitive dust generation may increase because more area is affected (i.e., more roads).~~

~~At end of section 4.3.1, there is reference to air dispersion modeling. What model was used? Where are the model results? What were the model assumptions? Did the model consider a broader affected area? What was modeled?~~

~~Section 4.3.1.1, 1st paragraph, last sentence. "Monitoring is performed at least every three years..." should say "monitoring is planned..." How many times has modeling been performed since the inception of the monitoring program?~~

~~Section 4.3.1.1, 3rd paragraph. An additional objective should be to establish baseline and historical data base for evaluating trends and assessing impacts.~~

~~Section 4.4.1.1, 2nd paragraph. "...ground temperatures at depth suggest that the permafrost is in long term equilibrium with the prevailing climate." What is the ground temperature profile from which this conclusion was reached (i.e., show data). Depth does not necessarily equate to equilibrium or stability. Stability is indicated by the absolute temperatures and the shape of the temperature profile with depth. Equilibrium is also governed by factors not discussed that include the thermal conductivity of each rock type, and the mean annual, winter, and summer air temperatures.~~

~~The 3rd paragraph in section 4.4.1.1 states that there are no large scale thermokarst features. However, on page 3-28 thermokarst features were described.~~

~~Section 4.4.1.1, last paragraph. Define what is meant by the term "footprint," which usually refers to the base of a building. In this case does it mean the entire developed area? (see, for example, Figure 4.4-2).~~

~~Figure 4.3-1. Where will the new snow, vegetation, and lichen monitoring stations be established in the new impacted watersheds in order to establish background in the new area?~~

~~Section 4.4.1.2, 1st paragraph. The term "...groundwater movement..." would be more accurately described as groundwater flow.~~

~~Section 4.4.1.2.3. How will mining of pits affect permafrost stability (especially on south-facing walls)? Also, permafrost depth is not uniform, but uniform depth is implied in the text. Permafrost depth is based on the bedrock properties including thermal conductivity and fracture density. The modeling referred to in section 4.4.1.2.2 assumed the depth to be 250 m. Is it wise to base the impacts on this assumption? What are and were the observed depths and temperatures in existing pit areas?~~

~~Section 4.4.1.2.3, 3rd paragraph. Sable will go below 320 m (the assumed depth of the bottom of permafrost) to 360 m. Thus, the assumption is that only 40 m of non-permafrost rock will be encountered. Is it valid to make this assumption on only one data point, knowing that the geothermal properties of kimberlites and the country rock are likely very different?~~

~~Figure 4.4-1 and previous page discussion. The results are compared on a log scale; however, differences between the mine area and the reference area are much higher than implied....first, because they all show an increase; and second (although not sure how the $P < 0.05$ is calculated), it appears as if the increases are higher than suggested. For example, chromium increased from 0.25 to 0.80 (3.2x), cobalt from 0.22 to 0.40 (1.8x), copper 1.00 to 1.08 (1.1x), lithium from 0.25 to 1.10 (4.2x), molybdenum from 0.05 to 0.09 (1.8x), strontium from 8.0 to 9.0 (1.1x) and titanium from 10 to 25 (2.5x).~~

~~Figure 4.3.2: How were the zones of influence determined? How did snow survey results indicate different zones of influence? Is Sable's zone of influence larger because it lasts longer or because it is a bigger pit?~~

~~4.5 Waste Rock Runoff Management Plan~~

~~Section 4.5.1st paragraph: Why is the Yamba Watershed included?~~

~~4.5.1.6 Pit Restoration: Reclamation to Lake Status~~

~~Paragraph 4: "Upper Exeter Lake has a surface volume of approximately and is large enough..." Value for surface area of Exeter Lake has been omitted.~~

~~Paragraph 5: What will be the source of water for refilling Beartooth Lake?~~

~~Has this method (creation of littoral habitat) for the reclamation of fish and aquatic habitat from open pit mines been tried anywhere else, i.e., is there a precedent for this and if so has it been successful?~~

~~Is it expected that the processed kimberlite which will form the basin of the reclaimed pits result in metal levels (e.g., Al and Ni) in the water column that are elevated or toxic to fish?~~

~~4.5.2.3.1 Potential Effects and Mitigation for Sable Pipe Development~~

~~Paragraph 7: Two Rock Lake will be reclaimed through release of water from the Sable pit. However, further details regarding its reclamation appear to be lacking.~~

~~Also it is not clear initially where the processed kimberlite from the proposed expansion will be stored. It is assumed that all processed kimberlite will be stored in the Long Lake containment facility. It is noted in the Project Description (Section 4.4) that it will be stored in the "Processed Kimberlite Containment Area," but in the EA it is referred to as the "Long Lake Containment Facility." The discrepancy between these two terms being used in two different but complementary documents was the source of some confusion in this review. Suggest the terms be made consistent (i.e., use either one or the other throughout) for the lay readers or those not thoroughly familiar with the entire project and its history.~~

~~Sable Lake is considered to be "ecologically isolated." There are (possibly anecdotal) reports from the existing Ekati operation that tagged fish have been unexpectedly found in other lakes separated from the lakes of origin by poor migration habitat. If this is the case, is it possible that fish (e.g., lake trout) are more mobile than expected?~~

~~4.5.5.2.5 Pit Reclamation: Beartooth Lake~~

~~Paragraph 1: "Beartooth Lake will be filled with processed kimberlite over two summer seasons." It appears that the other pits will not be backfilled with processed kimberlite. Why is this method being used at Beartooth Lake alone? Since Beartooth Lake will be the first to be reclaimed, will the same methods be used in other pits if successful? (The possibility of~~

doing this is referred to only in general terms in section 4.5.5.4, paragraph 1). Also, since this will be the first pit to be reclaimed, should not fish sampling studies be carried out prior to development so that impacts and reclamation success can be monitored?

4.5.6 Summary of Sable, Pigeon and Beartooth Pipe Development on Water VECs

Paragraph 5: A summary is provided in terms of a net gain for Pigeon Pit with regard to the DFO no net loss policy, but none is given for Sable or Beartooth, i.e., whether their development would result in a net loss or net gain.

It is assumed, but not stated in this report, that the “no fishing” policy for BHP employees would apply to the three proposed pits and surrounding areas as well. Suggest stating whether this policy would be in effect for the proposed expansion as well.

4.6 Wildlife and Habitat

There are numerous references in this section about the potential acceleration of green up in the dustfall zone (10–14 days), which is promoted as a mostly positive impact, with the only possible negative impacts coming from increased risk of collision or predation for wildlife exploiting feeding opportunities. What about the potential for contamination by heavy metals and petroleum hydrocarbons in these areas as well? This does not appear to be addressed. Also, wildlife might avoid browsing on vegetation that has been covered with dust (during the snow-free period). It appears this has not been addressed either.

Also, the way the information is presented in this section appears to be highly repetitive, with the same statements and data presented over and over again (e.g., the assumed benefits of dustfall on vegetation feeding opportunities). Suggest finding a way to present this information more concisely, without so much repetition.

4.6.1.2.1.2 Operational Activities

Caribou and Grizzly Bears: Assuming vehicles would be on the proposed Sable, Pigeon and Beartooth roads on a 24-hour basis, are caribou and grizzlies more susceptible to collisions with vehicles at night, and if so should not some contingency be made for this (e.g., lower speed limits at night)?

What will be the speed limits for vehicles using the proposed roads? It is stated as 60 km/h in the Project Description, but could not be found in the EA.

What about “common-sense” measures such as honking the horn to warn wildlife in possible danger of being struck or run over?

Table 4.6-9 Summary of Predicted Effects of the Proposed Development on Furbearers

Effects on foxes are predicted to be **negligible** (which is bolded in the report); however, effects on wolves and wolverines are not rated—only an overall rate of **minor** is given for furbearers. This rating appears too low, given the **moderate** rating given to grizzly bears,

~~and the sensitivity of wolves and wolverines to human disturbance, and the fact that wolverines “may be more vulnerable to population perturbations than grizzly bears” (Section 4.8.4.4). The rating for furbearers should not be driven by the least sensitive species, but by the *most* sensitive species, and it appears this is the wolverine. It seems reasonable therefore that furbearers should be ranked at least **moderate**, in view of the high vulnerability of wolverines.~~

~~4.7 Effects on the Social, Cultural and Economic Environment~~

~~Paragraph 2: “In general, the analysis and predictions outlined in the [1995] EIS are still valid and form a significant part of the current analysis.” Where is the line of reasoning to support or justify why the analysis and predictions are still valid, particularly in light of the fact that they form a significant part of this section?~~

~~4.7.7.2 Duration~~

~~Paragraph 2: add “respectively” to end of sentence. Same with section 4.7.2.3~~

~~Table 4.7-1~~

~~It would be helpful to include the contribution of the Ekati Project to the NWT GDP without the three proposed pipes as well, for comparison purposes, e.g., to see what the relative economic impacts of the expansion would be.~~

~~4.7.11.1 Human Health and the Biophysical Environment~~

~~There is no mention here of fish and aquatic habitat under a separate heading. As VECs (Table 4.2-1), they should be addressed separately. Fish are mentioned under wildlife; however, only in terms of their relevance to consumption by employees, not by non-employees (traditional subsistence harvesting). Also, fish are not generally considered as wildlife. The heading should perhaps be changed to Wildlife and Fish, or Wildlife and Aquatic Resources.~~

~~4.8 Residual Effects~~

~~A clear definition of residual effects is needed at the beginning of this section, e.g., Residual effects are those for which mitigation measures are not feasible or for which compensation has not yet been determined. They also include the effects that persist after mitigation measures have been successfully applied.~~

~~4.8.4.4 Furbearers~~

~~Paragraph 5: Do not agree with the predicted residual effects on wolves and wolverines (minor). Suggest they be considered separately, since foxes are considered separately, as are grizzly bears, and that residual effects on wolverines be assigned a **moderate** value instead of minor for the same reasons given in comments on Table 4.6-9 (above).~~

~~4.9 Cumulative Effects Assessment~~

~~4.9.1 Definition of Cumulative Effects~~

~~The definition provided could use some clarification.~~

~~Since the MVRMA does not have any specific guidelines for cumulative effects, suggest including the following definition from the Reference Guide for Addressing Cumulative Environmental Effects (CEAA 1996), which defines cumulative effects as:~~

~~“The effect on the environment which result from effects of a project when combined with those of other past, existing and imminent projects and activities. These may occur over a certain period of time and distance.”~~

~~Also suggest the following points be included to clarify the meaning of cumulative effects for the lay reviewer:~~

~~Generally speaking, cumulative effects can be divided into two principal categories:~~

- ~~• Temporal Effects: impacts on the environment which accumulate over time as a result of repeated incremental effects (e.g., air / road traffic, discharges to the aquatic environment). Impacts over a short period of time may be insignificant or non-measurable, but taken over time, they may become noticeable, even to the extent where they exceed the local environment’s capacity to assimilate their effects without deleterious change.~~
- ~~• Spatial Effects: impacts which arise as a result of multiple projects or activities operating in an area where effects can overlap and become additive or synergistic (e.g., air emissions, noise, effects on the water quality of a common watershed). These effects may not be significant or noticeable in the context of a single project, but if multiple projects are developed within a limited area and time, they can tax the buffering capacity of an ecosystem beyond its limits and so become critical issues.~~

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~~4.9.4.3.1.2 Koula Watershed~~

~~Paragraph 7: “Published papers...indicate that aquatic primary producers in the oligotrophic...waters in the area, including Lac de Gras are most likely limited by phosphorous.” There should be references to these published papers, since this is an important point (i.e., leading to conclude that the addition of nitrogen will therefore not likely cause an increase in primary producer biomass).~~

~~4.9.4.3.1 Surface Water Quality~~

~~It does not appear to be explicitly stated here that water quality should not be included in a cumulative effects assessment.~~

4.9.4.5.1 Caribou/Habitats

Paragraph 3: “The potential effect of [Ekati] on the...Bathurst caribou herd was one of the most important public concerns raised during the EARP hearings in 1996.” Wasn’t water quality a major concern also, and shouldn’t this be mentioned in the Surface Water Quality and Quantity section?

4.9.4.6 Socio-Economic Elements

Paragraph 1: “The lack of published data prevents adequate assessment of future developments such as the Winspear and Tahera diamond projects.” A cumulative effect assessment is based on impacts that are *probable*, not *possible*. Winspear and Tahera are still in their exploration and delineation stages, and should not be considered for this reason, not because of a lack of published data. If cumulative effects due to exploration activities are being considered, this should be made clear.

4.9.7 Analysis of Cumulative Effects

4.9.7.1 Air Quality

The possible effects of *mines* operating at such places as Jericho, Yamba Lake, Camsell Lake, and Kennady Lake are clearly hypothetical, and as such go beyond the premise for evaluation that “other projects or activities exist or are likely to be carried out and are not hypothetical,” as stated in Section 4.9.1. It appears to be of no practical use to include them; other than possibly to set a precedent for *expanding* the scope of future cumulative effects assessments.

Table 4.10-1 Summary of Spills at the Ekati Diamond Mine

Are the spill rates and volumes given comparable to other large mining operations in the NWT?

4.10.2 Risk of Malfunctions of Engineered Systems

Is there any contingency plan for slope failure in either the waste rock piles or processed kimberlite storage areas?

5.0 Environmental Management

Figure 5.1-1: The baseline studies that are referred to do not appear to include any provision for water quality or streamflow work. If this is true, why? Also, the Tier 2 Special Effects Monitoring refers to only the Larry and Leslie Lakes. What about the lakes in the Exeter Watershed? In general, the schematic reflects only the current mining operations and does not adequately address the new developments.

~~Near top of page 5-5. The statement, "...seeks to minimize the overall potential adverse effects of Ekati on the Lac de Gras region," implies that no additional consideration has been made regarding the Exeter Watershed.~~

~~Page 5-5, 4th paragraph. What are the current plans for modifying the OEMP to incorporate changes that reflect the development in the new watershed?~~

~~Section 5.2.2, 3rd paragraph. Define "reasonably" in the phrase, "maximize environmental quality to the extent reasonably practicable." The phrase indicates that compromises will occur. To what extent is the environment compromised for economics?~~

~~Section 5.2.2, 3rd paragraph. Define "serious" in the phrase, "act when necessary where there are threats of serious or irreversible damage." This implies that action will only be taken when something serious occurs, but this approach does not seem conservative enough or environmentally sound.~~

~~Section 5.2.2, last paragraph. Suggest adding the word foreseeable after "determine any..."~~

~~Section 5.2.3, first paragraph. Suggest adding the word foreseeable after "determine any..." and adding the phrase, "measure agreement with applicable ambient air quality objectives."~~

~~Section 5.2.3, 4th paragraph. Are the mass balance calculations performed using a model? What are the assumptions used to make the calculations?~~

~~Section 5.2.4, 1st paragraph. The EAR will report on long-term effects only. What about short-term and acute effects?~~

~~Section 5.2.5. "No changes to the Waste Management Plan are required to accommodate hazardous wastes resulting from activities at Sable, Pigeon and Beartooth." This may be true in concept, but there are specific details that will require amendments to the plan. For example, there will be new transportation and storage areas, and the Sable operations will be somewhat removed that may require faster responses than are currently capable from the existing set-up.~~

~~Section 5.2.6, 1st paragraph. Are the cited concentrations standards or guidelines or reference values? Also, although the existing mine plan may not alter the concentrations at any given time, the total load to the environment of nitrogen-related parameters will increase, because there are more areas being mined and more areas affected.~~

~~Section 5.2.6, 2nd paragraph. Reference is made to low phosphorous concentrations the site. What are the concentrations?~~

~~Page 5-10, last paragraph. Reference is made to mitigation procedures to reduce impact of nitrogen compounds. How effective are these procedures to data? Are there any data to validate the current mitigation practices?~~

5.5 Reclamation and Closure

5.5.2 Vegetation Re-establishment

It is noted that “Revegetation research was initiated in 1994 and continues to be an ongoing effort.” Have any test plots using different types of plants and soil been established to determine the effectiveness of various reclamation techniques, or are all areas being allowed to recover naturally? It appears the former may be the case, but there are no references to specific methods or studies (i.e., reports) done at the Ekati project site. The reference to Kidd and Rossow (1997) is made in the context that these studies were carried out in Alaska, but the reference indicates the study was done for the Fox portal.

PRELIMINARY DESIGN OF WATER CONTROL STRUCTURES

Executive Summary

1. Is there any experience documented for the construction and/or operation of frozen core dams, (e.g. at EKATI), or for the filter type concept (e.g. Long Lake Containment)?
2. What are the discharge requirement criteria (for turbidity)?
3. What are the anticipated levels of turbidity in mine water?
4. Are estimates of siltation/suspended solid volumes available? Are these significant?

2.0 SABLE

1. How reliable is the 1 m contour data? Was this derived from the 1:20,000 air photos or by a local survey?
2. The hydrology data is not available to review, but is a 1/10 AEP large enough for a 7 year life project given the fact that no long term data is available?
3. Has an interceptor ditch or dyke been considered to go around the Sable Pit and catch surface run off prior to contamination in the pit? This might minimize turbidity.
4. If water is stored in the pit or if de-watering pumps are temporarily halted due to an “extreme hydraulic event,” would there be consequences on the stability of the pit side slopes?
5. What is the impact on aquatic habitat downstream if water stored for one year is then discharged with higher flows?
6. What are the current decommissioning plans for the dams? Can breaching be done without impact on environment?
7. Do thermosyphons allow an impermeable frozen mass to form with ice filling the void space or do they just freeze the open work gravel particles? How do these zones get access to water to freeze in the void spaces?
8. The Geosynthetic Clay Liner (GCL) will initially be placed flat on the floor of the key trench excavation (or is it to be placed on thin layer of frozen core dam fill matrix?).

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Since construction is to be in winter, how do we ensure that there are no seepage paths left below the GCL and the frozen floor when the GCL will presumably itself be stiff and possibly frozen rigid, and also presumably very brittle?

9. How would the geometry of the core and GCL change if the key trench had to be significantly deepened due to poor foundation material (i.e., a minimum core width would have to be maintained).

10. The GCL liner is intended to be a "secondary seepage containment system" if a crack forms in the core. Will not the GCL also be ruptured if a crack forms across the core due to differential movement? Will it be frozen and presumably brittle?

11. How does the bentonite inside the GCL hydrate to achieve impermeability, if placed in winter with no free water accessible and maintained in frozen state during operation?

12. Is the depth of cover above the core (4 m) sufficient to prevent thawing of the core?

13. The Filter Dyke is planned to be constructed by placement through up to 7 m of water. It is agreed that the depth of water is required to ensure filtered flow function below the maximum depth of winter ice, but consideration should be given to temporarily lowering the lake water level during the construction (summer) in order to accurately place dam fill materials to the designed geometry and to minimize the risk of segregation during placement. The transition and filter materials will be difficult to place to the 3 to 5 m design width through 7 m depth of water by conventional end dumping or controlled slope failure methods, and there will be a significant risk of segregation possibly creating zones of open work gravel which does not adequately filter the seepage water. It may also prove to be difficult to achieve the steep side slopes designed, and compaction will not be possible. Construction through 7 m of water will also inhibit reliable cleaning off of the floor of the key trench through open boulder areas.

14. No details are provided for size of turbidity particles to be filtered out of the seepage water, nor are any details given of the design gradation of the filter material. It is anticipated that the filter material will have to contain relatively fine material to perform satisfactorily, and as such it is considered that a transition zone will be required between the filter and the rip rap material to prevent wash out of the filter due to wave action through the rip rap.

15. Where is the hydrologic baseline data to support the water balance analysis? The hydrologic data presented in EAR is not sufficient to adequately estimate an accurate water balance for Sable Lake. What is the basis for the 65% runoff coefficient? What is the basis for taking 65% of the annual runoff for the freshet event? Is this conservative? What is the basis for the annual evaporation rate of 320 mm? A uniform evaporation rate of 2.5 mm/day is assumed to occur over the 128 days when the lake is ice free. This does not seem valid, especially since seasonal variation and annual variation will be significant. Evaporation should vary with AEP. What is the basis for the upper bound groundwater inflow estimate? The water balance estimate is not provided with any discussion of its accuracy. However, knowing that the calculations are very sensitive to the chosen coefficients and assumed inputs (especially groundwater), there is an inherent large degree of error associated with the water balance as it is now presented. The water balance should be done on a monthly basis, account for wet and dry years, and determine

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the effect of various AEP events on lake volume. In addition, this will require more thorough use of existing data and the collection of additional data.

3.0 — PIGEON DEVELOPMENT

No comments

4.0 — BEARTOOTH DEVELOPMENT

Comments on frozen core dam as above.

It is our understanding HBJV wishes to drive a 5 x 4 x 1,000-m exploration decline at an earlier date than anticipated in order to obtain information which they consider to be critical for input to a bankable feasibility study. According to their submittal, this program would involve removing 40,000 tonnes of waste rock and the collection of approximately 3,000 ore samples @ approximately 1 kg each, to be analyzed on site or at an external lab. The estimated workforce would be approximately 40 personnel, and the surface area impacted by the exploration decline program would be 3-5 hectares. We further understand that HBJV has requested that this program be conducted under the existing licences captioned above.

HBJV hopes to begin work on the program in September 2002, which would also potentially involve an assay lab, shop, office, fuel storage area, ore stockpiles, waste pad, water intake, and KIA approved cuttings disposal area. The program would extend over a period of 5-10 months.

To our understanding this program constitutes is implied to represent a bulk sample operation, although this term is not used explicitly. It is also not clear why the development of the exploration decline was not included in the original land use permit and water use license applications. It appears that it was initially conceived to be part of the first activity of mining operations.

However, we are, nevertheless, aware of NIRB's letter of June 5, 2002, to DIAND Minister Nault requesting approval for a Part 5 review of the Doris Hinge Project; HBJV's June 10, 2002 letter to NIRB and NWB requesting that the amendments be processed under sections 12.10.2(b) and 13.5.5 of the NLCA; and the joint response by NIRB and NWB to HBJV's request for the amendment under these sections, in which NIRB-NWB propose that the exploration and development only proceed as authorized per sections 12.10.2(b) and 13.5.5 of the NLCA, with the further proviso that such short-term approval should be for a maximum term of one year, and that there would be no objections from any affected parties. The letter also notes that comments from all parties must be received by June 20, 2002.

For clarification purposes, section 12.10.2(b) [Exceptions] states that "Notwithstanding Section 12.10.1 [Projects Not to Proceed]—, where a project proposal has been referred for review pursuant to Part 5 or 6, approvals or licences for exploration or development activities related to that project may be issued if...(b) the activity can, in the judgement of NIRB, proceed without such a review." Section 13.5.5 states that "Notwithstanding Section 12.10.1, the NWB shall not be precluded from issuing interim, short-term approvals for water uses

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related to exploration or developmental work for a proposal under development impact review.”

We emphasize that these exceptions do not in themselves, exempt any of the permitted and licensed activities from the review process, and that it is implied that the activity can only proceed without review when it is entirely clear that no review is required (i.e., the proposed activity is relatively small and benign).

Based on our review of the amendment application and associated documents, we have the following concerns with the current proposal.

- 1) Based on the information presented, it is apparent the level of activity and size of the exploration footprint will increase substantially warranting the need for a much larger security deposit (i.e., >> \$750,000). At this time, and in such a short time, we cannot recommend a revised security deposit, but are concerned that the existing deposit is too small and was arrived at based on a much smaller footprint and level of activity.
- 2) The length of the decline is long, the end depth will be > 100 metres, and the volume of the excavated material is relatively large. HBJV estimates that the feasibility study “bulk sample” will be approximately 43,000 tonnes (40,000 tonnes of waste rock plus 3,000 tonnes of ore). This volume is likely more than 5% of the entire proposed mine operation, and seems excessive for feasibility study purposes. Bulk samples are typically much smaller, on the order of 5,000 to 10,000 tonnes. Further, based on the data presented, simple calculations suggest a larger volume may actually be mined from the decline (i.e., 4 x 5 x 1000 m x 2.6 tonnes/cubic metre, or 52,000 tonnes).
- 3) The feasibility study “footprint” of 3-5 ha is about 10% of the size of the mining footprint.
- 4) The size of the “exploration” work crew (i.e., 40) will be approximately the same as the “construction” or “mining” work crew (i.e., 42 to 47 depending on which documents are referenced). In general, this proposal appears to be more than just an exploration program, but the beginnings of a small mine, which should require a review prior to beginning. A couple obvious questions surface, for example: *Why was the exploration program not sufficient?* and, *What constitutes a “bankable” study?*
- 5) Are these amendments within the intent and scope of the existing water license and land use permit, or are the proposed activities substantially larger, so that an amendment is not appropriate, but perhaps a separate permit and license is required?
- 6) Significant project inertia will have been undertaken before a review is conducted, impacts to baseline will have occurred, and the EA process will be compromised.
- 7) There are no criteria or assurances (other than HBJV’s promise) that the waste rock used for road pads, pad storage and airstrip development will be benign, or that all potentially acid generating (PAG) rock will be managed appropriately. Further, without any data it cannot be determined what proportion of the decline will be PAG.

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- 8) There are no criteria or assurances that the management of minewater dewatered from the decline will be conducted appropriately and not impact the environment. Further, without any data, it cannot be determined what volume of water will be dewatered, what the minewater chemistry will be, and whether the proposal to store 'non-dischargeable' water onsite is feasible.
- 9) A baseline characterization program and baseline data have not been provided for the potentially affected environment, so it is not possible to know if sufficient information currently exists prior to significant on-site activity.

If Hope Bay and NIRB/NWB can assure the KIA that the mine activity and above-described concerns can be adequately addressed without a review and prior to the issuance of the amendments, then In view of the foregoing, and in addition to the concerns noted above (in italics), the KIA has no objection to the amendments to the above-captioned licences being processed as proposed by NIRB and NWB.

review letter Preliminary support a decision by NIRB to proceed directly to a [12.4.4 (b)] review. The primary objective of this decision is in essence to skip the screening step and reduce some preliminary review time. allow the project to proceed, or whether a full review will be required under the NLCA. both NIRB and is in favour of the proposal to refer the project to Minister Nault for a public review and hearing to be conducted jointly with the NWB are of the opinion that a full review will most likely be necessary

The proposed project is small gold mine that would be situated about 110 km southwest of Cambridge Bay and 5 km south of Roberts Bay/Melville Sound on lands owned entirely by the KIA. The proposed mining duration is short, lasting an approximately 40 month period from construction start up in 2003 to reclamation activities in 2007. The mine and facilities will have a relatively small footprint of about 34 ha that will include a short road to the beach at Roberts Bay, an airstrip, a small surface pit and underground mine, an ore stockpile, waste rock piles, a tailings containment area, cyanide and sewage treatment capabilities, a crushing and processing mill, a tank farm, a small nearshore port facility in Roberts Bay, water extraction facilities from Doris Lake, and other typical camp and mine components.

Based on these project elements, the project will result in irreversible changes to landscape and water bodies, as it is apparent that reclamation will not completely return the area to pre-development conditions. The project may have significant impacts to air quality (through diesel power generation emissions and fugitive dust), land (through terrain and habitat alteration), water quality (from effluent discharge), fresh water and marine habitat, fish and wildlife (marine and terrestrial), and socio economics (approximately 45 to 75 people employed over very short term).

It is not clear whether the short term economic gain from the 30+ months of mining activity is worth the associated environmental risks and socio economic impacts. The proponent indicates that additional prospects occur in the area, but it is unclear whether the proposed and additional projects are economically marginal or viable, that would ensure a longer term sustained development that would help rationalize some of the impacts. A detailed feasibility study will need to be prepared that fully assesses the project, its economics and reasonable

~~expectation of success. Measuring feasibility is typically part of the initial screening process in which the project may not be recommended to proceed as per NLCA 12.4.4 (c) or (d), and in the long run save both the proponent and reviewers time and costs. Nevertheless, the proposal appears to be sufficiently developed to permit a proper screening if necessary, but will require additional clarification of various project components and impacts during the review phase.~~

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~~we have provided some general our regarding the proposed projectare provided belowOur reviewPlease note that our reviewhas identifying environmental related concerns associated with the project's proposed footprint, facilities and operations and its potential impacts toengineering, bulk fuel storage, all weather road / airstrip , / fish habitat, and air quality, water quality, socio economics sesecommentsconcernsdealt with during carried forward to andorimpact statementEIS~~

~~**General Comment:** The Preliminary Project Description lacks details in certain critical areas. The Final Project Description will need more detail regarding facility layout, processes, water management, waste management, waste rock management, etc., to allow a comprehensive assessment.~~

Section 2.3.2—Water quality

~~This section notes that “the ore is characterized as ... having an uncertain acid generation potential...” and that “examination of the wall rock...showed that it poses no risk of acid generation...”~~

~~**Comment:** A project that has an uncertain acid generation potential is likely to raise significant public concern. Adequate characterization of the waste rock and ore for acid drainage potential must be performed to demonstrate that there are no risks.~~

~~significant Potentially affected fish populations will need to be characterized and adequate measures taken (i.e. Will be) to protect fish resources?... It is unclear whether Will all of Tail Lake or the lake all of Tails (or Tail) Lake will.? It is also unclear whether Or will the whole lake be removed from production? Willwill during projectat.? **Table 4: General Comment:** Figure 11 (Known Raptor Nest Sites 1995—2001) does not show the Project Area.~~

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~~**General Comment:** may could Further, the socio-economic report should fully address the project's short term impacts on the socio-economic aspects of the Kitikmeot region.~~

~~**Section 7.2—Water Quality:** In the second paragraph it is stated that “treated and clarified [sewage] effluent disposal will be either by aerial irrigation to a surface field or into the tailings discharge line, and in the last paragraph it is stated that “water from Tail Lake will be released by controlled siphon into the outflow below Doris Lake...”~~

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~~**Comment:** Effluent discharges from treatment facilities (for sewage and cyanide) and the tailings containment facility are not necessarily benign and may have the potential~~

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~~for water quality degradation and significant public concern, consider the also take negative behaviour in addition to into consideration, and not just In the first paragraph it is stated thatIn the last paragraph it is stated that Northern lakes can be quickly fished out by personnelPersonnel can quickly fish out northern lakesno fishing policy, a , (i.e., Section 4.1.1) General comment: Comment: In the second paragraph it is stated that It is unclear what stabilize means. Is this referring to water chemistry?~~

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~~END OF COMMENTS~~

~~The Kitikmeot Inuit Association appreciates the MVEIRB involving us in this review process, and we look forward to our future involvement.~~

If you have any questions, concerns, or comments, please contact the undersigned at (867) ~~982-3310~~983-2458.

Yours Sincerely,

KITIKMEOT INUIT ASSOCIATION

~~Charlie Evalik~~Jack Kaniak
~~President~~Lands Manager

cc. ~~To Distribution List~~Mr. Jack Kaniak, Kitikmeot Inuit Association (867) ~~982-3311~~
~~Ms. Bob Turner, NSMA~~ (867) 669-7442
~~Ms. Rachel Crapeau, YDFN~~ (867) 669-9003
~~Ms. Brenda Parlee, Lutsel K'e Dene Band~~ (867) 370-3010
~~Ms. Violet Camsell Blondin, Dogrib Treaty 11 Council~~ (867) 392-6389
~~Mr. Steve Harbicht, DOE~~ (867) 873-8185
~~Ms. Lisa Dyer, Government of the Northwest Territories~~ (867) 873-0221
~~Mr. Sevn Bohnet, DIAND~~ (867) 669-2701
~~Mr. Feisal Somji, Kitikmeot Geosciences Ltd.~~ (604) 638-0691