



September 13, 2012

File: S110-01-10

Chuck Hubert
Senior Environmental Assessment Officer
Mackenzie Valley Environmental Impact Review Board
Suite 200, 5102 – 50th Avenue
PO Box 938
Yellowknife NT X1A 2N7

Dear Mr. Hubert:

**Lutsel K'e Dene First Nation – Round 2 Information Request
Responses - Gahcho Kué Project Environmental Impact Review**

De Beers is pleased to provide the Mackenzie Valley Environmental Impact Review Board with responses to Round 2 Information Requests submitted by the Lutsel K'e Dene First Nation.

Sincerely,

Veronica Chisholm
Permitting Manager

Attachment

c: M. Tollis, Wildlife & Environment Manager, Lutsel K'e Dene First Nation



GAHCHO KUÉ PROJECT ENVIRONMENTAL IMPACT STATEMENT
ROUND 2 INFORMATION REQUEST RESPONSES

Round 2 Information Request Number: LK_01

Source: Lutsel K'e Dene First Nation

Subject: Fish Habitat Compensation Plan

Preamble

Concern: "As part of this process, several meetings have occurred with local and regional DFO staff to further the compensation planning and allow for DFO feedback."

Rationale: LKDFN believes that the members of the community have important traditional knowledge information to share that could inform the approach that DBC should be taking, as well as the finalization of options selected to compensate for the destruction of fish and fish habitat.

Request

LKDFN requests that DBC indicate how they considered TK in the selection of options for fish compensation.

Response

De Beers has engaged local aboriginal communities, and specifically Lutsel K'e Dene First Nation (LKDFN), on a number of occasions to discuss a variety of topics, including the draft Fish Habitat Compensation Plan and how to incorporate Traditional Knowledge (TK) into the proposed Gahcho Kué Project (Project). De Beers submitted a letter to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) on August 15, 2012 in response to the NWT Treaty #8 Tribal Corporation on the Fish Habitat Compensation Plan. This letter lists the various opportunities provided to the LKDFN for input into the conceptual compensation plan, both as part of the MVEIRB's review process and through engagement undertaken by De Beers. De Beers has, and will continue to incorporate information gathered from all parties, including the LKDFN, into the draft Fish Habitat Compensation Plan. However, De Beers note that Fisheries and Oceans Canada (DFO), as the regulator, will make the final decision with respect to compensation options and monitoring.

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In addition to the above opportunities, De Beers and DFO will be jointly hosting a compensation plan workshop with community representatives on September 20, 2012, to further discuss and refine compensation options. This workshop will create a further opportunity for individuals from communities, such as Łutsel K'e, to provide De Beers and DFO with guidance on the draft Fish Habitat Compensation Plan, including advice on how best to incorporate TK into fish habitat compensation options.

In addition to the above meetings and planned events, and noted in responses to the first round of Information Requests (LK_02, De Beers 2012), De Beers signed a Traditional Knowledge Agreement in 2006 with the LKDFN to undertake a Traditional Knowledge/Traditional Land Use (TK/TLU) Study for the Project. Over the past six years, De Beers has encouraged Łutsel K'e to complete the study and to incorporate the findings into recommendations to assist the company in utilizing TK for the Project, including in the proposed compensation plans and monitoring plans. When the results of the LKDFN TK/TLU study is made available, De Beers will use the information to further inform proposed mitigation or refinements to mitigation, including proposed compensation options, and to identify additional opportunities for incorporating TK into monitoring programs.

Please also refer to the response to DKFN_1 from the Round 2 Information Requests.

Reference

De Beers (De Beers Canada Inc.). 2012. Łutsel K'e Dene First Nation Information Request Responses – Gahcho Kué Project Environmental Impact Review. Submitted to Mackenzie Valley Environmental Impact Review Board. April 2012.

GAHCHO KUÉ PROJECT ENVIRONMENTAL IMPACT STATEMENT
ROUND 2 INFORMATION REQUEST RESPONSES

Round 2 Information Request Number: LK_02

Source: Lutsel K'e Dene First Nation

Subject: Objectives for Water Quality and Sediment Quality

Preamble

Concern: "Copper and cadmium have been identified as being above CCME WQGs in Kennady Lake under baseline conditions (Table 1). Per CCME (2007), these naturally elevated baseline concentrations indicate that site-specific WQOs for copper and cadmium should be above the CCME WQOs."

Rationale: In Table 1, total copper has a CCME WQG of 0.002-0.004mg/L depending on hardness, yet under baseline conditions in column 4, total copper has a value of 0.0012mg/L, and there is no baseline hardness measure. However, in the projected long-term steady state concentrations, copper ends at 0.002mg/L, exceeding CCME WQGs. In dissolved metals, copper's baseline is 0.00069mg/L with the same 0.002-0.004mg/L guideline. Further, it appears that baseline for aluminum (total and dissolved) is above CCME WQGs at baseline as well, and no consideration has been paid to aluminum.

Request

- 3.1 LKDFN requests DBC to explain further why a site-specific WQO is required for copper if the baseline concentration listed in the table is below CCME WQOs.
- 3.2 LKDFN also requests that DBC provide reasoning for not considering aluminum in their site-specific WQOs.

Response

Response to Request 3.1:

De Beers is not recommending a site-specific Water Quality Objective (WQO) for copper as the maximum predicted copper concentration in Kennady Lake (0.0023 mg/L) is well within the measured baseline range (0.0001 to 0.0153 mg/L). However, copper concentrations measured during the Surveillance Network Plan (SNP) and Aquatic Effects Monitoring Plan (AEMP) programs will

GAHCHO KUÉ PROJECT ENVIRONMENTAL IMPACT STATEMENT ROUND 2 INFORMATION REQUEST RESPONSES

be compared to a benchmark, such as the maximum measured baseline concentration.

Further to the technical memorandum describing the development process for WQOs provided by De Beers in June 2012 (Golder 2012), additional work has been undertaken in recommending proposed WQOs for the proposed Project. This additional work will be presented in a separate technical memorandum titled, *Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the Proposed Gahcho Kué Project – Recommendations*, which will be submitted to the MVEIRB Public Registry on September 13, 2012.

The memo includes a more detailed evaluation of baseline concentrations of copper within the receiving environment and an examination of key exposure and toxicity modifying factors (ETMFs) that may influence the bioavailability of copper to aquatic receptors. This evaluation is consistent with the approach recommended in Canadian Council of Ministers of the Environment (CCME; 2007), which notes the need to account not only for natural background concentrations of naturally occurring substances, but also for the influence of ETMFs. This work identified that copper concentrations were naturally elevated within Kennady Lake and in water bodies adjacent to Kennady Lake.

Response to Request 3.2:

Consistent with the approach described for copper, De Beers is not recommending a site-specific WQO for aluminium as the maximum predicted aluminium concentration in Kennady Lake (0.092 mg/L) is within the measured baseline range (0.0025 to 0.230 mg/L). Aluminum concentrations measured during the SNP and AEMP programs will be compared to a benchmark, such as the maximum measured baseline concentration.

References

- CCME (Canadian Council of Ministers of the Environment). 2007. A Protocol for the Derivation of Water Quality Guidelines for the Protection of Aquatic Life. Winnipeg, MB, Canada.

GAHCHO KUÉ PROJECT ENVIRONMENTAL IMPACT STATEMENT
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Golder (Golder Associates Ltd.). 2012. Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the Proposed Gahcho Kué Project – Initial Development Process. Technical Memorandum prepared by Golder Associates Ltd. for De Beers Canada Inc., June 27, 2012.

GAHCHO KUÉ PROJECT ENVIRONMENTAL IMPACT STATEMENT
ROUND 2 INFORMATION REQUEST RESPONSES

Round 2 Information Request Number: LK_03

Source: Lutsel K'e Dene First Nation

Subject: Objectives for Water Quality and Sediment Quality

Preamble

Concern: "The water quality modeling results indicate that baseline levels of only cadmium and copper exceed CCME WQGs and therefore these [are] the only two parameters predicted to exceed CCME WQGs at closure."

Rationale: According to Table 1, under the predicted long-term steady state concentrations column, the predicted concentrations of aluminum and fluoride both appear to exceed CCME WQGs.

Request

LKDFN requests DBC to explain why the parameters of aluminum and fluoride are not considered to exceed CCME guidelines.

Response

Aluminium

The maximum modelled aluminum concentration in Kennady Lake (0.092 mg/L) is less than 0.1 mg/L, which is the upper bound Water Quality Guideline for the Protection of Aquatic Life (WQG) (CCME 1999, with updates to 2012). The toxicity potential of aluminum is highly dependent on pH, and as such possesses two WQGs; 0.005 mg/L for waters below pH 6.5, and 0.1 mg/L for waters above pH 6.5. There is a high degree of conservatism associated with the Canadian Council of Ministers of the Environment (CCME) WQGs, and based on the potential for increased total dissolved solids (TDS) and alkalinity in the refilled Kennady Lake, which would be expected to result in higher pH conditions as well as naturally high background concentrations (local study area: 0.0025 to 0.23 mg/L), the higher bound WQG was applied to the modelled aluminum projections. Similarly, productivity in Kennady Lake is also expected to increase above baseline conditions (De Beers 2012); increased dissolved organic carbon (DOC) is expected to mitigate potential for toxicity on invertebrates and fish (Gunderson et al. 1994; Winter et al. 2005).

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Fluoride

Fluoride should have been included with cadmium and copper as a substance that is projected to be higher than the CCME WQGs in the 2012 EIS Supplement (De Beers 2012). The CCME WQG for fluoride is 0.12 mg/L (CCME 1999, with updates to 2012).

Based on the modelled projection, fluoride was identified as a SOPC in the 2012 EIS Supplement and assessed for effects to aquatic health. In this assessment, however, it was concluded that the maximum modelled fluoride concentration would be below an applicable chronic effects benchmark (CEB). The selected CEB was based on the British Columbia Ministry of Environment (BCMOE) (2012) WQG of 0.4 mg/L, compared to the maximum projected fluoride concentration in Kennady Lake of 0.13 mg/L. The BCMOE WQG is based on updated information on the potential for fluoride toxicity in comparison to the CCME WQG. The BCMOE WQG is still considered conservative as it applies to soft water (i.e., hardness values less than 10 mg/L), and projected hardness values in Kennady Lake following closure are anticipated to be higher, which is expected to further ameliorate potential toxicity.

Nevertheless, a site-specific water quality objective (WQO) has been developed for fluoride; this is described in a separate technical memorandum, titled, *Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the Proposed Gahcho Kue Project – Recommendations*, which will be submitted to the MVEIRB Public Registry on September 13, 2012.

References

- BCMOE (Government of British Columbia. Ministry of Environment). 2012. Approved Water Quality Guideline (Criteria) Reports. Fluoride – Recommended Guideline.
<http://www.env.gov.bc.ca/wat/wq/BCguidelines/fluoride/fluoridetoo-12.html>. Accessed September 7, 2012.
- CCME (Canadian Council of Ministers of the Environment). 1999, with updates to 2012. Canadian Environmental Quality Guidelines. Winnipeg, MB, Canada.

GAHCHO KUÉ PROJECT ENVIRONMENTAL IMPACT STATEMENT
ROUND 2 INFORMATION REQUEST RESPONSES

De Beers (De Beers Canada Inc.). 2012. Environmental Impact Statement Supplemental Information Submission for the Gahcho Kué Project. Submitted to the Mackenzie Valley Environmental Impact Review Board, Yellowknife, NWT, Canada.

Gunderson DT, Bustaman S, Seim WK, Cutis LR. 1994. pH, hardness, and humic acid influence aluminum toxicity to rainbow trout (*Oncorhynchus mykiss*) in weakly alkaline waters. Can J Fish Aquat Sci 51: 1345-1355.

Winter AR, Nichols JW, Playle RC. 2005. Influence of acidic to basic water pH and natural organic matter on aluminum accumulation by gills of rainbow trout (*Oncorhynchus mykiss*). Can J Fish Aquat Sci 62: 2303-2311.

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Round 2 Information Request Number: LK_04

Source: Lutsel K'e Dene First Nation

Subject: Objectives for Water Quality and Sediment Quality

Preamble

Concern: “1. Apply generic national (CCME) WQGs and sediment quality guidelines (SQGs) or, where such do not exist for some substances, the nearest equivalent benchmarks (e.g., USEPA water or sediment quality criteria).

“3. If baseline/reference concentrations are above the guidelines or benchmarks, replace the guidelines or benchmarks with those concentrations.”

Rationale: LKDFN believes that DBC should be striving to minimize their impacts to water quality, and making their best efforts to try and leave the water, post-closure, in as close to baseline conditions as they possibly can. It is understood that if a baseline parameter exceeds national guidelines, the guidelines should be adjusted in a site-specific way, with the intention of maintaining baseline values post closure. Under the *Process for Development of Water and Sediment Quality Objectives* section, DBC seems to endorse the idea that the baseline value of the exceeding parameter becomes the new guideline, in essence, the baseline value *is* the objective. LKDFN supports this idea, and believes that this notion should be applied to all parameters, not just those in excess of the CCME guidelines.

In Table 1, every single parameter measured is predicted to be higher post closure, and long term steady state than the current baseline concentrations; some will experience more than ten-fold increases in concentration. But these elevated values are still below CCME guidelines, so as far as “best practices” are concerned, DBC is following protocol. The national guidelines are in place as a conservative approach to protecting water quality, yet if all guidelines were exactly reached in these pristine lakes at closure, the water quality would be worse than its natural state. However, if the baseline water quality measurements *are* the guidelines, in trying to meet these objectives, DBC would be decreasing their water quality impact, and improving their environmental performance by holding themselves to a higher standard.

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Request

LKDFN requests that DBC provide information on why all baseline values cannot be the objectives for water quality, or at the least, why baseline values cannot be the objectives for the parameters that do not have a CCME WQG.

Response

De Beers' commitment to develop Water Quality Objectives (WQOs) and Sediment Quality Objectives (SQOs) for the proposed Gahcho Kué Project (Project) is based on the definition of these objectives as provided by the MVLWB (2011); that is, a numerical concentration be established to support and protect the designated uses of water at a specified site. Since the submission of the technical memorandum titled, *Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the Proposed Gahcho Kué Project – Initial Development Process* (Golder 2012), on June 18, 2012, WQOs for the proposed Project have been evaluated and a recommendations document prepared. This is a separate technical memorandum titled, *Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the Proposed Gahcho Kué Project – Recommendations*, which will be submitted to the MVEIRB Public Registry on September 13, 2012.

WQOs are not required for each of the substances listed in Table 1 in Golder (2012). WQOs are typically applied to substances that have the potential to affect aquatic life and where predicted concentrations exceed a threshold beyond baseline conditions and/or guidelines or benchmarks. The 2012 EIS Supplement for the proposed Project (De Beers 2012) concluded that there will be a change to water quality in Kennady Lake and in downstream waters to Lake 410. However, not all changes to water quality will result in the potential for effects to aquatic life. The goal is to prevent adverse effects to aquatic life, which does not necessarily require maintenance of baseline water quality conditions, but does require maintenance of non-toxic water quality conditions.

In the 2012 EIS Supplement (De Beers 2012) substances that have the potential to detrimentally affect aquatic health, and whose predicted concentrations were more than 10% greater than baseline concentrations and greater than their respective WQG were identified as substances of potential concern (SOPCs).

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SOPCs identified for the development of WQOs (Golder 2012) are the only substances that could, on the basis of scientific evidence, require WQOs that would serve as the basis for deriving effluent quality criteria (EQC).

Within the Recommendations memorandum mentioned above, De Beers assessed these SOPCs on a site-specific basis following CCME (2003, 2007) guidance, focusing on providing, where necessary, conservative numerical concentrations as WQOs that protect aquatic fauna in the receiving environment without providing an unnecessarily high level of conservatism.

In addition, numerical chemical benchmarks were developed for all other water quality parameters as identified in the EIS (De Beers 2012). These benchmarks will be used in the AEMP, together with comparisons to predicted concentrations and baseline/reference concentrations, for monitoring water quality status and trends for Kennady Lake following closure and for Lake N11 during operations.

References

- CCME (Canadian Council of Ministers of the Environment). 1999, with updates to 2012. Canadian Environmental Quality Guidelines. Winnipeg, MB, Canada.
- CCME. 2003. Canadian Water Quality Guidelines for Protection of Aquatic Life – Guidance for Site-Specific Application of Water Quality Guidelines in Canada and Procedures for Deriving Numerical Water Quality Objectives. Winnipeg, MB, Canada.
- CCME. 2007. A Protocol for the Derivation of Water Quality Guidelines for the Protection of Aquatic Life 2007. In: Canadian Environmental Quality Guidelines. Winnipeg, MB, Canada.
- De Beers Canada Incorporated (De Beers). 2012. Environmental Impact Statement Supplemental Information Submission for the Gahcho Kué Project. Submitted to the Mackenzie Valley Environmental Impact Review Board, Yellowknife, NWT, Canada.

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Golder (Golder Associates Ltd.). 2012. Water Quality Objectives (WQO) and Sediment Quality Objectives (SQO) for the Proposed Gahcho Kué Project – Initial Development Process. Technical Memorandum prepared by Golder Associates Ltd. for De Beers Canada Inc., June 27, 2012.

MVLWB (Mackenzie Valley Land and Water Board). 2011. Water and Effluent Quality Management Policy. Yellowknife, NWT, Canada.

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ROUND 2 INFORMATION REQUEST RESPONSES

Round 2 Information Request Number: LK_05

Source: Lutsel K'e Dene First Nation

Subject: Environmental Monitoring and Management Framework

Reference: 3.2.5

Preamble

Concern: "Concerns regarding the access road relate to the potential for increased harvesting of caribou."

Rationale: The monitoring of the winter access road to Mackay Lake notes that concerns related to the road are focused on the increased harvest of caribou. LKDFN believes that the current Tibbitt to Contwoyto Winter Road (TCWR) has been a source of various issues with the movement of caribou, and not strictly related to caribou harvest. The banks on the sides of these roads are a cause for concern with the community members, as they become too high and too deep for the caribou to cross, forcing them in a direction they do not necessarily want to travel. The roads interrupt migration routes and fragment habitat, and further, in the winter months when caribou are present on the roads, this is a source of mortality of caribou from collisions with vehicles. Understandably, caribou migration routes vary year to year, but over the planned 11 year mine life, and even greater, the life of the winter access road, it is reasonable to assume that the caribou will make at least one appearance on the road, or try to cross over it in some capacity.

Request

LKDFN requests that DBC provide more information on the potential impacts of the road, including impacts on migration routes, fragmentation of habitat, and mortality from collisions.

Response

The information requested has already been provided in the environmental impact statement (EIS), first round information request responses, and in other supplementary information submitted to the public registry, as detailed below.

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ROUND 2 INFORMATION REQUEST RESPONSES

2010 EIS Sections (De Beers 2010):

Section 7.5.2.2 discusses the effects of habitat quantity and fragmentation, including effects from the proposed Gahcho Kué Project (Project) Winter Access Road.

Section 7.4.2.2.3 includes an assessment of direct effects from vehicle collisions.

Section 7.5.4.1.2 considers indirect effects to caribou movement and behaviour from vehicle traffic and associated noise.

Information Request Responses (De Beers 2012a,b,c):

GKP 4 contains an analysis of collared caribou data from 1996 to 2010 to estimate the likely overlap between Bathurst caribou and the Project Winter Access Road.

GKP 5 discussed possible changes to the Tibbitt-to-Contwoyto Winter Road (TCWR) resulting from climate change, and resulting changes to interactions with caribou.

GKP 11 discussed caribou behavioural responses near roads, and the impact prediction made in the EIS.

TG 42 discussed the assessment of effects of the TCWR and how the traffic forecasts were affected by reasonably foreseeable future projects.

TG 44 included a supplementary cumulative effects assessment to further explore effects of more reasonably foreseeable future projects, and some additional measures of landscape loss and fragmentation to caribou. The assessment considered scenarios with and without winter roads to reflect the seasonal nature of winter roads.

YKDFN 1.9 provided further evidence regarding the low number of caribou collisions on winter roads, and how a shortened trucking season from climate change may affect the impact predictions.

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ROUND 2 INFORMATION REQUEST RESPONSES

YKDFN 1.13 reiterates the direct and indirect effects of winter roads to caribou, and the extent of possible interaction of caribou with the Project and Winter Access Road.

Other Submissions:

A letter response to YKDFN on June 11, 2012 (De Beers 2012d), reiterating areas of the EIS and other submissions that examined effects to caribou from winter roads.

The information provided below is a summary of the above analyses on the following topics:

- habitat fragmentation and barrier effects; and
- mortality from collisions.

Habitat Fragmentation and Barrier Effects

Road density on the winter range (0.01 km per km²) is well below the values that have resulted in observed effects to wildlife (0.7 to 1.5 km per km²: Nielsen et al. 2007; Frair et al. 2008). The change in the area of any particular habitat from the Project (including the Winter Access Road) was less than 0.1%, and the cumulative alteration of habitats on the winter range from the Project and other developments was less than 2% (De Beers 2010, Section 7.5.2.2). This level of habitat loss has not been shown to generate fragmentation effects in the ecological literature.

Fragmentation effects from winter roads will also depend on the location and movement rate of animals. For example, during the operational period of winter roads (late January to early to mid-April), caribou daily movement rate is lower than other seasons and the potential for interactions with vehicles and the road will partially depend on the distribution of animals (i.e., caribou encounter rate with winter roads likely decreases with increasing distance from annual late winter distribution of the herd).

Caribou interactions with the Project Winter Access Road were investigated using satellite telemetry and GPS collar data from 1996 to 2010 for the Bathurst

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ROUND 2 INFORMATION REQUEST RESPONSES

herd. This information was analyzed using Geographic Information System software and the following methods.

- To be conservative in regards to effects to caribou from the Project Winter Access Road, the earliest opening and latest closing dates of the TCWR for any year between 2000 and 2010 were used in the analysis (De Beers 2010, Section 11.8.2.5.1, Table 11.8-6). This provides a conservative approach, which also considers traffic from winter road construction prior to the operating period and public traffic after the operating period. The earliest opening date of the TCWR is January 16 and the latest closing date is April 16 (a span of 81 days).
- Studies have indicated that caribou in a tundra environment may avoid roads by up to 4 km during the sensitive calving season (Dau and Cameron 1986; Cameron et al. 1992, 2005). Although winter roads do not operate during the calving season, to be conservative, the assessment predicted that the extent of sensory disturbance (i.e., zone of influence) of winter roads was 5 km (De Beers 2010, Section 7.6.2.1). Thus, all caribou collar locations within 5 km of either side of the Project Winter Access Road were considered to have encountered the road. This distance was selected to include both the potential area of avoidance, and the area where caribou may be observed from the road by hunters.
- The analysis excluded the northern migration (May 1 to 31), which is when caribou daily movement rates are higher than other seasons. By this time the winter roads are considered to have little effect on caribou movement, as there is no traffic and the snow berms have begun to melt.

Using the criteria above, the number of encounters of collared caribou within the zone of influence of the Project Winter Access Road was calculated. During the winter road season, information from 98 collars over 14 years was available to estimate encounter rates.

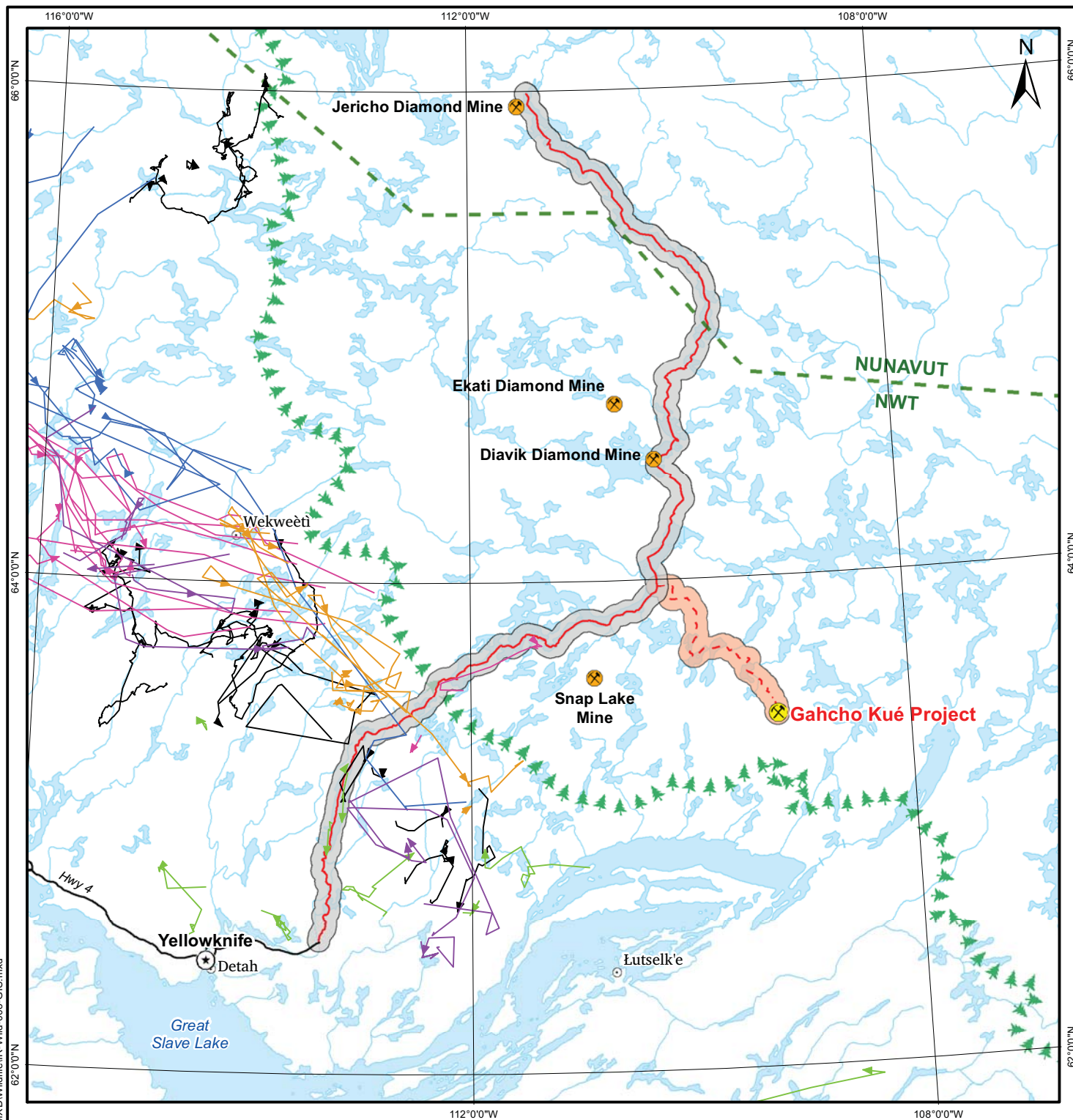
The results indicated that there have been no encounters between collared caribou and the Project Winter Access Road during the conservatively predicted operating period (January 26 to April 16) from 1996 through 2010 (Figure LK_05-1). This indicates a low probability of collared caribou

GAHCHO KUÉ PROJECT ENVIRONMENTAL IMPACT STATEMENT
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encounters with the Project Winter Access Road during the active winter road season. This means that caribou are not known to be present in high numbers in the Project area during the time of year when the Winter Access Road is open. It is also understood that the Project Winter Access Road operates outside of the migration period and that caribou do not have high movement rates at that time of year.

For all-weather roads, barrier effects to caribou have been studied. Approximately 60% of caribou groups observed were deflected along the Misery Road at the Ekati Diamond Mine (BHPB 2010). An increase in snow bank height decreased the likelihood that caribou would cross the Misery Road, but low sample size makes these results tenuous. It is important to note that, unlike the Project Winter Access Road or the TCWR, the Misery Road is an all-season road that is ploughed all winter (leading to much higher berms), and has continuous traffic during the time of the caribou northern migration. In contrast, caribou migration to the calving grounds begins after closure of winter roads, and physical barrier effects become negligible with the deterioration of road berms, particularly on the tundra.

It is likely that caribou exhibit predator avoidance behaviour and limit their distribution around the TCWR considering that harvesting from the road is permitted (with the exception of current harvesting ban). However, because caribou are hunted from (Zeimann 2007) and cross the TCWR (Figure LK_05-1), caribou do not completely avoid operating winter roads.



LEGEND

- Gahcho Kué Project
- Existing Mine
- Territorial Capital
- Populated Place
- Highway
- Tibbitt-to-Contwoyto Winter Road
- Winter Access Road
- Watercourse
- Waterbody
- Territorial/Provincial Boundary
- Treeline
- Tibbitt-to-Contwoyto Winter Road Buffer
- Gahcho Kué Winter Access Route Buffer
- 1997 Collar Movements
- 2002 Collar Movements
- 2003 Collar Movements
- 2005 Collar Movements
- 2007 Collar Movements
- 2010 Collar Movements

NOTES

Base data source: The Atlas of Canada; ENR GNWT collar data, 2010.

GAHCHO KUÉ PROJECT

Collared Caribou Encounters with Winter Roads

PROJECTION: Canadian Lambert Conf. Conic
DATUM: NAD83

Scale: 1:2,500,000
50 25 0 50
Kilometres

FILE No: IR-Wild-008-GIS

JOB No: 11-1365-0001

OFFICE: GOLD-SAS

DATE: April 3, 2012



REVISION No: 2

DRAWN: ANK

CHECK: JV

Figure LK 05-1

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Mortality from Collisions

The highest northbound traffic intensity and volume on the TCWR was 150 trucks per day occurring in 2007 when 10,922 northbound truck loads were hauled during a 73 day operating season (Figure LK_05-2; TCWRJV 2012, internet site). The Project predicts that up to 2,000 trucks may travel the TCWR and Project Winter Access Road during construction and up to 1,200 per year during operation. Between 2008 and 2011, at least 3,300 fewer trucks have used the TCWR annually, so total traffic volume including additional volume required for the Project should not exceed the maximum traffic levels observed in 2007.

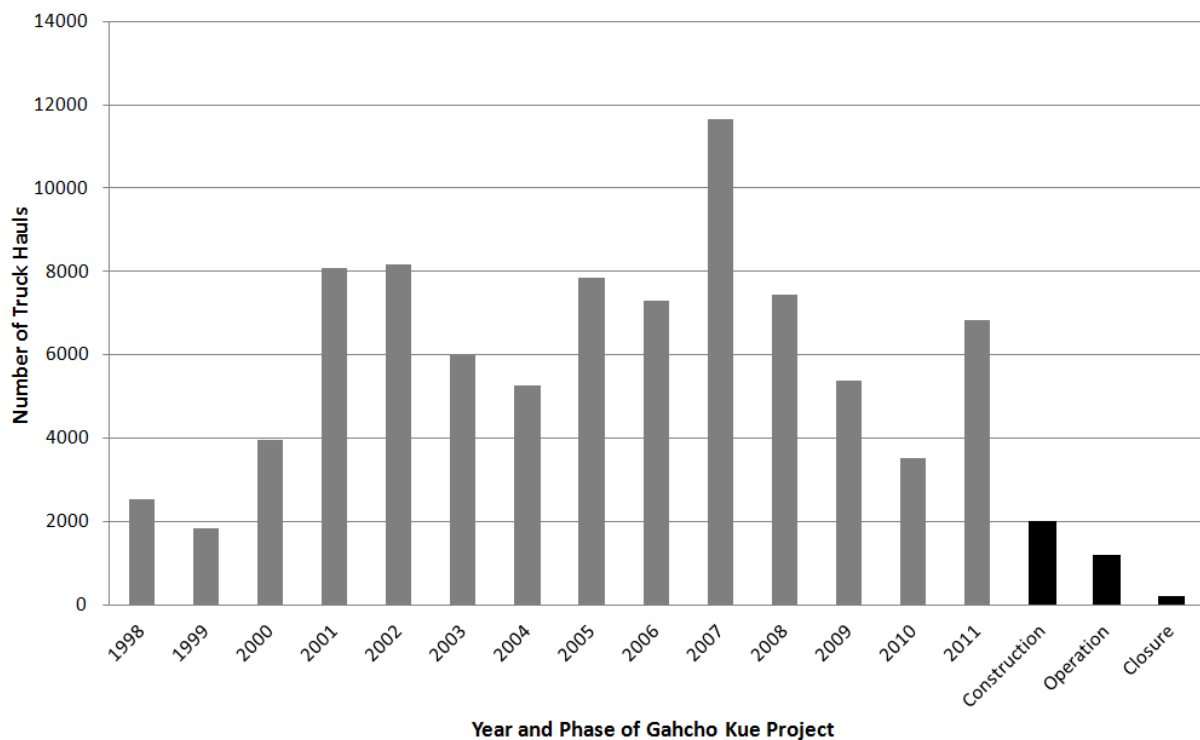


Figure LK_05-2. Northbound Haul Truck Volume from 1998 to 2011 and Maximum Predicted Volume for the Project during Construction, Operation and Closure (dark bars). Data presented for 1998 to 2009 were obtained from the Government Northwest Territories (GNWT 2009, internet site) and for 2010 to 2011 were obtained from the Tibbitt-to-Contwoyto Winter Road Joint Venture (TCWRJV 2012, internet site).

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The recorded caribou mortality from vehicle collisions is low (Fitzgerald pers. comm. 2012), and would result in negligible (non-measurable) change to caribou abundance. Traffic volume and intensity (truck loads per operating day) peaked during 2007 (Figure LK_05-2; TCWRJV 2012, internet site) and no caribou collisions were reported for this or any other year since 1999.

The location and movement rate of caribou would also influence the likelihood of animals interacting with the Project Winter Access Road. For example, during the operational period of the TCWR (late January to early April), caribou daily movement rate is lower than other seasons and the potential for interactions with vehicles and the road will partially depend on the distribution of animals (i.e., caribou encounter rate with the Project Winter Access Road likely decreases with increasing distance from annual winter distribution of the herd).

References

- Adamczewski, J., J. Boulanger, B. Croft, D. Cluff, B. Elkin, J. Nishi, A. Kelly, A. D'Hont, and C. Nicholson. 2009. Decline in the Bathurst Caribou Herd 2006-2009: A Technical Evaluation of Field Data and Modeling. DRAFT Technical Report December 2009. Government of the Northwest Territories.
- BHPB (BHP Billiton). 2010. Ekati Diamond Mine 2009 Wildlife Effects Monitoring Program. Prepared BHP Billiton Diamonds Inc. by Rescan™ Environmental Services Ltd.
- Cameron, R.D., D.J. Reed, J.R. Dau, and W.T. Smith, 1992. Redistribution of Calving Caribou in Response to Oil Field Development on the Arctic Slope of Alaska. *Arctic* 45:338-342.
- Cameron, R.D., W.T. Smith, R.G. White, and B. Griffith. 2005. Central Arctic Caribou and Petroleum Development: Distributional, Nutritional, and Reproductive Implications. *Arctic* 58:1-9.
- Dau, J.R. and R.D. Cameron. 1986. Effects of a Road System on Caribou Distribution During Calving. *Rangifer*, Special Issue No. 1:95-101.

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- De Beers (De Beers Canada Inc.). 2008. Snap Lake Mine: Analysis of Environmental Effects on Wildlife, 1999 to 2007. Prepared by Golder Associates Ltd. for De Beers Canada Inc.
- De Beers. 2010. Environmental Impact Statement for the Gahcho Kué Project. Volumes 1, 2, 3a, 3b, 4, 5, 6a, 6b, 7 and Annexes A through N. Submitted to Mackenzie Valley Environmental Impact Review Board. December 2010.
- De Beers. 2012a. Gahcho Kué Panel Information Request Responses – Gahcho Kué Project Environmental Impact Review. Submitted to Mackenzie Valley Environmental Impact Review Board. April 2012
- De Beers. 2012b. Tlicho Government Information Request Responses – Gahcho Kué Project Environmental Impact Review. Submitted to Mackenzie Valley Environmental Impact Review Board. April 2012
- De Beers. 2012c. Yellowknives Dene First Nation Information Request Responses – Gahcho Kué Project Environmental Impact Review. Submitted to Mackenzie Valley Environmental Impact Review Board. April 2012
- De Beers. 2012d. Response to Yellowknives Dene Letter of June 4, 2012. Submitted to Mackenzie Valley Environmental Impact Review Board. June 11, 2012. http://www.reviewboard.ca/upload/project_document/EIR0607-001_De_Beers_Canada_response_to_June_4_letter_from_YKDFN.PDF
- De Beers. 2012e. Gahcho Kue Project EIS Analysis Session Updates. Submitted to Mackenzie Valley Environmental Impact Review Board. December 15, 2011. http://www.reviewboard.ca/upload/project_document/EIR0607-001_Undertaking_Response_from_EIS_Analysis_Session_1323993040.PDF
- Frair, J.L., E.H. Merrill, H.L. Beyer, and J.M. Morales. 2008. Thresholds in landscape connectivity and mortality risks in response to growing road networks. *Journal of Applied Ecology* 45:1504-1513.

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GNWT (Government of the Northwest Territories). 2009. Northwest Territories Highway Traffic, 2008. Department of Transportation, Government of the Northwest Territories. September 2009. Available at http://www.dot.gov.nt.ca/_live/pages/wpPages/Documents_Driver_Vehicle_Licensing.aspx

Nielsen, S. E., E. M. Bayne, J. Schieck, J. Herbers, and S. Boutin. 2007. A new method to estimate species and biodiversity intactness using empirically derived reference conditions. *Biological Conservation* 137:403-414.

TCWRJV (Tibbitt to Contwoyto Winter Road Joint Venture). 2012. Tibbitt-to-Contwoyto Winter Road Joint Venture website, <http://jvtcwinterroad.ca/>.

Zeimann, J. 2007. Tibbitt Lake to Contwoyto Winter Road Monitoring Station Report. Department of Environment and Natural Resources, Government of the Northwest Territories. Yellowknife, NWT.

Personal Communications

Fitzgerald, Alan. 2012. Manager, Special Projects. Nuna Logistics. Telephone correspondence. February 6, 2012.

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Round 2 Information Request Number: LK_06

Source: Lutsel K'e Dene First Nation

Subject: Environmental Monitoring and Management Framework

Reference: 3..1, 3.3.2

Preamble

Concern: "The primary influences to the terrestrial ecosystem from the Project are related to vegetation and habitat loss, and changes to habitat quality (from factors such as dust)."

"In terrestrial areas, dust deposition and air emissions may alter soil properties by deposition of metals and other airborne contaminants, which could influence vegetation and terrestrial wildlife."

Rationale: DBC acknowledges that vegetation and wildlife will be impacted inside and outside of the project footprint. However, in section 3.2.6 on caribou monitoring, there is nothing that addresses the potential loss of habitat or potential health risks posed to caribou through dust deposition in soils and vegetation. This concern is raised repeatedly in the communities and none of the operational mines in the NWT have taken on the task of determining impacts to caribou from consumption of vegetation subject to dust-fall.

Instead DBC plans to contribute to the population monitoring of the Bathurst herd. LKDFN believes this is an easy way out of determining real impacts to caribou. The end of the caribou section states, "...the details of this contribution have not yet been defined, discussions between ENR and De Beers continue." We do not want this contribution to simply be the reporting of caribou sightings or incidents at the mine, instead we request an approach that would be more valued to the communities and more useful for continual improvement of mines in the long term.

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Request

LKDFN requests that DBC provides information on the effects of dust deposition on caribou health, and that DBC considers the impacts of dust deposition on caribou presence and caribou health throughout the life of the mine.

Response

The potential effect of dust on caribou health was a concern identified by the communities in the Environmental Impact Review. This concern has been investigated and several recent studies do not indicate a risk to caribou health from mine-related dust deposition (Golder 2004, 2011). There has been a study indicating that caribou may ingest dust and other mine-related materials while foraging (MacDonald and Gunn 2004), and there is some speculation that dust is a mechanism causing caribou to avoid mines (Boulanger et al. 2012). Regardless, levels of metals and contaminants in caribou are not considered to be of concern to either caribou or human health (INAC 2003).

Baseline information collected from the proposed Gahcho Kué Project (Project) is included in an ecological risk assessment that will be available for public review in September 2012. In summary, exposure to chemicals of concern was predicted to result in a negligible to low risk of adverse health effects to caribou. A large degree of conservatism was incorporated into the analysis. For example, the analysis over-estimated soil and kimberlite ingestion by caribou, over-estimated the time that a caribou may be close enough to the Project to ingest dust, and over-estimated the uptake of metals from any dust, soils and kimberlite ingested. Despite these conservative assumptions, Project-related risks from acute exposure to aluminum and iron, and from chronic exposure to iron were predicted to be low and negligible. Similar results were reported for the risk of exposure to increased metal concentrations observed in lichen at the Diavik Diamond Mine, which indicated that lichen were within safe levels for caribou (Golder 2011). In addition, a risk assessment at the Ekati Diamond Mine indicated that the Long Lake Containment Facility posed no health risk to caribou (Golder 2004).

The 2010 EIS (De Beers 2010) outlines the proposed mitigation to reduce dust emissions and De Beers has carried out a study to understand the level of

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natural dust mitigation on roads in the winter at mine sites (Golder 2012). In order to further alleviate the concerns of communities about dust and caribou health, De Beers will implement a Vegetation and Soils Monitoring Program, which will be linked to the Air Quality Monitoring Program and the Wildlife Monitoring Plan. The Air Quality Monitoring Program will include the sampling of particulate matter and dust deposition. These programs will provide information on dust deposition and potential changes to soil and vegetation chemistry at increasing distances from the mine, and control sites (i.e., areas not affected by the mine). The results from these programs will also be used to support the analyses of data from the Wildlife Monitoring Plan, particularly patterns in caribou distribution around the mine site (e.g., potential explanation for the observed zone of influence).

Finally, De Beers will provide opportunities to the LKDFN and others for regular visits to the mine, so that the communities may see the mine in operation and learn more about the Project operation and mitigation practices and procedures for limiting environmental effects.

References

- Boulanger, J., K. Poole, A. Gunn and J. Wierzchowski. 2012. Estimating the Zone of Influence of Industrial Developments on Wildlife: A Migratory Caribou and Diamond Mine Case Study. *Wildlife Biology* 18: 164-179.
- De Beers (De Beers Canada Inc.). 2010. Environmental Impact Statement for the Gahcho Kué Project. Volumes 1, 2, 3a, 3b, 4, 5, 6a, 6b, 7 and Annexes A through N. Submitted to Mackenzie Valley Environmental Impact Review Board. December 2010.
- Golder (Golder Associates Ltd.). 2004. Assessment of the Potential for Effects on Wildlife from Exposure to Processed Kimberlite at the Ekati Diamond Mine. Prepared for BHP Billiton Diamonds Ltd.
- Golder. 2011. Appendix II – Risk Assessment of Caribou Exposure to Metals from Dust Deposition on Lichen. Prepared for Diavik Diamond Mines Inc.

GAHCHO KUÉ PROJECT ENVIRONMENTAL IMPACT STATEMENT
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Golder. 2012. Determination of Natural Winter Mitigation of Road Dust Emissions from Mining Operations in Northern Canada.

INAC (Indian and Northern Affairs Canada). 2003. Northern Contaminants Program. Canadian Arctic Contaminants Assessment Report II. Highlights. Ottawa, On.

MacDonald, C. and A. Gunn. 2004. Analysis of the Ash Weight and Elemental Composition in Caribou Faecal Pellets Collected at Colomac and Other Sites in the NWT. Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories. Yellowknife, NWT. Manuscript Report No. 159