Memorandum

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TO:	Department of Environment and Natural Resources, Government of the Northwest Territories (ENR); Independent Environmental Monitoring Agency (IEMA); Environmental Monitoring Advisory Board (EMAB); Snap Lake Environmental Monitoring Agency (SLEMA).
FROM:	Brian Milakovic (Rescan Environmental Services Ltd.), John Virgl (Golder Associates Ltd.)
CC:	Harry O'Keefe (BHP Billiton Canada), Claudine Lee (BHP Billiton Canada), Colleen English (Diavik Diamond Mines Inc), David Wells (Diavik Diamond Mines Inc), Veronica Chisolm (De Beers Canada), Stephen Lines (De Beers Canada), Alexandra Hood (De Beers Canada).
SUBJECT:	Response to regulator and monitoring agency comments regarding the joint regional grizzly bear DNA monitoring program.

The mining companies would like to thank everyone for their comments on the proposal for a joint regional grizzly bear DNA monitoring program. The proposal was submitted on April 26th and comments have been received from ENR, IEMA, EMAB, SLEMA, John Boulanger, and an anonymous reviewer. The general support for the program is encouraging. We address the common themes (comments) from the reviewers in this memorandum to resolve some outstanding issues prior to commencement of the field studies. To enable some further discussion on these issues, the 2012 study will now commence June 12 (and run through September 12).

Objectives

The objective of this program for the mining companies is to monitor the spatial and temporal trends in the relative abundance, distribution, and movement of grizzly bears in a study area of approximately 30,000 km^2 (i.e., relative changes in this subset of the central barren ground population of grizzly bears). The mandate of the mining companies is not to determine a population estimate or density, but to monitor potential impacts to grizzly bears from operating mines. Local densities can be calculated, but it is the super-population that is the unit of interest. That is, how many bears might potentially come into conflict with the mines, and how does this demographic change over time. It must be restated that assumptions regarding closure are relaxed under a trend monitoring objective (Apps 2010; Proctor et al. 2010). The vast majority of studies upon which the reviewers are basing their comments are designed to calculate absolute abundance and density, which require demographic and/or geographic closure.

An additional objective is to provide information to ENR for the management of grizzly bears in the NWT. The data from this program can be used by ENR to analyze and manage the potential cumulative effects to grizzly bears from mineral development and other human activities that influence trends in population size and distribution.

Study Area

It was suggested that 30,000 km^2 was too small given this represented 7,500 km^2 per project. The proposed study area represents a substantial investment, which considers the seasonal range size and daily movement rates of female and male bears, and the scale of the existing and anticipated mining operations. The average size of a grizzly bear DNA study area in British Columbia and Alberta is less than 5,000 km^2 (Proctor et al. 2010), with a maximum of approximately 10,000 km^2. Mathieu Dumond, Regional Biologist with the Department of Environment in Nunavut, has a study area of 40,000 km^2. The sheer scale of that program necessitates a sampling regime spanning 5 years and only 2 sessions per year where the objective is to determine absolute abundance for population management. That time scale is impractical for monitoring mine-related effects over the longer term, which is one of the objectives of this program.

The division of a northern and southern study area is primarily for administrative purposes and logistics planning. The two data sets can be combined and treated in the analyses as a single unit.

Cell Size

The most common and largest issue is the choice of a 12x12 km cell size for sampling grizzly bear hair. There are several trade-offs to consider when designing a program of this scale, including the optimization of study area size and capture probabilities relevant to barren-ground grizzly bear ecology with finite resources and difficult logistics associated with working in the North. To be clear, the trade-off is study area size and sampling intensity or cell size (see also Proctor et al. 2010). With a 12x12 km cell size, a greater area can be covered with fewer cells without sacrificing capture probability (given the large movements and home ranges of barren ground grizzly bears). An increase in the number of sessions (6 compared to 4 in most studies) and conducting the study over 2 years is intended to maximize capture rates. Switching to a 10x10 km grid likely means a reduction in study area size by 40% (~22,000 km^2) of what is currently proposed in order to fit within budgetary and logistical constraints. The mining companies invite ENR to contribute as a funding partner in order to increase coverage utilizing a 10x10 km grid.

The suggestion was made that a 10x10 km cell size is the current standard. The notion of a standard cell size has not been tested and confirmed. Cell sizes in British Columbia and Alberta vary from 5x5 km to 16x16 km, depending on objectives, anticipated densities, and budgets (Proctor et al. 2010). The use of a 10x10 km cell size elsewhere does not qualify it as the standard. Only one study has been completed to date in the North that utilizes a 10x10 km cell size. John Boulanger stated in his comments that "it could be argued that 12x12 km cell size is adequate given larger home range sizes of bears in the area". Proctor et al. (2010) indicate that an important aspect of the study design is to consider the ratio of cell size to home range size and budget constraints (cell size and home range size are positively correlated).

Reviewers suggest that collar data should be used to further explore the adequacy of a 12x12 km cell size. It is unclear what is intended for this analysis. ENR offered to conduct an analysis on the collar data (R. Mulders, pers. comm.), but this has not been completed to date. McLoughlin et al. (1999) analyzed that data in depth. Their results showed that the average annual home range of a female barren-ground grizzly bear is 2,074 km^2 and that of a male is 6,685 km^2. There are 14 2-week periods between April 15 and October 31, resulting in an average 2-week home range of 148 km^2 for females, which is similar to the proposed 144 km^2 cell size. Movement rates of females peak during summer (21 June to 31 July) and late summer (1 August to 9 September) at approximately 6 km and 5 km per day, respectively. Over a 2-week period, this amounts to 70 to 84 km linear distance travelled. These numbers suggest that a 12x12 km cell size is adequate.

The measure of success is capture probability. John Boulanger suggests that a minimum capture probability of 0.2 is required for population and density estimates. Irrespective of objectives in this proposed study, a capture probability of 0.2 will suggest that future studies can utilize a larger cell size without sacrificing precision. The value of being able to cover larger areas with lower effort for grizzly bear management in the North cannot be overstated.

The mining companies are committed to monitoring impacts to grizzly bears from their activities. The 2012 data will be used to assess the effectiveness of the study design and if necessary, that information will modify the program moving forward.

Bait Stations

It was recommended that sampling stations be moved for each session. This is not logistically and financially feasible. The option of moving stations was tested during a pilot study at EKATI in 2010, and the additional logistics and costs quickly make this option untenable over the scale of this study. The introduction of novel lures during each session is intended to minimize trap habituation. However, as discussed above, cell sizes are not overly large relative to the movement rate and home ranges of barren-ground grizzly bears, likely making this option unnecessary.

The use of the tripod design has provided exceptional success in other programs, and there is no hesitation in their use here. Rather than anchoring them to the ground, the ability of a bear to roll them and play with the posts is considered an advantage of the design.

Survey Schedule

Because the 4 projects are in different phases and under different funding scenarios, the onset of the program is staggered between the north and south. This is not a significant issue given the life history of grizzly bears (e.g., adult survival rates and longevity). Nevertheless, in future cycles, the plan is to align the timing so that both areas are sampled in the same year.

Cumulative Effects

The mining companies maintain that the assessment of cumulative effects is a government responsibility. ENR went on record at the November 2, 2011 workshop, stating it will use the data obtained from this study to assess cumulative effects of mining activities on grizzly bears in the central barrens of the NWT. The data can also be used by ENR in the development of a grizzly bear management plan.

Reporting

The reporting requirements are currently unclear and the mining companies invite government and monitoring agencies to make recommendations. We propose a single reporting scheme that involves a field report at the end of each field season, an interim report of results in the winter following the first year, and a final report in the winter following the second year. It makes little sense to generate four separate reports for each project. We propose a single report that can be inserted into each respective annual wildlife monitoring report, either as a standalone chapter or as an appendix, which will provide regulators, monitoring agencies, and communities with exactly the same information.

Budget

An anonymous reviewer commented on the budget. If the reviewer's calculations are correct, then helicopter costs for a 12x12 km cell size over 30,000km^2 would actually be closer to $331,000 (assuming 12 minutes per station), approximately $60,000 less than the estimate quoted by the reviewer for 10x10 km cells over the same area, and $120,000 less than our initial estimate (which is based on experience conducting other programs in the NWT and Nunavut). From these programs, the maximum number of cells that can generally be visited in a day is 30. Furthermore, a 6 hour flight day translates into a 10 to 12 hour field day depending on the number of trap hits that are obtained. Mine safety protocols cannot be ignored, and EKATI has a 2-pilot system necessitating a Bell 206 long ranger.

Cameras

It is agreed that the addition of wildlife cameras will help answer several questions related to visit frequency, capture success, and family groups. The plan is to deploy 20 cameras in the northern study area in 2012, and to revisit the use of additional cameras in both study areas in subsequent years. At a cost of approximately $500/camera, the mining companies invite ENR to contribute additional funds to add more cameras in 2012.

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