

Response to Undertaking #9 – Interim ZOI Mitigation Measures and Offsetting

Undertaking #9: *“IEMA will undertake to bring concrete ideas of interim ZOI mitigations to the review board in advance of the meeting described in undertaking #6 and will also bring these ideas to the meeting described in undertaking #6.”*

Agency Response:

Introduction

The Agency understands that the intent of the undertaking is to identify possible increased or enhanced mitigation measures to reduce cumulative impacts of the Jay Project on the Bathurst caribou herd while research into casual mechanisms of the Zone of Influence (ZOI), which may take a longer period of time to address, is being conducted, and if analysis of the ZOI from the 2009 and 2012 Ekati-Diavik aerial surveys clarifies a trend of increasing strength (magnitude) of the effect.

In responding to this request for additional ideas, the Agency would first like to note that our Technical Report and proposed Measures ([PR#489](#)) offered a wide spectrum of possible mitigation including the following with some additional thoughts:

- **Design options** for the Jay Project (e.g., less disturbance to the esker crossing through a narrower road cut with one-way traffic);
- **Alternative locations** for Jay Project infrastructure to reduce habitat loss and disturbance (e.g., Jay haul road alignment #4);
- **Collaborative research** to determine ways of reducing the impacts of the ZOI that would then be applied to the Jay Project (e.g., determine the causes of the ZOI and apply appropriate mitigation);
- **Further information gathering** to determine ways of improving mitigation (e.g., analysis of the 2009 and 2012 caribou aerial survey data for ZOI to better understand more recent impacts and trends over time);
- **Improved monitoring** to measure the effectiveness of Jay Project mitigation (e.g., recommencement of aerial surveys over a larger area using new analytical techniques); and
- **Offsetting** or compensatory mitigation that could be undertaken on-site by DDEC (e.g., enhanced reclamation at Ekati, delays or phasing in other activities in the claims block including the Sable Project, or winter-only operations) and off-site by others (e.g., application of adaptive management and lessons learned from all diamond mine mitigation consistently across all developments, or limiting further development in the range of the Bathurst caribou herd). See the end of this undertaking for more discussion on offsetting.

In the view of the Agency, there should be serious consideration and application of the above approaches and those presented later in this document, to avoid a significant adverse cumulative impact from the Jay Project and other activities.

The Agency also notes that while it has extensive history and experience in oversight of the Ekati Mine and its regulators since 1997, we are not responsible for environmental management at the site, nor do we have any decision-making authority over DDEC. We can offer our refusable advice that is informed by our expertise and institutional memory. Our ideas for Jay Project and cumulative effects mitigation require discussion amongst all interested parties and we look forward to a productive discussion at the

October 1, 2015 workshop on the Jay Project to discuss mitigations directed at the ZOI and at compensatory (offset) mitigation of impacts on caribou as required by Day 2 undertakings #6 and #9 ([PR#643](#)).

Zone of Influence Mitigation

The ZOI is the distance at which caribou change their behaviour, habitat selection and distribution relative to disturbance (Boulanger et al. 2012 as referenced in the DAR s.12 [PR#132](#)). Causal mechanisms that contribute to the ZOI are unknown, but probably include a suite of variables, including dust deposition on vegetation (Boulanger et al. 2012), visual disturbance, noise, light, smell, general human activity, and perhaps memory and learned behaviours, all of which contribute to sensory disturbance and lower abundance of caribou within a certain distance from development and human activities.

Dominion Diamond Ekati Corp. (DDEC) has described a tiered mitigation approach in its most recent draft of the Conceptual Wildlife Effects Monitoring Plan (WEMP) - Jay Project (July 2015 [PR#518](#)). The WEMP includes Appendix B Caribou Road Mitigation Plan (CRMP) for the Jay Project, a specific plan developed to avoid and minimize effects from roads at the Ekati Mine on caribou mortality and barriers to movement. These documents were updated to reflect suggestions and discussion emanating from the 25 June 2015 WEMP workshop ([PR#459](#)) and previous workshops and input. Mitigations to remove or reduce impacts to wildlife in general, with specific reference to caribou, are presented in the main WEMP document. Measures specifically related to the caribou ZOI include dust suppression and specific mitigations for each of the following key environmental risks or pathways: direct habitat alteration and loss; indirect habitat alteration and loss; barrier to caribou movement and migration from roads and associated power lines and pipelines; and, protection to caribou and other wildlife from direct Mine-related mortality (refer to Section 4.2 in the WEMP).

The ZOI surrounding the Ekati mine infrastructure is spatially the largest residual effect for caribou arising from the development. Following are suggested interim ZOI mitigation measures to further decrease the distance and magnitude of the ZOI while research into causal mechanisms of the ZOI is being conducted and/or analyses find the magnitude has increased. We acknowledge that it is difficult to focus mitigations to address ZOI magnitude/strength that will not address ZOI distance/extent, and vice versa. For many of these mitigations monitoring is required to measure the frequency of traffic (type, speed and duration of any stops) as well as the caribou numbers, behaviour and distance to the edge of infrastructure:

1. **Let the leaders pass/breaks in traffic to allow time between vehicle passages:** While letting leaders pass is an essential idea repeated many times over the years by Elders, in practice it will be difficult to ensure this occurs when the caribou are not rapidly migrating. The solution is to ensure predictable breaks in the traffic which will reduce sensory disturbance and allow or encourage those caribou who are trying to cross the road to actually make their move. During operation, vehicle traffic on the Misery and Jay roads would be in the order of 160-210 passages/day (averaging 7-9 minute spacing) (DDEC response to DAR-IEMA-IR-44 [PR#292](#)). When caribou are likely to be present in the area, DDEC can either schedule systematic breaks in traffic, or convoy traffic to create as many regularly spaced gaps as possible. Systematic breaks in traffic or convoying are a means to safeguard caribou and provide a predictable ore flow and rate of mill feed. Regularly scheduled breaks in all traffic for 20 minutes every 2 hours may be

effective. Convoying may result in more frequent regular breaks of 15-20 minutes. These breaks in vehicle movement need not occur simultaneously across all Ekati roads, but can be staged. This mitigation will be in effect during spring (northern) migration (as noted primarily by collar movement), post-calving (to the end of August), and at other times of the year when more than 10 caribou are known to be present within 500 m of the road alignments. Studies in Arctic Alaska during summer suggested that activity budgets were impacted up to 300–600 m from roads in an oilfield setting, with greater sensitivity of cows and calves to human disturbances (Murphy and Curatolo 1987).

2. **Stopping distances and speed limits on all Ekati roads:** CRMP Table 3.1-1 (pg. 3-6 [PR#518](#)) provides recommended threshold distances and speed limits for drivers “following crossing” (apparently invoked only once caribou have crossed the road) during Operational Level (Blue): when caribou are less than 100 m from the road following crossing the driver is to remain stopped; at 100–200 m the driver may proceed at 20 km/hr; at 200–500 m at 40 km/hr, and at 500 m or more at 60 km/hr. During Level 3 (Red), DDEC has further proposed that when 1% of total cows (currently approximately 100 individuals) in the Bathurst herd are within 200 m of the Jay or Misery roads, or when one or more caribou groups observed within 500 m of the Jay or Misery roads during the northern migration (May), short-term or long-term closures are put in place. We suggest the distances in place during Operational Level (Blue) be applied to any caribou (prior to or after crossing) and during all periods when caribou may be in the vicinity of the mine site (since collars and road monitoring may not initially detect all caribou groups), with the following modifications to further decrease risk of mortality from vehicles, sensory disturbance and deflection rates. We also suggest that the duration of the stop should be specified to provide an opportunity for caribou to cross and is dependent on season, caribou behavior and proximity to the road. This information is summarized in Table 1.

Table 1. Agency Proposal for caribou distance thresholds, criteria for resuming traffic speed limits and duration of the stop.

Distance of Caribou from the Road	Calving, Post-calving and Fall (<10 adults in a nursery group)	Calving, Post-calving and Fall (≥10 adults)	Northern (spring) migration (any group size)
Less than 200 m	Driver to remain stopped for 30 minutes, then may proceed at 20 km/hr if behaviour is unchanged and caribou are not moving towards the road	Driver to remain stopped until caribou are greater than 500 m from the road	Driver to remain stopped/short-term closure
200-500 m	Driver to remain stopped for 10 minutes, then may proceed at 20 km/hr if behaviour is unchanged	Driver to remain stopped until caribou are greater than 500 m from the road	Driver to remain stopped/short-term closure
In sight and greater than 500 m	Driver to proceed at 30 km/hr	Driver to proceed at 30 km/hr	Driver to proceed at 40 km/hr

3. **Misery (Jay) esker crossing:** Enabling movement and migration along the Misery esker is of great concern to Aboriginal communities. Detection monitoring on the esker (perhaps remote video feeds or motion sensors stationed 1 or more km north and south of the Jay complex near the esker crossing) could signal when caribou are approaching. Movement of traffic through the Misery esker and up to 300 m on each side of the esker will be halted until caribou on or adjacent to the esker are more than 500 m and moving away from the road.
4. **Expert panel on infrastructure crossing of the esker system:** We propose that DDEC fund a panel of experts (beyond those involved in the current assessment and review) to help better design the Jay Project infrastructure crossing of the Misery esker system. Expert panels were proposed by the Review Board itself for co-disposal of waste rock and tailings, and wetlands water treatment for the proposed Fortune NICO mine ([Report of Environmental Assessment and Reasons for Decision Fortune NICO, pages 49-69 see Measure #4 and #6, copied below](#)).

Measure #4

In order to mitigate significant adverse impacts to water quality and the environment downstream of the project site, the developer will fund an expert peer review panel for the co-disposal facility. This panel of three people is to be established under the water licence in consultation with Fortune Minerals and the Tłjcẖ Government and consist of one appointee from each party and the Wek'eezhii Land and Water Board.

The peer review panel will be established prior to the start of mine operations and will be in place for the operational life of the mine. It will:

- *consist of technically qualified individuals capable of reviewing the design and performance of the co-disposal facility*
- *assess Fortune Minerals' Co-disposal Facility Monitoring and Management Plan; provide recommendations intended to reduce adverse impacts and improve the operations and effectiveness of the co-disposal facility to the Wek'eezhii Land and Water Board, Fortune Minerals, and the Tłjcho Government; and*
- *address questions from any of the three parties in relation to its assessments and recommendations.*

Measure #6

In order to mitigate significant adverse impacts to water quality and the environment downstream of the project site, the developer will fund an expert peer review panel to review and advise on the design and construction for the proposed constructed wetlands. This panel of three people is to be established under the water licence in consultation with Fortune Minerals and the Tłjcẖ Government and consist of one appointee from each party and the Wek'eezhii Land and Water Board.

The peer review committee will be established at the start of mine operations and will be in place for the operational life of the mine. It will:

- *consist of technically qualified individuals capable of reviewing the design and performance of constructed wetlands;*
- *assess Fortune Minerals' constructed wetlands pilot and field scale wetlands trials;*
- *provide recommendations intended to reduce adverse impacts from and improve the operation and effectiveness of the constructed wetlands to the Wek'eezhii Land and Water Board, Fortune Minerals, and the Tłjcẖ Government*

- *address questions from any of the three parties in relation to its assessments and recommendations.*

An expert review panel would be tasked with providing suggestions for the design and operation of the Jay Project esker crossing with a view to better design of a caribou-friendly location and design options (including options such as an overpass, an underpass, or buried infrastructure) and to provide lessons learned about the effectiveness of other important wildlife and infrastructure crossing areas (e.g., TransCanada Highway twinning through the Rockies). Enhanced ZOI mitigation would occur if the recommendations of this panel are applied to the Jay Project. The suggestions provided by this expert panel should be available to regulators and to the public. Another expert panel for the Jay Project has been proposed by the Lutsel K'e Dene First Nation, for meromixis in the Jay and Misery pits (Technical Report, pg. 8 [PR#521](#)).

5. **Dust suppression:** Dust on vegetation may be a part of the driver of the ZOI detected around the Ekati and Diavik mines (Boulanger et al. 2012). To decrease dust loads on vegetation, we suggest a much more vigilant control of dust on haul roads, especially the Misery road. This could build on the recent experimental testing of EnviroKleen on the Misery road. The EnviroKleen test was authorized by the [GNWT land use inspector](#) with a report from DDEC due by October 30, 2015. The principle is, simply, to exercise greater control over dust with a view to a quick reduction in dust deposition. If this is indeed a cause of the ZOI, the ZOI should decrease in extent and/or in magnitude (strength). Treating this as an experimental measure could also lead to adoption elsewhere, further reducing the cumulative impact on the Bathurst herd. This would involve reducing dust deposition and then re-measuring the ZOI. Reductions of dust on vegetation should also be evident and measureable. Dust control should also be applied elsewhere, such as on the LLCF, on waste rock piles, or when blasting.
6. **Blasting requirements:** To reduce sensory disturbance, blasting should not occur if caribou are detected within 2 km from the blast site when the blast will occur between 0 and 50 m below the surrounding terrain elevation, and within 1 km from the blast site when the depth of the blast site is greater than 50 m below terrain elevation (assuming the noise is attenuated more at greater depth in a pit). The size of blast should be minimized during migration times.
7. **Reductions in skyline activity:** Activity on the skyline may increase sensory disturbance and deter caribou from approaching an area more than activities that are not against the skyline. During all seasons when caribou may be present, if groups of more than 50 caribou are detected within 3 km of mine infrastructure, activity on the top of the WRSA should be curtailed.
8. **Caribou-friendly roads:** Movement by caribou across the Misery and Jay roads could be further facilitated by making more road verges caribou friendly (low slopes, use of smaller grade top crush, lower overall berm height), and making road alignments and grades that minimizes the need for safety berms (greater contouring to the landscape).
9. **Further Support for ZOI Research, Reporting and Evaluation:** A forum to continue to research ZOI and better evaluate the effectiveness of mitigation, like that provided by the current ZOI

Technical Task Group, should be continued. This forum would need support from the other mines within the Bathurst caribou herd range. Reporting will be important to ensure dissemination of results and promote adoption of improved mitigation by other developments within the range of the Bathurst herd. Continued support and faster progress of the overall Bathurst Range Planning exercise would also be helpful and supportive of protection of the herd.

Offsetting Ideas and Options

To assist with discussion of offsetting at the October 1 workshop, the Agency offers a number of ideas and options that DDEC could adopt itself, and that other developers and managers could (and should) consider implementing to reduce the cumulative impacts to the Bathurst caribou herd. While the terms “compensatory mitigation” or “cumulative effects mitigation” are often used synonymously with “offsetting”, we are following the terminology of Business and Biodiversity Offset Programme (BBOP 2015) and use the term offsetting.

Offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse impacts arising from project development after appropriate prevention and mitigation measures have been taken (BBOP 2015). Stated differently, an offset is a commitment to compensate for significant residual adverse impacts on a valued component identified after appropriate avoidance, minimisation and on-site rehabilitation measures have been taken according to the mitigation hierarchy. BBOP (2015) deals primarily with biodiversity offsets, but the principles can pertain to any value ecosystem component.

We suggest that preference be given to on-site offset mitigation, then off-site offset mitigation in proximity to the project area (i.e., in the general Jay, Ekati, Daivak area), and lastly mitigation farther away (i.e., anywhere within the Bathurst caribou range)(Jakle 2012). Many examples of offset mitigation focus on habitat restoration (BBOP 2015). However, we also acknowledge that since the current vulnerability of the Bathurst herd is very high, offsetting should be considered that will provide more immediate returns (as opposed to more long term habitat restoration that may take decades to come to fruition). Targets should be set for offsetting that are clear and measureable (perhaps using the same modelling approaches that predicted the reductions in fecundity), and thus require monitoring and adaptive management to ensure that the health of the herd improves

Consideration for reduce the cumulative impacts to the Bathurst caribou herd could include:

1. **Enhanced reclamation** (faster progress over a larger area to encourage more caribou friendly habitat and reduced disturbance) at Ekati (e.g., Old Camp, Fox waste rock pile and pit, the Long Lake Containment Facility);
2. **Delays or phasing in other activities** in the claims block including the Sable Project (DDEC announced that it will proceed with Sable on [September 10, 2015](#) and on Day One of the Public Hearing, Transcript pg. 28, [PR#369](#));

3. **Winter-only operations** at the Sable and/or Jay Projects to reduce the potential for caribou interactions with mining activities during the spring migration and the summer/fall post-calving movements;
4. **Similar mitigation by other developers** such as Diavik, Snap Lake or Gacho K'ue (e.g., application of adaptive management and lessons learned from all diamond mine mitigation consistently across all developments);
5. **Limiting further development** within the range of the Bathurst caribou herd through mandatory land use planning or land withdrawals;
6. **Protection of high quality and/or critical habitat** for the Bathurst caribou herd;
7. **Research into dust**, including how dust influences the zone of influence, and ultimately how dust suppression could reduce the distance and magnitude of the zone. If mitigation measures resulting from this new information were to be applied to Jay it would be project mitigation. But if the information is disseminated and the practises used elsewhere within the Bathurst range, it is cumulative effects mitigation; and
8. **Caribou protection measures** across the range of the Bathurst caribou herd. GNWT has imposed mobile caribou hunting exclusion areas based on the locations of the collared Bathurst animals. To further protect the Bathurst herd from sensory disturbance from developments during these critically low numbers and low herd resilience, we suggest that mobile caribou protection measures could be developed at Ekati (but should be applied across the Bathurst herd range – and thus would be considered offsetting mitigation). Caribou protection measures were used in the late 1970s and 1980s in the Kivalliq region to protect the Beverly and Qamanirjuaq caribou herds from mineral exploration within designated Caribou Protection Areas between 15 May and 15 July (for a review, see Gunn et al. 2007). Additional restrictions were in place from 15 May to 1 September within 10 km of designated water crossings. Land use permits incorporated requirements for aerial surveys to detect caribou and when caribou were found within a certain radius of the activities, exploration activities were required to be reduced or shut down. A form of mobile protection measures has been proposed and tested in the Sahtu (Gunn and Poole 2009) and are being considered for implementation in the Kivalliq Region of Nunavut (L. Manzo, Director of Lands, Kivalliq Inuit Association, pers. comm.). Mobile caribou protection measures could be put in place around the bulk of the Bathurst herd (as indicated by the collars or some form of structured aerial surveys), which would travel with the herd and could result in broad-scale reductions in activities (e.g., blasting, hauling) within a set movement radius (perhaps 10-15 km) of the herd. Mining activity would therefore be limited to activities that limit sensory disturbance while maintaining essential functions of the mine sites. The extent of restrictions could be scaled to season and caribou vulnerability. These strict measures could be relaxed or removed once herd abundance increases.

Literature cited

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