Fisheries and Oceans Canada

Information Requests

Draft Environmental Impact Statement
and Supporting Documents

Mary River Iron Ore Project

Submitted to:
Nunavut Impact Review Board
March 17, 2011

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I. INFORMATION REQUEST RELATING TO MARINE AQUATIC RESOURCES, MARINE FISH AND HABITAT, AND MARINE MAMMALS

The adverse impacts from the construction and operation of the Milne and Steensby Inlet Ports and the shipping component of the Project have not been fully assessed and reported. The baseline data and the monitoring data are essential components to the Mary River Project as data collected will be used to determine impacts. The information requested is necessary to complete the technical assessment of impacts to marine aquatic resources, to marine fish and habitat, and to marine mammals.

DFO IR #1: Potential Effects of Blasting on Fish at Steensby Port and Milne Port

Section: Vol. 8, Section 4.4 – Subjects of Note – Direct Mortality Due to Blasting, P. 98.

Preamble: The Proponent indicates that blasting will be conducted throughout the project area following the DFO Guidelines for the use of Explosives in or Near Canadian Fisheries Water" Wright and Hopky 1998. Volume 8, section 3.5.2.1 indicates that blasting will occur during the ice-cover season of year 1. It is not clear whether there will be any blasting under ice cover in subsequent years.

Results of testing and monitoring in the north have indicated the limit of 100 kPa was not protective of fish. As such, DFO has developed additional recommendations for use of explosives under ice cover in the Northwest Territories and Nunavut. DFO recommends that the proponent use 50 kPA as the threshold for instantaneous pressure change when blasting under ice cover. It is also recommended that monitoring be conducted in test holes to insure that the pressure can be kept under 50 kPa consistently prior to loading all of the charges.

Request:

- DFO requests additional information to confirm if blasting will occur under ice cover and if the guidelines of 50kPA will be followed.

DFO IR #2: Qualitative loss of Marine Fish Habitat at Milne and Steensby Port

Section: Vol. 8, Section 4.5 – Marine Fish Habitat, 4.5.2.1 Habitat Loss, P. 101

Preamble/Rationale: The proponent provides an estimation of the marine fish habitat which will be altered or lost as a result of the construction of the ore and freight docks at the Milne Port and the Steensby Port. However, it is not clear from the assessment whether this habitat is spawning, rearing or nursery habitat and which species would likely be using these areas. The ability to adequately offset this loss (i.e. fish habitat compensation) and determine the significance of this impact is uncertain.

Request:

- DFO requests that the proponent provide assessment of the potential habitat use in the impacted area by local fish species present.

Section: Volume 8, Appendix 8.1

Preamble: Field sampling of marine communities was extremely limited: 16 gillnet sets, which lasted less than 4 hours, in one year at Milne and about 20 sets in each of two years at Steensby. Fish sampling was also limited to waters no deeper than 50 m. The focus was clearly on nearshore species, but marine nearshore species can use habitats deeper than 50 m and project effects can certainly extend beyond the study area. The conclusions drawn from the sampling regarding the composition of the nearshore fish community and local species diversity (which is referred to as "low" for both sites with no

explanation of what low means or what it is in relation to) are poorly supported and explained.

Request:

a) Justify why such limited sampling was carried out for marine fishes.
b) Justify why sampling was limited to gillnetting.
c) How will the limited sampling be used as a baseline to assess impacts of the Project?
d) Why was sampling not carried out using standard survey methods (e.g., stratified random sampling)?

DFO IR #3: Marine Animal Valued Ecosystem Components

The exclusion of key indicators, or the selection of inappropriate species, as VECs for the effects assessment could result in the inadequate analysis of the potential significant impacts to the marine ecosystem. Impacts on marine ecosystem structure and function are not adequately evaluated based on the key indicators chosen.

Section: Volume 8, Appendix 8A-1

Preamble: The lower trophic levels of the ecosystem support the health of the mid- and upper trophic levels. An understanding of this part of the ecosystem is critical. Changes to this part of the ecosystem may occur at a more rapid rate and, therefore, be more easily detectable than in higher trophic levels (e.g., marine mammal species). Various invertebrates are key prey species for ringed seal, walrus, bearded seal, bowhead whales as well as a number of marine fishes. Detailed analysis of benthos and food chain components were not presented in the EIS. VECs chosen for marine ecosystems do not include invertebrates or marine fishes. Arctic Char, an anadromous fish rather than a marine fish, is not an appropriate species to be used as an indicator for marine fishes or for the Arctic marine system. As such impacts on marine ecosystem structure and function are not adequately evaluated based on the key indicators chosen.

Request:

a) Please provide and assessment of potential impacts to marine fishes and invertebrates using appropriate representative marine VECs. Examples of marine fishes could include Arctic Cod, Greenland Cod or sculpin.
b) How will potential effects to invertebrates be monitored and assessed?
c) Justify why no primary or secondary producer VECs or indicators were chosen to assess impacts on the benthos or food chain components for the LSAs or RSAs.

Section: Volume 8, Appendix 8A-2

Preamble: Vol. 8, table 8-5.1, the EIS reports that bearded seals are abundant in the northeastern Baffin Island RSA and the Foxe Basin-Hudson Strait RSA. Elsewhere in the document it states that Foxe Basin is an area of “high, or likely high, density for bearded seals”; only one of four areas identified in Nunavut (fig. 2.9, appendix 8A-2). This species is thought to exhibit strong site fidelity to breeding sites and Davis et al. 2008 reported overall limited gene flow. During aerial surveys conducted in June 2008 (fig. 4.23) most bearded seals were “sighted near mouth of Steensby Inlet” and along the proposed ship route. They are reported to be abundant throughout the Hudson Strait-Foxe Basin study area with most sightings between April to August when bearded seals were seen basking on the sea ice. Bearded seals are reported to give birth in April along the southern part of Steensby Inlet. Bearded seals were not selected as a Valued Ecosystem Component (VEC) for the EIS.

Other key marine mammals in the region currently not addressed in the EIS include harp seals, killer whales, minke, and humpback whales. The EIS indicates that minke and humpback are absent from Hudson Strait and Foxe Basin. Reported sightings of these two species have increased in recent years.

Request:
VECs for the Project failed to include some key components of the ecosystems within the identified LSAs and RSAs. Some of the key indicators chosen for the VECs are inadequate to assess environmental effects. As such, DFO requests the proponent:

d) Provide a rationale for why harp seals, killer whales, minke and humpback whales were not considered VECs.
e) Given the importance of Bearded seals within the Project area, especially in the areas of Steensby Inlet, Foxe Basin and Hudson Strait, revise the EIS to include bearded seals as a VEC. The assessment should include the effects the Project will have on the species, with particular focus on habitat change, disturbance, call masking (particularly during breeding season in spring) and pup mortality.

DFO IR #4: Impacts to Bowhead Whales

Section: Volume 8, Section 5.4.2

Preamble: The risk of collisions between bowheads and ships were assessed by way of a qualitative discussion with the conclusion that no mortality was expected to occur. This conclusion can only be supported if the assumption that the whales will avoid vessels underway is valid.

The EIS states that baleen whales are more susceptible to collisions than toothed whales. More extensive literature on North Atlantic Right Whales, which closely related to Bowhead Whales, and vessel collisions is likely available and could be used to support an assessment of the potential for Bowhead-Vessel collisions. Some bowhead whales may exhibit behaviour more akin to North Atlantic Right Whales and not swim out of the path of an oncoming ice breaker. Furthermore, ice conditions may further limit the whales ability to safely avoid a collision with the vessel.

Taking into consideration the estimated densities of various marine mammal species, relatively simple means to estimate the probability of a ship strike based on factors such as ship size, speed and mammal density should be available.

Request:
a) Provide a discussion of what is known regarding North Atlantic Right Whales and whale-vessel collisions, and how this information relates to the assumptions adopted within this EIS for Bowhead Whales.
b) Provide further evidence to support the assumption that Bowhead whales in Foxe Basin and Hudson Strait avoid oncoming vessels and as such, no mortalities would be expected to occur.
c) Provide a quantitative assessment of the potential for vessel-whale collisions.
d) Identify the mitigation measures proposed to reduce the probability of bowhead-whale – vessel interactions.

DFO IR #5: Impacts to Walruses

Section: Volume 8, Appendix 8A-2 Sections 3.2.8, 4.3.1.8, 4.3.2.9, Figures 3.12 and 3.13

Preamble: Surveys conducted to date do not adequately document walrus distribution and abundance within the LSAs and RSAs. Current DFO information, including local IQ, suggests that the area of pack ice east of Rowley Island is the preferred calving area for walrus in the north-western portion of the basin. The walrus distribution on the maps presented is poorly defined and extremely limited compared to available information from DFO and local IQ.

Request:

a) That the proponent consult with DFO in order to update walrus distribution maps based on the most current available survey and IQ information. The proponent is further encouraged to consult with DFO on appropriate survey methods in order to collect accurate baseline information which will also serve to inform future monitoring programs.
b) Please provide a thorough effects assessment using the current survey data with respect to the "no significant" impacts conclusions reached in 5.7.2.2 (Disturbance) in section 5.0 (pp. 176-182). For example, fig. 4.18 in app. 8A-2 shows locations of numerous walruses within approx. 3-20 km of the proposed Steensby Inlet port.
c) Walrus were identified as a VEC, yet it is noted surveys to count walruses on haul-outs were not conducted, specifically in Steensby Inlet and Foxe Basin. Given that this is an important behaviour of the species and would represent the period and areas where project-species interactions would be considered most likely, please provide baseline survey data to support the EIS conclusions and future monitoring programs.

Section: Vol. 3, section 3.6.3, p. 109

Preamble: Based on a request from the community of Cape Dorset, the EIS states that "While better ice conditions are found closer to the Baffin coast, ships will pass to the south of Mill Island (between Mill Island and Salisbury Island) to the extent possible". This would put the ship's path closer to the walrus haul-out on Salisbury Island.

Request:

d) Provide justification for this trade-off and the additional risk of impacts to walrus as a result of this routing.

Section: Volume 8, section 5.7.1.2 (p. 180), (p. 182), Section 5.7.2.2 (pg. 181) Table 8-5.8

Preamble: Acute responses of walrus to disturbance have been reported including abandonment of haul-outs and other areas (see literature on Bristol Bay and western Foxe Basin). In section 5.7.1.2, it states "It is likely that at least some individual walruses will be affected multiple times by icebreaking during the course of a single ice-covered season". As the proposed Project would operate for decades, there is the potential for impacts to walrus from long term chronic exposure to disturbances caused by Project activities.

Section 5.7.2.2 states that Boeing 737s will have to maintain low altitudes near the Steensby airstrip during landing and takeoff, so planned mitigation to operate at a minimum altitude of 450 m over marine areas won't be possible and also states that "it is uncertain if walruses that occur in Steensby Inlet will habituate to daily overflights of a commercial jet".

Request:

e) Justify why disturbances caused by the low altitudes of the Boeing 737s would not pose a significant risk to walruses in Steensby Inlet at times when walrus haul out in significant numbers, as was the case in September 2006 (appendix 8A-2, fig. 4.18).
f) What mitigation measures would be undertaken to prevent impacts to walrus during these events?
g) Provide information on what is known about long term chronic exposure of walrus to ongoing disturbance.
h) Provide an assessment of the potential impacts to walrus from repeated disturbances over the life of the Project.
i) Provide justification as to how the effects of disturbance on walrus are "fully reversible" given this species is known to be sensitive to disturbance and would be subject to chronic disturbance over decades from this Project.

Section: Volume 8, Section 5.7.2.2 (table 8-5.6)

Preamble: On page 177 it states "Avoidance would be temporary" and on page 178 "Walruses hauled out on ice may temporarily avoid an ore carrier transiting to and from Steensby Inlet by diving into the water, perhaps at distances ranging from 400-500 m up to several km". These statements are intended to provide support to the conclusion that impacts to walruses would be insignificant. In order to validate the conclusions of the EIS, statements within the EIS needed to be fully supported by published studies or documented historical/traditional accounts.

Request:
j) Provide further justification for statements made within Section 5.7.2.2.
k) Further define what is meant by "temporary".
l) Provide published information and expert opinion that support claims that walruses will not likely leave terrestrial haul-out sites in response to passing ore carriers at distances of 4.6-8 km (table 8-5.6).

Section: Vol. 8, section 5.1.2 (p. 131), section 5.4.2 (p.146), section 5.7.2.2

Preamble: Section 5.1.2 of the EIS states that walrus have been observed challenging ships that pass into their territory however section 5.4.2 identifies the risk of vessel collisions with marine mammals as considered low given their avoidance of ships.

Request:
m) Please explain this apparent contradiction**.**
n) Provide a more thorough explanation for how maintaining a constant vessel course and speed "whenever possible" and reducing idling of engines when docked will sufficiently mitigate disturbance to walrus from ore-carrying ships such that the significance of predicted residual effect is non significant at a high level of confidence.

DFO IR #6: Impact to Narwhals

Section: Volume 8, Section 5.1.4.2

Preamble: The EIS states

> *[…]narwhals are thought to overwinter in the eastern portion of Hudson Strait. [….] There have been relatively few studies of the effects of shipping on narwhals. Based on limited observations in the Project area, narwhals do not*

seem to respond to vessels (including the passage of an ore carrier) in Eclipse Sound and Milne Inlet to the same extent as responses documented during a 1982–1984 icebreaking study. The interaction of the Project with the narwhal population will be limited to the shipping activities in Milne Inlet during the open water season and as a result, the residual effect of the Project on the narwhal population is assessed as not significant."

Request:

a) Explain why the interaction between narwhal and shipping activity is limited to Milne Inlet when it was stated that narwhal are thought to overwinter in Hudson Strait.

II. INFORMATION REQUESTS RELATING TO THE FRESHWATER AQUATIC ECOSYSTEM AND FISH HABITAT

The negative impacts from the construction and operation of the mine site have not been fully assessed and reported. The information requested is necessary to complete the technical assessment of impacts to freshwater aquatic resources, specifically fish and fish habitat. The baseline data and the monitoring data are essential components to the Mary River Project as data collected will be used to determine impacts. The information requested is necessary to properly review the DEIS.

DFO IR #7: Stream Diversions – Mine LSA

Section: Vol. 7, Sections 4.5.5.10, 4.5.5.11, 4.5.5.14

Preamble: The proponent's DEIS indicates that numerous stream diversions in the Mine LSA are proposed primarily for the collection and discharge of run off from waste rock and ore stockpiles. The proponent indicates that there will be a moderate to high impacts on the quantity of Arctic char habitat within the impacted tributaries and lakes. The extent of the impacts and types of impacts are not clear from the analysis presented.

Request:
DFO requests that the proponent provide an assessment on the predicted impacts of the diversions including the following:

a) Amount of habitat which will no longer be usable by Arctic char due to reduced discharge.
b) Amount of habitat which will no longer be usable by Arctic char due to physical barriers or barriers caused by shallow water.
c) Will the reduction in discharge result in increased stranding of fish?
d) Will the predicted decrease in productive capacity impact the use of these watercourses as feeding and rearing habitat?
e) Any measures that can be implemented to mitigate impacts to fish habitat and/or fish passage.

DFO IR #8: Potential Effects of Blasting on Arctic Char

Section: Vol. 7, Section 4.4 – Subjects of Note, pg. 246

Preamble: The Proponent indicates that blasting will be conducted through out the project area following the DFO Guidelines for the use of Explosives in or Near Canadian Fisheries Water" Wright and Hopky 1998. It is not clear whether there will be any blasting under ice cover.

Results of testing and monitoring in the north have indicated the limit of 100 kPa was not protective of fish. As such, DFO has developed additional recommendations for use of explosives under ice cover in the Northwest Territories and Nunavut. DFO recommends that the proponent use 50 kPA as the threshold for instantaneous pressure change when blasting under ice cover. It is also recommended that monitoring be conducted in test holes to insure that the pressure can be kept under 50 kPa consistently prior to loading all of the charges.

Request:

- DFO requests additional information to confirm if blasting will occur under ice cover and if the guidelines of 50 kPA will be followed.

DFO IR #9: Habitat Loss due to Impeded Fish Passage

Section: Vol. 7, Section 4.5.6.3 – Habitat Loss due to Impeded Fish Passage, P. 274

Preamble: The proponent indicates that the installation of culverts along the rail line will result in a loss of fish habitat due to impeded fish passage. It is not clear whether other alternatives, e.g. clear span bridges, were considered to maintain fish passage.

Request:

- DFO requests an assessment of alternative water crossing designs which would avoid the loss of upstream fish passage.

DFO IR #10: Water Withdrawal from Phillips Creek

Section: Volume 7, Section 2.3.2.3

Preamble: During the Operation, Construction and Closure phases of the project water will be withdrawn from Phillips Creek during the open water season (June - September) and from Km32 Lake during the winter (October - May) when Phillips Creek is frozen. Information on the water withdrawal plan for Phillips Creek is lacking, in terms of where on Phillips Creek the water withdrawals will occur (one location or multiple), the timing, and criteria that will be use to determine the volume of water to be withdrawn relative to baseline flow conditions. This information is important in understanding the potential risk to fish and fish habitat in Phillips Creek relative to using Km32 Lake year round where the potential risk may be lower.

Request:

- DFO requests additional information on the water extraction plan for Phillips Creek with details on proposed locations, timing and volumes to be extracted and details on the criteria or process that will be used to determine the amount of water to be extracted relative to baseline flows conditions for Phillips Creek.

DFO IR #11: Sampling Methodology

Section: Volume 7

Preamble: The proponent uses the terms: suitable fish habitat preferred spawning habitat and suitable overwintering habitat throughout the DEIS. There are no clear definitions of these terms in the DEIS or the criteria used to differentiate between suitable and unsuitable habitat.

Request:

a) DFO requests that the proponent define these terms and provide the references which were used to define them.

Section: Volume 7 Appendix C

Preamble: The proponent describes the fish sampling methods utilized in Appendix 7C and references documents NSC 2006 and NSC 2008. DFO requests clarification on aspects of the fish sampling program.

Request:

b) The sample design for fish seems to vary from year to year and site to site. DFO requests that the proponent clarify the general approach and methodology by providing the references noted above as well as explaining variations noted in the sampling protocols from year to year and site to site.

c) Length stratified sample of ages is not useful in terms of characterizing fish populations and following changes in age structure of Arctic Char as development proceeds. Ideally a random sample (over space and time) should be used. DFO requests the rationale for the approach used over a random sample approach.
d) With the hoop net sampling, only the first 50 fish were measured each day. This may introduce biases in data. DFO requests clarification on why fish were not sampled randomly at intervals throughout time.
e) The report states that they attempted to achieve good temporal and spatial coverage for fish sampling on lakes. DFO request clarification on the spatial coverage that was used to verify presence/absence of fish.

III. INFORMATION REQUESTS RELATING TO THE ENVIRONMENTAL MANAGEMENT AND MONITORING PLANS

Environmental Management Plans are required to eliminate or mitigate potential negative impacts of the Project on the biophysical environment. The Fish Habitat No Net Loss Plan is required to mitigate negative impacts to freshwater and marine fish habitat and is necessary for completion of the technical review of the environmental assessment.

Monitoring will be required for any authorization issued under the Fisheries Act to demonstrate the effectiveness of mitigation measures, including fish habitat created or restored as compensation, and detect any unforeseen impacts to fish and fish habitat. Ultimately, the draft monitoring plan will be required to verify the extent to which the plan's purpose (i.e. demonstrating No Net Loss) can be achieved. This information is necessary for completion of the technical review of the environmental assessment.

DFO IR #12: Fish Habitat Compensation Plan Alternatives

Section: Vol. 10, Appendix 10D-7

Preamble: The Fish Habitat Compensation Plan presents three (3) potential approaches to satisfy the Fisheries & Oceans Canada's Policy for the Management of Fish Habitat (1986). Note this Policy is further supported by a Practitioner's Guide to Habitat Compensation (DFO, 2007). Section 5.1 of the Policy and section 4.1 of the Practitioner's Guide outlines a hierarchy of preferences when determining the type of fish habitat compensation. Included in this hierarchy is the implementation of mitigation measures that would avoid the loss or alteration of fish habitat. The Proponent's fish habitat compensation plan does not include an analysis of potential compensation options against this hierarchy of preferences. This issue was previously communicated to the Proponent on July 12, 2010, including a full explanation of the various concerns associated with approaches being proposed at that time.

Request:

- Provide an analysis of potential compensation option, taking into consideration the hierarchy of preferences outlined in the No Net Loss Policy and Practitioner's Guide to Habitat Compensation. The analysis will need to include feasibility of the various options, and/or supported rationale for dismissal, prior to proceeding to the next compensation approach in the hierarchy. Consideration should also be given to compensation options in the marine environment since fish habitat loss and alteration is also predicted to occur in the marine environment.

DFO IR #13: Monitoring of Marine Environment and Resources

Section: Volume 8, Section 6.2, Volume 10 Appendix 10D-10

Preamble: Monitoring and mitigation are crucial components of an EIS, particularly in the Arctic where there are significant environmental knowledge gaps and the impacts of development on this scale are largely unknown. The significant rate of large vessel movement (e.g., more than 200 transits to and from Steensby Port each year) in the study area will cause significant changes in the ice structures along the vessel track, and will likely change the distribution of marine mammals relative to their undisturbed states prior to the mine operation (especially given that many operations sounds will be detectable even out to hundreds of kilometres). There is no clear evidence presented in the EIS to assume that gradual or localized changes in the environment, in response to project activities, will be detectible; it is more likely that only catastrophic events will be

detected. It is not clear how and when the proposed monitoring and mitigation procedures would be updated if results warrant a change.

Request:

- Describe how the monitoring plans are sufficiently sensitive to allow detection of incremental or cumulative changes in the environment (e.g., reductions in marine mammal abundance or distribution, changes in species composition) in response to the Project.

IV. INFORMATION REQUESTS RELATING TO IMPACTS TO SEA ICE

Ice edges, polynyas and leads are critical habitat for marine mammals in arctic environments. Changes in the extent and structure of sea ice could have a significant impact on the marine inhabitants of Foxe Basin and Hudson Strait by reducing or creating barriers to important feeding, refuge, calving or rearing habitats, or by increasing predation on certain species by providing predators leads to areas previously inaccessible. The negative impacts from the operation of the shipping lanes during ice conditions have not been fully assessed and reported. The information requested is necessary to complete the technical assessment of impacts to marine aquatic resources, to marine fish and habitat, and/or to marine mammals.

DFO IR #14: Potential Effects on Marine Mammals from Creating New Leads due to Shipping

Section: Volume 8 Section 5.2.1. Key, P. xx.

Preamble: The opening of leads due to shipping may cause air breathing marine mammals to follow the ships and potentially become entrapped prior to re-freezing. Further, the new leads may result in new species entering these areas and/or staying longer, e.g. killer whales. An assessment of these potential impacts has not been provided in the EIS.

Request:

- DFO requests that the potential impacts on marine mammals of opening new leads due to shipping be fully assessed.

DFO IR #15: Shipping Corridor

Having a thorough understanding of the potential impacts from shipping and icebreaking on marine mammals in the local and regional study area requires complete information on the exact location and extent of the shipping corridor and the conditions of the ice prior to, during and following ice breaking activities. The following information is required in order to assess the potential changes to sea ice that may result from the shipping/ icebreaking activities associated with the project, as well as to conduct a more comprehensive cumulative effects assessment.

Section: Volume 8 Section 2.2

Preamble: The shipping corridor associated with this project will be located through an area used by a variety of fish and marine mammals. This may change the habitat being used by these species, however the extent of this impact is not clear.

Request:

a) DFO requests clarification of the term “nominal” shipping corridor?
b) Please verify that the “nominal” shipping corridor is 1.5 km wide as is indicated in Figure 8-2.2.
c) Further, how was the shipping route defined?
d) Please describe whether the LSA shipping route as shown in Figure 8-2.1, is fixed or somewhat flexible in response to other factors (e.g., weather, safety concerns).

Section: Volume 8 Section 2.3, Figure 8-2.1 and 8-2.2.

Preamble: Figure 8-2.1 and 8-2.2 includes ice data from 2009, which is used in the assessment of Landfast Ice Disruption Due to Ice Breaking. However, the text in the

baseline summary references (Markham, 1981; Prinsenberg, 1986) is from another decade. It appears there is an inconsistent use of applicable data.

Request:

e) DFO requests that the proponent verify that the data used are appropriate and correct.

Section: Volume 8 Section 2.5.4

Preamble: The disruption of pack ice indicates that for the purposes here, ice concentrations ranging from >1/10 ice cover to <10/10 ice cover were combined, thus eliminating landfast ice and areas of open water that may contain small concentrations of drift ice. However this also eliminated 10/10 pack.

Request:

f) DFO requests the rationale for not including the 10/10 class of ice be provided.

Section: Volume 8 Section 2.5.4

Preamble: The disruption of pack ice is approximately 0.025% of the pack ice occurring in the RSA. Using the same assumptions and determining that the LSA for sea ice is 146,000 km^2, (ship route of 1,460 km x 50 km on either side), much less than 0.05% of the maximum amount of pack ice could be affected by the ship track during each transit. However, using 1500 km x 53 m as in table 8-2.1, ~80 km^2 for 136 passages (see page 13) so locally impact is 80x136=10880 km^2 or 7.5%. The text and table differ from each other. Which one is correct?

Request:

g) DFO requests that the proponent verify whether the text or the table is correct.

Section: Volume 8 Section 2.5.4

Preamble: The disruption of pack ice doesn't provide information on the disruption of the pack near polynyas.

Request:

h) DFO requests that the proponent conduct an impact assessment for this effect, including possible mitigation measures and monitoring.

Section: Volume 8 Section 2.5.4

Preamble: Cape-class ships differ considerably in beam and draft from other ore-carriers and would be expected to have different impacts on the sea-ice.

Request:

i) DFO requests that FedNav experience with winter shipping in the Arctic with cape-class ore carriers be provided to support the estimates.

Section: Volume 8 Section 2.62.1, Table 8-2.3

Preamble: Table 8-2.3 provides the mean monthly area of landfast ice within the RSA and Steensby Inlet for a ten-year period ending 31 December, 2009. Data were extracted and summarized from monthly ice charts produced by the Canadian Ice Service (CIS) (Environment Canada). Throughout the RSA, landfast ice begins to form in

November, is at its maximum extent of about 51,000 km^2 in April, and declines in area until July.

Request:

j) DFO requests verification on whether >10/10 was used or only CIS fast ice. Further, was 10/10 included in the pack ice?

Section: Volume 8 Section 2.62.1

Preamble: Impact of ship movement during freeze-up will result in a rougher surface then would be formed under calm conditions.

Request:

k) Will there be any effect where ship waves hit islands, etc.?

l) What will be the effect of multiple tracks forming new leads on the stability of the landfast ice? Will it increase the likelihood of large pieces of landfast ice breaking free?

DFO IR#16: Impacts of Climate Change on Sea Ice

Section: Volume 8, Section 2.0

Preamble: The EIS identifies sea ice as a VEC. Climate variability and change (CVC) will diminish sea ice habitat (seasonal duration, consolidation, thickness, extent) making the remaining sea ice more valuable to ecosystem components that rely on it (i.e., marine mammals, marine fishes, primary and secondary producers). This then makes any additional disruptions potentially more important.

Request:

- Please provide greater in-depth analyses of the effects of ice-breaking on sea ice and interactions with CVC.

V. INFORMATION REQUESTS RELATING TO THE ENVIRONMENTAL ASSESSMENT METHODOLOGY

DFO IR #17: Assessment Methodology – Duration of Impact

Section: Vol. 2, section 3.8.2, Table 2-3.7

Preamble: Duration of impact is defined in the EIS as "how long an effect will continue to affect those who experience it". Yet, as identified in Table 2-3.7 short-, medium- and long-term are defined in terms of the Project as follows: over a period of several years, within the life of the project life and beyond the project life, respectively. Under this assumption, any effect experienced during construction would be dismissed as insignificant. However, for some terrestrial, freshwater and marine species, "short term" and "medium term", as currently defined, may represent most or all of a critical period within an individual's life history or even of an expected lifespan, or may impact several generations of a population.

The duration of impact may be defined using uniform terms, but should use more conservative timelines which represent periods which would be considered representative of short, medium and long term durations in terms of VECs experiencing the effect; for example a few hours, a season, or a period of years, not based on the phases of the project.

By evaluating the significance of an impact based solely on the duration of the project component and not to the period of effect within an individual's expected lifetime, or the number of generations likely to be affected, the significance of the impact is likely to be underestimated. Significance should therefore be re-assessed using more appropriate duration criteria and with full consideration of the length of critical life stages, overall longevity or generation time for each VEC.

Request:

a) Provide revised duration times of the short, medium and long term criteria which reflect "how long an effect will continue to affect those who experience it" for the majority of VECs, as opposed to phases linked to the project.
b) Revise the effects assessment for each VECs of the Project based on the revised duration criteria and taking into consideration the length of critical life stages for a VEC, a species expected lifetime, or the number of generations likely to be affected, within these defined short, medium and long term periods.

DFO IR #18: Assessment Methodology – Risk Probability

Section: Volume 8, Volume 9 Section 3.0

Preamble: In the EIS, quantitative probabilistic risk assessments are not included. All the assessments seem to be based on professional opinion (i.e., qualitative). There are likely cases where quantitative information is available such as the work done on probabilistic risk of oil spills in Norway for Russian tankers passing by Nordic countries.

Overall Quantitative Risk Analysis including probabilistic scenarios of collisions between ore carriers and whales, groundings, and spills needs to be included in the EIS.

Request:

a) Provide a quantitative risk analysis for the accidents and malfunctions events contemplated in the EIS, including but not limited to marine mammal-vessel collisions, vessel groundings, and accidental spills.

b) Justify the risk rating of moderate for events that will have catastrophic environmental impact although the likelihood of occurrence is rare or unlikely.
c) Table 9.3-2 indicates that a major diesel spill at sea has a "very low" risk rating. Stating the likelihood as "unlikely" results in the impact according to Table 3 in Appendix 10A-2 being considered "insignificant". Please further describe the measures that are proposed to be taken to reduce the likelihood of a major spill and provide the criteria used to determine the significance of a major diesel spill based on established EA practice (e.g. magnitude, duration, reversibility etc.) and how these were applied in determining the significance of this effect.

DFO IR #19: Assessment Methodology – Cumulative Effects Assessment

Section: Volume 9, Section 1.0

Preamble: The cumulative effects assessment seems to be based exclusively on qualitative professional opinion, without considering more quantitative modeling. Furthermore it examines a large number of small effects individually without considering how one impact may be magnified by another, and the cumulative interactions between them on a given VEC.

Request:
a) Provide information on the cumulative effects models considered and how they were incorporated, or rationalize why the assessment relied on "professional opinion" alone to support significance determinations.
b) Provide further justification for the methods used to assess and assign significance of cumulative effects and explain how the varying effects from a number of stressors were considered together in the cumulative effects assessment.

DFO IR #20: Assessment Methodology for Marine Mammals Impact Assessment

Section: Volume 8, Tables 8-5.2, 8-5.5, 8-5.9, 8-5.12, 8-5.15, 8-5.18, Section 5.5.5

Preamble: The tables identified above indicate that a 10% significance threshold for the LSA or RSA was chosen for delineating behavioural disturbance (non-mortality effects) of Project operations on ringed seals, walrus, and beluga, narwhal and bowhead whales, and polar bears based on "several studies". The second assumption identified in the section 5.5.5 *Key Assumptions in Assessment Approach* states that the data from those studies "…do not converge on specific exposure conditions resulting in particular reactions" and that "In reality, there is expected to be much variation in response to sound type and level". These statements clearly argue for a more precautionary threshold, especially for species designated by COSEWIC as at risk and where the confidence in effects estimates is lower.

Request:
a) Explain the rationale for the threshold values used and provide supporting evidence that they are precautionary.
b) Tables 8-5.4, 8-5.8, 8-5.11 (construction phase), 8-5.14 (construction phase), 8-5.17 (construction phase) give "high" levels of confidence in all cases except one (moderate for narwhal). Please provide rationale for the "high" levels of confidence given the admission that "there is expected to be much variation in response to sound type and level".

Section: Volume 8, Section 4.0

Preamble: The method used to assess the impacts of the Project on marine mammals seems to presuppose that animals are static so only a small proportion in the zone of influence will be disturbed. However, if those animals move away from the disturbance, in most cases they will impact animals in the areas into which they move, causing a "ripple effect" or affected animals may not have the opportunity to move if nearby habitat is already fully occupied by conspecifics or if ice prevents movement.

Request:

c) Explain how the effects assessment in the EIS accounts for these scenarios.

Section: Volume 8, Section 4.0

Preamble: The methods used to assess the impacts of the Project on marine mammals also seem to presuppose that animals operate at the population level and that finer stock structure effects are not at work. In reality, marine mammals segregate in various seasons such that the majority of a population segment (e.g., females with calves) aggregates in small areas so that virtually all members of that segment could be impacted by the Project (e.g., vessel noise).

Request:

d) Explain the implications of marine mammal segregation by age and sex on the effects assessment in the EIS.

VI. INFORMATION REQUESTS RELATING TO CLIMATE CHANGE

DFO IR#21: Climate Change Impacts and Interaction with Project Effects

Section: Volume 9, Section 1.4.4

Preamble: The most immediate impacts of climate change in the Arctic continue to be the reduction of summer sea ice, longer open water seasons in the fall and the reduction of the year-round presence of multi-year ice. These changes may have far reaching implications for Arctic ecosystems and will also result in the lengthening of the current shipping season. Shipping in the future may occur much later into the fall and possibly earlier in the spring, thereby increasing the possibility of interaction between migrating and calving species of marine mammals and ships. A thorough assessment of these interactions is necessary in order to complete the review of the EIS.

Request:

a) Given that climate change could also cause changes in animal and environmental conditions in the LSAs and RSAs, how will the proponent distinguish these from localized or cumulative effects caused by the operations themselves? Similar monitoring in adjacent/similar areas should be undertaken to ascertain if animals are displaced from the mine operations area, or if density or behavioural changes are climate-related.

b) Explain how ongoing environmental changes were considered in the cumulative effects assessment.

VII. INFORMATION REQUESTS RELATING TO SOUND AND POTENTIAL IMPACTS OF NOISE ON MARINE RECEPTORS

Project activities during construction and operation, such as the flying of jet, propeller and helicopter aircrafts, shipping and ice breaking, blasting and construction of the Milne and Steensby Port facilities, are likely to increase noise disturbances in the Local and Regional Study areas. Complete information on the potential sources of sound and the propagation of sound in the underwater environment, the hearing abilities of animals in all of the environments they inhabit (both when underwater and on land), animal behavioural responses to acute and chronic noise stressors occurring both on land and underwater must be assessed.

DFO IR#22: Sound Modeling

Section: Volume 8 Appendix 8C

Preamble: Sound is of vital biological importance to marine mammals and anthropogenic noise produced through shipping and other vessel activity can have various adverse effects on Arctic species, including hearing impairment, masking and behavioural responses. In the EIS, the sound propagation modelling used educated guesses and/or estimates based on several assumptions.

Request:

a) Provide a complete assessment of underwater noise modelling for SI, FB and HS and potential impacts on marine mammals.
b) Provide a full explanation/justification of how high uncertainty in sound propagation model inputs contributes to the level of uncertainty in the model outputs.

DFO IR#23: Baseline Information – Noise from Icebreaking Ships

Section: Volume 8, Appendix 8C-1 Table 4, section 5.6.1.2

Preamble: The specially-built icebreaking ore carriers, which would transport ore from Steensby Port to southern market, do not currently exist so their expected acoustic signature measures are not known. Nor is it known how the special signature and level of noise radiated by the ships will vary depending on different ice and bathymetric conditions. While “Ore carriers that will be used on the southern shipping route have a modern design that is expected to reduce noise output”, field measurements will still be critical to ascertain the sound outputs from these massively larger vessels. While their designs might be quieter than other vessels of comparable size and shape (assuming there are any), these larger ships likely put out greater magnitudes of sound energy given their significantly larger hull surface area.

Request:

a) Provide further information on the approach that will be used to acquire acoustic signature measures for these carriers in different ice and bathymetric conditions.
b) The EIS says that the icebreaking ore carriers will be designed using the best technology to be silent but there is no support provided for this. On the contrary, Table 4 in Appendix 8C-1 states the carriers will be equipped with 2 x controllable pitch nozzled propellers, 4 blades, 8.3 m diameter. It is understood that variable pitch propellers are not efficient with regard to radiated noise and should be avoided for noise-reduced ships. Provide information on the mitigation efforts to reduce the acoustic footprint of the icebreaking carriers.
c) What effect will icebreaking have on sound pressure?

DFO IR#24: Impacts of Sound – Acoustic Masking

Section: Volume 8, section 5.7.2.3

Preamble: From Clark et al. (2009) "Acoustic masking from anthropogenic noise is increasingly being considered as a threat to marine mammals, particularly low-frequency specialists such as baleen whales. Low-frequency ocean noise has increased in recent decades, often in habitats with seasonally resident populations of marine mammals, raising concerns that noise chronically influences life histories of individuals and populations. In contrast to physical harm from intense anthropogenic sources, which can have acute impacts on individuals, masking from chronic noise sources has been difficult to quantify at individual or population levels, and resulting effects have been even more difficult to assess".

Request:

a) The EIS reports that "Any masking that might occur along the shipping route, as a vessel passed by, would occur for only a short time (2-3 h)". A few hours represents a significant period of time in terms of masking of mother-calf communication especially if, say, walrus abandon a haul-out in response to ship noise. In Volume 8, section 5.7.2.3, justify how potential masking of walrus calf-juvenile calls (300-450 Hz), "which are distinct and used for mother-calf communication", by ship noise warrants a non-significant rating (in table 8-5.8).
b) While the duration of masking may be short relative to the interval between transits, it is still significant to the species in question in terms of its behavior and life history. Provide more thorough examination of the effects of shipping noise for all marine VECs along the shipping route over a period ranging from several minutes to several hours for species that depend on social communication for mating, group cohesion, etc. and acoustic sonar for feeding.
c) The EIS frequently states that call masking by shipping noise is unlikely because the sounds important to that marine mammal species are predominantly at higher frequencies than the shipping noise (e.g., Vol. 8, section 5.7.2.3, top of p. 186). The most uniformly effective mask is broadband noise such as the broadband (10-2000 Hz) sound fields used in the underwater noise modeling for the ore carriers (appendix 8C, table 16). For human speech, when a masking source with noise spanning 20 Hz to 4 kHz is present, the signal must be 12 dB louder than the broadband noise to achieve 80% word recognition. Provide better justification for rating masking effects as low magnitude, especially for low-frequency specialists like bowhead whales.

DFO IR#25: Mitigation Measure - Sound on the Marine Environment

Section: Volume 8, Section 5.6.2.2, 5.7.2.3, Tables 8-5.3 and 8-5.7

Request:

a) As described in Tables 8-5.3 and 8-5.7, what are the frequency characteristics and source level of the proposed acoustic deterrent systems? For some such systems, at close ranges some animals could be exposed to sound levels loud enough to cause TTS after even a short exposure.
b) Some mitigation measures will be based on sound modeling. Given the time to analyze acoustic data can be lengthy, when would new "safety radii" be adopted, if the results warranted this?
c) What effects would shipping noise have on key fishes? How will it be monitored and mitigated?
d) In section 5.7.2.3 it says that "The amount of masking will be a function of how close to the ship's path the walrus is". Provide quantitative analysis to indicate

how the walrus' communication space will change in response to the distance between it and the ship. [A paper by Clark et al. 2009 (Mar Ecol Prog Ser, vol. 395: 201–222) presents an analytical paradigm to quantify changes in an animal's acoustic communication space as a result of spatial, spectral, and temporal changes in background noise, providing a functional definition of communication masking for free-ranging animals and a metric to quantify the potential for communication masking. This paper may be useful.]

DFO IR#26: Airborne Noise

Section: Vol. 8, section 5.4.1.3 (p. 144) and fig. 8-5.1 (p. 145)

Preamble: Airborne noise must be considered especially near walrus haul-out sites. As noted in DFO IR#5 acute responses of walrus to disturbance have been reported including abandonment of haul-outs and other areas (see literature on Bristol Bay and western Foxe Basin). In order to assess walrus responses to noise resulting from project activities, further information is required to assess the hearing abilities of the species for all of the environments that they habitually frequent (terrestrial and underwater).

Request:

a) Provide in-air audiograms and a description of walrus hearing abilities.
b) Provide an assessment of the potential impacts to walrus due to airborne noise resulting from Project activities.

Section: Volume 8, Section 5.4.1.1, Section 5.7.2.2

Preamble: Section 5.4.1.1 states **"**The main source of noise from propeller-driven aircraft is the rotation of engines' propeller blades through the air." No characterization of the noise of jet propelled aircraft is provided. Jet-engine aircrafts will be operating at low levels Steensby Inlet and within proximity to Foxe Basin. Without an assessment of the potential noise generated by the jet airplanes in the vicinity, there is insufficient evidence to support the conclusion that a 450 m minimum altitude would be effective in mitigating noise impacts on marine mammals.

Request:

c) Provide an assessment of the noise generated by jet-engine aircrafts and potential impacts to marine mammals, or provide further justification as to why jet-engine aircraft should not be included in the assessment.

Section: Volume 8, Section 5.4.1.3 and 5.5.3.1
Preamble: In section 5.4.1.4 for the EIS it states that "In terrestrial mammals, TTS can last from minutes or hours to (in cases of strong TTS) days." while section 5.5.3.1 it says "TTS was not considered an injury".

Request:

d) Please provide justification to support the conclusion that hearing impairment that may last for minutes, hours or days would not pose a significant risk to a marine mammal in its avoidance of predators, passing ships or other potential threats.

DFO IR#27: Marine Mammal Hearing

Section: Volume 8, section 5.4.1.3 (p. 144) and fig. 8-5.1 (p. 145)

Preamble: Text in section 5.4.1.3, it states that "harbour and ringed seals are close relatives, and hearing abilities of phocinid seals as a group appear to be similar, it has

been assumed that both the underwater and in-air hearing abilities of ringed and harbour seals are similar".

Harbour and ringed seals are ecologically different enough that it is not safe to assume they have similar communication abilities. The in-air audiograms of harbour and harp seals demonstrate they are not especially similar. The underwater audiogram for the harbour seal is noticeably different than the in-air audiogram indicating that one does not provide a close indicator of what the other will be.

Request:

- Provide additional references to support the assumptions identified above.