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Kugluktuk

Phyllis Beaulieu
Manager of Licencing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B1J0

Bathurst Inlet
Kingaok

April 23rd, 2015

Bay Chimo
Umingmaktok

Re: TMAC Madrid Advanced Exploration Program Type B Water License Application

Dear Phyllis Beaulieu, KIA has completed its review of the *TMAC Madrid Advanced Exploration Program Type B Water License*.

Cambridge Bay
Ikaluktutiak

The KIA in review of TMAC's submission finds that there is a need for more information and further clarification in the design and operation of the Madrid Advanced Exploration Program's infrastructure and environmental impacts on water, fish, and wildlife.

Gjoa Haven
Okhoktok

The estimated consumption of 295 m³/day of fresh water is very close to the 300 m³/day threshold for a Type A water license and given the uncertainties in the proposed exploration program, KIA believes that the proposed program should be screened by NIRB under Article 12, Part 4 of the NLCA along with the provision of additional information on the program's design and operation.

Taloyoak

Kugaaruk

The following are KIA's consultants' comments on the submission for the Type B water license.

[The following comments were provided by the KIA's engineering consultants:](#)

Construction and Operation Phase

Issue #1: Waste rock slope design criteria.

Comment: The report notes 2H:1V waste rock side slopes for Madrid North waste rock piles but 2.5H:1V for Madrid South waste rock. No explanation or rational is provided for the different side slopes for similar waste rock materials.

Recommendation: TMAC provide rational for different slopes for the rock piles.



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Issue #2: Hydrological design criteria's selection of precipitation over watershed.

Comment: SRK has selected 25% of annual snowfall over watershed area plus 1:100 year 24 hour rainfall. No rational is provided for this selected value of 25%. Also it is not evident that this value allows for site snow fall accumulation due to drifting within the watershed basin.

Recommendation: TMAC provide rational for hydrological design criteria's selection of precipitation over watershed.

Issue#3: Hydrological design criteria for the Pollution Control Ponds.

Comment: No freeboard seems to have been allowed for in the design. Generally some freeboard amount is allowed for in the design of ponds. No rational is provided for the lack of freeboard being appropriate for the design of the pond. There may be some identifiable risks that could be mitigated through the use of freeboard.

Recommendation: TMAC provide rational for PCP hydrological design criteria.

Issue#4: Connection detail between the HDPE liner on the PCP Berm and the upstream 0.9 m deep cut-off trench.

Comment: No site specific geotechnical detail has been collected at the locations of the upstream cut-off trench where the liner is to be tied into. Any adverse ground conditions, including frost affected bedrock, immediately below liner proposed liner connection, could lead to seepage under the liner and under the Berm. In addition, no detail is provided regarding connection of the liner to the underlying subgrade.

Recommendation: TMAC provide more details on the connection of liner to underlying subgrade for PCP berm.

Issue#5: PCP Berms and associated lined pond area.

Comment: No geotechnical information has been collected under proposed berms or lined pond areas as design input. Organic materials, ground ice and highly fractured bedrock could be problematic for the performance of retention berms and liners. No engineering assessments and operational controls are identified to ensure proper performance of the containment berms and liners. No contingency measures are proposed for the event of pond seepage.



Recommendation: TMAC provide geological information for proposed PCP berms and information on operational controls to prevent seepage.

Issue#6: Pond operations – 90% empty state.

Comment: Please provide context of 90% empty state to indicate whether it pertains to volume or to time duration when pond is retained. Any remnant pond would collect at low point on upstream face, near the cut-off trench. Warm pond water would potentially melt any underlying permafrost leading to liner and berm performance issues.

Recommendation: TMAC clarifies the context of 90% state in terms of capacity or time.

Closure Phase

Issue#7: Waste rock side slopes are to be flattened during closure to 3V:1H.

Comment: Leaving the flattening operation until closure phase leaves work and potential costs that are put off till later closure phase. It is suggested that waste rock side slopes of 3H:1V be installed during operations so that this liability cost is not left until the closure phase. This minor operational change would hence reduce potential closure liabilities for the KIA.

Recommendation: TMAC install waste rock side slopes of 3H:1V during operations.

Issue#8: Waste rock cover design – HDPE liner plus 0.3 m of crushed rock.

Comment: HDPE liners are subjected to punctures and tears, depending upon the grain size and angularity of both the subgrade and the cover layers. This usually requires the use of finer grained material (nominally -15 mm) or heavy weight geotextile to protect the liner. These details are not mentioned in the current documents. Also the cover's design objectives for both the short and long term are not specified. This objective need to be specified and incorporated into the final design and closure cost estimate.

Recommendation: TMAC provide further details on rock cover design.

Issue# 9: Portals plugs – rock fill portal plugs are described.

Comment: The design objectives for the portal plugs are not specified. These objectives could be to act as a physical barrier to retain mine head water in expected parts of the Madrid South stopes and to provide crown pillar support. Also, the final portal plug designs should be stamped by a Professional Engineer in NU.



Recommendation: TMAC provide further details on portal plugs.

Issue #10: Closure Costs.

Comment: It is noted that SRK (2014a) provides a cost estimate for the conceptual closure plan. This cost estimate totals \$7.1 million (M) comprised of \$4.4M direct costs and \$2.7M indirect costs, based on the assumptions, quantities and rate provided therein. The indirect costs allowed for \$0.72M contingency, along with costs for mob/demob, G&A costs and site monitoring.

KIA's engineering consultants did not review this cost estimate in any detail but as the closure plan details and logistics evolve over time, the closure costs are expected to increase. In addition, the closure of the Madrid North and South facilities is likely dependent on the assumption that appropriate equipment and logistical supply (e.g. camp) are in the area for closure work of the other Doris North Project facilities. Should that equipment and support not be available from nearby sites, then the closure cost would be higher than stated.

Recommendation: TMAC provide further updates on closure costs.

[The following comments were provided by the KIA's wildlife consultant:](#)

Type B Water License: Appendix 5, Supporting Baseline Information

Issue #11: General Lack of Information on Baseline Results within Madrid Advanced Exploration Area.

Comments: Appendix 5, Environmental Baseline Part 6, Sections 3.2.1.1 to 3.2.3.2, p.3-7 to 3-10: The sections of Appendix 5 that summarize the wildlife baseline information collected for the Hope Bay belt project do not contextualize the findings spatially, meaning that impacts cannot be determined for the Type B Water License Application boundary. As this is baseline information is meant to support a water license application for the application zone shown in Figure 1.1-2 of Appendix 5 (part 1), critical wildlife use and habitat information should be summarized for within that boundary, particularly where critical wildlife habitat features could be destroyed through project development.

For example, sections 2.2.2.2 and 2.2.2.3 include vague information on dens, in statements such as: "Carnivore den surveys located three wolf dens in the Hope Bay Belt area", yet no information is provide as to whether these dens overlap with the application boundary for the Madrid advanced exploration project .



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Similar issues occur with regards to other wildlife VECs as well; information on the types and numbers of surveys conducted is provided, but no spatially specific information is included about use of the area within the proposed Type B Water License application boundary.

Recommendation: TMAC updates this information such that it explicitly summarizes the key habitat use and observations for each wildlife VEC within the proposed application boundary.

Type B Water Licence Application, Supplemental Information Report

Issue #12: More information on camp use and vehicular requirements.

Comments: In Section 4.1.4, Page 4-4, the proponent states that *"The Madrid Advanced Exploration Program will utilize available capacity at the existing permanent camp facilities at the Doris North Project and/or the planned camp at Windy Lake permitted under Type "B" Water License 2BE-HOP122. Combined, these camps have the capacity to house 360 workers."*

The proportion of people housed at the Doris North and/or Windy camps will affect wildlife differently. The location of workers for this project will affect the amount of traffic added to Doris North-Windy all weather road over the proposed 10-year period.

Recommendation: TMAC to provide information on the approximate numbers of people to be housed in each camp, information about when Windy camp is expected to open, and the numbers of vehicles expected to travel along the Doris North to Windy road.

Issue # 13: The type of flocculent to be used in suppression of sediment.

Comments: In Section 4.2.10.2, p. 4-11: The document states that the bulk samples will require the use of a flocculent for the suppression of sediment, which will be stored in the Madrid North Laydown Area.

Information on the flocculent to be used needs to be provided, as some flocculants and coagulants may be harmful to aquatic life and wildlife. *i.e.*, will mineral, natural, anionic, or synthetic (*i.e.* long chain polymer or sulfonated) flocculants be used?

Recommendation: TMAC provide information on the flocculent to be used in the suppression of sediment.



Issue #14: Effluent disposal on tundra and exposure of wildlife to heavy metals.

Comments: In Section 7.2, Table 7.2-1, p. 7-2, indicates that large volumes of surface contact water (40,000 and 94,000 cubic metres per year from Madrid South and North, respectively) will be partly discharged to the tundra in the area of the pollution control pond (when criteria for discharge are met). The quarry effluent discharge quality limits are presented in Table 7.2-1 and pollution control pond effluent discharge limits are presented in Table 7.4-1.

Ongoing deposition of water with these levels of arsenic, iron, nickel, zinc, copper, ammonia, TSS, etc. (Tables 7.4-1 and 7.2-1) may affect the toxic loads found in vegetation in the area. Wildlife feeding in these discharge areas could be exposed to concentrations of heavy metals that create physiological problems and the implementation of a highly effective waste and wildlife attractant management program will be required to ensure that wildlife do not access or feed in these areas.

However, the mitigation dealing with this issue, in Section 10.5.2, p. 10-2, states that: *“a waste and wildlife attractant management protocol will be implemented such that wildlife do not have access to camp wastes, contaminated areas, and attractants”*.

Recommendations: TMAC include some information about what will be, or will likely be, included in this plan, and whether the tundra discharge locations are included in this mitigation commitment.

Also include information on how the mitigation to keep wildlife out of areas will be evaluated for effectiveness, if the use of adaptive management is cited.

TMAC provide information on the numbers of samples, taken from vegetation and soil that will be available from areas that will be used for partial discharge of quarry effluents. It is important that these baseline levels be available for later comparison against metals measured in soils and vegetation after successive effluent discharges over the 10- year license period.

Issue #15: Habitat Loss and Changes in Movement and Behaviour only Part Mitigatable.

Comments: In Section 10.3, Table 10.3-1, p. 10-8, it shows that changes in movement and behaviour of wildlife due to sensory disturbance from blasting, human presence, vehicle, and aircraft traffic is rated as M, although most of these disturbances cannot be fully or even largely mitigated, particularly during construction.



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Recommendation: TMAC adds another category for negative but partly mitigable may provide a more realistic picture for information presented in this table.

Or, a more explicit discussion of the residual effects of sensory disturbances to wildlife VECs over the 10-year application period should address this issue.

Issue #16: No Information on Residual Impact to Wildlife.

Comments: In Section 10.5.2, p. 10-21, there is no statement about whether there is expected to be a residual or significant effect of this project on wildlife after mitigation. Other disciplines have included such a section. For instance, the authors of the aquatic organisms, fish, and fish habitat section (Section 10.5.3, p. 10-23) state that; "the Project is not expected to cause any significant adverse effects on Arctic Char, Lake Trout, Lake Whitefish, and Ninespine Stickleback in the Project area".

Recommendation: TMAC provide comment on the potential for a residual effect on wildlife after the application of mitigation as well as on the significance of that effect.

Issue #17: Cumulative Effects Section Lacking Information.

Comments: In Section 10.7, the cumulative effects section is very short and high level, and does not state whether the advanced exploration project is expected to contribute to cumulative effects.

Recommendation: TMAC provide more information or a comment on expected cumulative effects.

[The following comments were provided by the KIA's fish consultant:](#)

Issue #18: Possible impact of blasting activities on water bodies.

Comments: P. 6-3: Blasting activities are proposed for construction of project infrastructure and roads. Blasting is not included in the aquatic organisms, fish and fish habitat effects assessment (p. 10-21 to 10-23). Site infrastructure may be built as close as 31m to water bodies in the study area.

Recommendation: Please indicate if blasting activities may result in potential impacts to fish health, and identify any mitigation measures that will be considered for avoiding or reducing adverse effects.



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Issue #19: Update of Aquatic Effects Monitoring Program to include Madrid.

Comments: P. 9-3: The Doris North Project Aquatic Effects Monitoring Program will be revised to include the geographic scope of the Madrid area. A detailed plan will be provided 60 days prior to construction.

Recommendation: Review the updated Aquatic Effects Monitoring Program, once available.

Issue #20: Construction mitigation actions.

Comments: P. 10-17: Proposed mitigation for construction activities in or near water is very general, for example “currently accepted industry construction practices will be employed during construction and operations”, and “the release of poor quality water and/or sediment during construction and operations will be avoided through the use of erosion control measures and available spill and emergency response equipment”.

Recommendation: Please indicate more specific construction monitoring best management practices that will be adhered to such as maximum acceptable TSS levels, isolation of in-water works, or re-planting disturbed vegetation. If appropriate, a similar document from the Doris North project may be referred to.

Issue #21: Introduction of nutrients or contaminants to water bodies.

Comments: P. 10-21 – 10-22: Potential project-related effects include the introduction of nutrients or contaminants into streams and water bodies, which may produce negative effects on aquatic organisms. Discharge criteria values will be used to determine if site contact water in pollution control ponds can be safely discharged to the tundra (at minimum 31m away from local waterways), or alternatively trucked to the Doris North Project TIA (P. 6-4).

Discharge quality limits provided in Table 7.4-1 (p. 7-6 to 7-7) are based on the Doris North Water License 2AM-DOH1323. However, it is not clear how the discharge criteria were developed, or how they will adequately protect aquatic resources in the Madrid Project area.

Recommendation: It would be beneficial if the discussion of potential water quality effects was expanded on to include the following points: What are the discharge criteria values based on, and do they take into account the CCME aquatic guidelines for the protection of aquatic life? Are discharge criteria defined for the Doris North Project also applicable for the proposed Madrid Project? Please discuss.



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Issue #22: Culvert Crossings.

Comments: App. 5, Part 7, P. 4-1: Unimpeded 1m diameter closed bottom CSP culverts are proposed for Crossing #1 and Crossing #2 based on the assessment that the watercourses do not support fish that are part of a recreational, commercial, or Aboriginal fishery, or fish which support such a fishery. However, Crossing #2 is located between two fish-bearing lakes and contains forage fish species such as ninespine stickleback.

Recommendation: Please provide further evidence that this connecting watercourse does not act as an occasional corridor for migrating fish, and that the ninespine stickleback which reside in the creek are unable to support CRA fish species in adjacent water bodies. If a lack of supporting evidence exists, it is recommended that the culvert is designed to facilitate fish passage, and/or that a request for DFO review may be considered.

Issue #23: Sampling information for Crossing #1

Comments: App. 5, Part 7, P. 4-3: Crossing #1 was determined to not support fish during 2010 fisheries assessments. The detailed sampling information was not located.

Recommendation: Please indicate the details (e.g. sampling effort and timing) of the sampling surveys conducted to determine the non-fish bearing status at Crossing #1. Fish habitat information and photo documentation of the area would also be useful.

Issue #24: Location of Wolverine Lake Outflows.

Comments: App. 5, Part 7, P 4-2: It is noted that Wolverine Lake has two outflows that connect this lake to Patch Lake; one flows to the north (Crossing #2) and one to the east. The eastern outflow was not located on the map (Figure 3.3-1, P. 3-14), and it appears that it may be in or near the proposed south portal footprint.

Recommendation: Please indicate the location of the eastern outflow on a figure, and assess if and how it will be impacted by the project.

The following comments were provided by the KIA's aquatic consultant:

Issue #25: Freshwater requirements.

Comments: TMAC has estimated 295 m³/day of freshwater will be required throughout the life of the project. This estimate relies on estimated inflows from groundwater and other sources. Predictions and models are inherently subject to some degree of uncertainty. TMAC has not provided any site specific



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data on groundwater quality and quantity and the implications of this uncertainty have not been addressed by TMAC in their supporting documentation.

Given the uncertainty of water inputs and the resulting water balance, the predicted freshwater requirement may also be subject to some uncertainty. We are therefore concerned TMACs predicted freshwater requirements are ~98% of the Nunavut Water Board threshold of 300 m³/day for a Type A license.

TMAC may be required to alter their application from a Type B to Type A water license should the actual required freshwater volume exceed 300 m³/day and the existing uncertainty in their estimates, and absence of an estimate of variance in water requirements means that there is some potential that their water needs will exceed the Type A threshold.

Recommendation: That TMAC provide further information as per enclosed Information Request.

Issue #26: Insufficient data.

Comments: TMAC has not provided sufficient data to adequately assess several key project areas. Examples include:

- No site specific data or analyses of groundwater flow, groundwater chemistry or permafrost. Instead, TMAC assumes that conditions are similar to those at the Doris site.
- Water chemistry has not been modelled in the pollution control ponds (PCPs) and so one cannot determine how much effluent may be discharged to the tundra or how much may have to be placed in the Tailings Area.
- Details of management plans pertaining to the Madrid project have not been completed at this time,
- The method and exact locations at which PCP effluent will be applied to the tundra have not been provided and so one cannot assess the risk to surface water,
- A detailed water balance is not included. TMAC has only provided a “summary” in their supporting documentation.

Recommendation: That TMAC provide further information as per enclosed Information Request.



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Issue #27: The pollution control ponds (PCPs) and application of effluent to the tundra.

Comments: TMAC has not provided an estimate of water quality within the separate PCPs. This makes it impossible to determine if held water will be compliant with effluent discharge criteria for tundra application or require transport to the Doris North TIA. Further to this, no effluent quality discharge criteria has been provided for salinity in the form of TDS or chloride.

Groundwater inflows, particularly at Madrid South, will be a significant contribution to the water balance and salinity is assumed to be similar to that of seawater. Application of saline water to the tundra may degrade the permafrost and subsequent flow to surface water may impair aquatic life in the near shore.

TMAC has not provided a monitoring plan to track water quality down gradient from where PCP effluent will be applied to the tundra to confirm no impact to aquatic life.

Finally, there is no explanation of how the effluent will be applied to the tundra. Description of the application method is important to ensure that preferential flow paths or scouring of the tundra will not occur.

Recommendation: That TMAC provide further information as per enclosed Information Request.

Issue #28: Nunavut Impact Review Board Screening Exemption.

Comments: TMAC has undertaken an internal environmental impact screening assessment but has asked the NIRB for exemption from a formal screening assessment. Our review has identified substantial uncertainty with the project and the potential to elevate the application to a Type A license.

Recommendation: We advise the Kitikmeot Inuit Association to withhold approval of the water license until the NIRB provides a decision regarding the need for formal screening.

In addition to these recommendations, the KIA's aquatic consultant's Information Requests are also enclosed and needs to be addressed by TMAC Resources Inc. in feedback to the NWB and KIA.



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If the NWB Board or you have any questions concerning the comments submitted for the review of TMAC Madrid Advanced Exploration Program Type B Water License Application please contact me at your convenience.

Yours truly

A handwritten signature in dark ink, reading "John Roesch". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

John Roesch, P.Eng.

Senior Hope Bay Project Officer
Kitikmeot Inuit Association
Department of Lands and Environment

Cc Geoff Clark,
Director of Kitikmeot Inuit Association Department of Lands and Environment