



Fisheries and Oceans Canada Pêches et Océans Canada

Arctic Region | Région de l'Arctique
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September 1, 2022

Your file *Votre référence*

11MN034

Our file *Notre référence*

22-HCAA-01443

Karen Costello
Executive Director
Nunavut Impact Review Board

Subject: Meliadine Gold Mine Expansion, Meliadine Lake, Rankin Inlet – Information Requests

Dear Karen Costello,

Please find Fisheries and Oceans Canada's Information Request for the Final Environmental Impact Statement Addendum (FEIS Addendum) submission for the "Meliadine Extension" Project Proposal (NIRB File No. 11MN034).

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Senior Biologist
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Fisheries and Oceans Canada (DFO)

Fisheries and Oceans Canada (DFO) is a federal department responsible for protecting Canada’s three oceans and waterways ensuring they remain healthy for future generations and providing economic opportunities to Canadians and coastal communities. DFO’s Fish and Fish Habitat Protection Program (FFHPP) administers and ensures compliance for development projects taking place in and around fish habitat under the fish and fish habitat protection provisions of the *Fisheries Act* and relevant provisions of the *Species at Risk Act* (SARA).

The *Fisheries Act* and SARA provide a legal basis for conserving and protecting fish and fish habitat. The fish and fish habitat protection provisions of the *Fisheries Act* include: a prohibition against causing the death of fish, by means other than fishing (section 34.4); a prohibition against causing the harmful alteration, disruption or destruction of fish habitat (section 35); a framework of considerations to guide the Minister’s decision-making functions (section 34.1); and ministerial powers to ensure the free passage of fish or the protection of fish or fish habitat with respect to existing obstructions (section 34.3).

The fish and fish habitat protection provisions provide an approach to conserving and protecting fish and fish habitat, supported by policies and programs that provide for the long-term sustainability of freshwater and marine resources. The fish and fish habitat protection provisions apply to all fish and fish habitat throughout Canada and are applied in conjunction with other applicable federal laws and regulations related to aquatic ecosystems, including the *SARA*, the *Oceans Act*, regulations respecting aquaculture, and the *Aquatic Invasive Species Regulations*.

| Information Request No. | Subject | References | Issue/Concern | Information Request |
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| DFO-IR-01 | Scope of the reconsideration | <ul style="list-style-type: none"> NIRB Process; FEIS Addendum, Executive summary | In order to assess the potential impacts on fish and fish habitat under the <i>Fisheries Act</i> 2019, DFO will need to reconsider the components necessary to allow work to be conducted on the Meliadine site and not only the proposed new components as suggested by AEM. | With respect to the disposition of this issue, DFO would like the NIRB to provide clarity on the scope of the Reconsideration. |



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| | | | <p>The Proponent will ultimately require a Fisheries Act Authorization for all work, undertaking and activities that will impact fish and fish habitat whether it was covered under the 2014 Board process or not. This will trigger the duty to consult provision of the <i>Fisheries Act</i>.</p> <p>The Government of Canada relies on the Board's process to discharge its duty to consult under section 35 of the Constitution Act, 1982. As such, the Government of Canada supports a reconsideration process that enables Indigenous peoples to meaningfully participate and ensures adequate consultation on all components that might affect fish and fish habitat.</p> <p>If the current Reconsideration process does not include elements upon which DFO need to consult, DFO's ability to undertake its regulatory responsibilities and issue a Fisheries Act Authorization in a timely manner will be impacted.</p> | |
| DFO-IR-02 | Scope / Completed vs proposed works | <ul style="list-style-type: none"> • FEIS Addendum, Section 2 | <p>DFO would like clarity on what was proposed in the 2014 FEIS, what was completed for construction during Phase 1, what is proposed under the existing Project Certificate, and what will be modified in the Extension.</p> <p>In addition, on page 42, AEM states: "ongoing exploration activities and potential mine life extension are part of the scope of the Meliadine Mine."</p> <p>In the final Meliadine FEIS Recommendation Responses (August 05, 2014), AEM identified many details of which waterbodies would be affected</p> | <p>Please prepare and categorize a table into works that have already been constructed, works that were proposed in the 2014 FEIS but have not been constructed, and proposed works that are changes to what was approved in the 2014 FEIS.</p> |



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| | | | would come during the “Regulatory Phase” (For example in the response to IR DFO-33: “ <i>Specific details as to which ponds would have to be drained will be determined during further engineering design during the Regulatory Phase of the Project.</i> ”). DFO would like clarity on the works proposed and what has occurred. | |
| DFO-IR-03 | Existing work and permits affecting Fish and Fish Habitat | <ul style="list-style-type: none"> • FEIS Addendum, Section 2.3.6 | DFO would like clarification added to the statement in Section 2.3.6 regarding DFO's Letter of Advice, dated 27 November 2015, for a portion of Phase 1 of the Meliadine project (Tiriganiaq Pit 1 and Tiriganiaq Pit 2) as identified in the Request for Review and Fisheries Screening Assessment & Offsetting Plan received by DFO on 11 June 2015. DFO would like to note that Letters of Advice do not give authority under the <i>Fisheries Act</i> to cause Serious Harm, nor to cause the Death of Fish or a Harmful Alteration, Disruption, or Destruction (HADD) of Fish Habitat (<i>Fisheries Act</i> 2019). | Please provide a table that lists all of the work that was completed during Phase 1 on Meliadine Mine site that had the potential to impact waters frequented by fish. |
| DFO-IR-04 | Existing work | <ul style="list-style-type: none"> • FEIS Addendum, Table 2.3-1 | Table 2.3-1 only includes lakes and ponds physically impacted, but not all waterbodies, including streams and connecting channels that may have impacts from mine activities. | Please amend the table (Table 2.3-1) to include waterbodies downstream of works that will be subject to changes in flow from proposed mine activities. |
| DFO-IR-05 | Borrow pits | <ul style="list-style-type: none"> • FEIS Addendum, Section 2.3.11 Pits and Quarry Sites | Many potential borrow pits appear to be close to waterbodies and may impact fish bearing waters. | Please provide detailed maps of each borrow pit location as well as distance to waterbody (including seasonally inundated channels) and whether the waterbody is fish bearing or flows to a fish-bearing waterbody. |



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| DFO-IR-06 | Flow changes | <ul style="list-style-type: none">• FEIS Addendum, Section 2.3.4 Water Management | <p>The operations at the mine to date and proposed works change the direction and volume of flows on the site, including snowmelt. Although many of these changes may appear small, cumulatively they can have an impact on Fish and Fish Habitat, especially when changes to seasonally used habitat result in fish stranding or temporal changes to the use of that habitat. Section 2.3.4, Section 7. And Addendums D26 and D35.</p> | <ol style="list-style-type: none">1. Please provide a table of all the existing diversions and resultant changes to downstream flow and water level.<ol style="list-style-type: none">a. Include average flows (monthly and daily mean (m³/s)), how much flow is diverted/expected to be diverted, and where the flows are/will be diverted to.2. Please identify how the future operations of Meliadine will affect connectivity between all of the lakes and ponds.3. Please provide a table with changes of flow inputs and to and between waterbodies during and after mine operations, changes in water levels of ponds and lakes, as well as potential changes to flooded areas around the waterbodies.4. Provide changes in flow expected during pit flooding, and how those changes will impact downstream waterbodies, including seasonal channels. |
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| DFO-IR-07 | Road crossings | <ul style="list-style-type: none"> • FEIS Addendum, Section 2.3.9 Site Access, Access Roads, and Associated Water Crossings • Appendix D30 – Road Management Plan | <p>Without information on road locations, watercourse crossings, and construction details, DFO can not assess whether road infrastructure will affect the seasonal migration and movement of fish to necessary habitats, including shallow seasonal habitats that are important for fish rearing and feeding. The seasonal channels between fish bearing ponds are considered fish habitat.</p> | <p>Please provide an updated table of all the potential watercourse crossings (bridges and culverts) associated with the project as well as whether there are fish bearing waterbodies downstream and/or upstream of the crossing. The seasonal channels between fish bearing waterbodies are considered fish habitat. Include roads to Discovery, proposed windfarms, and the proposed airfield.</p> |
| DFO-IR-08 | Baseline Assessments | <ul style="list-style-type: none"> • FEIS Addendum, Section 4.3.2, Assessment Endpoints and Measurement Indicators; Section 7.5 Fish and Fish Habitat; and Appendix G7 Section 6 | <p>The assessment of potential effect does not include lower trophic level fish, its importance to other fish population nor update with new data collected on other fish population.</p> <p>Fish and Fish Habitat is identified as a VEC, carried over from the 2014 FEIS. Abundance and distribution of fish is identified as an Assessment Endpoint.</p> <p>It was identified in DFO’s final comments in the 2014 FEIS process that AEM did not include fish in lower trophic levels (i.e. Ninespine Stickleback) in the assessment of the VECs, despite the importance of those fish in supporting the aquatic ecosystem, including as a food base for aquatic and terrestrial/avian predators. In addition, new data was collected on expanded range of Arctic Char within the LSA (Lake A6), the importance of the A chain and B chain drainages for Arctic Grayling spawning, as well as the increased range identified as Ninespine Stickleback habitat.</p> | <p>Please provide a revised assessment on potential impacts to Fish and Fish Habitat including lower trophic level fish and new data collected on other fish population.</p> |



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| DFO-IR-09 | Duration of Residual Effects | <ul style="list-style-type: none"> FEIS Addendum, Section 4.5, Impact Assessment Approach and Impact Prediction - Table 4.5-1; Section 7; and Table 10.2-13 | <p>AEM identifies the duration of effect as the reversibility of the impact caused by the work not the time that the works causes an effect on the environment. AEM proposed Temporal definitions to be:</p> <p><i>Short-term: impact is reversible at end of construction</i> <i>Medium-term: impact is reversible at end of closure</i> <i>Long-term: impact is reversible within a defined length of time beyond closure</i> <i>Unknown: Impact may be reversible; however, the length of time cannot be defined</i> <i>Permanent: impact will last into perpetuity</i></p> <p>Section 7.3.1 states “<i>While, IQ suggests that there have been recent changes to water characteristics in the region, including lower water levels, thin ice conditions, later freeze-up, and earlier and more rapid melt of lakes, the cumulative effects from climate change and the Meliadine Extension on surface water quantity over the short duration of the Meliadine Extension (approximately 20 years of construction, operations and closure activities) are not expected to result in significant deviations from natural variability</i>”.</p> <p>In Table 7.4-10 AEM suggests that the changes to water quality from the effluent discharge will only be medium term, despite potentially occurring for more than a decade. Section 7.5 suggests the same to regarding changes to fish abundance and distribution.</p> | <ol style="list-style-type: none"> 1. Provide a rational and explanation for the definitions of Duration and revise the assessment to be based on the “duration” of the effect from the initiation of the work rather than the ability to be reversed at the end of construction and/or closure of the mine. 2. Revise the definitions of criteria in Table 4.5-1 and the assessment of the duration of Residual Effects in the FEIS Addendum based on environmental considerations rather than mine life. 3. Revise the FEIS Addendum to provide detailed statements of the duration of effects (in months/years from start of construction) to be included to support the determination of duration of the effects and significance. |
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| | | | <p>DFO's definition of duration as defined in the Fisheries and Oceans Risk Management Framework: <i>Short term (days), Medium term (weeks-months), Long term (multiple years – permanent); and, definition of Permanent Alteration: (to fish habitat) is of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes.</i></p> | |
| DFO-IR-10 | Fish and Fish Habitat | <ul style="list-style-type: none"> • FEIS Addendum, Section 7 | <p>DFO requires fish and fish habitat data to be up-to-date and compiled so DFO can assess potential effects.</p> <p>Fish and Fish Habitat data is spread through the FEIS Addendum Section 7, Appendix D26, Appendix G7, and the FEIS documents from 2014. The tables across the documents have inconsistent data or gaps, or only provide data from sometimes more than 10 years ago and a single sampling event.</p> | <ol style="list-style-type: none"> 1. Please provide a completed table of every waterbody in the LSA, locations, years that the waterbody was sampled, sample method, and fish species captured or observed. 2. In the Addendum, Please provide an overall summary of Fish and Fish habitat, and potential for each watershed and each waterbody per watershed. |
| DFO-IR-11 | Fish and Fish Habitat | <ul style="list-style-type: none"> • Appendix D26, Section 7, Table 7.1-1 | <p>Table 7.1-1 identifies residual effects per watershed based on the area of lakes affected by mine operations. Table 7.2-1 identifies a set of lakes and ponds that are affected. Neither include all</p> | <ol style="list-style-type: none"> 1. DFO requests clarity in the table - the table should identify the waterbody, the area (m²) of the natural |



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| | | | watercourses and waterbodies that are affected by the works. | <p>waterbody, the work occurring that affects the waterbody, the size of physical impact (water level/flow change, size of infill, etc), and the fish observed in the waterbody.</p> <p>2. DFO further requires lengths and descriptions (braided, diffuse, dimensions, seasonal, perennial, etc) of channels between all of the waterbodies and the change in flow/physical impact to those watercourses, including road crossings.</p> |
| DFO-IR-12 | Fish and Fish Habitat | <ul style="list-style-type: none"> FEIS Addendum, Section 7, Appendix D26, Appendix G7 | <p>The information across the documents have inconsistencies and gaps in data collection, including missing data on lakes such as updated info on lakes in the A-chain, Lake J1, and waterbodies in the Discovery area. In addition, waterbodies that are downstream in watersheds that will have flow diverted to contact water ponds or other treatment ponds, or where the watershed area will be affected and need to be identified.</p> <p>DFO requires adequate Fish and Fish Habitat information to assess potential effects from mining activities (e.g. Lakes such as J1 that may only be assessed for one season and have had habitat and flow changes due to works in the watershed. Arctic Char in Lake A6 indicate their presence in all the downstream</p> | <p>1. Please provide updates on fish and fish habitat assessments for all the lakes and channels that will be potentially impacted by the project. This should include multi-year data, data from spring and fall sampling events, and data based on sampling efforts that are suitable for potential and target species.</p> <p>2. In addition, include a revised assessment of Section 7.5.3 with new fish distribution and</p> |



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| | | | lakes), as well as a revision of where Ninespine Stickleback occur (if an upstream lake has Ninespine Stickleback and no overwintering potential, all downstream waterbodies, including channels provide fish habitat for the species). | <p>habitat use by lifestage information.</p> <p>3. In Section 7, please include a revised assessment of:</p> <ol style="list-style-type: none"> the potential for fish migrations into waterbodies in the LSA from Meliadine Lake, an assessment of the value of small-bodied fish to the larger ecosystem, including as a food source. <p>4. Update Appendix D26, Table 2.2-1 to include all the potentially affected waterbodies.</p> |
| DFO-IR-13 | Fish and Fish Habitat, Assessment of Effects | <ul style="list-style-type: none"> FEIS Addendum, Section 7.5, Table 7.5-1 | The table identifies that effects were assessed in the 2014 FEIS and there is “no change” in the assessed significance since the 2014 FEIS and from the proposed Extension. There has been years of work conducted that should inform a more detailed review of not just potential effects, but observed impacts and difference between predicted and observed outcomes. The “Assessed Significance – Meliadine Extension” in the 2022 FEIS Addendum should clearly include the new data and monitoring results to revise the 2014 FEIS rather than build on predictions and assumptions that may have been made in 2014. | Please provide an updated Table 7.5-1 that includes a revised assessment based on the results of the AEMP, findings of additional fish and fish habitat assessments, and information collected through past works such as dewatering the ponds around Tiriganiaq pits 1&2 in 2022. |



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| DFO-IR-14 | Fish and Fish Habitat, Assessment of Effects | <ul style="list-style-type: none"> FEIS Addendum, Section 7.5, Table 7.5-1 | The table states: <i>"Potential overexploitation of fish stocks due to improved road access can lead to changes in the abundance and distribution of fish"</i> , with an identified mitigation of: <i>"Mining staff will not be allowed to hunt or fish while on their work rotation. Agnico Eagle enforces no hunting, trapping, harvesting or fishing."</i> | Please identify how the increase in access from the AWAR as well as the proposed construction of boat launch facilities on Meliadine Lake may change the conclusion of the FEIS 2014 assessment. |
| DFO-IR-15 | Fish and Fish Habitat | <ul style="list-style-type: none"> FEIS Addendum, Section 7.5.3 and Section 7.5.4 | New data on fish and fish habitat has been collected since 2014 and should be assessed and reviewed. On page 298, the FEIS Addendum states that: <i>"As referenced in the 2014 FEIS, the potential for loss of fish and fish habitat will remain within the same 2014 footprint for the Meliadine Extension."</i> and <i>"The Meliadine Extension will result in effects to fish and fish habitat in the LSA which will vary over time. These results were described in Volume 7, Sections 7.5.5, 7.5.6 and 7.5.7 of the 2014 FEIS."</i> | Please provide a summary of the potential for loss and what the results are with new knowledge incorporated, and how changes to known distribution of Arctic Char, Arctic Grayling spawning, Ninespine Stickleback, and other fish species presence has been accounted for. |
| DFO-IR-16 | Marine Environment | <ul style="list-style-type: none"> FEIS Addendum, Section 8.2, page 306 | The FEIS Addendum states: <i>"There is a physical barrier between the location of the diffuser, the area of predicted change in water quality, and the areas where people may harvest shellfish."</i> | Please clarify what is meant by "physical barrier" |
| DFO-IR-17 | Fish and Fish Habitat | <ul style="list-style-type: none"> Appendix D26, Figure 2.2-1 and Section 4 and 5. | Figure 2.2-1 shows the increase in area from the Extension affects the C, D, J, CH, W, and X drainages in addition to the A and B. The discussion in Section 4 focuses on the A and B watersheds with little to no discussion on the others and incomplete identification of waterbodies in Table 4.4-1. A comment in Section 5.1 on page 31 states: <i>"There are a total of 38 waterbodies, 4 of which are categorized as lakes and the remaining are pond habitat. It is worth mentioning that the watercourses haven't been included in this section as they are</i> | Please provide a complete table of affected waterbodies and update the discussion in Section 4 to include impacts to all fish and fish habitat. |



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| | | | <p><i>primarily ephemeral streams with overland flow. They also only account for approximately 2 ha of the 431.73 Ha which will be impacted.</i>" This information is required for DFO to review potential effects. Watercourses that are "<i>primarily ephemeral streams</i>" are still considered fish habitat and are critical for the migration of fish species to semi-isolated waterbodies and seasonal habitat use.</p> | |
| DFO-IR-18 | Habitat Assessment and Offsetting | <ul style="list-style-type: none"> • Appendix D26, Section 7.1. | <p>Delineation of water bodies (including ephemeral streams, and how they change over seasons have been conducted largely based on GIS imagery without on site measurements. The Habitat Evaluation Model (HEP) is largely based on depths and substrates, which may under-value the importance of seasonal habitats and specifically rearing, feeding, and cover habitats for young of year and small bodied fish. Some of the lakes habitat types were assessed in the 2020/21 field season, but not all the lakes or streams/seasonal channels. The delineation of waterbodies and seasonally flooded channels appears to largely be based on satellite imagery and GIS. With potential errors in GIS based waterbody delineation, annual changes in the amount and depth of seasonally inundated habitats, and importance of seasonal shallow water habitat, it is difficult to understand the actual impact of works and potential habitat losses that would be offset.</p> | Please provide ground-truthing to the measurements of waterbody boundaries and stream and channel habitats |
| DFO-IR-19 | Harmful Alteration, Disruption, or Destruction of | <ul style="list-style-type: none"> • Appendix D26, Section 7.2 and Section 7.3 | <p>Appendix D26 Sections 7.2 and 7.3 state respectively: "<i>A loss of 431.73 Ha is predicted due to dewatering, loss of downstream connectivity, mining infrastructure, and overprinting from pits</i>" and "<i>All</i></p> | Provide an account of the complete change in area of habitat due to the mine activities and include the |



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| | Fish Habitat determination | | <p><i>Section 36 losses that are incurred from the Meliadine Extension are anticipated to be permanent. A loss of 165.69 Ha is predicted due to dewatering, loss of downstream connectivity, mining infrastructure, and overprinting from pits.</i></p> <p>Tables 7.2-1 and 7.3-1 list the waterbodies included in those losses, but there is no accounting for losses of channels to and from those waterbodies, the discontinuation of fish habitat upstream of those waterbodies, nor loss of habitat due to changes in flow (ephemeral and perennial habitats) in downstream waterbodies, including streams/ephemeral channels and lakes and ponds.</p> | change in area due to loss of seasonal flows with reduction in runoff (changed watershed capture). This is important in DFO's assessment of impacts to fish and fish habitat and in determining the potential Harmful Alteration, Disruption, and Destruction of fish habitat that may need to be offset. |
| DFO-IR-20 | Harmful Alteration, Disruption, or Destruction of Fish Habitat | <ul style="list-style-type: none"> Appendix D26, Section 9 | The summary indicates that the potential Harmful Alteration, Disruption, and Destruction of fish habitat for the project may be up to 431.73 Ha. | This statement should be revised to include the areas of permanent and temporary waterbodies as listed in DFO-IR-02 to DFO-IR-20 as potential Harmful Alteration, Disruption, and Destruction of fish habitat, and the statement should be clarified to indicate upon review by DFO. |
| DFO-IR-21 | Fish and Fish Habitat | <ul style="list-style-type: none"> Appendix D26, Figures D-1 to D-18 | AEM has not identified waterbodies that are adjacent to the "Meliadine Footprint Extension" as well as the "NIRB Approved Footprint" in figures D-1 to D-18. These waterbodies appear to be potentially affected by the mine. | Please revise these diagrams to include identification of all the potentially affected waterbodies in or near the boundaries identified in the figures. This includes channels that flow downstream from the "Meliadine Footprint Extension" |



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| | | | | and the “NIRB Approved Footprint”. |
| DFO-IR-22 | Fish and Fish Habitat | <ul style="list-style-type: none">• Appendix G7 | Electrofishing site location selection and timing of the surveys is not provided in the appendix. Based on Appendix A of Appendix G7 the electrofishing effort wasn't near inlets, outlets, or habitat features that might have more fish use. Knowing where and why a waterbody was electrofished is important in evaluating the data of a single seasons sampling as is the site conditions. This is important when determining presence/absence rather than sampling for population. | <ol style="list-style-type: none">1. Please provide an explanation as to why areas of waterbodies were sampled and why some lakes with insufficient data were not sampled (i.e. the area around the Discovery Mine and Lake J1).2. Please provide a description of site conditions and water conditions during the surveys - i.e. low water period, unseasonably low water, wind conditions etc. |

Environmental Health Program (EHP)
Regulatory Operations and Regions Branch (ROEB)
Health Canada
391 York Avenue
Winnipeg, Manitoba R3C 0P4

September 6, 2022

Karen D. Costello
Executive Director
Nunavut Impact Review Board
P.O. Box 1360
Cambridge Bay, Nunavut X0B 0C0

Sent by email to: info@nirb.ca

Subject: Health Canada's conformity review of Agnico Eagle Mines Limited's Final Environmental Impact Statement Addendum for the "Meliadine Extension" Project Proposal

Dear Karen D. Costello:

Thank you for your email dated August 5, 2022, requesting Health Canada's review of Agnico Eagle Mines Limited's Final Environmental Impact Statement (FEIS) Addendum for the "Meliadine Extension" Project Proposal for the Meliadine Gold Project.

Health Canada participates in environmental assessments as a Federal Authority under the *Nunavut Planning and Project Assessment Act, 2013*. Health Canada makes available specialist or expert information or knowledge in its possession to review panels and responsible authorities, among others.

The objective of this review was to identify information gaps within the FEIS Addendum that would need to be addressed in order for a technical review to be completed. Health Canada's comments are included herein for your consideration. These comments pertain to information necessary to evaluate project-related impacts to human health in the area of air quality, as well as clarification of the project description and scope. This information and context is necessary to support a technical review of the potential project-related impacts on human health.

Should you have any questions regarding Health Canada's comments, please feel free to contact Julie Anderson at julie.c.anderson@hc-sc.gc.ca.

Sincerely,



David Kitchen
Regional Manager,
Environmental Health Program, Manitoba/Saskatchewan Region
Regulatory Operations and Enforcement Branch
Health Canada



cc: Heather Jones-Otazo, A/Manager, Healthy Environments and Consumer Safety Branch (HECSB), Health Canada
Allison Denning, A/Senior Environmental Health Specialist, HECSB, Health Canada
Ninon Lyrette, Senior Environmental Health Specialist, HECSB, Health Canada
Wendy Wilson, Environmental Assessment Coordinator, HECSB, Health Canada
Julie Anderson, Regional Impact Assessment Specialist, EHP, ROEB, Health Canada

Attached: Attachment 1 – Conformity Information Requests – Meliadine Extension Project Proposal – Health Canada

Health Canada

Health Canada (HC) is a federal department responsible for helping Canadians maintain and improve their health. One of the ways this is accomplished is through participation in the environmental impact assessment of major resource and infrastructure projects. Specifically, HC provides expertise, information, and knowledge in its possession on proposed projects’ impacts to human health and makes recommendations to help reduce risks of the project on humans. Note that HC only provides recommendations; the Department does not approve or issue licenses or permits to enforce its recommendations.

| Information Request No. | Subject | References | Issue/Concern | Information Request |
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| HC-IR-01 | <p><u>Project description and scope</u> Scope of the Project components is unclear</p> | <p><u>FEIS REFERENCE</u> Meliadine Extension FEIS Addendum Section 1.1 Introduction PDF pg. 36 - 57</p> <p>Section 2.1 Meliadine Extension Design PDF pg. 58 - 59</p> <p>Appendix H2: Meliadine Extension Noise Modelling Section 2.0, PDF pg. 6</p> <p><u>NIRB GUIDANCE REFERENCE</u> “Project Description (EIS Guidelines, section 6.1, 6.2, 6.3, and 6.6)”</p> | <p>Based on the information provided in the <i>Meliadine Extension FEIS Addendum</i>, the scope and details of some of the proposed Project components are unclear.</p> <p>a) Detailed information on what will be involved with the new portal and infrastructure for Tiriganiaq-Wolf deposit could not be located by Health Canada (HC). It was also unclear whether the currently approved Tiriganiaq deposit and mining activities are within the Tiriganiaq-Wolf mining area described in the Meliadine Extension Design or whether these are two independent areas/activities.</p> <p>b) Open pit mining of the Wesmeg deposit was listed in the currently approved activities (<i>FEIS Addendum</i>, PDF pg. 36), but was not listed as part of the extension. However, in Appendix H2 (PDF pg. 6), underground mining at Wesmeg mining area was listed among the proposed Extension features. This Project description discrepancy should be clarified.</p> <p>c) Logistical and operational implications (e.g., anticipated changes to noise, dust, and air emissions) of shifting from open pit mining to underground mining were not discussed. This information and context is necessary to support a technical review of the potential project-related impacts on human health.</p> | <p>With respect to the disposition of this issue, HC recommends the following information be provided:</p> <ol style="list-style-type: none"> 1. Provide an updated map with each of the deposits labelled, clearly indicating the location(s) of Tiriganiaq and Tiriganiaq-Wolf mining areas, as well as the other relevant approved and proposed deposits associated with the Meliadine Mine. Provide a description of what will be involved with the new portal and infrastructure at Tiriganiaq-Wolf. Identify all relevant human receptor locations (recreational areas, seasonal cabins, permanent residences, other sensitive receptors such as schools, hospitals etc.) on these maps, as applicable. 2. Confirm whether underground mining is proposed for the Wesmeg deposit, and if so, |

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| | | | | <p>whether blasting noise or other potential impacts to human receptors were included in the assessment.</p> <p>3. Provide a detailed description of the logistical and operational implications for all proposed mining methods (which appear to include both an open pit and an underground mine) including, but not limited to, changes in:</p> <ul style="list-style-type: none"> • Noise impacts at the Project site; • Traffic and associated vehicle noise and air emissions along haul roads; • Dust and other air emissions from all on-site Project activities; • Possible contamination of country foods; and, • Possible contamination of local drinking water supplies. |
| <p>HC-IR-02</p> | <p>Project description and scope Scope of the Project Certificate reconsideration is unclear</p> | <p>FEIS REFERENCE Meliadine Extension FEIS Addendum Section 1.1.5.1 PDF pg. 55</p> <p>NIRB GUIDANCE REFERENCE "Description of the baseline (EIS Guidelines, section 7.3, 7.4., 8.1, and 8.2)"</p> | <p>The scope of the Project Certificate reconsideration review is currently unclear.</p> <p>In Section 1.1.5.1 of the <i>Meliadine Extension FEIS Addendum</i> (PDF pg. 55), the Proponent "requests the NIRB scope the reconsideration in consideration of the fact that many key components of the Meliadine Extension have already completed a NIRB assessment in 2014". As presented by the Proponent, the incremental changes in mine infrastructure and activities would form the basis of the review, in which case, the existing environmental conditions would serve as a new baseline.</p> | <p>With respect to the disposition of this issue, HC recommends the following information be provided:</p> <p>1. Clarify whether the scope of the technical assessment is limited to the new mine components and activities or includes existing activities subsequent to the 2014 assessment. All changes to the environment that have occurred as a result of</p> |

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| | | | <p>However, given that the Addendum uses the 2014 assessment and pre-mine conditions as a baseline for comparison for most of the VCs, the assessment would more appropriately include all present and future mining activities cumulatively assessed against the pre-2014 baseline conditions.</p> | <p>the existing mine and future activities should be considered.</p> |
| HC-IR-03 | <p>Air Quality Information deficiency related to the air quality impacts from the airstrip</p> | <p>FEIS REFERENCE Meliadine Extension FEIS Addendum Sec 5.1.2.1 Air Quality PDF pg. 119-122</p> <p>Appendix H1: Meliadine Extension Air Quality Modelling Study PDF pg. 1-75</p> <p>NIRB GUIDANCE REFERENCE “Impacts to air quality from airstrip (8.1.1)”</p> | <p>Evidence demonstrating consideration of potential impacts to air quality resulting from the airstrip should be provided.</p> <p>Section 5.2 of the <i>Meliadine Extension FEIS Addendum</i> does not include sufficient content describing the potential impacts to air quality from the airstrip, including construction, operation, and decommissioning.</p> <p>The information provided on the airstrip is that “[t]he airstrip will likely increase fugitive dust emissions but the TSF [tailings storage facility] and WRSFs [waste rock storage facilities] will be smaller than originally anticipated balancing increased emissions from the newly added airstrip”. Consequently, the document states “...no particulate matter modelling was needed for the Mine Site as the 2014 FEIS modelling is considered to be a conservative assessment of effect”.</p> <p>Mining emissions differ from airplane emissions, and should not be considered to be ‘balanced-out’ based on the decrease in air emissions from a smaller TSF and WRSF. Evidence validating this conclusion was not referenced within <i>Appendix H1: Meliadine Extension Air Quality Modelling Study</i> or other documents.</p> | <p>With respect to the disposition of this issue, HC recommends the following information be provided:</p> <ol style="list-style-type: none"> 1. Provide a robust description and analysis assessing the potential impacts to air quality from all Project-related activities (including any existing mining activities) during the construction, operation, and decommissioning phases of the airstrip. 2. Provide additional justification to validate the approach used to assess air quality impacts from airstrip activities. |
| HC-IR-04 | <p>Air Quality Information deficiency related to the air quality cumulative effects of the Project</p> | <p>FEIS REFERENCE Meliadine Extension FEIS Addendum Section 5.2.6 Cumulative Effects Assessment PDF pg. 129</p> <p>NIRB GUIDANCE REFERENCE “Cumulative Effects Assessment for each VC (EIS Guidelines, section 7.11)”</p> | <p>Data related to the air quality cumulative effects of the Project are lacking.</p> <p>According to Section 5.2.6 of the <i>Meliadine Extension FEIS Addendum</i>, since there are no other projects in the vicinity of the proposed Project, there are “...no cumulative effects foreseeable for regional air quality”. However, the predictions associated with the cumulative air quality emissions have not been updated to include</p> | <p>With respect to the disposition of this issue, HC recommends the following information be provided:</p> <ol style="list-style-type: none"> 1. Include all Project-related emissions, including existing operations, and construction and operation of future Project-related components in the air |

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| | | | <p>construction and operations of all proposed Project-related components in addition to emissions from the current operations of the existing mine.</p> | <p>quality assessment, notably activities at the Project site in addition to haul road and airport activities. This could be considered in the context of a 'cumulative effects assessment'.</p> <p>2. Provide a comparison of the new cumulative air emissions of the Project, for each air contaminant (refer to HC-IR-05), to appropriate territorial and federal guideline levels.</p> |
| <p>HC-IR-05</p> | <p>Air Quality Information deficiency related to the overall air quality impacts of the Project</p> | <p>FEIS REFERENCE Meliadine Extension FEIS Addendum Section 10.3.7.4 Air Quality PDF pg. 527-528</p> <p>Appendix H1: Meliadine Extension Air Quality Monitoring Study Section 2.5 Air Contaminants PDF pg. 13</p> <p>NIRB GUIDANCE REFERENCE "Description of the baseline (EIS Guidelines sections 7.3, 7.4, 8.1, and 8.2)"</p> <ul style="list-style-type: none"> - "Incorporation of monitoring data from existing years of project construction and operations"; <p>"Anticipated effects (i.e., potential interactions) (EIS Guidelines, sections 7.8, 7.9, 8.1 and 8.2)</p> <ul style="list-style-type: none"> - "Update all models as required for this proposal (e.g., noise and air quality modelling)" | <p>Recent data related to air quality contaminants associated with the Project are not provided.</p> <p>According to Section 2.5 of <i>Appendix H1: Meliadine Extension Air Quality Monitoring Study</i>, the only air contaminants examined as part of the air quality modelling study were nitrogen oxides (NO_x), nitrogen dioxide (NO₂), and sulphur dioxide (SO₂). Data and/or rationale are not available in the Air Quality section that describe why the following air contaminants associated with mining projects (which have been linked to impacts on human health - see Health Canada 2017) are not considered: total suspended particulates (TSP), fine particulates (PM₁₀), particulates smaller than 2.5 microns (PM_{2.5}), carbon monoxide (CO), ozone, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), diesel particulate matter (DPM), and any other toxic pollutants (from mobile and/or stationary sources).</p> <p>HC acknowledges that these air contaminants are discussed in <i>Section 10: Human Health and Ecological Risk</i>, but the data are from the 2014 Environmental Impact Statement and the assessment has not been revised with more contemporary information, with the exception of NO₂ and SO₂.</p> <p><i>Health Canada. 2017. Guidance for Evaluating</i></p> | <p>With respect to the disposition of this issue, HC recommends the following information be provided:</p> <p>1. Revise air quality modelling to include:</p> <ul style="list-style-type: none"> • Air contaminants associated with the Project, including but not limited to: TSP, PM_{2.5}, PM₁₀, CO, VOCs, PAHs, DPM, and any other contaminants from mobile and/or stationary sources, and/or provide justification why these contaminants were not included; • Estimates of the above-mentioned air contaminants for all phases of the Project (construction, operation, decommissioning); and, |

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| | | | <p><i>Human Health Impacts in Environmental Assessment: Air Quality</i> https://publications.gc.ca/collections/collection_2017/sc-hc/H129-54-1-2017-eng.pdf</p> | <ul style="list-style-type: none"> Existing and recent baseline air quality data (i.e., post-2014 Environmental Impact Statement). |
| HC-IR-06 | <p><u>Air Quality</u> Information deficiency related to air quality impacts of the Project</p> | <p><u>FEIS REFERENCE</u> Meliadine Extension FEIS Addendum Section 5.2 Air Quality Figure 5.2-1, PDF pg. 127-128</p> <p><u>NIRB GUIDANCE REFERENCE</u> "Anticipated changes to the environment; Anticipated effects (i.e., potential interactions) (EIS Guidelines, sections 7.8, 7.9, 8.1 and 8.2)"</p> | <p>Numerical predictions from the air quality model are not provided.</p> <p>On PDF pg. 127 of the <i>Meliadine Extension FEIS Addendum</i>, the text indicates that "Figure 5.2-1 shows the daily 1-hour maximum NO₂; and average annual NO₂ predicted concentrations respectively for the worst case scenario". However, no isopleths were shown on Figure 5.2-1 because there were no predicted exceedances for the 1-hour maximum or yearly average concentrations of NO₂ or SO₂ under each of the three wind turbine scenarios. As such, the predicted concentrations and their spatial distribution are not actually shown on the map.</p> | <p>With respect to the disposition of this issue, HC recommends the following information be provided:</p> <p>a) Update Figure 5.2-1 to include isopleths of predicted NO₂ and SO₂ concentrations as described in the text on PDF pg. 127 and figure title, including any nearby human receptor locations. This would enable HC to review the potential health impacts from exposure to Project-related NO₂ and SO₂.</p> |

Natural Resources Canada (NRCan)

Natural Resources Canada (NRCan) is committed to improving the quality of life of Canadians by ensuring the country’s abundant natural resources are developed sustainably, competitively and inclusively. NRCan develops policies and programs that seek to enhance the contribution of the natural resources sector to the economy, improve the quality of life for all Canadians and conducts innovative science in facilities across Canada to generate ideas and transfer technologies. NRCan is an established leader in the fields of energy sources and distribution; forests and forestry; minerals and mining; earth sciences; energy efficiency and science and data. NRCan draws its expertise from the following areas within the department when providing its technical review: the Geological Survey of Canada (GSC), CanmetMINING and the Explosives Regulatory Division (ERD).

Since 1842, the Geological Survey of Canada (GSC) has produced cutting-edge, authoritative geoscience to support mineral exploration, climate change research, marine and coastal resilience, and natural hazards mapping. For this review, the GSC will provide expertise in hydrogeology and permafrost.

CanmetMINING is a world-class leader in the research and development of mining innovation technologies related to extraction, processing and reducing impacts to the environment. Research scientists from CanmetMINING can support the review of areas of the Project related to mine waste management, acid rock drainage and metal leaching, and potential impacts to sediment and water quality.

The Explosives Regulatory Division (ERD) administers the application of the *Explosives Act*, which is the role that makes NRCan a Regulatory Authority under the *Nunavut Project Planning and Assessment Act*. ERD ensures that manufacturers, importers, exporters, and vendors of explosives, as well as those who store explosives or sell restricted components, comply with Canada’s Explosives Act and its regulations. Explosives licensing by NRCan is limited to licensing of storage or manufacture of explosives. NRCan does not monitor or authorize their use.

| Information Request No. | Subject | References | Issue/Concern | Information Request |
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| NRCAN-IR-01 | Geochemistry test data—ARD/ML | <ul style="list-style-type: none"> FEIS Addendum Appendix G6 Geochemical Characterization and Source Term Report section 4.1.7 page 4-28 | The FEIS states that kinetic test data will be provided upon completion of testing. However, the duration of kinetic test is lengthy, and the timing of termination can vary depending on the results. In support of the FIES review, NRCan is requesting the provision of preliminary test results that are currently available. | <ol style="list-style-type: none"> Provide results of kinetic tests to date for all tests initiated since the 2014 FEIS. |

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| | | | Without the kinetic test data, a thorough evaluation of acid rock drainage and metal leaching potential of new materials that were not analyzed as part of the 2014 FEIS cannot be completed. This has implications for the review of the acid rock drainage/metal leaching (ARD/ML) management plan as well as the development of source terms for the site water quality predictive model. | |
| NRCAN-IR-02 | Geochemistry test data–ARD/ML | <ul style="list-style-type: none"> FEIS Addendum Appendix G6 Geochemical Characterization and Source Term Report section 8.5.1 page 8-33 | Analogue data from the Meadowbank Mine (Phaser, BB Phaser, and Vault pits) is used to develop scaling factors to estimate pit wall runoff chemistry. However, the nitrogen species are estimated based on monitoring data from the active pits at both the Meadowbank and Amaruq mines. | 2. Clarify why the Amaruq mine pit water quality monitoring data is not used to develop the scaling factors for pit wall runoff chemistry during operations. |
| NRCAN-IR-03 | Mine waste disposal in exhausted open pits–ARD/ML | <ul style="list-style-type: none"> Conformity Determination for Agnico Eagle Mines Limited’s Final Environmental Impact Statement Addendum for the “Meliadine Extension” Project Proposal and Commencement of the NIRB’s Technical Review Period page 3 of 8 | NRCAN encourage the use of exhausted open pits for the management of tailings and waste rock that could be sources of ARD/ML. Such practice reduce reliance on surface facility maintenance such as dam stability over the long term, which eliminates risk of dam failure. However, in-pit disposal may still need mitigation measures to limit groundwater contamination to the extent practicable. For instance, impervious surrounds may be required to limit mobilization of metals through rock fractures. It is also possible that the tailings hydraulic conductivity be higher than the surrounding rock and if so, a pervious surround might be required. | 3. When considering tailings and waste rock disposal in open pits, please provide information on mitigation measures (use of the pit as is versus implementation of pervious surrounds, clay barriers, etc.) that may be needed to limit metals releases from the pit disposal facility. |

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| NRCAN-IR-04 | Pressure to head conversion— Groundwater Quantity | <ul style="list-style-type: none"> FEIS Addendum Appendix G5 Hydrogeology Existing Conditions, section 3.7 and Figure 7; Appendix H6 Hydrogeology Modelling Report | Vibrating Wire Piezometers measure water pressures. These are reported as freshwater heads; the conversion is important for data reporting and groundwater modelling. | <ol style="list-style-type: none"> Provide the numerical equations for TDS vs. depth (Fig 6) and water density vs. depth that were used in the conversion of pressures to freshwater heads. Indicate whether a generic TDS vs. depth equation (Fig. 6) or measured TDS data were used to convert pressures to freshwater heads. Indicate if pressures measured below the permafrost are converted similarly. |
| NRCAN-IR-05 | M11-1257 vertical gradients relative to Lake B5— Groundwater Quantity | <ul style="list-style-type: none"> FEIS Addendum Appendix G5 Hydrogeology Existing Conditions, Table 9 | Vertical gradients are calculated relative to an upgradient lake, not relative to the lake that the open talik and the piezometers underlie. | <ol style="list-style-type: none"> Provide Table 9 recalculated with vertical hydraulic gradients relative to the elevation of Lake B5. Assess the vertical gradients relative to Lake B5 Provide an assessment of the |

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| | | | | uncertainty of the vertical hydraulic gradients. |
| NRCAN-IR-06 | Identify the hydrostratigraphic units of piezometers– Groundwater Quantity | <ul style="list-style-type: none"> FEIS Addendum Appendix G5 Hydrogeology Existing Conditions, section 3.7 and Figure 7; Appendix H6 Hydrogeology Modelling Report | Piezometric head response depends on the hydrogeological setting. Knowledge of this setting aids interpretation of data. | 10. Provide a table indicating the hydrostratigraphic units (e.g. Tables 2 and 3 in Appendix H6) that each piezometer is completed in. |
| NRCAN-IR-07 | Piezometer data – Groundwater Quantity | <ul style="list-style-type: none"> FEIS Addendum Appendix G5 Hydrogeology Existing Conditions, Figure 7. Also reproduced in FEIS Addendum Figure 7.2-5, and Appendix H6 Hydrogeology Modelling Report Figure 14. | Data are not interpretable due to presentation; incorrect data is present in the inset table. | <p>11. Report elevations in meters above sea level in both the figure and the table.</p> <p>12. The large number of lines with similar colours makes it difficult to identify with certainty which data belong to which sensor. The figure is inaccessible to colour-blind readers. Data lines should be labelled or clearly identifiable.</p> |

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| | | | | <ol style="list-style-type: none">13. Several lines overlap, making the data difficult to see clearly. Consider dividing into two figures to reduce overlap, improve clarity and accessibility.14. Confirm lines do not go off scale above the maximum elevation.15. The data are collected as pressure but are presented in elevation (heads). It is not indicated in the text whether or how the data have been corrected for TDS/density in the transformation from pressure to elevation (see NRCan-04).16. The table of sensor depths indicates that deeper sensors have higher sensor elevations. Confirm sensor elevations.17. Provide a timeline of mining progress |
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| | | | | to aid with the interpretation of the hydraulic responses. |
| NRCAN-IR-08 | Conceptual model flow directions– Groundwater Quantity | <ul style="list-style-type: none"> FEIS Addendum Appendix H6 – Hydrogeology Modelling Report, Figure 4-5. | Conceptual flow model appears to indicate incorrect direction of groundwater flow. Current arrows indicate flow from low elevation lakes (lower heads) to higher elevation lakes (higher heads). | 18. Confirm the directions of groundwater flow arrows between lakes B7, A8 and Meliadine Lake in Figures 3 and 4. |
| NRCAN-IR-09 | Hydraulic heads – Groundwater Quantity | <ul style="list-style-type: none"> FEIS Addendum Appendix H6 – Hydrogeology Modelling Report, Figures 4, 21-24. | Patterns of hydraulic heads can change with depth; depth of the model layer is not stated. | 19. State the depth of the model layer for which the hydraulic head equipotentials are displayed. |
| NRCAN-IR-10 | Modelled groundwater flow rates– Groundwater Quantity | <ul style="list-style-type: none"> FEIS Addendum Appendix H6 – Hydrogeology Modelling Report | Modelled groundwater flow rates to and from open talik lakes are not presented and cannot be compared to hydrological budgets. | 20. Provide a table of predicted groundwater flow rates in/out of lakes for lakes with open taliks (B4, B5, B7, A6, A8, D4, D7, CH6, and Meliadine Lake (north and south separated) for each modelled year including a pre-mining baseline (analogous to Appendix H6, Table 9)). |

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| NRCAN-IR-11 | Hydrogeology modelling, no TDS results presented– Groundwater Quantity | <ul style="list-style-type: none"> FEIS Addendum Appendix H6 – Hydrogeology Modelling Report | Modelling results of TDS distributions are not presented. | 21. Provide cross-sections of predicted TDS contours (analogous to Figure 7 (Appendix H6), but moved slightly westward to intersect Tiriganiaq underground) for model times presented in Figures 21-24 (Appendix H6). |
| NRCAN-IR-12 | Assessment of closure and post-closure phases– Groundwater Quantity | <ul style="list-style-type: none"> FEIS Addendum Appendix H6 – Hydrogeology Modelling Report | There is no hydrogeological modelling of closure and post closure phases. | 22. Conduct hydrogeological modelling of closure and post-closure groundwater flow. 23. Assess the time required to reach steady state groundwater flow conditions (a drawdown cone appears to persist into 2043 on Figure 24, Appendix H6). 24. Tabulate groundwater flow in/out of lakes and pit lakes. |

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| | | | | <p>25. Assess vertical groundwater flow in all exhausted pits refilled with tailings and waste rock storage during closure and post-closure phases.</p> <p>26. Estimate hydraulic properties of refilled underground mines, and open pits infilled with tailings or waste rock.</p> |
| NRCAN-IR-13 | Effect of saline water storage in B7 (and others)– Groundwater Quantity | <ul style="list-style-type: none"> • FEIS Addendum Appendix H6 – Hydrogeology Modelling Report | Infiltration of saline water to B7 open talik during operations as a saline pond (2025-2043) can change salinity, buoyancy and flow patterns into the closure and post-closure phases. | <p>27. Evaluate the infiltration of saline water (flow, concentration and depth of saline intrusion) into the open talik beneath B7 as a result of its operation as a saline pond (2025-2043).</p> <p>28. Ensure a saline boundary condition is implemented for saline pond B7 when conducting hydrogeological modelling of closure and post-</p> |

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| | | | | closure groundwater flow (see NRCan-12). |
| NRCAN-IR-14 | Post-closure groundwater flow—Groundwater Quantity | <ul style="list-style-type: none"> FEIS Addendum Appendix H6 – Hydrogeology Modelling Report, Figure 2 | A change in lake levels from background conditions to the post closure phase may influence vertical groundwater flow in open taliks and affect potential contaminant migration from tailings and waste rock stored in refilled pits. | 29. Provide a table of planned lake/pit lake elevations for post-closure conditions. |
| NRCAN-IR-15 | Tailings and waste rock disposed in pit lakes—Groundwater Quantity | <ul style="list-style-type: none"> FEIS Addendum, section 2.5 | Presence or absence of a barrier/cover between tailings or waste rock and pit lakes can influence groundwater and contaminant transport processes and fluxes. | 30. Discuss whether or not a barrier or cover material is planned to isolate tailings or waste rock from the overlying pit lake water for both open and closed talik lakes. Describe the proposed water/sediment contacts in pit lakes. |
| NRCAN-IR-16 | Timetable of refilling mines and pits—Groundwater Quantity | <ul style="list-style-type: none"> FEIS Addendum Appendix D-35 Water Management Plan, sections 3.8, 3.9 | The timing of disposing tailings and waste rock in exhausted pits and their flooding could influence the assessment of their potential impacts. | 31. Provide a timetable/timeline for the refilling of underground mines and exhausted pits and their flooding. |
| NRCAN-IR-17 | Post-closure open talik—Groundwater Quantity | <ul style="list-style-type: none"> FEIS Addendum Appendix D-35 Water Management | Lakes with existing open taliks have been expanded to include adjacent pit lakes and form larger lakes with less intervening land). | 32. Discuss how the post-closure configuration of lakes and pit lakes |

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| | | Plan, Figure 3-22 | | may alter the long-term extent of open talik beneath pit lakes. |
| NRCAN-IR-18 | Climate information utilized for thermal modelling-Permafrost | <ul style="list-style-type: none"> FEIS Addendum section 5.4, Appendices H-08, D21, D18 | Freezing of mine waste, including waste rock storage facilities (WRSF) and tailings storage facility (TSF) is to be utilized to limit infiltration of water into facilities and limit oxidation and effects on water quality. The design of mine waste storage facilities needs to consider climate change to ensure long-term thermal performance of the facilities. The Proponent has conducted thermal modelling to determine that WRSFs and TSF will freeze and the active layer will be restricted to the cover material at closure and for many years beyond. Climate change scenarios have been incorporated into the thermal model. However, from the information provided (e.g. FEIS Addendum 5.4, p. 100-104; Appendix H-08 sec. 3 and 4), it appears the Proponent has utilized the climate change scenarios from the IPCC 5th Assessment (IPCC 2014). The 6th IPCC Assessment has since been released (in 2021) and climate change scenarios would have been updated. Use of the most recent information can improve understanding of the climate conditions that mine waste facilities will operate under and therefore reduce uncertainty with respect to the thermal condition of WRSFs and the TSF. | 33. Please clarify whether climate change scenarios utilized in thermal models have been updated based on the most recent information available and/or whether the Proponent will utilize the most recent climate change scenarios available in their thermal modelling to determine the thermal evolution of the mine waste storage facilities as design advances. |

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| NRCAN-IR-19 | Ground thermal regime in the project area | <ul style="list-style-type: none"> FEIS Addendum section 6.3; Appendices G1, G5, H4, H6 | <p>Information on ground temperatures can be utilized to characterize the ground thermal regime including the thickness of permafrost. Information on the vertical and lateral extent of permafrost is required to inform hydrogeological models and to determine whether proposed underground mines will be partially within unfrozen ground. This is essential for assessments of mine water inflow quantity and water management needs particularly since water will be saline. The Proponent has utilized a combination of ground temperature data acquired from thermistor cables and thermal modelling to characterize permafrost conditions and to delineate frozen and unfrozen ground. Data continues to be collected from deep thermistor cables installed in support of the 2014 FEIS and additional cables were installed in 2020 including those installed in the vicinity of the Discovery deposit (FEIS Addendum 6.3.2.1, Table 6.3-1). The recent data collected including that from new installations improves assessment of the ground thermal regime, constrains the depth of permafrost and supports thermal model calibration and validation (e.g. FEIS Addendum 6.3.2.2, Appendix G5, H4, H6). The Proponent indicates that the thermistors installed at Discovery in 2020 were still stabilizing so no new data were available (FEIS Addendum 6.3.2.2, Table 6.3-1; App G1, Pt 1 sec.4, Table 8). It is not clear however, whether they have stabilized over the past two years and whether data have been acquired that could be utilized to support improved assessments of thermal conditions and the intersection of the proposed Discovery underground mine with unfrozen ground. This information would also support refinement of groundwater models utilized to determine water inflow into the underground mine.</p> | <p>34. Please indicate whether any suitable data have been acquired from new thermistor cables installed in 2020 in the vicinity of the Discovery deposit. If data have been acquired, update the thermal and groundwater models and assessments of mine water inflow.</p> |
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| NRCAN-IR-20 | Thermal evolution of the Tailing Storage Facility (TSF) | <ul style="list-style-type: none"> • FEIS Addendum sections 2.3.2, 6.2.2.3; Appendices D18, D21, D35 (Pt 2, 3.6.3) | <p>It is NRCan’s understanding that the approach to tailings disposal has been modified since the 2014 FEIS. A TSF will still be required but this will be a dry stack TSF that encompasses a smaller footprint adjacent to Lake B7 within the approved 2014FEIS footprint. Frozen conditions within the tailings pile can enhance the performance and containment of the TSF and reduce the potential for impact on water quality especially since there is some uncertainty regarding the geochemical characteristics of the tailings (Appendix D21, sec. 4). Although the Proponent indicates that the TSF design does not rely on frozen conditions (Appendix D21, sec. 4), they are beneficial, particularly if there should be any failure of the liner included in the design of the containment berm. Results of thermal analysis indicate that the TSF will remain frozen after closure for many years and the active layer will be maintained within the cover limiting interaction of water and oxygen with potentially acid generating or metal leaching tailings (FEIS Addendum 6.2.2.3; Appendix D21, D18 sec. 4.4). However, there seems to be few details regarding the thermal modelling included in the FEIS Addendum similar to those provided for the waste rock storage facilities (e.g. Appendix H-08). Reference is made (Appendix D18, sec. 2.9) to a design report done by Tetra Tech (2018) but this has not been provided in the supporting information. This information would be useful to better understand the details of the TSF design and the thermal modelling conducted to reach the conclusions in the FEIS Addendum regarding thermal evolution and performance of the TSF and potential impacts on water quality.</p> | <p>35. Please provide the supporting information on the TSF design and the thermal analysis/modelling completed to support conclusions regarding the thermal evolution of the TSF. This might include (but not limited to) reports such as Tetra Tech (2018).</p> |
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