

Attachment 1
Lynn Lake Gold Project
Information Requirements from Environmental Impact Statement Technical Review

On August 23, 2021, the Impact Assessment Agency of Canada commenced Round 2 technical review of the Environmental Impact Statement and responses to Round 1, Package 3 Information Requests for the Lynn Lake Gold Project. The table below is to assist in the preparation of Information Requests that support full understanding of the Project’s potential for significant adverse environmental effects and potential impacts to rights.

| Reference IR# | Expert Dept. or group | EIS Guideline Reference | EIS Reference | Context and Rationale | The Proponent is Required to ... |
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| Human Health | | | | | |
| IAAC-174a and c | Health Canada MCCN | 6.1 Project setting and baseline conditions 6.1.1 Atmospheric environment 6.1.11 Human environment 6.3.4 Indigenous peoples | Volume 2, 18.4.1 Analytical assessment techniques Volume 5, Appendix H, Lynn Lake Gold Project Human Health and Ecological Risk Assessment Technical Modelling Report 4.1 Air 5.4.1 Non-carcinogenic chemicals 5.4.3 Human Health Risk via Inhalation | It is unclear why exposure to metals and other contaminants of potential concern (COPCs) due to dust resuspension was not considered in the human health risk assessment (HHRA). i) The Proponent’s response to IAAC-174 refers to “Deposition of fugitive dusts [that] could have resulted in metal accumulation in soil and terrestrial country foods and backyard garden produce.” However, the HHRA does not address the potential resuspension of dusts and associated COPCs (including those associated with historic mining activities and present under current conditions). The Soil and Terrain Baseline technical data report (Volume 4, Appendix E) notes that, “Wind erosion risk for both topsoil and subsoil is primarily high” for both sites, suggesting dust (re)suspension could be reasonably expected. Failure to consider resuspension of dust may underestimate the human health risk from potential exposure through inhalation and via ingestion of country foods onto which dust has deposited. Additionally, the Proponent’s response to IAAC-174 does not consider non-metal COPCs in any environmental media other than | Health Canada suggests that the Impact Assessment Agency of Canada (the Agency) request the following information from the Proponent: i) Describe how resuspension of dust was considered in the evaluation of airborne metals and other COPCs or provide justification for excluding this exposure pathway, and specify how/whether contaminants from historical mining and the construction and decommissioning phases were incorporated into this pathway. Provide a justification if either consideration was excluded. ii) Re-consider whether the use of a target HQ value of 1.0 is appropriate for all VOCs, PAHs, and metals. Provide additional rationale for the use of 1.0 for those instances where the use of this target rather than the |

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| | | | 5.4.4 Human Health Risk via Direct Soil Contact | <p>ambient air (see further comment to IAAC-179). The adequacy of an assessment of inhalation risk from dust resuspension would be further challenged by the:</p> <ul style="list-style-type: none"> • absence of baseline information for COPCs other than metals in soils; and • exclusion of predicted emissions of COPCs during the construction and closure phases that may accumulate in soils, in addition to those from the operations phase. <p>The rationale for the use of a non-default target hazard quotient (HQ) is not substantiated by the evidence provided in the HHRA.</p> <p>ii) With regard to use of a target HQ of 0.2 rather than 1.0, the Proponent’s response to IAAC-174 indicates that, “...For the remaining COPCs (VOCs [volatile organic compounds], PAHs [polycyclic aromatic hydrocarbons], metals), the maximum calculated CRs [concentration ratios] were below 0.01 (Section 5.4.3 for HHRA TMR) and thus, applying a CR (HQ) of 0.2 rather than 1.0 would not alter the conclusions of the HHRA.” However, within Section 5.4.3 of the HHRA, there are instances of CR values that were greater than 0.01; for example, acrolein in Table 5-48 (value of 0.28), trimethylbenzene in Table 5-49 (0.63), and total chromium in Table 5-60 (0.34). In these cases, the use of a threshold of 0.2 would change the conclusions of the HHRA, contrary to the information provided in the Proponent’s response.</p> | recommended value of 0.2 may change the conclusions of the HHRA. Update the characterization of risks from COPCs using a HQ target of 0.2 for inhalation exposure, as appropriate. |
| IAAC-179 | Health Canada | 6.1.11 Human environment 6.3.4 Indigenous peoples | Volume 5, Appendix H Lynn Lake Gold Project, Human Health and Ecological Risk Assessment Technical Modelling Report 5.4 Risk Characterization | <p>Justification for excluding certain contaminants of potential concern (COPCs) and exposure pathways from the multi-media HHRA, and for integrating risks from multiple exposure pathways was insufficient. Information to support the use of the applied plant and animal tissue uptake factors was insufficient.</p> <p>i) In the response to IAAC-179, the Proponent states that, “the risks associated with inhalation exposures were calculated using toxicological reference values (TRVs) specific to inhalation exposures and the mechanism of action, biological endpoints, and</p> | <p>Health Canada suggests that the Agency request the following information from the Proponent:</p> <p>i) Provide a multi-media approach in the HHRA for those COPCs that are present in several media and/or act on the same target organ(s) and/or share common mechanisms of action. For those COPCs where the inhalation pathway is assessed separately from other exposure pathways, provide a COPC-specific justification.</p> |

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| | | | <p>Tables 5-9 to 5-16</p> | <p>target organs differ from those associated with oral/dermal exposures. Thus, summing inhalation and oral/dermal HQs has no meaningful toxicological basis.” Health Canada disagrees with this assertion as inhalation TRVs are primarily intended to address exposure scenarios where only inhalation exposure is operative and/or where toxic effects are specific to inhalation exposure. This application is most likely to be valid for volatile compounds; however, even when addressing purely volatile compounds, both inhalation and dermal absorption are possible, and for some chemicals, dermal uptake can be quite extensive (e.g., Brown et al. 1984). For example, polycyclic aromatic hydrocarbons (PAHs) do not exclusively produce portal-of-entry or other inhalation-specific effects, contrary to the Proponent’s claims. In addition, the example COPCs cited in the response to IAAC-179 (thallium and chromium) had dominant exposure pathways (i.e., ingestion and inhalation, respectively), and are not necessarily representative of COPCs with predicted exposure across several, more equal pathways. For these reasons, additional contaminant-specific justification is required to support separating inhalation exposure from all other pathways.</p> <p>ii) With the exception of inhalation, all pathways deemed operable in the HHRA’s Conceptual Site Model (Figure 5-1) only considered potential risks from exposure to metals. It is unclear why project-related semi-volatiles or non-volatile contaminants (e.g., PAHs) would be present in air (as components of dust and/or diesel particulate matter [DPM] or in other forms) without depositing and migrating to other environmental media (i.e., soil, sediment, plants, surface water, and groundwater) where they can be taken up by plants and animals used as human food sources. A multimedia assessment combining all of these exposures should also be completed for these COPCs.</p> <p>iii) The sediment ingestion pathway was deemed operable but screened out of the HHRA because it was considered unlikely that human receptors would come into direct contact with sediment</p> | <p>ii) Provide further justification for excluding non-metal COPCs from all pathways except inhalation (e.g., via ingestion of airborne COPCs other than metals that have deposited onto soil, water, and vegetation). If additional COPCs should be considered for exposure pathways beyond inhalation, update the HHRA accordingly.</p> <p>iii) Include sediment pathways for manganese and any other relevant COPCs as part of the multimedia HHRA</p> <p>iv) Provide the literature source(s) for the uptake values that were used in Equation 4.1.</p> |
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| | | | | <p>(Table 5-4). However, concentrations of manganese in sediments are expected to exceed soil quality guidelines for direct contact in the predicted Future Case scenario (Table 5-3, Volume 5, Appendix H). As the baseline HQ for total ingestion of manganese already exceeded the health target of 0.2 for human receptors at both sites (as noted in IAAC-183), the sediment pathways should be included in the multimedia HHRA as a precautionary approach.</p> <p>iv) Finally, Section 4.0 of the HHRA indicates that concentrations of COPCs in plant and animal tissues were determined using uptake factors (Equation 4.1) but these factors were not provided. Further information regarding the approach for determining baseline and future case concentrations of COPCs in soils and tissues is required to understand the results of the HHRA.</p> <p><i>H.S. Brown et al. (1984). The role of skin absorption as a route of exposure for volatile organic compounds (VOCs) in drinking water, Am. J. Public Health. 74(5), 479-484.</i></p> | |
| IAAC-180 | Health Canada | 6.1.11 Human environment 6.3.4 Indigenous peoples | Volume 5, Appendix H Lynn Lake Gold Project, Human Health and Ecological Risk Assessment Technical Modelling Report 5.1.1.4 Specific assumptions for the Off-Duty worker receptor 5.2.2.1 Inhalation exposures | <p>Insufficient rationale was provided to support the use of dose averaging for all VOCs in the inhalation assessment.</p> <p>i) Health Canada (2019, Appendix E) cautions that duration and use of dose averaging (i.e., mathematically spreading out a short-duration dose over a longer period) should be carefully considered, particularly in cases where chemicals have potential developmental (fetal) effects. The response to IAAC-180 indicates that none of the chronic inhalation TRVs were based on developmental effects, so use of averaging was appropriate for DPM, HCN (hydrogen cyanide), VOCs, non-carcinogenic PAH, and metals evaluated in the HHRA. However, Table 5-9 of the HHRA (Volume 5, Appendix H) indicates that the annual non-carcinogenic TRV for ethylbenzene (a VOC) was based upon a health endpoint of “developmental toxicity” and the annual TRV for xylenes (another VOC) was based on effects including “fetal retardation, increased proportion of fetal mortality and resorbed fetuses”. This</p> | <p>Health Canada suggests that the Agency request the following information from the Proponent:</p> <p>i) Confirm whether non-developmental toxicity chronic TRVs were used for ethylbenzene and xylene. If the developmental toxicity-based annual TRVs were used for the chronic inhalation assessment, update the calculation result and interpretation without applying dose averaging for these COPCs.</p> <p>ii) Clarify whether a local off-duty worker receptor was considered in the HHRA (i.e., someone who would both be living on-site for 26 weeks of the year and living or engaging in traditional activities in the LAA for the remaining 26 weeks). If not, describe how the current HHRA and assumptions for human receptors would be protective of this particular situation.</p> |

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| | | | | <p>suggests that dose averaging may not be appropriate for all VOCs without further justification to support the generalized approach.</p> <p>The use of dose averaging for assessing inhalation risks of COPCs is not protective of off-duty workers who remain in the LAA.</p> <p>ii) The exposure assessment of off-duty workers has not fully considered workers from the local community who live in and use the Local Assessment Area (LAA) on their time off, as other human receptors from the local community would. This assessment was based on 2 weeks of exposure followed by 2 weeks off, during which time the worker is presumed to leave the LAA. Given the expressed local interest in potential employment opportunities, a worker from or engaging in traditional land use activities in the LAA is highly conceivable. As such, neither the dose-averaging approach nor the proposed measure to cover the work camp area with aggregate material to eliminate dust and soil exposure may be sufficient for protecting off-duty and off-rotation workers who remain in the LAA.</p> <p>iii) According to the Proponent's response to IAAC-180-a, off-duty workers were only assessed for risks via inhalation exposure, which may further underestimate the health risks (and the CR, or HQ) for these receptors (refer to Health Canada's comment on Proponent's response to IAAC-174, above, for further information on considering additional exposure pathways).</p> | <p>iii) Update the HHRA to include relevant exposure pathways and COPCs as part of the multimedia HHRA, as per Health Canada's comments to the Proponent's response to IAAC-174 and IAAC-179, as applicable.</p> |
| IAAC-181 | IAAC | <p>2.4 Application of the precautionary approach</p> <p>6.3.4 Indigenous peoples</p> | <p>Volume 2 14.4.2.1 Project Pathways</p> <p>18.4.1 Analytical Assessment Techniques</p> | <p>Health Canada encourages proactive mitigation of PM_{2.5} to maintain concentrations as low as reasonably achievable.</p> <p>The assumptions used in the HHRA for off-duty worker receptors were based on a two weeks on, two weeks off shift rotation. The Proponent's response to IAAC-181 indicates that this was the planned schedule at the time when the HHRA was completed and the response to IAAC-12 clarified that shift rotations will likely be 3:1 for construction and 2:2 or 4:4 for operations. Attachment IAAC-181 provides an updated assessment to consider the</p> | <p>Health Canada suggests that the Agency request the following information from the Proponent:</p> <p>i) Propose additional mitigations to reduce the risks of PM_{2.5} exposure to human receptors in a 3:1 construction rotation schedule.</p> <p>The Proponent may wish to refer to the following guidance from the Canadian Council of Ministers of the Environment (CCME):</p> |

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| | | | <p>Appendix A, Attachment IAAC-181</p> <p>IAAC-12</p> | <p>inhalation risks associated with a 3 week on, 1 week off schedule. The schedule change increases the annual average HQ for PM_{2.5} from 0.82 to 1.2, which was deemed overly conservative by the Proponent given that “these results are based on air quality modelling that do not account for frozen ground on the stockpiles, tailings management facility or in the open pit, that would prevent particulate release from the sources during the winter months.” The Proponent recognizes that PM_{2.5} is a non-threshold pollutant, meaning that human health effects may occur even at low levels below the CAAQS.</p> <p>Given that construction will not be limited to winter months and that guideline values for PM_{2.5} should not be construed as limits to which polluting up to is allowed, additional mitigation options should be considered for the construction phase.</p> | <p>CCME 2007. <i>Guidance Document on Continuous Improvement and Keeping-Clean-Areas-Clean (KCAC) - Canada-wide Standards for Particulate Matter and Ozone. PN 1389, ISBN 978-1-896997-72-8 PDF.</i></p> |
| IAAC-183 | <p>Health Canada</p> <p>IAAC</p> <p>MCCN</p> | <p>5.0 Engagement with Indigenous Groups and Concerns Raised</p> <p>6.1 Project setting and baseline conditions</p> <p>6.1.11 Human environment</p> <p>6.3.4 Indigenous peoples</p> | <p>Volume 2</p> <p>18.4.1 Analytical Assessment Techniques</p> <p>18.4.2.1 Project Pathways</p> <p>19.2.2.1 Indigenous Health Conditions</p> <p>19.4 Assessment Residual Environmental Effects on Indigenous Peoples</p> <p>19.4.3.3. Residual Effects</p> | <p>Further clarification is needed to support the assumptions used to establish country food (specifically fish) consumption rates and the assumptions on mercury speciation in country foods used for the HHRA.</p> <p>i) The Proponent’s response to IAAC-183 does not specify how the consumption rates for human receptors (presented in Table 5-1) were determined. The explanation column describes an adjustment of data from Chan et al. (2012) to obtain intake rates for different country foods for different age classes. It also notes that 10% of fish were from local waterbodies, but it is unclear how this value was incorporated into the calculations and whether this value accounts for different trophic levels or sizes of fish that might be caught locally compared to commercially bought fish. This is particularly important in light of the potential exceedances of health risk targets (hazard quotient >0.2) for the baseline case for methyl mercury, thallium, and manganese, where consumption of country foods has been identified as the primary source.</p> <p>ii) The Proponent’s response to IAAC-183 does not specify why all mercury in fish was assumed to be in the form of methyl mercury,</p> | <p>Health Canada suggests that the Agency request the following information from the Proponent:</p> <p>i) Clarify how the data from the FNFES food study (Chan et al., 2012) were used to determine consumption rates for non-Indigenous and Indigenous receptors in the local area (HHRA Table 5-1) and how assumptions for fish consumption accounted for varying sizes or species in local catch compared to supermarket fish. Provide adjustment ratios and/or sample calculations as appropriate.</p> <p>ii) Provide a rationale for using inorganic mercury instead of methyl mercury when assessing health risks from consumption of country foods other than fish. Alternatively, update the HQ values assuming that all mercury is present in the form of methyl mercury for all country foods.</p> |

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| | | | <p>Volume 5, Appendix H Lynn Lake Gold Project, Human Health and Ecological Risk Assessment Technical Modelling Report 5.4.5 Human Health Risks via Ingestion of Food Table 5-1 Table 5-86</p> | <p>whereas inorganic mercury was assumed to be the predominant form in other country foods (refer to Section 5.4.5 of the HHRA). It is unclear whether there were speciation data to support this assumption. In the absence of a mercury speciation data, Health Canada recommends using the assumption of 100% methylmercury in all country foods and that the TDIs (tolerable daily intake values) for methylmercury be employed for all country foods, including wild game, vegetation, and fish. This approach ensures that the potential health risks are not underestimated.</p> <p><i>Chan et al., 2012. First Nations Food, Nutrition, and Environment Study: Results from Manitoba (2010).</i></p> | |
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