TMI_921-HE(2)-01

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TMI_921-HE(2)-01	HE(2)-01	3	CEA Agency	**Reference to EIS Guidelines:**	Section 3.2, 10.1.3
				Reference to EIS / Appendix	Section 6; Appendix W-2
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: The Agency is aware that additional data such as new receptor locations, not found in Section 6 or the appendices of the revised EIS, are used in the June 2018 HHRA (Appendix W-2 of the revised EIS). For example, Section 3.5.2.1 of the updated HHRA indicates that "the air modelling was redone using the same emissions and methods as presented in Section 6.6 of the revised EIS (April 2018), but focusing on possible modelling receptors covering the study areas described in Section 3.1.1." Where any exposure point concentrations used as inputs in the June 2018 HHRA are different from those presented in Section 6 or in appendices of the revised EIS, it is important to explain the factors, data sources, modelling scenarios and assumptions that have changed, such as new receptor locations, to identify the tables or sections in Section 6 or in appendices that are superseded by the new data, and to clearly present the new data in the final HHRA. Section 3.2 of the EIS Guidelines indicates that "Assumptions will be clearly identified and justified. All data, models and studies will be documented such that the analyses are transparent and reproducible."	
				Specific Question / Request for Information: A. Where exposure point concentrations provided in the final HHRA are different those provided in Section 6 of the revised EIS: • explain the factors, data sources, modelling scenarios and assumptions that have changed; • identify the tables or sections in Section 6 or in appendices of the revised EIS that are superseded by the new data; and	

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				• present the new data in the final HHRA.
				Response: Section 6.6 of the revised EIS (April 2018) provided an evaluation of the effects of the Project on air quality and considered the potential effects of the Project on air quality during the Site Preparation and Construction, Operations, and Closure phases of the Project. There are no air emission sources during the Post-Closure phase of the Project as such no predicted values were modelled. The air quality assessment presented in Section 6.6 of the revised EIS (April 2018) focussed, appropriately on the maximum predicted concentrations at the property boundary, as well as at 43 identified sensitive receptors. The locations where air quality predictions were made was shown on, Figure 6.1.4.5-1 "Air Quality Local Study Area" provided in Section 6.1.4 of the revised EIS (April 2018). The property boundary predictions represented the appropriate values for determining compliance with Ontario Regulation 419/05, while the CCME (2006) identifies that the sensitive receptor which meet the CCME definition of community-based receptors, would be the most appropriate locations for determining compliance with ambient air quality criteria. In Section 6.19 of the EIS (April 2018) the air quality predictions were discussed in terms of potential health implications. Table 6.19.2.1-4 of Section 6.19 of the EIS (April 2018) provided a refined screening of CACs using the maximum modelled concentrations at the sensitive receptors, which correspond to the closest "community-oriented receptors" as defined by the CCME (2000). The results presented in Table 6.19.2.1-4 of the revised EIS indicated that none of the predicted concentrations exceed their respective ambient air quality criteria, with the exception of total suspended particulate (TSP). The maximum 24−hour TSP concentration during the Site Preparation and Construction Phase was shown to marginally exceed (by 2.6%) it's Ontario Ambient Air Quality Objective. The Ontario Ambient Air Quality Objective was set based on visibility (i.e. aesthetic) criteria and not the protection of human health. Therefore, no CACs were identified as COCs relevant to human health and a quantitative assessment of potential human health risks via the inhalation pathway is not warranted. Although the results presented in Section 6.19 of the EIS (April 2018) identify that there are no exceedances of the appropriate values for ambient air quality objectives, a number of Round 2 Information Requests were received regarding the potential risks to human receptors via the inhalation pathway. Treasury Metals' recognizes that Project Workers may be exposed to CACs within the Operations Area (Study Area No. 1), and members of Indigenous communities may visit areas that fall outside of the Operations Area, but within the property boundary of the Goliath Gold Project, to practice traditional uses of the lands and resources. Project work and traditional land use do not meet the CCME definition of a community-based receptor and thus determination of compliance with the application of Ambient Air Criteria is not appropriate for these receptors. To capture the possible risk to peoples using these areas, the air modelling was redone using the same emissions and methods as presented in Section 6.6 of the revised EIS (April 2018), but focusing on possible modelling receptors covering the HHERA (August, 2018) Study Areas. The refined modelling includes 308 modelling receptor located within the Operations Area (Study Area No. 1), 3,474 modelling receptor locations within the LSA (Study Area No. 2) 1,445 of which fall inside the Property Boundary, and

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				at 46 modelling receptor locations within the Village of Wabigoon (Study Area No. 3). The revised air quality modelling grid in support of the HHERA (August, 2018) is shown relative to the Property Boundary and the three Study Areas, on Figure 3.1.1-1 of the HHERA (August, 2018) Report (August, 2018). The maximum concentrations for each parameter at each of the modelling receptors, and averaging periods evaluated were determined for the Site Preparation and Construction, Operations, and Closure phases of the Project. Given that this work was completed in support of the HHERA (August, 2018), the highest UCLM of the modelled receptors in each of the Study Areas, over the five-year period modelled was selected as the EPC for each parameter within each study area. Therefore: • The only factor that is different in the HHERA (August, 2018) than the EIS with respect to air quality modelling is the receptor grid which as shown on Figure 3.1.1-1 was revised to include all areas within the property boundary, including the operations area. All air quality modelling assumption were provided as Appendix J to the EIS (April 2018); • The tables related to air quality in Section 6.6 and 6.19 of the EIS (April 2018) remain valid for assessing the health implications for determining compliance with ambient air quality criteria (both Ontario Regulation 419/05 and CCME) and are not superseded by any table in the HHERA (August, 2018). In the HHERA (August, 2018), new tables are provided in Section 3.5 where the 95% UCLM concentrations of CACs and metals are qualitatively screened to the Canadian Ambient Air Quality Standards (CAAQS) or the Ontario Ambient Air Quality Criteria (AAQC) for all available averaging periods. It is noted however, that as per the definition of the CAAQS and AAQC, these are the criteria to be applied at “community-based” receptors including sensitive receptor locations and appropriate for determining regulatory compliance. There are no community-based receptor or sensitive receptor locations within the Property Boundary, as Project work and traditional land use do not meet the CCME definition of a community-based receptor and thus determination of compliance with the application of Ambient Air Criteria is not appropriate for these receptors. The results presented in the new tables in the HHERA (August, 2018) do not supersede any table presented in Section 6 of the EIS, but rather provide a complimentary screening specifically in support of the objectives of HHERA and to satisfy the Round 2 Information Requests received. The predicted EPCs of CACs and metals within the Operations Area, the LSA (including outside of the Operations Area but inside the Property Boundary where traditional land use is practiced), and in the Village of Wabigoon are appropriately assessed for their implications on potential health effects in the HHERA Report (August, 2018) (August, 2018). • All new data are provided in Appendix I to the HHERA (August, 2018) Report (August, 2018)- Raw Data. All of the information provided in this IR is included in Section 3.5 of the HHERA (August, 2018) Report (August, 2018).

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				Agency Comment on Draft Response: Additional detail on selected receptor locations for the HHRA was provided to Health Canada in an email on September 13, 2018. The proponent clarified that exposure point concentrations (EPCs) from the three study areas were used in the screening process for the HHRA. For clarity it would be beneficial to present contour maps similar to those in Appendix J-2 Figures 6 to19 of the EIS inclusive of the MPOI in all study areas. Annual NO2 should also be included (see AE(2)-01). Provide contour maps similar to those presented in Appendix J-2 of the Environmental Impact Statement, inclusive of the Maximum Point Of Impingement (MPOI) in each study area. The new maps should include the updated property boundary, and show the contours for areas beyond the Operations Area and within the updated property boundary where the use of lands and resources could by members of Indigenous communities could continue.
				Specific Response to Agency Comments: THIS RESPONSE HAS BEEN SUPERCEDED BY TMI_954-HHRA(2)-01
				Revised Response: THIS RESPONSE HAS BEEN SUPERCEDED BY TMI_954-HHRA(2)-01

TMI_922-HE(2)-02

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TMI_922-HE(2)-02	HE(2)-02	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3
				Reference to EIS / Appendix	Appendix W-2, Section 4.1.1

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				Cross-reference to Round 1 IRs: n/a
				Context and Rationale: It is unclear, from the descriptions given in Section 4.1.1 of the June 2018 HHRA, whether access to Blackwater Creek Tributary #1 within the HHRA Local Study Area will be restricted to Indigenous people during any phase of the Project, and whether any country foods that are typically found in wetland areas may be harvested from this area during or after the Project. If harvesting of country foods would be allowed, an assessment of the impact of the effluent on country foods in Blackwater Creek Tributary #1 should be included.
				Specific Question / Request for Information: A. Clarify whether access to Blackwater Creek Tributary #1 will be restricted to Indigenous people during any phase of the Project, and whether any country foods that are typically found in wetland areas would be harvested from this area during or after the Project. B. Assess the impact of the effluent on the country foods harvested from Blackwater Creek Tributary #1, if the effluent is discharged directly into an area producing the country foods. C. Describe additional mitigation measures to reduce potential effects on country foods in Blackwater Creek Tributary #1, or on wild rice anywhere at or near the Project.
				Draft Response: A. The HHERA (August, 2018) was completed under the conservative assumption that members of the public and Indigenous communities will have access to areas outside of the Operations Area and inside the Property Boundary which includes Blackwater Creek Tributary #1. The HHERA (August, 2018) was completed to conservatively assume that members of Indigenous communities may practice their traditional use of the lands and resources, including country foods harvesting, in areas immediately adjacent to the Operations Area. As described in the HHERA (August, 2018) Report (August, 2018), for safety purposes there will be no access to the Operations Area by members of the public or Indigenous communities during the active life of the project (i.e. Site Preparation and Construction, Operations, Closure). The HHERA Report (August, 2018) was conservatively completed to assume that although there is no access to the Operations Area for Country Foods harvesting, a percentage of the country foods ingested would come from the Operations Area given that it will be difficult to control access to mobile birds and small mammals which may access the Operations Area and thus be exposed to Project-specific media and then be harvested outside of the Operations Area. To satisfy this information request, Figure 6.21.4-1 “Areas where Access will be Affected” from the EIS (April 2018) which illustrates where the Operation Area is located relative to Blackwater Creek Tributary #1, and shows that while access will be affected to the Operations Area, it will not be affected to Blackwater Creek Tributary #1, has been

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				reproduced and included in the HHERA (August, 2018) Report (August, 2018). Areas that support country foods habitat, including vegetation, wildlife including mammals and birds, and fish habitat were provided in a series of Figures in Section 5 and 6 of the EIS (April 2018) and information received from members of Indigenous communities regarding where they currently practice their land and resource use for traditional purposes was described in Section 5 of the EIS (April 2018) and used to assess the effects of the Project in Section 6 of the EIS (April 2018). A number of figures from the EIS (April 2018) have been reproduced and included within the HHERA Report (August, 2018) to satisfy this Information Request and also the 2018 Health Canada guidance document entitled "Guidance for Evaluating Human Health Impacts in Environmental Assessments: Country Foods". Wild rice is an important country food item that is typically found in wetland areas and based on meaningful engagement information received to date is harvested in areas surrounding the Project. Wild rice was considered an indicator for the evaluation of the effects of the Goliath Gold Project on Wetlands described in Section 6.15 and as an indicator for the evaluation of effects of the Project on Indigenous Peoples as described in Section 6.21 of the EIS. Figure 6.15.4.1-2 "Wild Rice Local Study Area for the Goliath Gold Project" has been reproduced within the HHERA Report (August, 2018) shows the locations where wild rice stands exist and where wild rice may be harvested and used as a country food. This figure illustrates that there are no wild rice harvesting areas within Blackwater Creek Tributary #1, however that wild rice stands are present at the mouth of Blackwater Creek where it meets Wabigoon Lake. Chemical concentrations in Blackwater Creek were used in the HHERA (August, 2018) to model chemical concentrations in wild rice which was considered in the country foods assessment presented in HHERA Report (August, 2018). Exposure to chemical concentrations in wild rice via the ingestion pathway was assessed as part of the HHERA (August, 2018) (August 2018). B. The effluent discharge pipe is not located in an area known to support or be currently used for country foods harvesting, however, the HHERA (August, 2018) (August 2018) has been conservatively completed to assume that all areas outside of the Operations Area, but inside the Property Boundary may be used for country foods harvesting. The HHERA (August, 2018) assesses the impact of the effluent on the country foods harvested from Blackwater Creek Tributary #1 by considering the surface water quality results at nine modelling locations, including BW1 which is immediately downstream of the effluent discharge pipe. The surface water quality model relied upon for the assessment of effects of the Project on Surface Water Quality (as detailed in Section 6.10 and Appendix JJ to the EIS (April 2018)) was used to estimate surface water quality for the Base Case, Project Alone, and Project Assessment Scenarios in the HHERA (August, 2018). The surface water predictions provided in the HHERA (August, 2018) represent the 95% UCLM concentrations predicted at 9 locations (BW1, BW2, HB1, TL1, TL2, TL3, LC1, Thunder Lake and Wabigoon Lake) for a wet, dry, and average year. The locations of water quality modeling are provided on Figure 3.5.2.3-2 in the HHERA (August, 2018). The maximum 95th UCLM of this data was conservatively selected as the exposure point concentration (EPC) for surface water. It is important to highlight that the maximum EPC in surface water (i.e. worst-case prediction) was not necessary at BW1 given that surface water quality is poor in the existing environment. Treasury Metals has committed (Cmt_034) that during operations, effluent discharged from the Project to Blackwater Creek will meet the Provincial Water Quality Objectives (PWQO) or background concentrations if background levels are above the PWQO. Where there is no PWQO for a parameter, the commitment will be to meet the Canadian Water Quality Guidelines (CWQG). For total mercury, the commitment will be that effluent discharged to

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				Blackwater Creek will meet background concentrations for that watercourse. Background concentrations for Blackwater Creek are defined as the 75th percentile in accordance MOECC receiving water assessment policy. The sampling point for this commitment is the effluent discharge location. Therefore, for parameters that exceed the PWQO in the existing environment, surface water quality at the point of effluent discharge is actually better as a result of the Project's water treatment process. To ensure that the highest level of conservatism was captured in the HHERA (August, 2018), the maximum 95% UCLM concentration in surface water at any of the nine locations was selected rather than assuming that water quality at the effluent discharge point would represent the worst-case scenario. The maximum EPC was then used to model uptake of chemicals of concern from surface water into country foods including wild rice, birds and mammals, and fish. C. The HHERA (August 2018) indicated that a Health and Safety Plan would be required as a risk management measure for Project Workers within the Operations Area (Study Area 1) for the protection of select CACs in air as well as for the dermal contact and incidental ingestion pathway of Project-specific media including waste rock and TSF supernatant water. The Health and Safety Plan effectively mitigates any potential effect on human health and therefore no residual adverse effects are identified. This mitigation measure has been previously described in the EIS (April 2018) in Section 6.19 and is summarized in Section 10 of the EIS (April 2018) Commitments and Mitigation Measures Summary as Commitments (Cmt_005, Cmt_006, Cmt_007 and Mit_130). No other residual effects were identified in the HHERA (August, 2018), as such no other mitigation measures are required.
				Agency Comment on Draft Response: B/C. Mitigation measures for pathways to country foods may be required based on the responses to HHRA-03 and HHRA-05. B/C. Update the responses with consideration of comments HHRA-03 and HHRA-05.
				Specific Response to Agency Comments: The assessment of residual effects has been revised to consider the potential risk via the sum of all operable pathways as described in TMI_956-HHRA(2)-03 which also considered the potential for bioaccumulation as described in TMI_958-HHRA(2)-05. For human health a residual adverse effect is defined when the risk for the Project Assessment Scenario via the sum of all operable pathways, exceeds the Health Canada acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario. In those cases where the potential risk via the sum of all operable exposure pathways is less than base, then the residual effect would not be adverse. The evaluation of residual adverse effects has focused on the Project Assessment Scenario recognizing that individuals cannot be exposed to the Project Alone Assessment Scenario under real world conditions. In keeping with the EIS Guidelines for the Goliath Gold Project, the estimated potential risk via the sum of all operable exposure pathways is based upon the predictions that incorporate the mitigation measures described in the revised EIS (April 2018). In keeping with risk assessment methodology, the residual adverse effects for have been identified in the absence of risk

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				management measures, however the implementation of a Health and Safety Plan at the Goliath Gold Project will be a mandatory requirement. **Residual adverse effects were identified via exposure to thallium, zinc and arsenic which were driven primarily by the country foods pathway.** As stated in the response to TMI_956-HHRA(2)-03, the current level of conservatism relied upon is the country foods assessment is not appropriate for basing mitigation measures on. With the exception of fish, no country foods were sampled as part of the baseline sampling efforts and subsequently all the concentrations in country foods were modelled via the use of literature derived uptake factors. In all cases the Project Assessment Scenario was only exceeded when the Base Case Assessment Scenario also exceeded its respective Health Canada benchmark. It is unlikely that potential risk via exposure to thallium, zinc, and arsenic via in country foods exists in the existing environment, and instead the risk estimates in exceedance of Health Canada benchmarks in the Base Case Assessment Scenario are more likely to be an artifact of the conservatism relied upon in the HHERA. By the nature of the risk assessment methodology, if the risk estimates in the existing environment are overly conservative, as are the predictions for the Project Assessment Scenario (i.e Project Alone + Base Case). The Follow-Up Program for Human Health as detailed in the Goliath Gold Project Follow Up Addendum should be used to verify the predictions presented in the HHERA, prior to making management decisions for potential exposure to thallium, zinc, and arsenic in country foods.
				Revised Response: **Part A.** The 2018 HHERA was completed under the conservative assumption that members of the public and Indigenous communities will have access to areas outside of the Operations Area and inside the Property Boundary which includes Blackwater Creek Tributary #1. The HHERA was completed to conservatively assume that members of Indigenous communities may practice their traditional use of the lands and resources, including country foods harvesting, in areas immediately adjacent to the Operations Area. As described in the 2018 HHERA Report, for safety purposes there will be no access to the Operations Area by members of the public or Indigenous communities during the active life of the project (i.e. Site Preparation and Construction, Operations, Closure). The 2018 HHERA was conservatively completed to assume that although there is no access to the Operations Area for Country Foods harvesting, a percentage of the country foods ingested would come from the Operations Area given that it will be difficult to control access to small birds and small mammals which may access the Operations Area and thus be exposed to Project-specific media and then be harvested outside of the Operations Area. Figure 3.6.3-1_Spatial Extent for Effects on Country Foods of the 2018 HHERA illustrates the overlap of the Project with various traditional land and resource uses including large game hunting and plant harvesting. Figure 3.6.3-1 is provided with the Round 2 responses as TMI_946-HE(2)-04B_Attachment 2. This information was obtained by Treasury Metals by way of a Traditional Knowledge and Land Use Study (TKLUS) for the Goliath Gold Project conducted by the Métis Nation of Ontario. At the request of the involved Rightsholders, the specific areas of country foods harvesting are to remain confidential however, as expressed on October 10, 2018 in a meeting between Treasury Metals and the MNO

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				Consultation Committee, they are satisfied with the conservative assumption that all areas in the vicinity of the Goliath Gold Project (and discussed in the HHERA) are currently used for traditional land and resource use. **Part B.** The effluent discharge pipe is not located in an area known to support or be currently used for country foods harvesting, however, the 2018 HHERA has been conservatively completed to assume that all areas outside of the Operations Area, but inside the Property Boundary may be used for country foods harvesting. The 2018 HHERA modelled the worst case chemical concentration in surface water based on predicted effluent quality into wild rice to ensure that the health of those consuming wild rice was protected. Although no surface water chemicals of concern were identified, uptake into wild rice was performed for all 14 COCs (identified in all environmental and project-specific media including methyl-mercury.) based on the maximum/worst-case surface water quality predictions. It is important to highlight that the maximum EPC in surface water (i.e. worst-case prediction) was not necessary BW1 given that surface water quality is poor in the existing environment and commitments Treasury Metals has made with respect to protecting surface water quality. Treasury Metals has committed that final effluent water quality from the treatment plant will meet PWQO values (CCME values where no PWQO value exists), or background when the background is greater than the PWQO. In the case of mercury, Treasury Metals has committed to discharge at or below a concentration of 0.00002 mg/L (based on an average upstream background concentration in Blackwater Creek). The commitment by Treasury Metals related to mercury is 10 times more stringent than the PWQO. As part of the Round 2 information request process, Treasury Metals was asked to model effluent quality rather than simply making a commitment (TMI_877-SW(2)-04) and the result indicated that for mercury, the actual concentration in the effluent (0.000002 mg/L) is 2 orders of magnitude “cleaner” (i.e. lower) than existing water quality in Blackwater Creek. As part of the Round 2 information request process, a number of Round 2 responses were received related to groundwater quality, seepage, mine waste, surface water quality and ultimately the effects on fish and fish habitat. As such, the surface water quality model has been revised to capture those changes. All of the changes, as well as revised predictions of surface water quality, have been incorporated in the revised surface water quality model described in detail in the Goliath Gold Project Water Addendum. Based on this new data as part of the Round 2 process, the HHERA was revised to include the new surface water quality model and modelled effluent quality to Blackwater Creek. **Part C.** In the 2018 HHERA, the assessment of residual effects considers the potential risk via the sum of all operable pathways as described in TMI_956-HHRA(2)-03 which also considered the potential for bioaccumulation as described in TMI_958-HHRA(2)-05. For human health a residual adverse effect is defined when the risk for the Project Assessment Scenario via the sum of all operable pathways, exceeds the Health Canada acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario. In those cases where the potential risk via

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				the sum of all operable exposure pathways is less than base, then the residual effect would not be adverse. The evaluation of residual adverse effects has focused on the Project Assessment Scenario recognizing that individuals cannot be exposed to the Project Alone Assessment Scenario under real world conditions. In keeping with the EIS Guidelines for the Goliath Gold Project, the estimated potential risk via the sum of all operable exposure pathways is based upon the predictions that incorporate the mitigation measures described in the revised EIS (April 2018). With the risk assessment methodology, the residual adverse effects for have been identified in the absence of risk management measures, however the implementation of a Health and Safety Plan at the Goliath Gold Project will be a mandatory requirement. Residual adverse effects were identified via exposure to thallium lead and arsenic which were driven primarily by the country foods pathway. As stated in the response to TMI_956-HHRA(2)-03, the current level of conservatism relied upon is the country foods assessment is not appropriate for basing mitigation measures on. With the exception of fish, no country foods were sampled as part of the baseline sampling efforts and subsequently all the concentrations in country foods were modelled via the use of literature derived uptake factors. In all cases the Project Assessment Scenario was only exceeded when the Base Case Assessment Scenario also exceeded its respective Health Canada benchmark. It is unlikely that potential risk via exposure to thallium, zinc, and arsenic via in country foods exists in the existing environment, and instead the risk estimates in exceedance of Health Canada benchmarks in the Base Case Assessment Scenario are more likely to be an artifact of the conservatism relied upon in the HHERA. By the nature of the risk assessment methodology, if the risk estimates in the existing environment are overly conservative, as are the predictions for the Project Assessment Scenario (i.e Project Alone + Base Case). The Follow-Up Program for Human Health as detailed in the Goliath Gold Project Follow Up Addendum should be used to verify the predictions presented in the HHERA, prior to making management decisions for potential exposure to thallium, zinc, and arsenic in country foods.
				<u>Agency Comment on Revised Response</u> A. To reduce uncertainty in model predictions for country foods it is recommended that baseline samples be collected to validate modeled baseline predictions prior to the beginning of construction activities. This may be conducted as part of a follow-up program measure. B. Update the country foods monitoring program to reflect the findings/uncertainty of the HHRA with explicit plans for specific contaminants to be monitored in specific media. Consider country foods information available to date from Indigenous communities, as well as from the literature (e.g. Chan et al.2014), and the uncertainty in the modelled values of thallium, zinc, arsenic, cobalt, mercury/methylmercury, and lead (see HE(2)-06, HHRA(2)-05, HHRA(2)-11A). Include fish samplings for methylmercury analysis independent of effluent concentrations. Chan et al. 2014. First Nations Food, Nutrition, and Environment Study (FNFNES): Results from Ontario (2011/2012). University of Ottawa.

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				Specific Comment to Agency Part A. As part of the Round 2 process, the Agency requested that Treasury Metals provide all Round 2 responses in draft to facilitate a more efficient review process. The draft follow-up program was submitted on September 14, 2018. Since that time a number of reviewers from the Agency, as well as technical reviewers from DFO, ECCC, NRCan, MECP, and Health Canada have requested revisions to the follow-up program. In addition, the Indigenous stakeholders and their consultants have also requested specific details with respect to follow up monitoring. Given the number of invested stakeholders, a decision was made to issue only one draft version of the Goliath Gold Follow Up Addendum and one Final Goliath Gold Project Follow Up Addendum. Comprehensive details regarding the follow up program for human health and country foods are provided in the Final Goliath Gold Follow Up Program Addendum. Part B: The Final Goliath Gold Follow Up Addendum provides the country foods monitoring program designed to reflect the findings/uncertainty of the HHERA with explicit plans for specific contaminants to be monitored in specific media. The Goliath Gold Follow Up Program Addendum described how the inclusion of community specific TK with respect to dietary consumption may be used to support the Chan et al. FNFNES study which was relied on in the HHERA. The follow up program for human health specifically states that metals and methylmercury will be analyzed in all environmental and project- specific media as well as in country foods including fish which would allow for the derivation of site-specific uptake factors to further reduce the uncertainty in the HHERA.
				FINAL RESPONSE **Part A.** The 2018 HHERA was completed under the conservative assumption that members of the public and Indigenous communities will have access to areas outside of the Operations Area and inside the Property Boundary which includes Blackwater Creek Tributary #1. The HHERA was completed to conservatively assume that members of Indigenous communities may practice their traditional use of the lands and resources, including country foods harvesting, in areas immediately adjacent to the Operations Area. As described in the 2018 HHERA Report, for safety purposes there will be no access to the Operations Area by members of the public or Indigenous communities during the active life of the project (i.e. Site Preparation and Construction, Operations, Closure). The 2018 HHERA was conservatively completed to assume that although there is no access to the Operations Area for Country Foods harvesting, a percentage of the country foods ingested would come from the Operations Area given that it will be difficult to control access to small birds and small mammals which may access the Operations Area and thus be

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				exposed to Project-specific media and then be harvested outside of the Operations Area. Figure 3.6.3-1_Spatial Extent for Effects on Country Foods of the 2018 HHERA illustrates the overlap of the Project with various traditional land and resource uses including large game hunting and plant harvesting. Figure 3.6.3-1 is provided with the Round 2 responses as TMI_946-HE(2)-04B_Attachment 2. This information was obtained by Treasury Metals by way of a Traditional Knowledge and Land Use Study (TKLUS) for the Goliath Gold Project conducted by the Métis Nation of Ontario. At the request of the involved stakeholders, the specific areas of country foods harvesting are to remain confidential however, as expressed on October 10, 2018 in a meeting between Treasury Metals and the MNO Consultation Committee, they are satisfied with the conservative assumption that all areas in the vicinity of the Goliath Gold Project (and discussed in the HHERA) are currently used for traditional land and resource use. **Part B.** The effluent discharge pipe proposed location is not located in an area known to support or be currently used for country foods harvesting, however, the 2018 HHERA has been conservatively completed to assume that all areas outside of the Operations Area, but inside the Property Boundary may be used for country foods harvesting. The 2018 HHERA modelled the worst case chemical concentration in surface water based on predicted effluent quality into wild rice to ensure that the health of those consuming wild rice was protected. Although no surface water chemicals of concern were identified, uptake into wild rice was performed for all 14 COCs (identified in all environmental and project-specific media including methyl-mercury) based on the maximum/worst-case surface water quality predictions. It is important to highlight that the maximum EPC in surface water (i.e. worst-case prediction) was not necessary BW1 given that surface water quality is poor in the existing environment and commitments Treasury Metals has made with respect to protecting surface water quality. Treasury Metals has committed that final effluent water quality from the treatment plant will meet PWQO values (CCME values where no PWQO value exists), or background when the background is greater than the PWQO. In the case of mercury, Treasury Metals has committed to discharge at or below a concentration of 0.00002 mg/L (based on an average upstream background concentration in Blackwater Creek). The commitment by Treasury Metals related to mercury is 10 times more stringent than the PWQO. As part of the Round 2 information request process, Treasury Metals was asked to model effluent quality rather than simply making a commitment (TMI_877-SW(2)-04) and the result indicated that for mercury, the actual concentration in the effluent (0.000002 mg/L) is 2 orders of magnitude “cleaner” (i.e. lower) than existing water quality in Blackwater Creek. As part of the Round 2 information request process, a number of Round 2 responses were received related to groundwater quality, seepage, mine waste, surface water quality and ultimately the effects on fish and fish habitat. As such, the surface water quality model has been revised to capture those changes. All of the changes, as well as revised predictions of surface water quality, have been incorporated in the revised surface water quality model described in detail in the Goliath Gold Project Water Addendum. Based on this new data as part of the Round 2

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				process, the HHERA was revised to include the new surface water quality model and modelled effluent quality to Blackwater Creek. **Part C.** In the 2018 HHERA, the assessment of residual effects considers the potential risk via the sum of all operable pathways as described in TMI_956-HHRA(2)-03 which also considered the potential for bioaccumulation as described in TMI_958-HHRA(2)-05. For human health a residual adverse effect is defined when the risk for the Project Assessment Scenario (i.e. Project Alone + Baseline) via the sum of all operable pathways, exceeds the Health Canada acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario. In those cases where the potential risk via the sum of all operable exposure pathways is less than base, then the residual effect would not be adverse. The evaluation of residual adverse effects has focused on the Project Assessment Scenario recognizing that individuals cannot be exposed to the Project Alone Assessment Scenario under real world conditions. In keeping with the EIS Guidelines for the Goliath Gold Project, the estimated potential risk via the sum of all operable exposure pathways is based upon the predictions that incorporate the mitigation measures described in the revised EIS (April 2018). The results of the HHRA identified residual adverse effects for three of the valued components; arsenic, zinc, and thallium. Residual adverse effects for human health were identified to both the resident and visitor/harvester receptors for thallium (non-cancer risk), zinc (non-cancer risk), and arsenic (cancer risk). Ingestion of country foods contributed the highest proportion to the overall characterization of residual adverse effects via the sum of risk from all operable exposure pathways. The country foods assessment relied solely on the use of modelled chemical concentration data as a baseline country foods study was not completed in support of the revised EIS (April 2018), as such there are uncertainties associated with the predictions which are likely to overestimate the calculations used to determine residual adverse effects. A detailed follow up program has been provided in the Final Goliath Gold Follow Up Program Addendum to verify the predictions related to country foods and other pathways used in the assessment of residual adverse effects on human health. The results of the HHRA indicated that there would be no residual adverse effects to a Project Worker with the implementation of a Health and Safety Plan which includes the prescribed use of personal protective equipment such as dust masks/respirator, long pants and sleeves, and gloves when working within the Operations Area of the Project. The incremental risks associated with the Project relate to the exposure of country foods to the media present within the operations area (e.g., TSF supernatant water and waste rock during the active phases of the Project). The country foods affected by these Project media are restricted to the local study area and are unlikely to be exposed to contaminants from other Projects. In the case of human consumption, it is reasonable that humans could consume country foods from other areas within the larger region. However, this consumption would offset the consumption of food potentially affected by the Goliath Gold Project, thereby reducing the potential risk associated with the Goliath Gold Project. Therefore, cumulative effects associated with the identified residual adverse effects of the Project on

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				human health (i.e., thallium, zinc, and arsenic) via the country foods pathway are not likely to occur. As there were residual adverse effects (effects that remain after the implementation of mitigation and risk management measures), a determination of magnitude was done in accordance with Section 13.1 of the EIS Guidelines (CEAA, 2013). The significance assessment determined that all of the residual adverse effects were classified as having magnitude of Level I. Effects of a Level I magnitude are not considered significant, therefore there were no significant residual adverse effects. The Follow-Up Program for Human Health as detailed in the Final Goliath Gold Project Follow Up Addendum will be used to verify the predictions presented in the HHERA.

TMI_923-HE(2)-03

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_923-HE(2)-03	HE(2)-03	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3
				Reference to EIS / Appendix	Appendix W-2, Section 3.5.3; Section 5.9, Figure 5.9.3.2-1
				Cross-reference to Round 1 IRs	TMI_347-AC(1)-21, TMI_348-AC(1)-22, TMI_354-AC(1)-28, TMI_361-AC(1)-35, TMI_485-AC(1)-159, TMI_500-AC(1)-174, TMI_618-AC(1)-291, TMI_619-AC(1)-292, TMI_651-AC(1)-324, TMI_654-AC(1)-327, TMI_787-AC(1)-368, TMI-797-AC(1)-378, TMI_822-AC(1)-403, TMI_850-AC(1)-431
				Context and Rationale: Section 3.5.3 of the June 2018 HHRA (Appendix W-2 of the revised EIS) does not include wild rice as a country food studied in the country foods assessment. Several Indigenous groups indicated in previous comments to the Agency that wild rice is an economic resource, and consumed by their people. The Agency notes particular concern in relation to contamination of wild rice. Figure 5.9.3.2-1 of the revised EIS shows known locations of wild rice stands near the Project. It is unclear why wild rice was not included in the country foods assessment.	

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				To reassure Indigenous groups that the environmental assessment predictions are accurate, in areas where there may be uncertainty in relation to wild rice, follow-up program measures should be identified, such as appropriate follow-up monitoring, notification and regular communication with Indigenous groups.
				Specific Question / Request for Information: A. Include wild rice in the country foods assessment, or provide a rationale for excluding it. B. Describe additional mitigation measures to reduce potential effects on wild rice harvested at or near the Project. C. Provide details of the follow-up program related to wild rice, to confirm that EA predictions are acceptable.
				Response: A. This response has been superseded by TMI_945-HE(2)-03B Part A B. This response has been superseded by TMI_945-HE(2)-03B Part B C. This response has been superseded by TMI_945-HE(2)-03B Part C
				Agency Comment on Draft Response None Received
				Revised Response Not required. Agency accepted Draft Response.

TMI_924-HE(2)-04

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_924-HE(2)-04	HE(2)-04	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3
				Reference to EIS / Appendix	Appendix W-2, Section 3.1.1; Appendix EE, Figures 5.1 and 5.2; Section 5.9; Section 13

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				Cross-reference to Round 1 IRs: n/a
				Context and Rationale: It is unclear whether the proponent considered the guidance document published by Health Canada in 2018 when evaluating human health impacts by country foods. This guidance should be followed by the proponent in the development of the final HHRA. Figure 3.1.1-1 of the June 2018 HHRA does not clearly mark the locations of receptors being considered for the study. The locations of all receptors (including locations of traditional use of lands and resources, permanent residences, seasonal cottages/cabins, and recreational areas for determination of potential effects under subsection 5(2) of the *Canadian Environmental Assessment Act, 2012*) should be clearly identified to ensure that the receptors are selected in accordance with the land use in the area. Ensure that any new receptor locations identified through IR# AE(2)-03B are included in Figure 3.1.1-1. In areas where there would be a pathway that could impact human health, in relation to country food harvesting activities that would be permitted to continue, provide a detailed map. The map should include specific locations of country food harvesting activities (i.e., hunting, gathering, fishing etc.). This map, or series of maps, would consolidate and update the information provided in Appendix EE, Figure 5.1 and 5.2, and from maps showing locations of various plants in Section 5.9 of the revised EIS. Areas of potential fish harvesting should also be identified in waterbodies, given the bioaccumulative potential of metals, such as methylmercury. To reassure Indigenous groups that the environmental assessment predictions are accurate, in areas where there may be uncertainty in relation to human health or country foods, follow-up program measures should be identified, such as appropriate follow-up monitoring, notification and regular communication with Indigenous groups. These maps will be useful in developing these follow-up programs, to understand where potentially affected country foods may be found in the vicinity of the Project. It is unclear, at this time, what country foods will be monitored, and at what locations and times. Reference: Health Canada. 2018. Guidance for Evaluating Human Health Impacts in Environmental Assessments: Country Foods. https://www.canada.ca/en/health- canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-country-foods.html

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				Specific Question / Request for Information: A. Use the 2018 Health Canada guidance for the final HHRA to evaluate the human health impacts by country foods. B. Update Figure 3.1.1-1 to clearly mark the locations of off- site receptors. Ensure that any new receptor locations identified through IR# AE(2)-03B are included in the figure. C. Categorize the receptor points located in question B to distinguish locations of traditional use of lands and resources, permanent residences, seasonal cottages/cabins, and recreational areas. D. Provide a detailed map of the country foods harvesting areas including areas of potential fish harvesting. The Agency recognizes that some of this information may be confidential, in which case the existence of such areas may be mentioned without locating on the map. E. Provide details of the follow-up programs related to human health and country foods, to confirm that EA predictions made about country foods are acceptable. It is noted that the follow-up program related to wild rice would be provided in response to IR# HE(2)-03C.
				Response: A. This response has been superseded by TMI_946-HE(2)-04B Part A B. This response has been superseded by TMI_946-HE(2)-04B Part B C. This response has been superseded by TMI_946-HE(2)-04B Part C D. This response has been superseded by TMI_946-HE(2)-04B Part D E. This response has been superseded by TMI_946-HE(2)-04B Part E
				Agency Comment on Draft Response None Received
				FINAL RESPONSE Agency accepted Draft Response as Final.

TMI_925-HE(2)-05

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_925-HE(2)-05	HE(2)-05	3	CEA Agency	**Reference to EIS Guidelines:**	Sections 10.1.3, 11.4
				Reference to EIS / Appendix	Section 13; Appendix W-2, Section 3.3.3.4
				Cross-reference to Round 1 IRs	TMI_207-HE(1)-14
				Context and Rationale: Section 3.3.3.4 of the updated HHRA indicates that the Post-Closure (Abandonment) Phase is "when human and ecological receptors may also once again have full access to the project site (i.e. it will no longer be fenced)." The same section also indicates that "the pit lake will be monitored as it is filling to determine whether batch treatment will be required to ensure the water meets PWQO [Provincial Water Quality Objectives] or background if background levels exceed the PWQO". It does not appear that the pit lake will be monitored against health-based guidelines to protect human receptors from ingestion of pit water, or receiving surface water (i.e., Blackwater Creek Tributary #1) of groundwater affected by the Project. No information was provided to indicated that Indigenous people would not be in contact with surface water, or that exposure would be limited or minimized (e.g. signage, fencing, risk communication strategies).	
				Specific Question / Request for Information: A. Update monitoring and follow up plans to assume that local human receptors will fully resume the traditional land use at the site during the abandonment phase, and that Indigenous people may be in contact with surface water unless additional justification can be presented to indicate that exposure will be limited/minimized (e.g. signage, fencing, risk communication strategies etc.).	
				Response: **PART A.** An updated Follow-Up Program including details of monitoring with respect to confirming the predicted effects outlined in the HHERA (August 2018) with respect to changes in country foods for consumption and human health. The details provided in Section 7 of the HHERA (August 2018) supersede the details in Section 13.19 of the EIS (April, 2018), however all other Follow-Up Programs and Monitoring including on current land and resource use for traditional purposes remain valid unless specifically stated otherwise as part of the Round 2 Information Request Responses.	

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				Information regarding traditional land and resource use relied upon in the HHERA is described in Section 3.6.2 of the HHERA (August, 2018). The HHERA (August, 2018) conservatively assumed that not only would human receptors would fully resume the traditional land use within all areas of the Property Boundary including the Operations Area during Post-Closure (i.e. abandonment) but that a percentage of the food during all Project phases would be exposed to the Operations Area and associated Project-specific media. The Follow-Up Plan for human health including country foods is provided in Section 7 of the HHERA (August, 2018) and captures this assumption. In accordance with *CEAA 2012*, the Follow-Up Program is procedural methodology for "verifying the accuracy of the environmental assessment of a designated project", and for "determining the effectiveness of any mitigation measures", that are implemented to mitigate the adverse effects of the project. In accordance with the EIS Guidelines, the follow-up program is described in "sufficient detail to allow independent judgment as to the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them), and to confirm both the assumptions and the effectiveness of mitigation". Although no adverse effects were identified in the HHERA (August, 2018) via ingestion of country foods as a result of the Goliath Gold Project, the Follow-Up Program provided was sufficiently detailed to ensure that the program and associated monitoring outlined could be used for verifying the accuracy of the HHERA (August, 2018) provided in support of the EIS (April 2018).
				Agency Comment on Draft Response None Received
				FINAL RESPONSE An updated Follow-Up Program, which supersedes Section 13 of the revised EIS (April 2018), has been provided in support of the Round 2 process as the Goliath Gold Follow Up Program Addendum. The updated Follow-Up Program including details of monitoring with respect to confirming the predicted effects outlined in the HHERA (August 2018) with respect to changes in country foods for consumption and human health. Information regarding traditional land and resource use relied upon in the HHERA is described in Section 3.6.2 of the 2018 HHERA. The 2018 HHERA conservatively assumed that not only would human receptors fully resume the traditional land use within all areas of the Property Boundary including the Operations Area during Post-Closure (i.e. abandonment) but that a percentage of the food during all Project phases would be exposed to the Operations Area and associated Project-specific media.

TMI_926-HE(2)-06

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_926-HE(2)-06	HE(2)-06	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3, 12.1.2
				Reference to EIS / Appendix	Appendix W-2, Section 3.2.4
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: The Agency is aware that the submitted HHRA is a draft document. Section 3.2.4 of the June 2018 HHRA (Appendix W-2 of the revised EIS) indicates that the human health is currently not included in the cumulative effects assessment. If residual effects to human health are predicted from the final HHRA (Appendix W-2 of the revised EIS), then the cumulative effects assessment should be updated to reflect this.	
				Specific Question / Request for Information: A. Update the cumulative health effects section to include any residual effects predicted in the final HHRA.	
				Response: Part A: The HHERA (August 2018) confirmed that with risk management measures in place, including a Health and Safety Plan for Project Workers, no potential health risks were identified. The Health and Safety Plan serves as an effective mitigation measure for human health and no residual adverse effects are identified (MIT_130, Section 10 of the EIS (April 2018)). A cumulative effects assessment of human health is not required as per the EIS guidelines for the Goliath Gold Project (Appendix Y of the EIS (April 2018)).	

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				Agency Comment on Draft Response: A. HC does not agree with the HHRA conclusion that no residual adverse health effects are identified. Refer to HC comments for HHRA-03 for more details.
				Specific Response to Agency Comments: A. Include a discussion related to the HC advice provided in HHRA-03 and update the HHRA to justify the conclusion that no residual adverse health effects are expected.
				Revised Response: The 2018 HHERA has been revised in response to Agency comments on the Draft HHERA submitted in August 2018. The assessment of residual effects has been revised to consider the potential risk via the sum of all operable pathways as described in TMI_956-HHRA(2)-03 which also considered the potential for bioaccumulation as described in TMI_958-HHRA(2)-05. For human health a residual adverse effect is defined when the risk for the Project Assessment Scenario via the sum of all operable pathways, exceeds the Health Canada acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario. In those cases where the potential risk via the sum of all operable exposure pathways is less than base, then the residual effect would not be adverse. The evaluation of residual adverse effects has focused on the Project Assessment Scenario recognizing that individuals cannot be exposed to the Project Alone Assessment Scenario under real world conditions. In keeping with the EIS Guidelines for the Goliath Gold Project, the estimated potential risk via the sum of all operable exposure pathways is based upon the predictions that incorporate the mitigation measures described in the revised EIS (April 2018). With the risk assessment methodology, the residual adverse effects for have been identified in the absence of risk management measures, however the implementation of a Health and Safety Plan at the Goliath Gold Project will be a mandatory requirement. Residual adverse effects were identified via exposure to thallium, zinc and arsenic which were driven primarily by the country foods pathway. As stated in the response to TMI_956-HHRA(2)-03, the current level of conservatism relied upon is the country foods assessment is not appropriate for basing mitigation measures on. With the exception of fish, no country foods were sampled as part of the baseline sampling efforts and subsequently all the concentrations in country foods were modelled via the use of literature derived uptake factors. In all cases the Project Assessment Scenario was only exceeded when the Base Case Assessment Scenario also exceeded its respective Health Canada benchmark. It is unlikely that potential risk via exposure to thallium, zinc, and arsenic via in country foods exists in the existing environment, and instead the risk estimates in exceedance of Health Canada benchmarks in the Base Case Assessment Scenario are more likely to be an artifact of the conservatism relied upon in the HHERA. By the nature of the risk assessment methodology, if the risk estimates in the existing environment are overly conservative, as are the predictions for the Project Assessment Scenario (i.e Project Alone +

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				Base Case). The Follow-Up Program for Human Health as detailed in the Goliath Gold Project Follow Up Addendum should be used to verify the predictions presented in the HHERA, prior to making management decisions for potential exposure to thallium, zinc, and arsenic in country foods. In the revised 2018 HHERA, a qualitative interpretation of cumulative effects and "significance" has been provided as pre this information request.
				<u>Agency Comment on Revised Response</u> A. The proponent acknowledged that residual adverse effects are identified for residents and visitors/harvesters via ingestion of thallium, zinc and arsenic in country food (HHRA section 6.1.5, pg. 311). However, the proponent came to the conclusion that "*…this is unlikely to be a valid representation of potential risk in the existing environment but rather an artifact of the conservative assumptions relied upon in the risk assessment and the use of literature derived uptake factors for modelling chemical concentration into country food tissue*". HC does not support the proponent's view and conclusion for the reasons mentioned in HC's comment on HHRA(2)-05. **A. Provide detailed rationale with examples to verify the proponent's conclusion that adverse health effects are unlikely to occur due to the conservative assumptions employed in the study. Alternatively, re-assess the health effects based on conservative but realistic assumptions and provide detailed discussion on the assessment result. In the absence of further rationale or re-assessment, remove the HHRA conclusion that the predicted adverse health risks could be an artefact of the conservative assumptions.** B. Furthermore, the adverse health risk via the ingestion of cobalt in country food (HQ of 1.9 for toddler and 1.1 for adult residents/visitors/harvesters) exceeded the threshold HQ of 1.0 in Study Areas 2 and 3 (HHRA Tables 4.4.1.3-1A and 1B). However, the proponent concluded that "there is no risk associated with cobalt in country foods" as "*the Project is contributing minimally to potential risk relative to Base Case as indicated by the lack of exceedances in the Project Alone Assessment Scenario*" (HHRA section 4.4.1.3, pg. 167) and did not consider cobalt for further assessment. It is not appropriate to determine the adverse health effects by comparing to the baseline risk level as this approach inherently considers the incremental (project) risk only (see HC comment on HHRA(2)-03A). **B. Assess the residual adverse effects of cobalt based on the total risk (i.e. baseline + project risks) and update the follow-up monitoring plans.**

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				Response to Agency Comment **Part A.** A final HHERA report entitled the Final HHERA (February 2019) has been provided that incorporates all Round 2 information requests, as well as informal requests made by Health Canada and The Agency. The language in Final HHERA (February 2019) supersedes all language in the previous drafts (i.e. August and November Submissions). Residual adverse effects are driven by the sum of all exposure pathways i.e. inhalation, dermal contact and ingestion (see TMI_956-HHRA(2)-03). Therefore, residual adverse effects cannot be identified via ingestion of thallium, zinc and arsenic in country food pathway alone. Residual adverse effects to three valued components were identified and carried forward for consideration of cumulative effects and significance as per the Project guidelines define by CEAA. No cumulative effects were identified and all of the residual adverse effects were not determined to be significant based on a magnitude level of I. The final language reads as follows: *"The results of the HHRA identified residual adverse effects for three of the valued components; arsenic, zinc, and thallium. Residual adverse effects for human health were identified to both the resident and visitor/harvester receptors for thallium (non-cancer risk), zinc (non-cancer risk), and arsenic (cancer risk). Ingestion of country foods contributed the highest proportion to the overall characterization of residual adverse effects via the sum of risk from all operable exposure pathways. The country foods assessment relied solely on the use of modelled chemical concentration data as a baseline country foods study was not completed in support of the revised EIS (April 2018), as such there are uncertainties associated with the predictions which are likely to overestimate the calculations used to determine residual adverse effects. A detailed follow up program has been provided in the Final Goliath Gold Follow Up Program Addendum to verify the predictions related to country foods and other pathways used in the assessment of residual adverse effects on human health. The results of the HHRA indicated that there would be no residual adverse effects to a Project Worker with the implementation of a Health and Safety Plan which includes the prescribed use of personal protective equipment such as dust masks/respirator, long pants and sleeves, and gloves when working within the Operations Area of the Project."* It is important to note to Health Canada that during the review of the November HHERA submission, the Agency noted that there were discrepancies in the simple mathematical addition between the baseline data (i.e. Base Case Assessment Scenario) and the Project + Baseline data (i.e Project Assessment Scenario). Treasury Metals and their consultants informed the Agency that this was due to the use of measured fish data in the Base Case Assessment Scenario, versus modelled fish data in all other assessment scenarios. For most parameters, measured fish and modelled fish correlated reasonably well, however for thallium, the correlation was not close which modeled thallium concentrations being 2 orders of magnitude higher than what was actually measured in the fish tissue collected in the

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existing environment (Figure 1 below). Therefore, the misleading results were indicating that the project was contributing to thallium risk. The data in Figure 1 below show a direct comparison between measured fish and modelled fish concentrations at baseline for all 14 COCs. For thallium the actual concentration measured in fish is two orders of magnitude lower than what is predicted using modelled data. Therefore, the results as presented in the November 2018 HHERA which used measured thallium concentrations in fish at baseline, and modelled concentrations of thallium for all Project phases through post-closure indicated that there was potential risk via exposure to thallium in country foods which drove the overall conclusions regarding residual adverse effects.

Parameter	Symbol	Measured Fish Concentration (mg/kg)	Modelled Fish Concentration (mg/kg)
Antimony	Sb	0.00315	0.00459
Arsenic	As	0.04219	0.00806
Cadmium	Cd	0.00219	0.00288
Cobalt	Co	0.00575	0.04124
Copper	Cu	0.19948	0.08219
Lead	Pb	0.01614	0.00928
Mercury	Hg	0.22503	0.08391
Methyl-Mercury	Me-Hg	0.22503	0.93228
Thallium	Tl	0.00437	0.45564
Uranium	U	0.00175	0.05727
Zinc	Zn	8.85213	0.91764
Aluminum	Al	2.94688	10.26945
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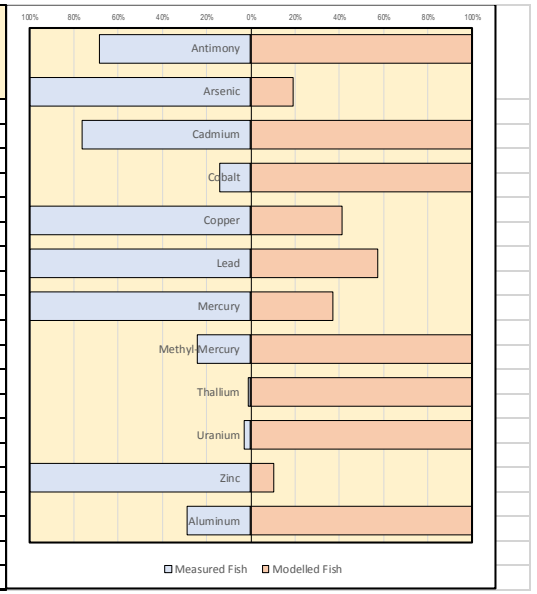

At the request of the Agency, the HHERA model was re-run to use modelled fish data at baseline so that a reasonable comparison and conclusions could be made based on modelled concentrations of thallium through post-closure. The numerical values in the Final HHERA (February 2019) are different as a result. Furthermore, the HHRA conclusions have been revised so that the predicted adverse health risks could be an artefact of the conservative assumptions is removed.

The Final Goliath Gold Follow Up Addendum provides the country foods monitoring program designed to reflect the findings/uncertainty of the HHERA with explicit plans for specific contaminants to be monitored in specific media. The Goliath Gold Follow Up Program Addendum described how the inclusion of community specific TK with respect to

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				dietary consumption may be used to support the Chan et al. First Nations Food, Nutrition & Environment Study (FNFNES) study which was relied on in the HHERA. The follow up program for human health specifically states that metals and methylmercury will be analyzed in all environmental and project- specific media as well as in country foods including fish which would allow for the derivation of site-specific uptake factors to further reduce the uncertainty in the HHERA. **Part B:** As stated in Part A, at the request of the Agency and their reviewers in TMI_956-HHRA(2)-03, the HHERA has been revised to determine residual adverse effects via the sum of all pathways. An assessment of residual adverse effects was performed for all 14 COCs including cobalt for each human receptor based on Project + Baseline i.e. the Project Assessment Scenario. This information was provided in Section 4.6 of the November HHERA submission and is included in Section 4.6 of the Final HHERA (February 2019). There were no residual adverse effects determined for cobalt via the sum of all exposure pathways. The definition of a residual adverse effect is as follows: *"For human health a residual adverse effect is defined when the risk for the Project Assessment Scenario via the sum of all operable pathways, exceeds the Health Canada acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario. In those cases where the potential risk via the sum of all operable exposure pathways is less than base, then the residual effect would not be adverse"*
				FINAL RESPONSE A residual adverse effect is defined when the risk for the Project Assessment Scenario (i.e. Project Alone + Base Case) via the sum of all operable pathways, exceeds the acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario. In those cases where the potential risk via the sum of all operable exposure pathways is less than Base Case, then the residual effect would not be adverse. The evaluation of residual adverse effects has focused on the Project Assessment Scenario recognizing that individuals cannot be exposed to the Project Alone Assessment Scenario under real world conditions. For human health exposure to criteria air contaminants (CACs) the operable pathway is via the inhalation of air pathway and therefore residual adverse effects were characterized based on the inhalation pathway alone. Whereas, for inorganic metals (and methylmercury) human exposure may be via the inhalation and via direct contact with soil, water, Project-specific media and ingestion of country foods, therefore residual adverse effects are characterized based on the sum of all operable exposure pathways. In keeping with the EIS Guidelines for the Goliath Gold Project, the estimated potential risk via the sum of all operable exposure pathways is based upon the predictions that incorporate the mitigation measures described in the revised EIS (April 2018). In keeping with risk assessment methodology, the residual adverse effects for have been identified in the absence of risk management measures, however the implementation of a Health and Safety Plan at the Goliath Gold Project will be a mandatory requirement. Where residual effects are identified (section 4.5), as per the EIS

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				guidelines for the Goliath Gold Project, they were carried forward to for an assessment of cumulative effects (section 4.7) and determination of significance (section 4.8). The results of the HHERA screening identified 14 contaminants of concern/valued components in soil, air, water and/or Project-specific media based on exceedances of their respective criteria/guidelines/standards. All 14 were carried forward for a quantitative human health risk assessment and assessment of residual adverse effects, cumulative effects, and significance. The results of the HHRA identified residual adverse effects for three of the valued components; arsenic, zinc, and thallium. Residual adverse effects for human health were identified to both the resident and visitor/harvester receptors for thallium (non-cancer risk), zinc (non-cancer risk), and arsenic (cancer risk). Ingestion of country foods contributed the highest proportion to the overall characterization of residual adverse effects via the sum of risk from all operable exposure pathways. The country foods assessment relied solely on the use of modelled chemical concentration data, as a baseline country foods study was not completed in support of the revised EIS (April 2018). As such there are uncertainties associated with the predictions which are likely to result in an overestimate the calculations used to determine residual adverse effects. A detailed follow up program has been provided in the Final Goliath Gold Follow Up Program Addendum to verify the predictions related to country foods and other pathways used in the assessment of residual adverse effects on human health. The results of the HHRA indicated that there would be no residual adverse effects to a Project Worker with the implementation of a Health and Safety Plan which includes the prescribed use of personal protective equipment such as dust masks/respirator, long pants and sleeves, and gloves when working within the Operations Area of the Project. The incremental risks associated with the Project relate to the exposure of country foods to the media present within the operations area (e.g., TSF supernatant water and waste rock during the active phases of the Project). The country foods affected by these Project media are restricted to the local study area and are unlikely to be exposed to contaminants from other Projects. In the case of human consumption, it is reasonable that humans could consume country foods from other areas within the larger region. However, this consumption would offset the consumption of food potentially affected by the Goliath Gold Project, thereby reducing the potential risk associated with the Goliath Gold Project. Therefore, cumulative effects associated with the identified residual adverse effects of the Project on human health (i.e., thallium, zinc, and arsenic) via the country foods pathway are not likely to occur. As there were residual adverse effects (effects that remain after the implementation of mitigation and risk management measures), a determination of magnitude was done in accordance with Section 13.1 of the EIS Guidelines (CEAA, 2013). The EIS Guidelines go on to describe the elements that should be considered when determining environmental significance under CEAA 2012. These include the following: • Magnitude; • Geographic extent; • Timing and duration; • Frequency; and

<table>
<tr><th>Unique Identifier</th><th>Agency IR #</th><th>Annex</th><th>Agency / Group / Stakeholder</th><th>Cross Reference / Comment / Information Request / Response</th></tr>
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Reversibility.
In assigning levels of magnitude, the thresholds set out in Table 1.
Table 1: Definitions for Levels of Magnitude
<table>
<tr><th></th><th>I</th><th>II</th><th>III</th></tr>
<tr><td>Non-Cancer Risk</td><td>Base Case HQ and Project Case HQ are within 1 order of magnitude</td><td>Project Case HQ is between 1 and 2 orders of magnitude higher than Base Case HQ</td><td>Project Case HQ is more than 2 orders of magnitude higher than Base Case HQ</td></tr>
<tr><td>Cancer Risk</td><td>Base Case ILCR and Project Case ILCR are within 1 order of magnitude</td><td>Project Case ILCR is between 1 and 2 orders of magnitude higher than Base Case ILCR</td><td>Project Case ILCR is more than 2 orders of magnitude higher than Base Case ILCR</td></tr>
<tr><td>Lead Risk</td><td>Base Case MOE and Project Case MOE are within 1 order of magnitude</td><td>Project Case MOE is between 1 and 2 orders of magnitude less than Base Case MOE</td><td>Project Case MOE is more than 2 orders of magnitude lower than Base Case MOE</td></tr>
<tr><td colspan="4">NOTES:
A residual adverse effect is defined when the risk for the Project Assessment Scenario via the sum of all operable pathways, exceeds the Health Canada acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario.</td></tr>
</table>

The significance assessment determined that all of the residual adverse effects were classified as having magnitude of Level I. There was no requirement to classify the other assessment measures. Effects of a Level I magnitude are not considered significant. Therefore, there were no significant residual adverse effects identified for human health.

The Final Goliath Gold Follow Up Addendum provides the country foods monitoring program designed to reflect the findings/uncertainty of the HHERA with explicit plans for specific contaminants to be monitored in specific media. The Goliath Gold Follow Up Program Addendum described how the inclusion of community specific Traditional Knowledge with respect to dietary consumption may be used to support the Chan et al. First Nations Food, Nutrition & Environment Study (FNFNES) study which was relied on in the HHERA. The follow up program for human health specifically states that metals and methylmercury will be analyzed in all environmental and project- specific media as
</td></tr>
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Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				well as in country foods including fish which would allow for the derivation of site-specific uptake factors to further reduce the uncertainty in the HHERA.

TMI_927-HE(2)-07

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_927-HE(2)-07	HE(2)-07	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3
				Reference to EIS / Appendix	Appendix W-2, Section 4.0
				Cross-reference to Round 1 IRs	TMI_218-HE(1)-25
				Context and Rationale: The proponent provided worked examples for important exposure scenarios, such as the inhalation of fugitive dust, and ingestion of country foods via wild game, fish and plants, in response to IR# HE(1)-25. These examples should be updated to reflect changes in the final HHRA (Appendix W-2 of the revised EIS), and included as an appendix in the final HHRA. Worked examples allow reviewers to validate the formulas and input values used in deriving the estimated exposures.	
				Specific Question / Request for Information: A. Include updated worked examples for each exposure scenario in the final HHRA, preferably as an appendix to the final HHRA.	

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				Response: Part A. Appendix III "Sample Calculations" to the HHERA (August, 2018) provides updated worked examples for each exposure scenario in the final HHRA.
				Agency Comment on Draft Response None Received
				FINAL RESPONSE Agency accepted Draft Response as Final.

TMI_928-HE(2)-08

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_928-HE(2)-08	HE(2)-08	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3
				Reference to EIS / Appendix	Appendix W, Table M and Table 5, Appendix W-2, Table 3.5.2.3-1
				Cross-reference to Round 1 IRs	TMI_204-HE(1)-11, TMI_328-SD(1)-23
				Context and Rationale: Appendix W, Section 4.4.2, Table M of the revised EIS indicates a toxicological reference value (TRV) for lead of 0.0036 ug/kg- bw/day. It is assumed that the units are erroneous, and were meant to be "mg/kg- bw/day". It is unclear whether this TRV was used in the June 2018 HHRA (Appendix W-2 of the revised EIS). The proponent does not appear to have considered the benchmark dose limit (BMDL) for lead of 0.5 µg/kg-bw/day) published by European Food Safety Authority in 2010, which is similar to the reference value proposed by the World Health	

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				Organization and the Joint FAO/WHO Expert Committee on Food Additives (WHO/JECFA) in 2011. These TRVs are substantially smaller than the proposed TRV employed by the proponent (3.6 µg/kg bw/day). As such, the health risk of lead exposure could have been underestimated. A Canadian Drinking Water Quality Guideline (CDWQG) threshold of 10 µg/L was provided for selenium in the June 2018 HHRA, Table 3.5.2.3-1, based on a Health Canada reference from 2012. Note that the CDWQG for selenium was updated in 2014 based on recent scientific findings, and is now 50 µg/L. References: European Food Safety Authority. 2010. Scientific Opinion on Lead in Food: EFSA Panel on Contaminants in the Food Chain (CONTAM). EFSA Journal; 8(4):1570. World Health Organization and Joint FAO/ WHO Expert Committee on Food Additives. 2011. Safety evaluation of certain food additives and contaminants: Lead (page 381-497). WHO, Geneva. Health Canada. 2014. Guidelines for Canadian Drinking Water Quality – Summary Table. Ottawa, Ontario. Health Canada. Available online at: https://www.canada.ca/content/dam/hc-sc/migration/hc- sc/ewh- semt/alt_formats/pdf/pubs/water-eau/sum_guide- res_recom/sum_guide-res_recom-eng.pdf
				Specific Question / Request for Information: A. Use the updated lead TRV and the updated Health Canada CDWQG threshold for selenium in the final HHRA.
				Response: A. The TRV selected for lead in the HHERA Report (August, 2018) was 5×10^{-4} mg/kg/ day provided by JECFA (2011) and EFSA (2013) based on developmental neurotoxicity in children and changes in systolic blood pressure in adults. Due to recent changes in regulatory guidance, lead (unlike any other COC) is no longer considered to be a threshold toxic chemical. Health Canada (2013) and other jurisdictions (California EPA 2009; WHO 2007) currently support the concept that lead and lead compounds are non-threshold substances. Evaluation of lead toxicity and risks based on exposure limits is no longer recommended by these agencies. The current scientific evidence suggests that previously published exposure limits may not adequately reflect the actual risk related to lead exposure. Unlike the other non-cancer COCs, the TRV for lead is based on a non-threshold effect. As such, it is not assessed based on a HQ of 0.2, but rather an exceedance of a risk specific dose. The lead exposure dose and risk characterization data set broken down by Project phase, receptor, and exposure pathway or each of the three Study Areas and all Assessment Scenarios, is provided in Appendix V of the HHERA (August, 2018).

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				The updated Health Canada CDWQG threshold for selenium was included in the final HHERA. Given that the new guideline is less conservative than the former guideline no new exceedances were identified.
				Agency Feedback on Draft Response Health Canada acknowledges that the revised HHRA will provide a follow-up program for country foods to confirm the current predictions. Health Canada also acknowledges that the HHRA included the risk levels of lead for the off-site human receptors in Table 4.6-1 to 3. However, the HHRA did not characterize the non-threshold toxicological effects of lead for these off-site receptors. As acknowledged by the proponent, a Tolerable Daily Intake (TDI) approach for lead is no longer considered appropriate as more recent scientific evidence suggest that there may be a risk at any level of exposure. Please note that the BMDL value used in the HHRA does not necessarily indicate that there are any 'safe' levels of lead exposure. A. Provide detailed characterizations about the adverse health risks of the off-site receptors (i.e., receptors that use areas beyond the Operations Area and within the updated property boundary) exposed to lead in country food.
				Specific Response to Agency Comment This IR has been superseded by TMI_964-HHRA(2)-11
				Final Response This IR has been superseded by TMI_964-HHRA(2)-11

TMI_929-HE(2)-09

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_929-HE(2)-09	HE(2)-09	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3, 11.4
				Reference to EIS / Appendix	Appendix W, Section 4.5.6

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				Cross-reference to Round 1 IRs: TMI_207-HE(1)-14, TMI_217-HE(1)-24
				Context and Rationale: The proponent's response to IR# HE(1)-14 indicates that "tissue concentrations in lower-trophic level fish species should represent a conservative estimation of levels in higher-trophic species." This conclusion is unclear and requires additional clarification and, if available, literature references, to ensure that health risks associated with lead from the consumption of fish have been properly modeled. The proponent's response to IR# HE(1)-24 describes how potential risks associated with total exposures of lead and mercury were recalculated. Ensure that the final HHRA reflects these recalculations. In particular, although the estimated change in fish tissue concentrations may be low, human health risks should be determined based on the total concentration of a substance following release, not an incremental concentration change. It is unclear whether any of the contaminants in soil have the potential to bioaccumulate or biomagnify through the food chain, and how this bioaccumulation/biomagnification potential was considered in the screening process.
				Specific Question / Request for Information: A. Provide a rationale for why lead concentrations from lower-trophic level fish species would be a reasonable approximation of higher-trophic level species. B. Update the final HHRA to include the recalculations described in IR# HE(1)-24. C. Provide the criteria used to evaluate the uptake of contaminants from soil to country foods, any bioconcentration factors (BCFs) used in the calculations for modelling human exposure, and how bioaccumulation was considered in the screening process for contaminants in soil.
				Response: **PART A** The 2018 HHERA Report (August, 2018) provided as part of the Round 2 Information Request response package supersedes the former SLRA originally provided as Appendix W. The current HHERA does not support the assumption that lower-trophic level fish species would be a reasonable approximation of higher-trophic level species. In the current HHERA, chemical concentrations in higher-tropic level fish (Walleye and Sauger) that were collected as part of the baseline fisheries studies, were considered in the country foods assessment. A total of 28 Walleye and one Sauger were caught by angling in Wabigoon Lake. All 31 fish were retained for tissue sampling and ageing. The

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				youngest Walleye were two years old and their length and weights ranged between 230 mm to 272 mm, and 84 g to 125g respectively. The oldest and largest individual was 10 years old, had a total length of 564 mm and weighed 1.9 kg. The Sauger was 10 years old and had a total length of 255 mm and weighed 106 g. Mercury results for the largest and smallest fish by weight in the sample were 0.245 mg/kg and 0.114 mg/kg respectively. Mercury levels ranged from a low of 0.0865 mg/kg to a high of 0.473 mg/kg. The raw data for the measured fish in provided in Appendix I "Raw Data" of the HHERA (August 2018) Report (August 2018). The exposure point concentration considered in the country foods assessment was the 95% Upper Confidence Limit of the Mean (UCLM). Measured fish concentrations are referred to as "measured fish" in the HHERA report and used to calculate exposure and potential risk via ingestion in the Base Case Assessment Scenario (Described in more detail in the answer to HE(2)-09B below). As part of the HHERA, chemical concentrations of contaminants of concern in fish were also modelled for all Project phases and Assessment Scenarios using uptake factors provided by Sheppard et al., 2010. Uptake factors are provided in Appendix II "Supplemental Information for the HHERA of Country Foods for the Goliath Gold Project", and Appendix IV "Model Inputs" to the HHERA (August, 2018). Modelled fish concentrations are referred to as "modelled fish" in the HHERA (August, 2018) Report (August, 2018). Modelled Fish and Measured Fish concentrations correlated well for all COCs and for mercury were within 2%. These results indicate that the approach outlined in the HHERA (August 2018) of using uptake factors provided by Sheppard et al. provided a good approximation of measured fish tissue concentrations and provided a conservative approach by overpredicting lead and mercury concentrations in fish. As stated in Section 7 of the HHERA (August, 2018) the Follow-Up Program will be utilized to collect site-specific uptake factors for country foods and would reduce the uncertainty associated with the predicted concentrations of COCs in fish. **PART B** *For Reference Purposes IR#HE(1)-24 asked "Revise the assessment, using total concentrations of mercury and lead (i.e. sum of baseline and incremental contributions) in fish to calculate hazard quotients, so potential health risks are not underestimated"* The 2018 HHERA Report (August, 2018) provided as part of the Round 2 Information Request response package supersedes the former SLRA originally provided as Appendix W. In the 2018 HHERA, as per Environmental Assessment Guidance three (3) Assessment Scenarios were considered for all exposure scenarios, pathways, receptors, and Study Areas including ingestion of fish. As described in Section 3.2 "Assessment Scenarios" of the HHERA (August, 2018), the assessment scenarios considered were: **1. Base Case Assessment Scenario-** considers potential risk to human and ecological health associated with present, pre-Project conditions, including ambient environmental conditions and existing sources of potential risk (including chemical concentrations in soil, water, air, and country foods). The Base Case Assessment Scenario represents the level of risk that would be experienced in the vicinity of the Project should the Project not proceed.

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				2. Project Alone Assessment Scenario- valuates potential human and ecological health risks from exposure to predicted chemical concentrations in environmental media as a result of the Project Alone. **3. Project Assessment Scenari**o- includes the consideration of the anticipated Project Alone Assessment Scenario conditions in combination with the Base Case Assessment Scenario. This assessment scenario evaluates the contributions of the Project in addition to baseline conditions for all phases of the Project. The Project Assessment Scenario represents the levels of exposure that would be experienced in the vicinity of the Project should the Project proceed. As per the EIS guidelines, where residual adverse effects were identified with the implementation of mitigation measures, a fourth scenario, **4. Cumulative Effects Assessment Scenario** was considered. The Cumulative Effects Scenario considered the potential risks associated with the combined effects of the baseline conditions, the Project, as well as reasonable foreseeable projects and future activities in the region. The objective of this scenario is to ensure that the combined exposures and potential risk associated with all anticipated sources of chemicals to the regional environment are not underestimated. Thus the HHERA (August, 2018) Report (August, 2018) presents a "revised assessment using total concentrations of mercury and lead (i.e. sum of baseline and incremental contributions) in fish to calculate hazard quotients, so potential health risks are not underestimated". **PART C** Uptake factors including bioconcentration factors, transfer coefficients, wet:dry conversion factors, and dietary characteristics are provided in Appendix II "Supplemental Information for the HHERA of Country Foods for the Goliath Gold Project", and Appendix IV "Model Inputs" to the HHERA (August, 2018). Contaminants of concern were selected based on exceedances of air, soil, or water criteria in environmental media, and Project-specific media. The screening process identified COCs in waste rock, surface water, and TSF supernatant water. Regardless of the source media, all COCs selected from environmental or Project-specific media were conservatively modelled into country foods. Where COCs were selected, EPCs were modelled into country foods for all three study areas and all assessment scenarios. Concentrations of COCs were modeled from their source media into country foods via the concentration in source media multiplied by an uptake factors (bioaccumulation factors or transfer coefficients/factors), with consideration given to receptor specific inputs required such as ingestion rates and wet:dry conversion factors. Full details of the modeling of COC concentrations into country foods is provided in Appendix II-Supplemental Information for the HHERA of Country Foods for the Goliath Gold Project. A sample calculation is also provided for each country food, in Appendix II.

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				Chemical concentrations of COCs were modelled into country foods for each of the three Study Areas, however with the assumption that some food items are mobile (i.e. mammals and birds), and therefore receptors in Study Areas No. 2 or 3 may consume a food item that was exposed to the TSF supernatant water or that it has ingested plants or invertebrates exposed to waste rock at Study Area No. 1. The country foods assessment was assessed for all Project Phases, Assessment Scenarios and human receptors with the exception of a Project Worker. A Resident may be conservatively protective of a Project Worker given that Project Workers may also be residents of the LSA or the Village of Wabigoon.
				Agency Comment on Draft Response None Received
				FINAL RESPONSE Agency accepted Draft Response as Final.

TMI_930-HE(2)-10

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_930-HE(2)-10	HE(2)-10	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3, 12.1.1
				Reference to EIS / Appendix	Appendix W, Table 3, Appendix W-2, Section 3.5.2.1
				Cross-reference to Round 1 IRs	TMI_173-AE(1)-11, TMI_212-HE(1)-19

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				Context and Rationale: It is important to consider all averaging periods for chemicals of potential concern (COPCs), where available. The Ontario Ministry of the Environment, Conservation and Parks limits and Canadian Ambient Air Quality Standards (CAAQS) are derived for different timescales based upon relevant exposure durations and associated health effects. It is noted that the nickel point of impingement limit cited in the revised EIS Appendix W, Table 3 (0.04 µg/m3) is based on an annual averaging period, not a 24-hour averaging period.
				Specific Question / Request for Information: A. Use predicted annual concentrations of NO2 in the final HHRA. B. Use all air parameters, for all applicable averaging periods, against the most up-to-date applicable provincial and federal health-based standards, particularly the updated CAAQS thresholds for NO_2 and SO_2, in the final HHRA. C. Include any new receptor locations identified through IR# AE(2)-03B (as per IR# AE(2)-03E).
				Response: **PART A** Predicted annual concentrations of NO_2 are used in the final HHERA. Criteria air contaminants (CACs) including NO_2 are discussed in Section 3.5 of the HHERA. **PART B** All air parameters, for all applicable averaging periods, against the most up-to-date applicable provincial and federal health-based standards, particularly the updated CAAQS thresholds for NO_2 and SO_2, are used in the final HHERA. Criteria air contaminants (CACs) including NO_2 are discussed in Section 3.5 of the HHERA. **PART C** The air modelling receptor grid was specifically revised in support of the HHERA. The refined modelling includes 308 modelling receptor located within the Operations Area (Study Area No. 1), 3,474 modelling receptor locations within the LSA (Study Area No. 2) 1,445 of which fall inside the Property Boundary, and at 46 modelling receptor locations within the Village of Wabigoon (Study Area No. 3). The revised air quality modelling grid in support of the HHERA is shown relative to the Property Boundary and the three Study Areas, on Figure 3.1.1-1. The sensitive receptor located used for determining regulatory compliance are also shown on the figure. It was assumed that human receptors may

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				work, live, visit, and/or harvest at any of these receptor locations. The following paragraphs provide information regarding rationale as to the approach employed in the HHERA.
				Agency Comment on Draft Response None Received
				FINAL RESPONSE Agency accepted Draft Response as Final.

TMI_931-HE(2)-11

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_931-HE(2)-11	HE(2)-11	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3, 12.1.1
				Reference to EIS / Appendix	Appendix W-2, Section 3.5.2.1
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: Section 3.5.2.1 of the June 2018 HHRA (Appendix W-2 of the revised EIS) does not provide predicted concentrations for total suspended particulate (TSP), PM10 and PM2.5 during each phase of the project. It is stated in this section that TSP was selected over PM10 and PM2.5 as the airborne particulate parameter to be evaluated, with a rationale that TSP includes both PM10 and PM2.5 and thus allows for a conservative estimation of the airborne particulate exposure. However, health effects are most often associated with smaller particle sizes. The risk associated with fine particles, particularly PM2.5, is higher than the health risk associated with PM10 or TSP (Health Canada, 2016). As such, it would be more appropriate to consider PM2.5 and PM10 as separate from TSP, or to consider all TSP as PM2.5. In addition PM2.5 and PM10 are non-threshold substances below which there are no	

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				known non-effect levels; unlike TSP, which can have threshold and non-threshold effects depending on the particle size. This section also discusses PM10 and PM2.5 fractions of TSP that are "averaged over the site preparations and construction, operations and closure phases", which may underestimate health risks in a particular phase where a form of particulate would be more prevalent. Assessment of exceedances and health risks of the project during each phase will inform the determination of mitigation measures for each phase of the Project. As requested in IR# AE(2)-02, ensure that the final HHRA accounts for diesel particulate matter (DPM). Reference: Health Canada. 2016. Guidance for Evaluating Human Health Impacts in Environmental Assessment: AIR QUALITY, http://publications.gc.ca/site/eng/9.802343/publication.html
				Specific Question / Request for Information: A. Provide exposure point concentrations for TSP, PM10 and PM2.5 for each phase, using the same format as in Tables 3.5.2.1-1 to 3.5.2.1-3 of the June 2018 HHRA (Appendix W- 2). B. Ensure that the final HHRA accounts for diesel PM, PM10 and PM2.5 for each phase using all averaging times available (24-hour and annual). Include the incremental lifetime cancer risk (ILCR) of diesel PM as part of the final HHRA. Include a discussion on the contribution of this project to the overall ambient levels of TSP, PM10 and PM2.5 at the nearby receptor locations. C. In the final HHRA, consider PM10, PM2.5 and NO2 are non- threshold pollutants, as any exposure to these contaminants could be considered as a potential residual effect.
				Draft Response: **PART A** Exposure point concentrations for all CACs including TSP, PM10 and PM2.5 for all project phases and Study Areas are provided in Table 3.5.3.1-1. Raw data tables for all assessment scenarios are provided in Appendix 1- Raw Data. The potential effects of the Project on human health, specifically via the inhalation of inorganic COCs (specifically metals) associated with the inhalation of suspended particular matter (PM_{10}, $PM_{2.5}$ and TSP) are assessed in Section 3.5.3.2 of the HHERA (August, 2018) Report (August, 2018). Total suspended particulate (TSP) was selected as the

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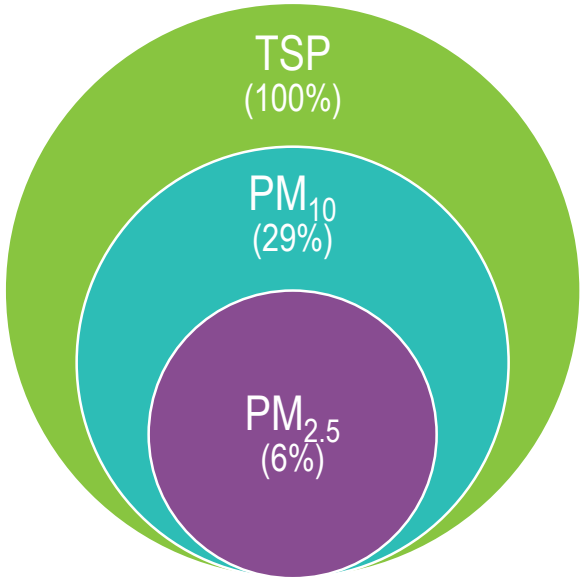
				particulate matter group to be used in determining possible chemical exposures to airborne COCs because it was the most conservative approach. As illustrated in Figure 3.5.3.2-1 of the HHERA (August, 2018) (and provided herein), the use of the TSP concentration will conservatively include both the PM_{10} and $PM_{2.5}$ fractions of the airborne particulate matter associated with the Project. Although Health Canada recommends the use of PM_{10} in their $DQRA_{CHEM}$ guidance document, the PM_{10} emissions from the Project represent 29% of the TSP emissions (averaged over the site preparations and construction, operations and closure phases). The $PM_{2.5}$ fraction of the airborne particulate matter could represent the finer airborne particles known to pose a greater risk to human health, as they can be inhaled deeply into the lungs, are chemically reactive, and have complex characteristics. However, the use of $PM_{2.5}$ emissions from the Project represent 6% of the TSP emissions (averaged over the site preparations and construction, operations and closure phases). Therefore, while scientific logic may be used in support of the use of either PM_{10} or $PM_{2.5}$, for determining exposures for use in the HHERA (August, 2018), the choice to use TSP for calculating exposures for the HHERA (August, 2018) represents the most conservative approach, capturing 100% of the airborne particulate emissions and thus 100% of the possible exposure to airborne metals. The use of TSP may therefore overestimate potential risk given that PM10 and PM2.5 are more likely to be biologically available and capable of exerting health effects at the cellular level. 

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				Figure 3.5.3.2-1: Distribution of Airborne Particle Sizes **PART B** As part of the Round 2 Information Request process, a number of information requests were received from the Canadian Environmental Assessment Agency (the Agency) and their technical review teams regarding the assessment of human health with respect to criteria air contaminants (CACs). An expanded assessment has been provided in the 2018 HHERA report to directly respond to those information requests. The assessment of CACs was performed in Section 3.5 of the HHERA. Activities associated with each Project phase are expected to emit Criteria Air Contaminants (CACs) including CO, NO_x, SO_2, TSP, PM_{10}, and $PM_{2.5}$. Section 6.6 of the revised EIS (April 2018) provided an evaluation of the effects of the Project on air quality and considered the potential effects of the Project on air quality during the Site Preparation and Construction, Operations, and Closure phases of the Project. There are no air emission sources during the Post-Closure phase of the Project as such no predicted values were modelled. The air quality assessment presented in Section 6.6 of the revised EIS (April 2018) focussed, appropriately on the maximum predicted concentrations at the Property Boundary, as well as at 43 identified sensitive receptors. The Property Boundary predictions represented the appropriate values for determining compliance with Ontario Regulation 419/05, while the CCME (2006) identifies that the sensitive receptor which meet the CCME definition of community-based receptors, would be the most appropriate locations for determining compliance with ambient air quality criteria. In Section 6.19 of the EIS (April 2018) the air quality predictions were discussed in terms of potential health implications. Table 6.19.2.1-4 of Section 6.19 of the EIS (April 2018) provided a refined screening of CACs using the maximum modelled concentrations at the sensitive receptors, which correspond to the closest "community-oriented receptors" as defined by the CCME (2000). The results presented in Table 6.19.2.1-4 of the revised EIS (April 2018) indicated that none of the predicted concentrations exceed their respective ambient air quality criteria, with the exception of total suspended particulate (TSP). The maximum 24−hour TSP concentration during the Site Preparation and Construction Phase was shown to marginally exceed (by 2.6%) it's Ontario Ambient Air Quality Objective. The Ontario Ambient Air Quality Objective was set based on visibility (i.e. aesthetic) criteria and not the protection of human health. Therefore, no CACs were identified as COCs relevant to human health and a quantitative assessment of potential human health risks via the inhalation pathway is not warranted. Although the results presented in Section 6.19 of the EIS (April 2018) identify that there are no exceedances of the appropriate values for ambient air quality objectives, a number of Round 2 Information Requests were received regarding the potential risks to human receptors via the inhalation pathway. Treasury Metals' recognizes that Project Workers may be exposed to CACs within the Operations Area (Study Area No. 1), and members of Indigenous communities may visit areas outside of the Operations Area, but within the Property Boundary of the Goliath Gold Project, to practice traditional uses of the lands and resources. Project work and traditional land use do not meet the CCME definition of a community-based receptor and thus determination of compliance with the application of Ambient

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				Air Criteria is not appropriate for these receptors. However, to capture the possible risk to peoples using these areas, the air modelling was redone using the same emissions and methods as presented in Section 6.6 of the revised EIS (April 2018), but focusing on possible modelling receptors covering the HHERA Study Areas. The refined modelling includes 308 modelling receptor located within the Operations Area (Study Area No. 1), 3,474 modelling receptor locations within the LSA (Study Area No. 2) 1,445 of which fall inside the Property Boundary, and at 46 modelling receptor locations within the Village of Wabigoon (Study Area No. 3). The assessment of the effects of CACs on human health was performed using the same two-step qualitative and quantitative approach defined above. At the request of Health Canada, predicted EPC of CACs were compared to the Canadian Ambient Air Quality Standards (CAAQS) or the Ontario Ambient Air Quality Criteria (AAQC) for all available averaging periods. As stated in the EIS, and in the section above, there were no CAC exceedances identified at the sensitive receptor locations which are appropriate for determining regulatory compliance. The results indicated that the predicted EPC of CACs in the LSA and Village of Wabigoon were below the qualitative screening criteria. As such there are no potential health risks anticipated to human receptors who may access the areas within the Property Boundary but outside of the Operations Area via inhalation of CACs. There are no residual adverse effects identified to human receptors in the LSA or the Village of Wabigoon who may live, visit, or practice traditional use of land and resources via the inhalation of CACs in air as a result of the Project. Within the Operations Area, the predicted EPCs of NO_2, $PM_{2.5}$, and PM_{10} were larger than the CAAQS/AAQC (appropriate for use at sensitive receptors) for select averaging periods. Although a quantitative approach was considered for $PM_{2.5}$, PM_{10}, Treasury Metals was informed by Health Canada that they do not currently support a quantitative assessment of these forms of particulate matter, and the qualitative assessment would suffice at this time. The potential Health implications of NO_2 to a Project Worker within the Operation Area was quantitatively assessed. There is no access to the Operations Area by members of the public or Indigenous communities during the active life of the project and highlight that there are no sensitive or community-based receptors within the Operations Area. Under good health and safety practices, an occupational health and safety plan would be in place for Project Workers and serve as an appropriate risk management/ mitigation measure. As such no residual adverse effects are identified as a result of NO_2 concentrations within Operations Area. In addition to the CACs discussed above, for which there are regulatory criteria available in Canada, Round 2 Information Requests AE(2)-02 an HE(2)-11 requested that the human health risk include a quantitative assessment of incremental cancer risk from diesel particulate matter(DPM) using the unit risk and inhalation slope factor available from the California Office of Health Hazard Assessment, California EPA (2015). The HHERA included a quantitative assessment of the potential health implication of DPM as a result of the Project. The results indicated that there were no non-cancer risks associated with DMP emissions from the Project in any of the three Study Areas, identified. Estimated ILCRs marginally exceeded the Ontario target ILCR of 1×10^{-6}, and are within the Health Canada target of 1×10^{-5}, It is highlighted that predicted background concentrations of DPM in the three Study Areas were consistent with those defined by the California EPA. At background concentration the use of the California EPA slope factor resulted in ILCR estimates two orders of magnitude greater than Ontario's target and one order of magnitude larger

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				than the Health Canada's target. The United States is less conservative than Canada when it comes to the definition of "essentially negligible" cancer risks. Therefore, while the application of a U.S. derived slope factor may be appropriate in the U.S., based on Health Canada's definition, it may not be feasible to obtain "essentially negligible" cancer risks at background concentrations of DPM in the environment. The results presented herein illustrate the need for additional consideration prior to adopting values provided by other regulatory agencies within Canada. Given that there is a relatively large level of uncertainty associated with the application of the California EPA cancer slope factor in Canada, that Health Canada has not adopted a quantitative approach for other forms of particulate matter (i.e. PM_{10} and $PM_{2.5}$ as discussed above), and that the non-cancer risk estimates for DPM were below levels anticipated to pose risk to human receptors, no potential risks from DPM are determined at this time. Predicted EPCs of metals sorbed to particulate matter satisfied their respective qualitative screening criteria at Study Areas No. 1, 2 and 3. As such there are no potential risks anticipated to Project Workers, Residents, and/or Visitors/Harvesters via the inhalation of fugitive dust pathway. **PART C** In the HHERA (August 2018), PM_{10}, $PM_{2.5}$ and NO_2 were considered as non- threshold pollutants. As part of ongoing correspondence during the Round 2 Information Request Process, Treasury Metals was informed by Health Canada via email on August 1st that: *$PM_{2.5}$, and NO_2 have been assessed by Health Canada and the conclusions reached are that both exhibit widespread population-level health effects that indicate that they should be treated as non-threshold contaminants where any level of or increase in exposure can result in adverse health effects. Health Canada is currently developing an approach for the quantitative assessment of these contaminants. In the interim Health Canada would support an approach that includes an evaluation against the CAAQS and a discussion of the implications of the CAAQS-associated management levels, plus a robust qualitative analysis of the potential health effects of these non-threshold contaminants in relation to exposure throughout the project area and the potential to reduce emissions of pollutants that form these two air contaminants. For PM_{10}, evaluation against the Ontario AAQC may be used and considered in a similar manner (i.e., robust qualitative analysis and potential options to reduce emissions of this pollutant). Furthermore, Health Canada no longer supports the Sum25 and Sum15 approach for quantifying the effects of exposure to PM_{10} and $PM_{2.5}$.* In follow-up correspondence on August 7, 2018, Health Canada amended their response and stated the following: *With regards to a recommendation on the non-threshold end point that Health Canada wishes to see applied in the HHRA of potential health effects of NO_2, they suggest following the **following** endpoints*

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				described in the Human Health Risk Assessment for Ambient Nitrogen Dioxide (i.e. using the concentration response curve to quantify the effects). Specifically the following endpoints may be considered: • *Short-term (acute exposure) respiratory effects (asthma)* • *Short-term (acute exposure) all-cause mortality* • *Long-term (chronic exposure) respiratory mortality* *This approach should be considered in addition to the qualitative assessment previously described for NO2.* *Health Canada also confirmed that they no longer support the 1999 Sum25 and Sum15 guidance for assessing PM_{10} and $PM_{2.5}$.* Therefore, PM_{10} and $PM_{2.5}$ are recognized as non-threshold chemicals however were not quantitatively assessed for potential risk in the HHERA Report (August, 2018), and instead a qualitative assessment was provided. NO_2 was both qualitatively and quantitatively assessed as a non-threshold chemical in the HHERA Report (August, 2018) using the endpoints provided by Health Canada in their correspondence on April 7, 2018.
				Agency Comment on Draft Response: The proposed air monitoring programs include monitoring for NO2 and either PM10 or PM2.5. Health Canada identifies that the fine particles pose a greater risk to human health than coarse ones, as the fine particles can be inhaled deeply into the lungs, are chemically reactive and have complex characteristics (Health Canada. 2016). In the absence of monitoring for both particulate matter sizes, PM2.5 should be monitored to adequately assess the health risks of air-borne articulate matters. Health Canada. 2016. Guidance for Evaluating Human Health Impacts in Environmental Assessment: AIR QUALITY. Update the monitoring program to Include PM2.5 and NO2 monitoring at the MPOI. Describe how a notification system could be implemented to inform Indigenous land users about PM2.5 and NO2 levels.
				Specific Response to Agency Comments: THIS RESPONSE HAS BEEN SUPERCEDED BY TMI_955-HHRA(2)-02

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				Final Response: THIS RESPONSE HAS BEEN SUPERCEDED BY TMI_955-HHRA(2)-02

TMI_932-HE(2)-12

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TMI_932-HE(2)-12	HE(2)-12	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3
				Reference to EIS / Appendix	Appendix W-2, Section 3.5.2.1
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: It is unclear whether airborne particulates generated from the Project might settle onto Thunder Lake and associated waterbodies to the west of the operations area, in locations where there might be use by Indigenous peoples for traditional activities. If there is a potential for deposition, then an assessment of potential effects on human health via exposure to water or sediment, and ingestion of fish or other food species sourced from the lakes, should be done.	
				Specific Question / Request for Information: A. Assess the impacts of particulates settling on Thunder Lake and associated waterbodies on human health via the direct and indirect pathways, such as the ingestion of fish or other food species sourced from the lakes, as well as the direct exposure to water and sediment.	
				Response: **PART A**	

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				The effects of airborne particulates settling on Thunder Lake and associated water bodies on human health as well as the ability of members of Indigenous communities to continue to practice their current uses of land and resource for traditional purposes was assessed via the direct and indirect pathways in the EIS submitted April 2018 as well as the HHERA. The air pathway of exposure was also considered in the human health risk assessment of country foods as detailed in the HHERA (August 2018). No potential risks were identified to human receptors via the inhalation of air, inhalations of fugitive dust, or ingestion of fish had food impacted by particulate deposition as a result of the Project. Details are as follows: The impacts of particulates settling in areas including areas of Thunder Lake and other associated waterbodies as assessed in Section 6.6 of the revised EIS (April 2018) and Section 6.19 of the revised EIS (April, 2018). Section 6.6 of the revised EIS (April 2018) provided an evaluation of the effects of the Project on air quality and considered the potential effects of the Project on air quality during the Site Preparation and Construction, Operations, and Closure phases of the Project. There are no air emission sources during the Post-Closure phase of the Project as such no predicted values were modelled. The air quality assessment presented in Section 6.6 of the revised EIS (April 2018) focussed, appropriately on the maximum predicted concentrations at the Property Boundary, as well as at 43 identified sensitive receptors. The locations where air quality predictions were made was shown on, Figure 6.1.4.5-1 “Air Quality Local Study Area” provided in Section 6.1.4 of the revised EIS (April 2018). The Property Boundary predictions represented the appropriate values for determining compliance with Ontario Regulation 419/05, while the CCME (2006) identifies that the sensitive receptor which meet the CCME definition of community-based receptors, would be the most appropriate locations for determining compliance with ambient air quality criteria. In Section 6.19 of the EIS (April 2018) the air quality predictions were discussed in terms of potential health implications. Table 6.19.2.1-4 of Section 6.19 of the EIS (April 2018) provided a refined screening of CACs using the maximum modelled concentrations at the sensitive receptors (including those on the shores of Thunder Lake), which correspond to the closest “community-oriented receptors” as defined by the CCME (2000). The results presented in Table 6.19.2.1-4 of the revised EIS indicated that none of the predicted concentrations exceed their respective ambient air quality criteria, with the exception of total suspended particulate (TSP). The maximum 24−hour TSP concentration during the Site Preparation and Construction Phase was shown to marginally exceed (by 2.6%) it’s Ontario Ambient Air Quality Objective. The Ontario Ambient Air Quality Objective was set based on visibility (i.e. aesthetic) criteria and not the protection of human health. Therefore, no CACs were identified as COCs relevant to human health and a quantitative assessment of potential human health risks via the inhalation pathway is not warranted. In addition to the effects on human health, the results of the air quality assessment were also relied upon for assessing the effects of the project on the ability of Indigenous communities to practice traditional land and resource use including:

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				• Fishing- (recreational and commercial) • Hunting • Trapping • Cottages and Outfitters & Other Recreational uses Although the results presented in Section 6.6 and 6.19 of the EIS (April 2018) identify that there are no exceedances of the appropriate values for ambient air quality objectives and no potential effects on human health identified at those sensitive receptor locations, a number of Round 2 Information Requests were received regarding the potential risks to human receptors via the inhalation pathway. Treasury Metals' recognizes that Project Workers may be exposed to CACs within the Operations Area (Study Area No. 1), and members of Indigenous communities may visit areas that fall outside of the Operations Area, but within the Property Boundary of the Goliath Gold Project, to practice traditional uses of the lands and resources. Traditional land use and Project work do not meet the CCME definition a community-based receptor which is why they were not included. To satisfy the Round 2 Information Requests received, and to capture the possible risk to peoples using these areas, the air modelling was redone using the same emissions and methods as presented in Section 6.6 of the revised EIS (April 2018), but focusing on possible modelling receptors covering the HHERA (August, 2018) Study Areas. The refined modelling includes 308 modelling receptor located within the Operations Area (Study Area No. 1), 3,474 modelling receptor locations within the LSA (Study Area No. 2) 1,445 of which fall inside the Property Boundary, and at 46 modelling receptor locations within the Village of Wabigoon (Study Area No. 3). The revised air quality modelling grid in support of the HHERA (August 2018) is shown relative to the Property Boundary and the three Study Areas, on Figure 3.1.1-1. The locations of the sensitive receptors which meet the CCME definition of community-based receptors and are appropriate for determining compliance with ambient air quality criteria, are also shown on Figure 3.1.1-1. As shown on Figure 3.1.1-1 the receptor grid for modelling air quality in support of the HHERA (August, 2018) again includes area of Thunder Lake. The assessment of the effects of air contaminants (criterial air contaminants including particulate matter and metals sorbed to particulate matter) on human health was performed using a two-step qualitative and quantitative approach in the 2018 HHERA. First, predicted CAC EPCs were qualitatively screened against their CAAQS and AAQC for all available averaging periods. The qualitative assessment via CAC screening is provided in Table 3.5.3.1-1 for all three Study Areas, i.e., the Operations Area, the LSA (including areas within the Property Boundary but outside of the Operations Area where traditional land and resource use is practiced) and the Village of Wabigoon. The results of qualitative screening presented in Table 3.5.3.1-1 of the HHERA (August, 2018), indicate that, predicted of concentrations of NO_2, $PM_{2.5}$, and PM_{10} were larger than the ambient air criteria appropriate for application at

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				sensitive receptors, for one or more averaging period but only in the Operations Area (Study Area No. 1). During the active life of the Project access to the Operations Area will be restricted for safety and security reasons. Only employees of Treasury Metals will be allowed within the Operations Area. There will be no access to the Operations Area by members of the public or Indigenous communities during the active life of the Project. There will be no harvesting of country foods within the Operations Area for the active phases of the Project, and there are no sensitive or community-based receptors within the Operations Area. Following Closure, during the passive Post-Closure phase of the Project, full access to the Operations Area will resume as will the practice of traditional land and resource use. There are no air emissions during the post-closure phase of the project, thus the Project will not result in any adverse effects via deposition or air emissions during this phase of the Project. Concentrations of metals sorbed to particulate matter in air satisfied their appropriate qualitative screening criteria in all Study Areas and for all phases of the Project. Dustfall deposition rates were also modelled over the air modelling receptor grid and includes water bodes relevant for assessing the potential effects of the Project, including on human health. The results of the air quality assessment presented in Section 6.6 and 6.19 of the EIS are consistent with the results presented in the 2018 HHERA, that no potential impacts are identified via the deposition of dust. The rates of deposition are highest within the Operations Area (Study Area No. 1) where airborne particulate sources are located, and then rapidly drops off with increasing distance away from the Operations Area boundary. Dustfall levels are essentially background at locations on Thunder Lake and the Village of Wabigoon and even within the Operations area do not result in changes to substrate quality that would result in human health effects. As provided in Table 3.5.3.1-1 of the HHERA (August, 2018), there were no instances where dustfall deposition rates exceeded their ambient air criteria outside of the Operations Area. Therefore, there are no anticipated changes to environmental media (soil, water, sediment, country foods) as a result of the predicted dustfall rates associated with the Project. As such, no adverse effects as a result of the Project are anticipated. Further to this, a detailed human health risk assessment of country foods was also completed as part of the 2018 HHERA. Contaminants of concern (COCs) were identified in waste rock, surface water, and TSF supernatant water. Where COCs were selected, concentrations were modelled into country foods for all three Study Areas and all Assessment Scenarios. There were no air COCs identified, including for instances that would affect the country foods pathway or the ability for indigenous communities to practice their traditional use of land and resources. No residual effects are identified. There were also no changes to soil chemistry as a result of the essentially negligible dust fall levels outside of the Operations Area. No soil COCs were identified. Therefore, collectively the HHERA (August, 2018) and the revised EIS (April 2018) provide a comprehensive investigation on the effects of air quality on human health, quality of country foods for consumption, and the ability of indigenous communities to continue to practice their current use of land and resources for traditional purposes.

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				Agency Comment on Draft Response: Sediments in lakes and tributaries surrounding the operations area are expected to serve as a sink for project contaminants via effluent discharge, air deposition and groundwater discharge. However, the HHRA did not consider sediment as a potential exposure pathway and has not provided adequate rationale. Potential exposure pathways should be excluded based on the proper assessment of the exposure and risk levels. As acknowledged by the proponent in HHRA Section 4.8.1, the preclusion of the sediment pathway is an additional source of uncertainty in the risk assessment.
				Specific Response to Agency Comments: A. Consider the sediment exposure pathway for the assessment of the human exposure and health risks or provide additional rationale for its exclusion.
				Revised Response: A. There was insufficient baseline sediment data to suppose the evaluation of potential risk in the Base Case Assessment Scenario. Given that there are no human health COCs (metals or methyl-mercury) identified in surface water in the Base Case, Project Alone, or Project Assessment scenario, and the Project is well upstream of the sediment contamination downstream of the former Dryden paper mill, the lack of baseline sediment data is unlikely to have a meaningful effect on the conclusions presented in the 2018 HHERA, the revised EIS (April 2018), and the Round 2 responses. Given that residual adverse effects for human health are defined that when the risk for the Project Assessment Scenario via the sum of all operable pathways, exceeds the Health Canada acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario, an attempt to model the sediment pathway for the Project Alone would not have been useful. Instead, like country food which also did not have baseline chemical concentrations available, the baseline concentration of the COCs in sediment should be confirmed by way of the Follow-up Program for Human Health. The Follow-Up Program for Human Health is provided in the Goliath Gold Follow-Up Addendum which supersedes Section 13 of the revised EIS (April 2018).
				Agency Comment on Revised Response

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				HC does not support the proponent's view that the baseline sediment study and assessment of the health risk via sediment pathway are not useful as the contaminants of concern (COCs) for human health are not identified in surface water. Sediment contaminants should be screened against the soil quality guidelines (SQGs), such as the CCME SQGs (HC. 2017), rather than against the surface water quality guidelines as assumed by the proponent. Furthermore, residual adverse health effects should be assessed based on the total risk (i.e. baseline + project risks) rather than on the project alone risk (see comment on HHRA(2)-03A). Additionally, given the potential effects of the sediment pathway on country foods (e.g. wild rice, fish, waterfowl, etc.), the sediment quality (i.e. baseline + project) should be properly determined to reduce the uncertainties associated with the assessment of exposure via country foods. In response to HE(2)-12 the proponent has indicated "*[t]here was insufficient baseline sediment data to suppose the evaluation of potential risk in the Base Case Assessment Scenario*". However in Section 5.8 of the EIS, sediment samples have been collected during three different investigations (1997, 2011 and 2012). It is unclear why there is insufficient baseline sediment data to consider in the HHRA. The proponent included sediment data collection as a part of the country food FUP, however, details of the sediment study plan (i.e. study parameters, sampling locations, monitoring frequency and duration, etc.) were not provided. Health Canada. 2017. Supplemental Guidance on Human Health Risk Assessment of Contaminated Sediments: Direct Contact Pathway. Contaminated Sites Division, Safe Environments Directorate, Health Canada. **A. Include additional rationale to support the assertion that there is insufficient baseline sediment data to support the baseline assessment and HHRA. The sediment pathway should be considered as a viable one for its potential impacts on the country food quality, therefore it is recommended that additional baseline samples be collected and screened against the appropriate guidelines or predicted exposure levels. The HHRA should be updated accordingly. In the absence of these data, provide further details of the sediment study plan in the revised FUP.**
				Comment to the Agency A. It is understood that Health Canada is concerned with the sediment pathway and has requested additional rationale as to why it was not directly assessed in the Goliath Gold Project HHERA and that additional baseline samples be collected and screened against the appropriate guidelines or predicted exposure levels. Additional rationale to support the exclusion of the direct contact with sediment pathway are provided below along with screening of the maximum sediment concentrations from the limited data set against soil quality criteria. With respect to the collection of additional baseline data, the reviewer is encouraged to refer to the follow up program which is provided in the Final Goliath Gold Project Follow Up Addendum which contains details for additional sampling and

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				monitoring to confirm the predictions in the revised EIS (April 2018) for all technical disciplines including human health. The follow up program for human health as provided in the Final Goliath Gold Project Follow Up Addendum specifically states that: *The 2018 HHERA included an updated assessment of potential risk via the ingestion of country foods pathway. Human health impacts associated with the country foods pathway were assessed with consideration given to Health Canada's 2018 guidance document entitled "Guidance for Evaluating Human Health Impacts in Environmental Assessment: Country Foods". The results of the HHERA indicated that the country foods pathway contributed the highest proportion to the overall calculation of residual adverse effects via the sum of all exposure pathways. Much of the data relied upon in the assessment of potential risk via the country foods pathway, were data modelled from measured baseline data, which subsequently leads to potential risk estimates in exceedance of the Health Canada targets for the Project Alone and Project Assessment Scenarios. Given that the 2018 Health Canada guidance was released after the submission of the revised EIS (April 2018), the new guidance should be considered in the design of the Follow-Up Program for human health. Although the current country foods assessment meets the requirements of Appendix A: Country Foods Assessment in Environmental Assessments, the baseline sampling/ receptor specific information gathered in support of the assessment could be improved upon in the Follow-Up Program to reduce uncertainty associated with the modelling assumptions.* *As per the 2018 Health Canada country foods guidance document, if concentrations of chemicals in country foods were either not measured or not comprehensive, then it is recommended that they be identified prior to project start. As detailed in the Follow-Up Program Treasury Metals will measure concentrations of COCs in environmental and Project-specific media as well as country foods items. Given that this guidance was only made available following the submission of the EIS (April 2018), in an effort to satisfy the monitoring requirements described by Health Canada with respect to country foods, Treasury Metals will include a reference site (i.e., nearby site with similar environmental conditions, but outside the influence of the Project) to established baseline conditions. This approach is considered acceptable as per the 2018 Health Canada country foods guidance document.* *The following lists provides details of the follow up program for country foods which should be completed for baseline conditions (i.e. prior to site preparation and construction) and then considered as part of the follow-up program during the active phases of the Project. Details on the frequency of the follow-up program for country foods sampling may be determined in consultation with regulators and indigenous stakeholders, however Treasury Metals suggests at a frequency that matches the commitments to update other models such as the Groundwater Model (i.e. every 3 years).* *A Follow-Up Program for Human Health including a Country Foods Assessment will include the following with respect to chemical analysis:* • *Inclusion of sediment and groundwater sampling as part of their respective follow-up programs.* • *Collection of the environmental (soil, water, air, sediment, and groundwater) and Project-specific media (waste rock, tailings supernatant water pit lake water) to confirm the exposure point concentrations relied upon in the HHERA.*

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				○ *The samples would be analyzed for a suite of metals via ICP-MS with methyl-mercury being analyzed in at least 10% of the samples to determine the rate of methylation (if any) in each media type.* ○ *The concentration results from analytical testing would be compared to relevant human health-based criteria as well as criteria for the protection of ecological receptors.* ○ *The measured concentrations in environmental and Project-specific media would then be used to update the modelling into country food items if and when required.* • *Collection of country food items from the terrestrial and aquatic food webs in consultation with the Indigenous communities.* ○ *Emphasis will be placed on the collection of biota items known to be consumed via ongoing engagement and dietary consumption surveys, and to the biota for which exposure to project-specific media is confirmed via the follow-up programs related to vegetation, fish, wildlife, and birds.* ○ *All country food items will be analyzed for a suite of metals via ICP-MS with methylmercury being analyzed in at least 10% of the samples to determine the rate of methylation (if any) in each media type.* ○ *The measured concentrations in country foods can be used to determine the site-specific uptake factors into each biota type which can then be used to update the modelling for other country foods items that have not been sampled (for example species at risk), if required. This would alleviate the uncertainty associated with the use of literature derived uptake factors.* ○ *For non-mobile country food items (i.e. plants including medicinal plants and wild rice, root vegetables, mushrooms, and berries), co-located surface water, sediment, or soil samples will be collected in addition to the country food item and submitted for the same chemical analysis to aid in the derivation of site-specific uptake factors. This would alleviate the uncertainty associated with the use of literature derived uptake factors. Consideration will be given to account for the fact that some species and tissues may have higher concentrations of COPCs due to bioaccumulation and biomagnification, and some plants are known hyperaccumulators* ○ *Collection of fish including fish from different tropic levels and habitat types (i.e. stream resident fish versus lake resident fish) as well as the water and sediment sample from where these fish are collected to allow for determination of site-specific uptake factors and tissue concentrations. All fish will be analyzed for a suite of metals via ICP-MS with methylmercury being analyzed in at least 10% of the samples to determine the rate of methylation. The proportion of methylmercury: total mercury in fish is anticipated to be*

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				greater than 95% thus methylmercury analysis of fish tissue samples is unlikely required to continue long term as total mercury concentrations may be assumed to be almost entirely comprised of methylmercury. Collection of fish from different tropic levels and habitat types along with co-located sediment and water samples would allow for the determination of site-specific uptake factors and would alleviate the uncertainty associated with the use of literature derived uptake factors. • *If arsenic is measured in environmental and Project-specific media at concentrations greater than their standard analytical detection limits, then consideration will be given to chemical speciation of arsenic in select food items given that toxicity differs based on chemical speciation. For example, mushrooms and aquatic invertebrates uptake and biotransform arsenic from substrates including in tailings from gold mines to arsenobetaine which is the only non-toxic form of arsenic, therefore using total arsenic concentrations from ICP-MS would overestimate the potential risk to human receptors via the ingestion of mushrooms aquatic invertebrates.* • *If arsenic and lead are measured in environmental and Project-specific media at concentrations greater than their standard analytical detection limits, then consideration will be given to performing bioavailability testing using physiologically based extraction test (PBET) on a smaller proportion of the media samples given that lead and arsenic bioaccessbility is known to be decreased by 40-60% in select substrates. Therefore, using total lead and arsenic concentrations form total metal analysis via ICP-MS would overestimate potential uptake and subsequent toxicity/risk.* With respect to additional rationale as to why the sediment pathway was not considered as part of the Problem Formulation step, it is important to highlight to the reviewers that the waterbodies immediately adjacent and downstream of the Goliath Gold Project (e.g. Blackwater Creek and Wabigoon Lake) are not currently suitable for recreational (bathing/swimming) use not are they acceptable for drinking water use (due to microbiological contaminants, such as bacteria, protozoa and viruses [specifically *Giardia lamblia*]) and therefore the direct contact with sediment pathway (i.e. dermal contact and incidental ingestion) is not anticipated to contribute meaningfully to the overall potential for risk via the sum of all operable exposure pathways. Instead, the dominant exposure pathway for human health risk for the Goliath Gold Project HHERA is the ingestion of country foods as there are no COC exceedances identified in air, soil, or water. Very little baseline sediment data was available relative to the datasets for air, soil, and water thus it was deemed insufficient to base predictions and modelling on. For baseline sediment data, only 11 parameters were sampled, most at only 5 locations, and there was inconsistency between sampling years i.e. mercury and zirconium were sampled at 19 locations but only in 2012, but in 2012 no other metal analysis was performed. Furthermore, analysis of methylmercury in the sediment was not performed which is the parameter known to be of greatest concern to the Indigenous stakeholders. Methylmercury is not anticipated in the sediment as the Project is upstream of the impacts from the Dryden paper mill and present in the Wabigoon/English River System,

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				but nonetheless important to characterize. Furthermore, effluent discharges and resultant surface water quality is not predicted to increase chemical loading in the sediment. As part of the Round 2 process, a number of questions were raised from the hydrogeology and geochemistry regarding seepage quality and mine waste, which resulted in substantial revisions to the surface water quality modelling and surface water quality predictions (as provided in the Final Goliath Gold Project Water Addendum). The surface water quality relied on in the HHERA was updated to capture those changes. The updated surface water quality modelling continues to indicate that surface water quality will be largely unchanged as a result of the Project, with resulting water quality being the same as, or slightly improved from the existing condition for most parameters and remaining below the PWQO for the protection of aquatic life in those situations where the water quality is predicted to the higher than existing condition. Therefore, the Goliath Gold Project alone is not predicted to increase contaminant loading into sediment and pose risk to human health via the direct contact pathway, or via accumulation into country foods. In all cases where potential risk was identified via the sum of all exposure pathways for the Project Assessment Scenario (i.e. Project + Baseline), potential risk was driven by the potential risk associated with the Baseline Conditions and largely as a result of the ingestion of country foods pathway. It was noted in the HHERA that there was uncertainty in the country foods assessment due to the lack of baseline data and the reliance on literature derived uptake factors, thus an extensive follow up program was provided in the Goliath Gold Project Follow Up Addendum which also included sampling of sediment, derivation of site specific sediment to plant and sediment to fish uptake factors, and sampling of country foods which may be influenced by the sediment pathway. The follow up program for human health including details regarding the follow up program for sediment is provided in the Final Goliath Gold Project Follow Up Addendum. The Health Canada reviewers have asked that baseline sediment data be screened against soil guidelines and Treasury Metals has provided the screening based on the limited dataset in Table 1 below in order to achieve completeness. However, it is noted that the appropriateness of doing so is not currently supported by federal risk assessment technical guidance especially given that as stated above the direct contact with sediment pathway in the water bodies surrounding the Goliath Gold Project is essentially negligible relative to the country foods pathway. Additionally, it is specifically stated in the guidance document for federal contaminated sites referenced by HC (Health Canada. 2017. Supplemental Guidance on Human Health Risk Assessment of Contaminated Sediments: Direct Contact Pathway. Contaminated Sites Division, Safe Environments Directorate, Health Canada) that: 1. Currently no human health-based sediment criteria or guidelines established by a Canadian jurisdiction (FCSAP, 2017). The few human health-based sediment criteria currently available from other jurisdictions would not be directly applicable to most Canadian federal contaminated sites, as they generally do not consider all potentially relevant exposure pathways, or they rely on regional data to assist with the development of site-specific screening criteria (FCSAP, 2017); and 2. Soil criteria do not account for bioaccumulative or biomagnifying chemicals in aquatic foods. Soil criteria are therefore not suitable for identifying bioaccumulative or biomagnifying chemicals that should be considered in evaluating risks associated with the consumption of seafood (i.e. fish, shellfish, aquatic vegetation or aquatic birds) from the site

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The results of the sediment screening for the protection of human health based on provincial and federal soil quality guidelines derided for the protection of human health indicate that the maximum measured concentration of nickel in sediment is elevated above the MECP and CCME soil quality guideline. Concerns of nickel contamination in the regional area are not reported by Indigenous and non-Indigenous stakeholders and nickel is not considered in the Ontario Sport Fishing Guide for lakes in the area. The baseline dataset for sediment is not comprehensive and was therefore not considered in the HHERA or in the original response to TMI_932-HE(2)-12. Instead, the follow up program for human health has been relied on for the collection of additional sediment data at baseline which should include a full suite of metals including the 14 COCs, nickel as well as methylmercury. The details of the follow up program for human health have been updated to specifically also include nickel in the chemical analysis to ensure that baseline concentrations of nickel are not accumulating into country foods at levels which may pose risk to human health and are not elevated in areas where human receptors may be exposed to sediment for recreational purposes.

Table 1. Screening of Maximum Measured Sediment Concentrations

Parameter	Maximum Measured Concentration (µg/g) [1]	MECP Table 2 Soil Standards (µg/g) [2]	CCME Soil Quality Guidelines$_{HH}$ (µg/g) [3]
As	3.5	18	12
Cd	0.145	1.2	10
Cr	54	160	64
Cu	51.6	140	63
Fe	0.0294	NV	NV
Mg	21.4	NV	NV
Ni	**1260**	**100**	**200**
Pb	34.4	120	140
Zn	268	340	10000
Hg	0.05	1.8	6.6
Zr	11.7	NV	NV

Notes

1 Maximum Measured Concentration as presented in Table 5.8.2.2-1 of the Revised EIS (April 2018)

2 MECP Table 2 Standards in a Potable Groundwater Condition for Residential Land Use and Coarse-Textured Soils as proviooded in "Rationale for the Development of Soil and Groundwater Standards for Use at Contaminated Sites in Ontario", MECP 2011

3 CCME Soil Quality Guideline for the Protection of Human Health Residential/Parkland Land Use

NV No Value- Insufficient toxicity data to support derivtion of soil protection value for human health

FINAL RESPONSE:

Part A: The available baseline dataset for chemical concentrations in sediment is not comprehensive and therefore is considered insufficient to support the evaluation of potential risk via the sediment pathway in the Base Case Assessment Scenario. Additionally, the current federal risk assessment guidance does not provide screening criteria for sediment specifically and highlights that soil criteria are not protective of chemicals which may bioaccumulate into

plants and animals. Despite these technical limitations at the request of Health Canada, Treasury Metals has screened the limited baseline sediment data against soil quality guidelines provided by the MEP and CCME as shown in Table 1. The results of the limited sediment screening for the protection of human health based on provincial and federal soil quality guidelines, indicate that the maximum measured concentration of nickel in sediment is elevated above the MECP and CCME soil quality guidelines. Concerns of nickel contamination in the regional area are not reported by the Indigenous and non-Indigenous stakeholders and nickel is not considered in the Ontario Sport Fishing Guide as requiring a fish consumption advisory for lakes in the area. The baseline dataset for sediment is not comprehensive relative to the datasets for soil, air, and water and was therefore not relied on in the HHERA for modelling uptake into country foods or prediction on human health. Instead, the follow up program for human health has included sampling of sediment, derivation of site specific sediment to plant and sediment to fish uptake factors, and sampling of country foods which may be influenced by the sediment pathway. The follow up program also states that sediment samples sediment and associated country foods samples will include laboratory analysis of a full suite of metals including the 14 COCs, nickel as well as methylmercury. The details of the follow up program for human health have been updated as a result of this Round 2 response to specifically also include nickel in the chemical analysis to ensure that baseline concentrations of nickel are not accumulating into country foods at levels which may pose risk to human health and are not elevated in areas where human receptors may be exposed to sediment for recreational purposes.

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Mg	21.4	NV	NV
Ni	**1260**	**100**	**200**
Pb	34.4	120	140
Zn	268	340	10000
Hg	0.05	1.8	6.6
Zr	11.7	NV	NV

Notes

1 Maximum Measured Concentration as presented in Table 5.8.2.2-1 of the Revised EIS (April 2018)

2 MECP Table 2 Standards in a Potable Groundwater Condition for Residential Land Use and Coarse-Textured Soils as proviooded in "Rationale for the Development of Soil and Groundwater Standards for Use at Contaminated Sites in Ontario", MECP 2011

3 CCME Soil Quality Guideline for the Protection of Human Health Residential/Parkland Land Use

NV No Value- Insufficient toxicity data to support derivtion of soil protection value for human health

There are no human health COCs (metals or methymercury) identified in surface water in the Base Case, Project Alone, or Project Assessment Scenarios, and the Project is well upstream of the sediment contamination downstream

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				of the former Dryden paper mill. The lack of baseline sediment data is unlikely to have a meaningful effect on the conclusions presented in the 2018 HHERA, the revised EIS (April 2018), and the Round 2 responses given that the direct contact with sediment pathway is essentially negligible relative to the country foods pathway. Given that the residual adverse effects for human health are defined that when the risk for the Project Assessment Scenario (Project + Baseline) via the sum of all operable pathways, exceeds the Health Canada acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario, an attempt to model the sediment pathway for the Project Alone would not have been useful. Instead, like the country foods pathway which also did not have baseline chemical concentrations available, the baseline concentration of the COCs in sediment should be confirmed by way of the Follow-up Program for Human Health. The first line of this program specifically states: *A Follow-Up Program for Human Health including a Country Foods Assessment may include the following with respect to chemical analysis:* • ***Inclusion of sediment*** *and groundwater data;* The Follow-Up Program for Human Health is provided in the Final Goliath Gold Follow-Up Addendum which supersedes Section 13 of the revised EIS (April 2018).

TMI_933-HE(2)-13

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_933-HE(2)-13	HE(2)-13	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3
				Reference to EIS / Appendix	Appendix W Section 4.3.2, Table J; Appendix W-2, Section 3.5.2.1
				Cross-reference to Round 1 IRs	TMI_200-HE(1)-07
				Context and Rationale: Dose averaging should be considered based on chemical-specific information about dose-metric (concentration- vs. dose-dependent toxicity), persistence of effects, elimination half-life and so on.	

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				In proposed intermittent exposure scenarios in Appendix W, Table J of the revised EIS, the exposure received on a given day could be 'diluted' by mathematically averaging the exposure over a longer time period. The amortized values identified were used to calculate the hazard quotients (HQs), which may have resulted in an underestimation of risks to human health at the site. Refer to the memo "Memorandum: A Primer for Evaluating Human Health Risk at Contaminated Sites for Chronic and Less-Than-Chronic Exposures to Chemicals" (Health Canada, 2016) for further information on how to adequately address dose amortization issues in the intermittent exposure scenarios.
				Specific Question / Request for Information: A. In the final HHRA, provide a chemical-by-chemical rationale for the application of dose-averaging in the short- term and intermittent exposure scenarios. B. Based on the response to question A, reassess the human exposure and health risk according to the procedures described in Health Canada's 2016 memorandum.
				Response: **PART A.** IR asked to refer to the memo "Memorandum: A Primer for Evaluating Human Health Risk at Contaminated Sites for Chronic and Less-Than-Chronic Exposures to Chemicals" (Health Canada, 2016) for further information on how to adequately address dose amortization issues in the intermittent exposure scenarios. This document was considered for use in the HHERA (August, 2018) however based on the chemicals of concern identified and exposure scenarios assessed, it was not appropriate for use within the HHERA (August, 2018) for the following reasons: • In the 2018 HHERA, short- term and intermittent exposure scenarios were not considered. Therefore, the application of dose-averaging in the in the short- term and intermittent exposure scenarios was not required. • Furthermore, the only carcinogenic COC identified was arsenic, which is not a mutagenic carcinogen and therefore does not require TRV lifestage adjustments. **PART B** Based on the response in Part A, no assessment of the HHERA (August, 2018) is required. It is noted however that the HHERA (August, 2018) supersedes the original Screening Level Risk Assessment provided as Appendix W to the EIS (April 2018).

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				Agency Comment on Draft Response: A. The proposed exposure scenario for the Visitor/Harvester [24 hrs/d, 7d/wk, 13wk/yr; (HHRA page 125)] can be considered intermittent as the yearly duration of the exposure (13 wk/yr) is substantially shorter than a year. However, the proponent stated in the response to HE(2)-13A that "[i]n the 2018 HHRA, short- and intermittent exposure scenarios were not considered". It is not clear how/if the Visitor/Harvester receptors were evaluated in the updated HHRA.
				Specific Response to Agency Comments A. Clarify which exposure pathways were considered for the proposed intermittent exposure scenario of the Visitor/Harvester receptor and why the scenario was excluded from further quantitative assessment in the 2018 HHRA
				Specific Response to Agency Comment For the Visitor/Harvester, it was conservatively assumed that the ingestion of country foods collected from the three Study Areas may occur 365 days per year. Although it was stated in the last sentence of the referenced paragraph on page 125 that 365 days per year of country foods ingestion was applied, to address the comment, this section of the HHERA Report has been restructured to read: "Activities associated with harvesting are assumed to occur for 24 hours per day, 7 days per week, for 13 weeks per year to environmental media, however a Visitor/Harvester may ingest country foods 365 days per year" To clarify, a Visitor/ Harvester may be exposed to environmental and Project—specific media via the following exposure pathways: • Inhalation of outdoor air; • Direct contact and incidental ingestion of soil; • Ingestion of surface water as drinking water; and • Ingestion of country foods Given that there were no air or soil COCs identified in areas where the Visitor/Harvester has access, where COCs in surface water were identified, ingestion of surface water as drinking water is not a reasonably operable pathway of

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				exposure (because of pathogens in Blackwater Creek), and that the Visitor/Harvester will not have access to direct contact with Project-specific media including waste rock and TSF supernatant water, the ingestion of country foods pathway is the dominant pathway of exposure for the Visitor/Harvester. Therefore, it was not most appropriate to assess this human receptor group via the proposed intermittent exposure scenario, as it was conservatively assumed this receptor would consume country foods 365 days per year for their 80-year life expectancy.
				Revised Response: **PART A.** IR asked to refer to the memo "Memorandum: A Primer for Evaluating Human Health Risk at Contaminated Sites for Chronic and Less-Than-Chronic Exposures to Chemicals" (Health Canada, 2016) for further information on how to adequately address dose amortization issues in the intermittent exposure scenarios. This document was considered for use in the HHERA (August, 2018) however based on the chemicals of concern identified and exposure scenarios assessed, it was not appropriate for use within the HHERA (August, 2018) for the following reasons: • In the 2018 HHERA, short-term and intermittent exposure scenarios were not considered. Therefore, the application of dose-averaging in the in the short- term and intermittent exposure scenarios was not required. • Furthermore, the only carcinogenic COC identified was arsenic, which is not a mutagenic carcinogen and therefore does not require TRV lifestage adjustments. Although the 2018 HHERA Report assumed that the activities associated with visiting/harvesting would occur for 24 hours per day, 7 days per week, for 13 weeks per year to environmental media, it was assumed that a Visitor/Harvester may ingest country foods for 365 days. A Visitor/ Harvester may be exposed to environmental and Project—specific media via the following exposure pathways: • Inhalation of outdoor air; • Direct contact and incidental ingestion of soil; • Ingestion of surface water as drinking water; and • Ingestion of country foods Given that there were no air or soil COCs identified in areas where the Visitor/Harvester has access, where COCs in surface water were identified, ingestion of surface water as drinking water is not a reasonably operable pathway of exposure (because of pathogens in Blackwater Creek), and that the Visitor/Harvester will not have access to direct contact with Project-specific media including waste rock and TSF supernatant water, the ingestion of country foods pathway is the dominant pathway of exposure for the Visitor/Harvester. Therefore, it was not most appropriate to assess this human receptor group via the proposed intermittent exposure scenario, as it was conservatively assumed this receptor would consume country foods 365 days per year for their 80-year life expectancy.

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				PART B Based on the response in Part A, no re-assessment in the HHERA (August, 2018) is required. The 2018 HHERA supersedes the original Screening Level Risk Assessment provided as Appendix W to the EIS (April 2018).
				Agency Comment on Revised Response None Received
				FINAL RESPONSE Final response is the same as revised response as the Agency accepted the revised response. **PART A.** IR asked to refer to the memo "Memorandum: A Primer for Evaluating Human Health Risk at Contaminated Sites for Chronic and Less-Than-Chronic Exposures to Chemicals" (Health Canada, 2016) for further information on how to adequately address dose amortization issues in the intermittent exposure scenarios. This document was considered for use in the HHERA (August, 2018) however based on the chemicals of concern identified and exposure scenarios assessed, it was not appropriate for use within the HHERA (August, 2018) for the following reasons: • In the 2018 HHERA, short-term and intermittent exposure scenarios were not considered. Therefore, the application of dose-averaging in the in the short- term and intermittent exposure scenarios was not required. • Furthermore, the only carcinogenic COC identified was arsenic, which is not a mutagenic carcinogen and therefore does not require TRV lifestage adjustments. Although the 2018 HHERA Report assumed that the activities associated with visiting/harvesting would occur for 24 hours per day, 7 days per week, for 13 weeks per year to environmental media, it was assumed that a Visitor/Harvester may ingest country foods for 365 days. A Visitor/ Harvester may be exposed to environmental and Project—specific media via the following exposure pathways: • Inhalation of outdoor air; • Direct contact and incidental ingestion of soil; • Ingestion of surface water as drinking water; and • Ingestion of country foods Given that there were no air or soil COCs identified in areas where the Visitor/Harvester has access, where COCs in surface water were identified, ingestion of surface water as drinking water is not a reasonably operable pathway of exposure (because of pathogens in Blackwater Creek), and that the Visitor/Harvester will not have access to direct

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				contact with Project-specific media including waste rock and TSF supernatant water, the ingestion of country foods pathway is the dominant pathway of exposure for the Visitor/Harvester. Therefore, it was not most appropriate to assess this human receptor group via the proposed intermittent exposure scenario, as it was conservatively assumed this receptor would consume country foods 365 days per year for their 80-year life expectancy. **PART B** Based on the response in Part A, no re-assessment in the HHERA (August, 2018) is required. The 2018 HHERA supersedes the original Screening Level Risk Assessment provided as Appendix W to the EIS (April 2018).

TMI_934-HE(2)-14

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_934-HE(2)-14	HE(2)-14	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3
				Reference to EIS / Appendix	Appendix W-2, Table 3.5.2.1-1 to 3.5.2.1-3
				Cross-reference to Round 1 IRs	TMI_213-HE(1)-20
				Context and Rationale: Ensure that the final HHRA (Appendix W-2 of the revised EIS) uses total exposure concentrations (i.e. baseline + project), to consider existing conditions in determining the overall health effects of the Project. It is unclear why the values found in the project assessment scenario in Table 3.5.2.1-3 are not a sum of the base scenario values given in Table 3.5.2.1-1 and the project alone scenario in Table 3.5.2.1-2.	

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				Specific Question / Request for Information: A. Update the HHRA using the total exposure concentrations (i.e. baseline + project) and calculate total hazard quotients, to properly present the overall health risks. Consider IR# HE(2)-01 when updating any tables in the report.
				Response: **PART A** As described in Section 3.2 of the HHERA (August, 2018), the HHERA (August, 2018) was completed using three assessment scenarios (Base Case, Project Alone, and Project (i.e. baseline + project), and considered a fourth assessment scenario (cumulative effects, where residual effects were identified). No residual adverse effects were identified in the HHERA (August, 2018), therefore a cumulative effects assessment was not required. Exposure point concentrations were provided and assessed for the Base Case, Project Alone, and Project Assessment Scenarios in the Study Areas for four Project Phases. The details of each Assessment Scenario are specifically provided as follows: **Base Case Assessment Scenario** The Base Case Assessment Scenario considers potential risk to human and ecological health associated with present, pre-Project conditions, including ambient environmental conditions and existing sources of potential risk (including chemical concentrations in soil, water, air, and country foods). The Base Case Assessment Scenario represents the level of risk that would be experienced in the vicinity of the Project should the Project not proceed. The Base Case Assessment Scenario is assessed by evaluating the potential risk associated with existing concentrations in chemical media, obtained from the results of monitoring completed in support of the EIS. The use of existing measured data is supplemented by modelled predictions where data gaps have been identified (e.g., baseline chemical concentrations in country foods and ecological receptors). **Project Alone Assessment Scenario** The Project Alone Assessment Scenario evaluates potential human and ecological health risks from exposure to predicted chemical concentrations in environmental media as a result of the Project Alone. Chemical concentrations in environmental media are obtained using air, soil, and water data modelled from measured data. The chemical concentrations in Project-specific media such as waste rock, ore (representative of the tailings composition), and tailings storage facility (TSF) supernatant water were measured. Predicted chemical concentrations in country foods and ecological receptors are modelled as part of the HHERA (August, 2018). The Project Alone Assessment Scenario does not consider existing chemical concentrations associated with the Base Case Assessment Scenario. **Project Assessment Scenario**

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				The Project Assessment Scenario includes the consideration of the anticipated Project Alone Assessment Scenario conditions in combination with the Base Case Assessment Scenario. This assessment scenario evaluates the contributions of the Project in addition to baseline conditions for all phases of the Project defined above, namely: Site Preparation and Construction, Operations, Closure, and Post-Closure. The Project Assessment Scenario represents the levels of exposure that would be experienced in the vicinity of the Project should the Project proceed. **Cumulative Effects Assessment Scenario** The Cumulative Effects Scenario will be assessed qualitatively only, where feasible and only if the potential for residual health effects are identified. The Cumulative Effects Scenario will consider the potential risks associated with the combined effects of the baseline conditions, the Project, as well as reasonable foreseeable projects and future activities in the region. The objective of this scenario is to ensure that the combined exposures and potential risk associated with all anticipated sources of chemicals to the regional environment are not underestimated. The approach used for assessing the potential cumulative effects of the Project with respect to human and ecological health is generally consistent with the requirements of CEAA 2012, and follow the procedures set out by the Agency in the document entitled "Technical Guidance for Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act*, 2012" (CEAA, 2014). Additional information is set out in the operational policy statement entitled "Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act*, 2012" (CEAA, 2015). The Cumulative Effects Scenario is consistent with the cumulative effects assessment presented in Section 7 of the revised EIS (April 2018).
				Agency Comment on Draft Response None Received
				FINAL RESPONSE Agency accepted Draft Response as Final.

TMI_935-HE(2)-15

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_935-HE(2)-15	HE(2)-15	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3
				Reference to EIS / Appendix	Appendix W-2, Section 3.5.3
				Cross-reference to Round 1 IRs	TMI_195-HE(1)-02
				Context and Rationale: Section 3.5.3 provides a list describing "the COCs [chemicals of concern] identified in any of the media requiring modelling into country foods" The list of chemicals does not include barium, chromium, molybdenum, nickel, selenium and tin, which are all identified in Table 3.5.2.4-1 (predicted exposure point concentrations in ore/tailings and waste rock) as parameters for which "concentration exceeds criteria, parameter carried forward as COC in HHERA". No rationale is provided for not carrying forward these chemicals in the country foods assessment.	
				Specific Question / Request for Information: A. Include barium, chromium, molybdenum, nickel, selenium, and tin as chemicals of concern in the country foods assessment, or provide a rationale for excluding them.	
				Response: PART A: Concentrations of barium, chromium, molybdenum, nickel, selenium, and tin in ore samples collected and analysed as part of Treasury Metals' exploration program exceeded CCME or MOECP soil quality criteria in earlier versions of the risk assessment, however have not been included as COCs in the country foods assessment in the revised 2018 HHERA, as ore is not an operable pathway of exposure based on current Project design. The following discussion is provided in Section 3.5.3.4 of the HHERA (August, 2018) for clarification. *"Ore samples were collected and analysed for metal concentrations as part of Treasury Metals' exploration program. Metal concentrations in ore may serve as a surrogate for the metal concentration in future tailings. From an environmental prospective the biggest concern with tailings is metal leaching and residual adverse effects to the surrounding surface water bodies. The original screening level risk assessment (SLRA) assessed tailings as an operable exposure media considering that the exposure pathways would be the same for waste rock and soils. The original SLRA was provided as Appendix W to the original EIS, however has been superseded with the current HHERA. In the revised design of the Project, tailings from the Goliath Gold Project will be maintained under water cover during the Operations Phase of the Project and then encapsulated at Closure through Post-Closure using a wet or dry cover option to physically and*	

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				chemically isolate the tailings from the surrounding environment. In the dry cover option, tailings are covered with a graded layer of granular material and then a clay or synthetic cap is placed over the granular material. This is then covered with an organic material on which vegetation may grow. This organic layer is physically and chemically isolated from the tailings. In the wet cover option, tailings are covered with a graded layer of granular material and then flooded with non-process water. In the case of the Goliath Gold Project, about 300,000 m³ of clean water (about 60% of the water in the mine water and stormwater ponds) would be required to ensure the tailings remain flooded during a drought year. In the wet cover option, tailings are physically isolated by the granular materials and chemically isolated by the water cover. Given the depth of water cover (about 0.5 to 1 m), and the granular base, vegetation growth within the water cover is discouraged. The wet cover option generally provides the best surface water quality following Closure of the Project, and serves as a mitigation measure for the dry cover option. The HHERA (August, 2018) was conservatively completed using the surface water quality results of the dry cover option. Dermal contact, incidental ingestion, and chemical uptake into country foods are not considered operable exposure pathways for tailings. Leaching to surrounding surface water bodies was considered as described in Appendix JJ to the EIS (April 2018), the water report. As such, tailings are not considered an operable exposure media in the current HHERA. " Table 3.5.2.4-1 (predicted exposure point concentrations in ore/tailings and waste rock) has been revised and is now "Table 3.5.3.5-1: Exposure Point Concentration of Metals in Waste Rock" to more clearly reflect the Project-specific media assessed in the HHERA (August, 2018).
				Agency Comment on Draft Response None Received
				FINAL RESPONSE Agency accepted Draft Response as Final.

TMI_943-HE(2)-16

<table>
<tr><th>Unique Identifier</th><th>Agency IR #</th><th>Annex</th><th>Agency / Group / Stakeholder</th><th colspan="2">Cross Reference / Comment / Information Request / Response</th></tr>
<tr><td rowspan="5">TMI_943-HE(2)-16</td><td rowspan="5">HE(2)-16</td><td rowspan="5">4</td><td rowspan="5">Eagle Lake First Nation</td><td>Reference to EIS Guidelines:</td><td>Part 2, Section 10.1.3</td></tr>
<tr><td>Reference to EIS / Appendix</td><td>Section 6.19.1; Appendix W and Appendix W-2</td></tr>
<tr><td>Cross-reference to Round 1 IRs</td><td>TMI_872-WL(2)-03</td></tr>
<tr><td colspan="2"><u>Context and Rationale:</u>

The Agency is aware that the June 2018 Human Health Risk Assessment (HHRA) (Appendix W-2 of the revised EIS) is a draft document and that only portions of the entire updated document were submitted for review. It is unclear whether the Ecological Screening Level Risk Assessment (ESLRA) in Section 5 of Appendix W has been revised to consider the following points.
Section 6.19.1 of the Revised EIS states that “with the exception of nuisance animals, wildlife would be allowed to use the project site during operations, where they would be able to access the TSF, and its cover of treated process water.” Yet, Appendix W-2, Section 3.5.3, indicates that “uptake of COCs [chemicals of concern] into country foods from waste rock was considered the dominant exposure pathway for COC uptake into country foods, and COC concentrations from ore/tailings were not used in the country foods assessment.” This access of wildlife must be considered in the ERA.
Section 5.2.5.5 of Appendix W states that the scope of the current ESLRA did not include assessing exposure pathways for aquatic receptors or wildlife with aquatic based diets, although these were complete and COCs are present that exceed the protection of aquatic life guidelines. It is important that any exposure pathways that can lead to exposure to humans by consumption of country foods be incorporated into the ERA and HHRA.</td></tr>
<tr><td colspan="2"><u>Specific Question / Request for Information:</u>

A. Ensure that the uptake of contaminants from ore/tailings by wildlife that would be able to access the TSF and may frequent the project site are considered in the Ecological Screening Level Risk Assessment. The response to this question should be informed by the response to IR# WL(2)-03, regarding effects to wildlife accessing the TSF.
B. Where any exposure pathways involving wildlife or aquatic receptors can lead to exposure via country foods consumed by humans, ensure that these pathways are fully integrated in the ERA, and in the HHRA. Discuss any uncertainty introduced by excluding complete exposure pathways from the ERA and HHRA.</td></tr>
<tr><td colspan="2"><u>Response:</u>

PART A:</td></tr>
</table>

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				The uptake of contaminants from ore/tailings by wildlife that would be able to access the TSF and may frequent the project site are considered as part of the HHERA (August 2018) provided in support of the Round 2 Information Request process. The HHERA Report supersedes the former SLRA. In the SLRA, submitted as part of the original EIS, the solid portion of tailings was considered a meaningful pathway of exposure, however based on revisions to the engineering design of the Project, the supernatant water is now the dominant exposure media with respect to the tailings storage facility (TSF). In the HHERA (August 2018), contaminants of concern were selected from environmental media (including air, soil, and/or surface water) and/or Project-specific media (including waste rock, TSF supernatant water, and/or pit-lake water). Where COCs were selected, a qualitative and quantitative assessment of potential risk on human health and ecological receptors were performed for three Study Areas (Study Areas No. 1, 2, and 3), four Project phases (Site Preparation and Construction, Operations, Closure, and Post-Closure) and three Assessment Scenarios (Base Case, Project Alone, and Project). In the HHERA (August 2018), wildlife including mammals and birds within the Operations Area (Study Area No. 1) were conservatively assumed to use the TSF Supernatant Water as their sole drinking water source, and spend 100% of their time within the Operations Area which represents an overestimate of potential risk, as during operations there will be very little suitable habitat for ecological receptors as the Operations Area will be stripped to bedrock and subject to extensive heavy equipment use as part of the active mining process. Figure 4.1.4-1 of the HHERA provides the conceptual site model for human health and indicates which exposure pathways were considered (including those from the TSF supernatant water) and where COCs were selected and a quantitative assessment was performed. Figure 5.3.4-1 of the HHERA provides the conceptual site model for the ecological risk assessment and indicates which exposure pathways (including those from the TSF supernatant water) were considered and where COCs were selected and a quantitative assessment was performed. For clarification, the following discussion is provided in Section 3.5.3.4 of the HHERA (August, 2018) with respect to the selection of TSF supernatant water as the dominant exposure media from the TSF. *"Ore samples were collected and analysed for metal concentrations as part of Treasury Metals' exploration program. Metal concentrations in ore may serve as a surrogate for the metal concentration in future tailings. From an environmental prospective the biggest concern with tailings is metal leaching and residual adverse effects to the surrounding surface water bodies. The original screening level risk assessment (SLRA) assessed tailings as an operable exposure media considering that the exposure pathways would be the same for waste rock and soils. The original SLRA was provided as Appendix W to the original EIS, however has been superseded with the current HHERA. In the revised design of the Project, tailings from the Goliath Gold Project will be maintained under water cover during the Operations Phase of the Project and then encapsulated at Closure through Post-Closure using a wet or dry cover option to physically and chemically isolate the tailings from the surrounding environment. In the dry cover option, tailings are covered with a graded layer of granular material and then a clay or synthetic cap is placed over the granular material. This is then covered with an organic material on which vegetation may grow. This organic layer is physically and chemically isolated from the tailings. In the wet cover option, tailings are covered with a*

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				graded layer of granular material and then flooded with non-process water. In the case of the Goliath Gold Project, about 300,000 m³ of clean water (about 60% of the water in the mine water and stormwater ponds) would be required to ensure the tailings remain flooded during a drought year. In the wet cover option, tailings are physically isolated by the granular materials and chemically isolated by the water cover. Given the depth of water cover (about 0.5 to 1 m), and the granular base, vegetation growth within the water cover is discouraged. The wet cover option generally provides the best surface water quality following Closure of the Project, and serves as a mitigation measure for the dry cover option. The HHERA (August, 2018) was conservatively completed using the surface water quality results of the dry cover option. Dermal contact, incidental ingestion, and chemical uptake into country foods are not considered operable exposure pathways for tailings. Leaching to surrounding surface water bodies was considered as described in Appendix JJ to the EIS (April 2018), the water report. As such, tailings are not considered an operable exposure media in the current HHERA. " **PART B.** As described in the HHERA report (August 2018), contaminant concentrations were modelled into ecological receptors for use in both the ERA and the country foods assessment as part of the HHRA. Country foods items were selected based on information shared by members of Indigenous communities during ongoing engagement activities and valued ecological components (i.e. ecological receptors) were selected using the data collected as part of the baseline studies for the aquatic and terrestrial environment (Section 5 of the EUIS, April 2018), as well as federal guidance documents for completing an ERA. In the ERA a particular emphasis was placed on species at risk. No complete pathways were excluded from either the ERA or the HHRA submitted as part of the HHERA (August 2018). As discussed above and as shown in Figures 4.1.4-1 and 5.3.4-1 of the HHERA (August 2018), the solid portion of the tailings although considered, was determined to be an inoperable exposure pathway in the HHERA based on the engineering design of the Project. The TSF supernatant water was more appropriately assessed as a media exposure source in both the ERA and HHRA. Full details are provided in the HHERA (August 2018), submitted in support of the Round 2 Information Request process.
				Agency Comment on Draft Response None Received
				FINAL RESPONSE Agency accepted Draft Response as Final.

TMI_944-HE(2)-17

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_944-HE(2)-17	HE(2)-17	4	Eagle Lake First Nation	**Reference to EIS Guidelines:**	Part 2, Section 10.1.3
				Reference to EIS / Appendix	Appendix W, Section 4.5.6
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: Section 4.5.6, Table T of Appendix W (HHRA in the 2015 EIS, unchanged in 2018 revised EIS) provides incremental fish tissue concentrations, but only provides lead concentrations in walleye in Wabigoon Lake and mercury concentrations in fish in Blackwater Creek. It is unclear why concentrations of both metals are not provided for both locations, and how much uncertainty may be introduced into the HHRA by omitting site-specific information on contaminants.	
				Specific Question / Request for Information: A. Provide site-specific tissue concentrations for lead in fish in Blackwater Creek and mercury in walleye in Wabigoon Lake. If these are unavailable, discuss the uncertainty introduced into the human health risk assessment by assuming concentrations from another waterbody in the assessment.	
				Response: **PART A:** The 2018 HHERA Report (August, 2018) provided as part of the Round 2 Information Request response package supersedes the former SLRA originally provided as Appendix W. The current HHERA does not support the same approach employed in the former SLRA and instead relies on measured fish data from Wabigoon Lake and modelled fish data using worst-case surface water quality predictions and a "water to fish" update factor provided by Sheppard et al., 2010, to assess potential risk to human receptors via the consumption of country foods. Surface water quality was predicted at 9 modelling nodes shown on Figure 3.5.3.4-1 of the HHERA, however the worst-case water quality predictions were found in Blackwater Creek. The assumption that worst-case water quality predictions would be representative of all surrounding waterbodies represented a conservative approach to the HHERA to ensure that risks were not underestimated. Full details are provided in the HHERA, however the results indicated that the potential risk of all COCs including lead, mercury and methylmercury in fish were below the Health Canada risk targets for all receptors for the Base Case, Project Alone, and Project Assessment Scenarios.	

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				The exposure point concentrations of contaminants of concern in measured fish and modelled fish for all Study Areas, Project phases, and Assessment Scenarios, relied upon in the HHERA (August 2018) are provided in Appendix IV Tables IV-18 and IV-19, respectively of the HHERA Report (August 2018).
				Agency Comment on Draft Response None Received
				FINAL RESPONSE Agency accepted Draft Response as Final.

TMI_945-HE(2)-03B

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_945-HE(2)-03B	HE(2)-03B	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3
				Reference to EIS / Appendix	Appendix W-2, Section 4.1.1
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: In responding to this question, consider your response to IR# AC(2)-09. Section 3.5.3 of the June 2018 HHRA (Appendix W-2 of the revised EIS) does not include wild rice as a country food studied in the country foods assessment. Several Indigenous groups indicated in previous comments to the Agency that wild rice is an economic resource, and consumed by their people. The Agency notes particular concern in relation to contamination of wild rice. Figure 5.9.3.2-1 of the revised EIS shows known locations of wild rice stands near the Project. It is unclear why wild rice was not included in the country foods assessment. To reassure Indigenous groups that the environmental assessment predictions are accurate, in areas where there may be uncertainty in relation to wild rice, follow-up program measures should be identified, such as appropriate follow-up monitoring, notification and regular communication with Indigenous groups. The follow-up program	

<table>
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<tr><td></td><td></td><td></td><td></td><td>measures should be developed in consultation with Indigenous groups, to ensure that the program can be responsive to their interests.</td></tr>
<tr><td></td><td></td><td></td><td></td><td><u>Specific Question / Request for Information:</u>

A. Include wild rice in the country foods assessment, or provide a rationale for excluding it.
B. Describe additional mitigation measures to reduce potential effects on wild rice harvested at or near the Project.
C. Provide details of the follow-up program to verify EA predictions related to wild rice, and how Indigenous groups would be involved in the development and implementation of the program.

THIS IR SUPERSEDES IR# HE(2)-03.</td></tr>
<tr><td></td><td></td><td></td><td></td><td><u>Response:</u>
<u>PART A. No change to response provided August 20, 2018</u>
Wild rice was included in the country foods assessment (See Section 3.5 and Appendix II- Supplemental Information for the HHRA of Country Foods for the Goliath Gold Project of the HHERA Report (August, 2018)). Wild rice was identified during engagement activities with Indigenous communities as an important food item both in terms of their own diet, but also for the commercial sale. Chemical concentrations were modelled into wild rice using the “water to macrophyte” uptake factor provided by Sheppard et al., 2010. Therefore “wild rice” is synonymous with “macrophyte” in the HHERA (August, 2018). Chemical concentrations in wild rice are provided in Appendix IV of the HHERA (August 2018).
<u>PART B. No change to response provided August 20, 2018</u>
Section 10 of the EIS (April 2018) Commitments and Mitigation Measures Summary provides the details of all mitigation measures required for the Project. Wild rice was used as an indicator for assessing the effects of the Project on Wetlands in Section 6.15 of the EIS (April 2018), and also for the effects of the Project on Indigenous Peoples in Section 6.21. Although this Information Request is likely meant to be specific to the Country Foods Assessment completed as part of the HHERA (August, 2018), a brief summary of the identified mitigation measures for wild rice as part of the effects of the Project on Wetlands has been provided to ensure completeness.
Table 6.1.3.14-1 from Section 6 of the EIS demonstrates that wild rice was assessed for Wetlands in the EIS using the following measures: loss in identified habitat, changes in water level, and changes in water quality.
Table 6.1.3.14-1: Wetlands and Vegetation VCs, Indicators and Measures
<table>
<tr><th>Valued Components (VCs)</th><th>Indicators</th><th>Measures</th></tr>
<tr><td rowspan="4">Wetlands</td><td>Wetland extent</td><td>Change in area (ha)</td></tr>
<tr><td rowspan="3">Wild rice</td><td>Loss of identified habitat (ha)</td></tr>
<tr><td>Changes in water level (m)</td></tr>
<tr><td>Changes in water quality</td></tr>
</table>
</td></tr>
</table>

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	Floating Marsh Marigold (*Caltha natans*)	Change in potential habitat (ha)
Vegetation communities	Predominantly coniferous forest	Change in area (ha)
	Predominantly deciduous forest	Change in area (ha)
	Successional areas	Change in area (ha)
	Potential berry harvesting areas	Change in area (ha)

The EIS (April 2018) indicated that the Goliath Gol Project would not have an adverse effect on wild rice (Table 6.15.4.5-1 of Section 6 of the EIS). Although no mitigation measures are required for wild rice, as described in Section 6.15.5 of the EIS (April 2018), the following mitigation measures will be implemented as part of the Project to help avoid potential effects on wetlands and vegetation:

- Minimized the amount of wetland and vegetated area clearing required for the Project by optimizing the pit design and siting Project infrastructure in previously disturbed areas. [Mit_050, Mit_065].
- Retention of forested areas wherever feasible. [Mit_084].
- Identification and protection of known vegetative SAR locations. [Mit_085].
- Avoid broadcast spraying of herbicides for vegetation management. [Mit_086].
- Ensure proper culvert sizing for all new water crossing installations, allowing for maintenance of existing flows and water levels. [Mit_082].
- Develop slope dependent vegetated buffers along rivers creeks and wetlands in conjunction with the MNRF. [Mit_066].
- Develop sediment and erosion plans which will reduce sedimentation into wetlands and reduce the potential for dust cover on roadside vegetation. [Mit_008, Mit_046, Mit_054].
- Restoration of all disturbed habitats upon closure to the extent feasible. [Mit_068].

In Section 6.21 of the EIS (April 2018) the effects of the Project on Indigenous Peoples using wild rice as an indicator and the following measures: loss in wild rice areas, changes in water quality, changes in water levels, and changes in quality for consumption (Table 6.1.3.20-1: Aboriginal People VCs, Indicators, and Measures). That table was reproduced for reference in the HHERA Report (August, 2018) and is provided as Table 3.5.3-1 Valued Components, Indicators, and Measures Applied in the EIS to Assess the Effects of the Project on Indigenous People (also included below). Assessing the effects of the Project on changes in quality for consumption was the overall objective for the assessment of all country foods including wild rice. Where changes in quality for consumption are identified, a residual adverse effect would be identified, and mitigation measures required as per the requirements set out in the EIS Guidelines.

The results of the risk characterization of ingestion of country foods including wild rice presented in the HHERA (August, 2018), indicated that for the Project Assessment Scenario risk estimates only exceeded the HQ/ILCR target, when they also exceeded the HQ/ILCR target in the Base Case Assessment Scenario. This indicates that the incremental changes in potential risk values associated with the Goliath Gold Project's (including effluent discharge) will have very little to no effect on the health risks associated with exposure to COCs via country food ingestion at all

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three Study Areas. The results indicate that while potential effects on human health may be present as a result of ingestion of country foods within the three Study Locations assessed, these effects are not a consequence of the Goliath Gold Project. As such, there were no changes in quality for consumption identified and no residual adverse effects identified as a result of the Goliath Gold Project on human health via country foods ingestion. No additional mitigation measures were required for wild rice or the country foods exposure pathway in general.

Table 3.5.3-1 Valued Components, Indicators, and Measures Applied in the EIS to Assess the Effects of the Project on Indigenous People

Valued Components (VCs)	Indicators	Measures
Harvesting and gathering of plant material	Wild rice	Loss of wild rice areas
		Changes in water quality
		Changes in water levels
		Changes in quality for consumption
	Berry Harvesting	Loss of potential harvest areas
		Changes in quality for consumption
	Medicinal plant harvesting	Loss of forest
		Loss of wetland
		Changes in quality for consumption
	Changes in access	Land where access is controlled
		Lands removed from access
	Diminished on-the-land experience	Changed views
		Noticeable changes in noise

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response		
				Hunting	Ungulates	Habitat loss
						Changes in quality for consumption
					Furbearers	Habitat loss
					Waterfowl	Habitat loss
						Changes in quality for consumption
					Changes in access	Land where access is controlled
						Lands removed from access
					Diminished on-the-land experience	Changed views
						Noticeable changes in noise
				Trapping	Furbearers	Habitat loss
					Changes in access	Land where access is controlled
						Lands removed from access
					Diminished on-the-land experience	Changed views
						Noticeable changes in noise
				Fishing	Sport fish	Change in abundance
						Changes in quality for consumption
					Baitfish	Change in abundance
					Commercial fishing	Fish for consumption (sport fish)

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response

		Baitfish collection
	Changes in access	Land where access is controlled
		Lands removed from access
	Diminished on-the-land experience	Changed views
		Noticeable changes in noise

NOTES:

BOLD & SHADED	Objective of Country Foods Assessment presented within the HHERA (August, 2018) Report (August, 2018)

PART C.

The Follow-Up Program for wild rice as part of confirming the results presented in the EIS with respect to effects of the Project on Wetlands was provided in Section 13.15 of the EIS (April 2018). The Follow-Up Program for wild rice as part of confirming the results presented in the EIS with respect to effects of the Project on Indigenous Peoples was provided in Section 13.21 of the EIS (April 2018). As required as part of the 2018 Health Canada country foods assessment guidance document, a Follow-Up Program and Monitoring plan specific to the HHRA of country foods is detailed in Section 7.0 of the HHERA (August, 2018) Report (August, 2018). The Follow-Up Program for human health provided in the HHERA Report (August, 2018) supersedes Section 13.19 of the EIS (April 2018).

Full details are provided in Section 7 of the HHERA (August, 2018) Report (August, 2018), however briefly, key details related to wild rice and other country foods include:

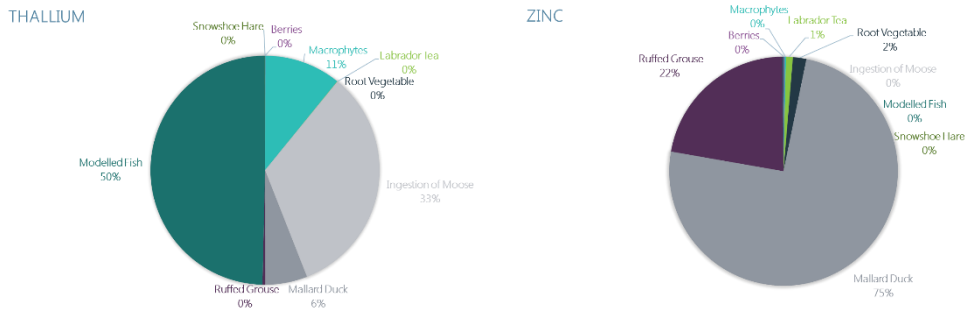
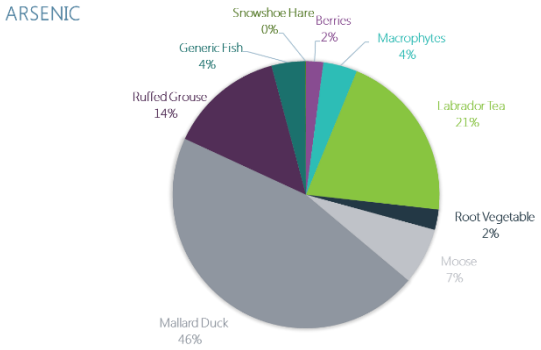
A Follow-Up Program for Human Health including a Country Foods Assessment may include the following with respect to chemical analysis:

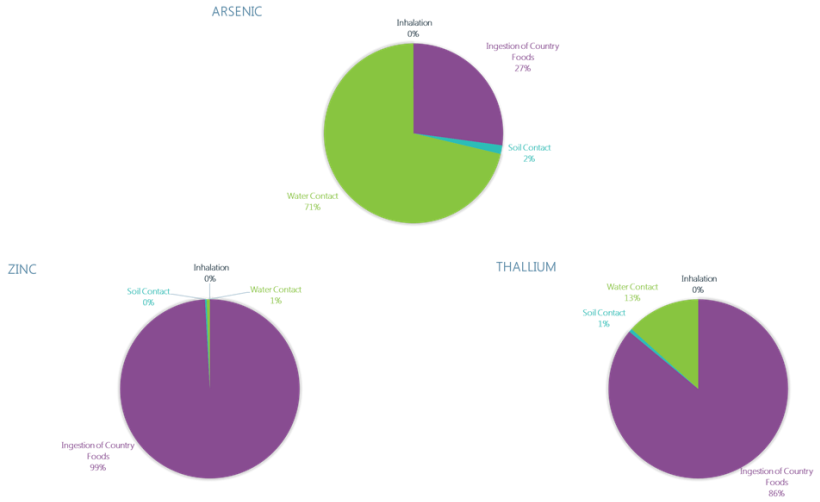
- Sampling of the environmental and Project-specific media to confirm the exposure point concentrations relied upon in the HHERA (August, 2018) including the country foods assessment. The measured concentrations should then be used for revised modelling of uptake into country foods (including wild rice).
- Inclusion of sediment and groundwater data collected as part of their respective Follow-up Programs;

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				• Collection of plants including medicinal plants, root vegetables, wild rice, and berries from each of the three Study Areas, as well as the soil/water/sediment directly from where these plants are growing for chemical analysis of metals to allow for determination of site-specific uptake factors and tissue concentrations; • Collection and chemical analysis of tissues are most representative of country food consumption (accounting for the fact that some species and tissues may have higher concentrations of COCs due to bioaccumulation and biomagnification, and some plants are known hyperaccumulators); • Collection and chemical analysis of wild game samples including moose, grouse, duck and rabbit or other meat sources identified during ongoing engagement as representing an important food source; • Chemical speciation of arsenic and lead given that toxicity differs based on chemical speciation; • Inclusion of methyl-mercury analysis in all media and biota samples submitted for laboratory analysis; and • Determination of exposure to chemicals through market food ingestion, as certain contaminants of concern associated with the proposed project may be present in commercially available foods, are naturally occurring (e.g., metals) or are associated with other anthropogenic processes unrelated to the proposed project. A country foods survey- during ongoing engagement activities, the following receptor information may be collected on a community, or household specific basis • Receptor characteristics (i.e., age, gender, cultural affiliation, etc.), including receptors with atypical consumption patterns due to occupational, recreational, and cultural activities relevant to country food consumption (e.g., hunters, trappers, fishers); • A list of the country foods consumed; • The source of country foods (i.e., where the food is typically harvested and how it is obtained—hunted, fished, gathered, etc.); • Specific tissues (skin, fatty flesh, muscular flesh or organs) or parts of plants (roots, leaves, flowers, berries, seeds, etc.) that are consumed; • The typical portion size for each tissue or part of plants consumed, using standard measures such as measuring cups or spoons, or weights;

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				• The frequency of country foods consumption (i.e., the number of servings per week or month or season, and the typical method of preparation: skin on/off, washing, peeling, cooking (raw, fried, baked, etc.), drying, fermenting, and any other preparation methods that may affect the COPC concentration of the foods consumed; • The frequency of foods consumed that have been purchased from a grocery store or supermarket; and • Additional traditional knowledge (i.e., species consumed, when the foods are consumed, their residence times, and times of increased consumption of specific foods such as, seasonal patterns or migration periods) As stated in Section 12.22 of the revised EIS (April 2018), to ensure that Indigenous communities most affected by the Project have input into the effectiveness of the Environmental Management Plans and Follow-up Programs, Treasury Metals proposes to form an Environmental Management Committee. This committee would be made up of members from Indigenous communities and would meet with representatives from Treasury Metals on a to-be-determined basis, possibly quarterly or semi-annually. Treasury Metals would present any reportable information on the management plans as well as the results of the follow-up programs. If exceedances or issues arise that show mitigation measures have not been as effective as expected, the potential for further actions would be discussed with the committee. The Environmental Management Committee would also provide a forum for discussing other environmental matters with the potentially affected Indigenous communities such as upcoming permits, additional TK that might have been collected since completion of the EA process, and any other environmental matters of relevance to the committee including financial support for operation of the committee. Treasury Metals encourages and welcomes participation by members of WLON as part of the proposed Environmental Management Committee so that requests such as “more baseline water quality studies” may be appropriately considered and completed
				Agency Comment on Draft Response: B. Overall risk (i.e., not incremental risk) from exposure to wild rice, or other country foods, should be considered when assessing residual impacts and subsequent mitigation or monitoring measures. B. While considering comments HHRA-03 and HHRA-05, if required, propose additional mitigation measures and follow-up monitoring of wild rice stands.

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				Specific Response to Agency Comments: B1. The HHERA assessed potential risk for the Base Case, Project Alone and Project Assessment Scenarios. The Project Assessment Scenario equaled the Project Alon plus Base Case Assessment Scenarios. Thus, overall risk (i.e., not incremental risk) from exposure to wild rice, or other country foods, was considered when assessing residual impacts and subsequent mitigation or monitoring measures. B2. In the HHERA, a residual adverse effect is defined when the risk for the Project Assessment Scenario (i.e. Project Alone + Base Case) via the sum of all operable pathways, exceeds the acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario. In those cases where the potential risk via the sum of all operable exposure pathways is less than Base Case, then the residual effect would not be adverse. The results of the HHRA identified residual adverse effects for three of the valued components; arsenic, zinc, and thallium. Residual adverse effects for human health were identified to both the resident and visitor/harvester receptors for thallium (non-cancer risk), zinc (non-cancer risk), and arsenic (cancer risk). Ingestion of country foods contributed the highest proportion to the overall characterization of residual adverse effects via the sum of risk from all operable exposure pathways for thallium and zinc. As shown in the Figures 1 and 2 below (Figures 4.4.1.3-1 and 4.4.2.3-1 from the Final HHERA (February 2019), wild rice (i.e. macrophytes) contributed very little to the overall risk characterization accounting for only 11%, 0%, and 4% of total exposure in foods for thallium, zinc, and arsenic, respectively. Furthermore, although the residual adverse effects for thallium and zinc were driven by the country foods pathway (Figure 3), the residual effects associated with arsenic were largely attributed to the baseline surface water quality, although the surface water data indicated that arsenic was below the Health Canada drinking water standard and the PWQO protective of freshwater aquatic life (Figure 3). The Final Goliath Gold Follow Up Addendum provides the country foods monitoring program designed to reflect the findings/uncertainty of the HHERA with explicit plans for specific contaminants to be monitored in environmental and project specific media. The follow up program for human health specifically states that metals and methylmercury will be analyzed in all environmental and project-specific media as well as in country foods including wild rice which would allow for the derivation of site-specific uptake factors to further reduce the uncertainty in the HHERA.

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				 **Figure 1 (4.4.1.3-1) Relative Contributions to Hazard Quotient via Ingestion of Country Foods**  **Figure 2 (4.4.2.3-1) Relative Contributions to Incremental Lifetime Cancer Risk via Ingestion of Country Foods**

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				 **Figure 3. Relative Contribution to Residual Adverse Effects via all Operable Exposure Pathways**
				Revised Response: **PART A.** Wild rice was included in the country foods assessment (See Section 3.5 and Appendix II- Supplemental Information for the HHRA of Country Foods for the Goliath Gold Project of the HHERA Report). Wild rice was identified during engagement activities with Indigenous communities as an important food item both in terms of their own diet, but also for the commercial sale. Chemical concentrations were modelled into wild rice using the "water to macrophyte" uptake factor provided by Sheppard et al., 2010. Therefore "wild rice" is synonymous with "macrophyte" in the HHERA). Chemical concentrations in wild rice are provided in Appendix IV "Model Inputs" of the HHERA. The ingestion of wild rice was considered as part of the ingestion of country foods pathway as well as in the determination of residual adverse effects via the sum of all operable exposure pathways as per TMI_956-HHRA(2)-03. **PART B.**

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				The assessment of residual effects has been revised to consider the potential risk via the sum of all operable pathways (including ingestion of wild rice) as described in TMI_956-HHRA(2)-03 which also considered the potential for bioaccumulation as described in TMI_958-HHRA(2)-05. For human health a residual adverse effect is defined when the risk for the Project Assessment Scenario via the sum of all operable pathways, exceeds the Health Canada acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario. In those cases where the potential risk via the sum of all operable exposure pathways is less than base, then the residual effect would not be adverse. The evaluation of residual adverse effects has focused on the Project Assessment Scenario recognizing that individuals cannot be exposed to the Project Alone Assessment Scenario under real world conditions. In keeping with the EIS Guidelines for the Goliath Gold Project, the estimated potential risk via the sum of all operable exposure pathways is based upon the predictions that incorporate the mitigation measures described in the revised EIS (April 2018). With the risk assessment methodology, the residual adverse effects for have been identified in the absence of risk management measures, however the implementation of a Health and Safety Plan at the Goliath Gold Project will be a mandatory requirement. Residual adverse effects were identified via exposure to thallium, zinc and arsenic which were driven primarily by the country foods pathway. As stated in the response to TMI_956-HHRA(2)-03, the current level of conservatism relied upon is the country foods assessment is not appropriate for basing mitigation measures on. With the exception of fish, no country foods were sampled as part of the baseline sampling efforts and subsequently all the concentrations in country foods were modelled via the use of literature derived uptake factors. In all cases the Project Assessment Scenario was only exceeded when the Base Case Assessment Scenario also exceeded its respective Health Canada benchmark. It is unlikely that potential risk via exposure to thallium, zinc, and arsenic via in country foods exists in the existing environment, and instead the risk estimates in exceedance of Health Canada benchmarks in the Base Case Assessment Scenario are more likely to be an artifact of the conservatism relied upon in the HHERA. By the nature of the risk assessment methodology, if the risk estimates in the existing environment are overly conservative, as are the predictions for the Project Assessment Scenario (i.e Project Alone + Base Case). The Follow-Up Program for Human Health as detailed in the Goliath Gold Project Follow Up Addendum should be used to verify the predictions presented in the HHERA, prior to making management decisions for potential exposure to thallium, zinc, and arsenic in country foods including wild rice. Section 10 of the revised EIS (April 2018) Commitments and Mitigation Measures Summary provides the details of all mitigation measures required for the Project. The mitigation measures presented in the revised EIS (April 2018) for wild rice are re-stated below. • Minimized the amount of wetland and vegetated area clearing required for the Project by optimizing the pit design and siting Project infrastructure in previously disturbed areas. [Mit_050, Mit_065]. • Retention of forested areas wherever feasible. [Mit_084]. • Identification and protection of known vegetative SAR locations. [Mit_085]. • Avoid broadcast spraying of herbicides for vegetation management. [Mit_086]. • Ensure proper culvert sizing for all new water crossing installations, allowing for maintenance of existing flows and water levels. [Mit_082].

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				• Develop slope dependent vegetated buffers along rivers creeks and wetlands in conjunction with the MNRF. [Mit_066]. • Develop sediment and erosion plans which will reduce sedimentation into wetlands and reduce the potential for dust cover on roadside vegetation. [Mit_008, Mit_046, Mit_054]. • Restoration of all disturbed habitats upon closure to the extent feasible. [Mit_068]. **PART C.** The Follow-Up Program for Human Health including Country Foods is provided in the Goliath Gold Follow-Up Addendum. A Follow-Up Program for the Country Foods Assessment pathway includes the following with respect to chemical analysis: • Sampling of the environmental and Project-specific media to confirm the exposure point concentrations relied upon in the HHERA (August, 2018) including the country foods assessment. The measured concentrations should then be used for revised modelling of uptake into country foods (including wild rice). • Inclusion of sediment and groundwater data collected as part of their respective Follow-up Programs; • Collection of plants including medicinal plants, root vegetables, wild rice, and berries from each of the three Study Areas, as well as the soil/water/sediment directly from where these plants are growing for chemical analysis of metals to allow for determination of site-specific uptake factors and tissue concentrations; • Collection and chemical analysis of tissues are most representative of country food consumption (accounting for the fact that some species and tissues may have higher concentrations of COCs due to bioaccumulation and biomagnification, and some plants are known hyperaccumulators); • Collection and chemical analysis of wild game samples including moose, grouse, duck and rabbit or other meat sources identified during ongoing engagement as representing an important food source; • Chemical speciation of arsenic and lead given that toxicity differs based on chemical speciation; • Inclusion of methyl-mercury analysis in all media and biota samples submitted for laboratory analysis; and

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				• Determination of exposure to chemicals through market food ingestion, as certain contaminants of concern associated with the proposed project may be present in commercially available foods, are naturally occurring (e.g., metals) or are associated with other anthropogenic processes unrelated to the proposed project. A country foods survey- during ongoing engagement activities, the following receptor information may be collected on a community, or household specific basis: • Receptor characteristics (i.e., age, gender, cultural affiliation, etc.), including receptors with atypical consumption patterns due to occupational, recreational, and cultural activities relevant to country food consumption (e.g., hunters, trappers, fishers); • A list of the country foods consumed; • The source of country foods (i.e., where the food is typically harvested and how it is obtained—hunted, fished, gathered, etc.); • Specific tissues (skin, fatty flesh, muscular flesh or organs) or parts of plants (roots, leaves, flowers, berries, seeds, etc.) that are consumed; • The typical portion size for each tissue or part of plants consumed, using standard measures such as measuring cups or spoons, or weights; • The frequency of country foods consumption (i.e., the number of servings per week or month or season, and the typical method of preparation: skin on/off, washing, peeling, cooking (raw, fried, baked, etc.), drying, fermenting, and any other preparation methods that may affect the COPC concentration of the foods consumed; • The frequency of foods consumed that have been purchased from a grocery store or supermarket; and • Additional traditional knowledge (i.e., species consumed, when the foods are consumed, their residence times, and times of increased consumption of specific foods such as, seasonal patterns or migration periods) As stated in Section 12.22 of the revised EIS (April 2018), to ensure that Indigenous communities most affected by the Project have input into the effectiveness of the Environmental Management Plans and Follow-up Programs, Treasury Metals proposes to form an Environmental Management Committee. This committee would be made up of members from Indigenous communities and would meet with representatives from Treasury Metals on a to-be-

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				determined basis, possibly quarterly or semi-annually. Treasury Metals would present any reportable information on the management plans as well as the results of the follow-up programs. If exceedances or issues arise that show mitigation measures have not been as effective as expected, the potential for further actions would be discussed with the committee. The Environmental Management Committee would also provide a forum for discussing other environmental matters with the potentially affected Indigenous communities such as upcoming permits, additional TK that might have been collected since completion of the EA process, and any other environmental matters of relevance to the committee including financial support for operation of the committee. Treasury Metals encourages and welcomes participation by members of Indigenous Groups as part of the proposed Environmental Management Committee so that requests such as "more baseline water quality studies" may be appropriately considered and completed.
				Agency Comment on Draft Response Comment is the same as TMI_922-HE(2)-02.
				Comment to the Agency The final Goliath Gold Project Follow Up Addendum captures all requested revisions with respect to the follow up program for country foods from Health Canada, the Agency, and the Indigenous stakeholders and their consultants. Fulsome details have been provided in the response to TMI_922-HE(2)-02 and a final response provided below.
				FINAL RESPONSE **PART A.** Wild rice was included in the country foods assessment (See Section 3.5 and Appendix II- Supplemental Information for the HHRA of Country Foods for the Goliath Gold Project of the HHERA Report). Wild rice was identified during engagement activities with Indigenous communities as an important food item both in terms of their own diet, but also for the commercial sale. Chemical concentrations were modelled into wild rice using the "water to macrophyte" uptake factor provided by Sheppard et al., 2010. Therefore "wild rice" is synonymous with "macrophyte" in the HHERA). Chemical concentrations in wild rice are provided in Appendix IV "Model Inputs" of the HHERA. The ingestion of wild rice was considered as part of the ingestion of country foods pathway as well as in the determination of residual adverse effects via the sum of all operable exposure pathways as per TMI_956-HHRA(2)-03. The results of the HHRA identified residual adverse effects for three of the valued components; arsenic, zinc, and thallium. Residual adverse effects for human health were identified to both the resident and visitor/harvester receptors for thallium (non-cancer risk), zinc (non-cancer risk), and arsenic (cancer risk). Ingestion of country foods contributed the highest proportion to the overall characterization of residual adverse effects via the sum of risk from all operable exposure pathways for thallium and zinc. Direct contact with arsenic in surface water contributed the highest proportion to the overall characterization of residual adverse effects via the sum of risk from all operable exposure pathways for arsenic, although the concentration of arsenic in the water bodies did not exceed PWQO or Health Canada's maximum acceptable criteria for drinking water. The source of arsenic in the surface water bodies is not

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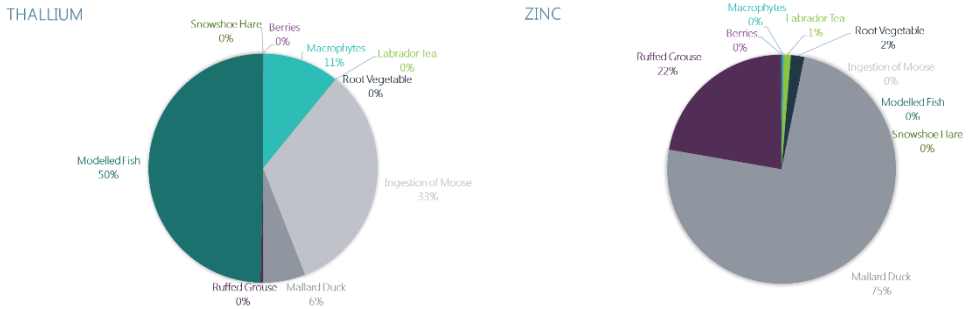
				anthropogenic, rather a consequence of the natural geology of the region which is a common occurrence in Northern Ontario. Therefore, potential risk to human health is not anticipated for the Base Case Assessment Scenario nor the Goliath Gold Project Assessment Scenario. No risk management measures/ mitigation measures are required for arsenic. As shown in the Figures 1 and 2 below (Figures 4.4.1.3-1 and 4.4.2.3-1 from the Final HHERA (February 2019), wild rice (i.e. macrophytes) contributed very little to the overall risk characterization accounting for only 11%, 0%, and 4% of total exposure in foods for thallium, zinc, and arsenic, respectively.  **Figure 1 (4.4.1.3-1) Relative Contributions to Hazard Quotient via Ingestion of Country Foods**

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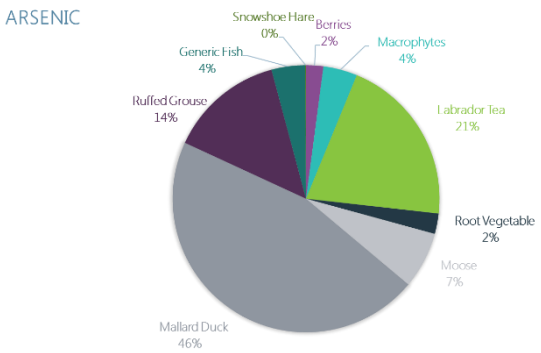

Figure 2 (4.4.2.3-1) Relative Contributions to Incremental Lifetime Cancer Risk via Ingestion of Country Foods

PART B.

As stated in the response to TMI_956-HHRA(2)-03, the current level of uncertainty relied upon is the country foods assessment is not considered most appropriate for basing mitigation measures on. Instead a baseline country foods program is provided in the Final Goliath Gold Follow Up Addendum. The program was designed following Health Canada's 2018 guidance document for the assessment of country foods in an EA. In keeping with the EIS guidelines, where residual adverse effects are identified, a cumulative effects assessment and significance assessment are required. The results indicated that there would be no cumulative effects as there were no effects identified that would spatially and temporally overlap with other Projects. Furthermore, all the residual effects had a magnitude level of I, indicating that they are not significant. The country foods assessment and quantitative ecological risk assessment relied solely on the use of modelled chemical concentration data as a baseline country foods study was not completed in support of the revised EIS (April 2018), as such there are uncertainties associated with the predictions which are likely to overestimate the calculations used to determine residual adverse effects. A detailed follow up program has been provided in the Final Goliath Gold Follow Up Program Addendum to verify the predictions related to chemical concentrations in plants and soil organisms and mammals and birds used in the assessment of residual adverse effects on human health and ecological receptors. Treasury Metals recognizes that the perception of risk, safety, and well-being is a concern to members Indigenous communities and has proposed to work with each Indigenous stakeholder community to develop a risk communication plan to help mitigate the perceptions of risk, safety and well-being associated with the Goliath Gold Project.

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				Section 10 of the revised EIS (April 2018) Commitments and Mitigation Measures Summary provides the details of all mitigation measures required for the Project. The mitigation measures presented in the revised EIS (April 2018) for wild rice are re-stated below. • Minimized the amount of wetland and vegetated area clearing required for the Project by optimizing the pit design and siting Project infrastructure in previously disturbed areas. [Mit_050, Mit_065]. • Retention of forested areas wherever feasible. [Mit_084]. • Identification and protection of known vegetative SAR locations. [Mit_085]. • Avoid broadcast spraying of herbicides for vegetation management. [Mit_086]. • Ensure proper culvert sizing for all new water crossing installations, allowing for maintenance of existing flows and water levels. [Mit_082]. • Develop slope dependent vegetated buffers along rivers creeks and wetlands in conjunction with the MNRF. [Mit_066]. • Develop sediment and erosion plans which will reduce sedimentation into wetlands and reduce the potential for dust cover on roadside vegetation. [Mit_008, Mit_046, Mit_054]. • Restoration of all disturbed habitats upon closure to the extent feasible. [Mit_068]. **PART C.** The country foods assessment and quantitative ecological risk assessment relied solely on the use of modelled chemical concentration data as a baseline country foods study was not completed in support of the revised EIS (April 2018), as such there are uncertainties associated with the predictions which are likely to overestimate the calculations used to determine residual adverse effects. A detailed follow up program has been provided in the Final Goliath Gold Follow Up Program Addendum to verify the predictions related to chemical concentrations in plants and soil organisms and mammals and birds used in the assessment of residual adverse effects on human health and ecological receptors. As stated in Section 12.22 of the revised EIS (April 2018), to ensure that Indigenous communities most affected by the Project have input into the effectiveness of the Environmental Management Plans and Follow-up Programs, Treasury Metals proposes to form an Environmental Management Committee. This committee would be made up of members from Indigenous communities and would meet with representatives from Treasury Metals on a to-be-determined basis, possibly quarterly or semi-annually. Treasury Metals would present any reportable information on the management plans as well as the results of the follow-up programs. If exceedances or issues arise that show mitigation measures have not been as effective as expected, the potential for further actions would be discussed with the committee. The Environmental Management Committee would also provide a forum for discussing other environmental matters with the potentially affected Indigenous communities such as upcoming permits, additional TK that might have been collected since completion of the EA process, and any other environmental matters of relevance to the committee including financial support for operation of the committee. Treasury Metals encourages and welcomes participation by members of Indigenous Groups as part of the proposed Environmental Management

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				Committee so that requests such as "more baseline water quality studies" may be appropriately considered and completed. As part of the Round 2 process, Treasury Metals have advanced their engagement with all Indigenous stakeholders including Métis Nation of Ontario (MNO), Asubpeeschoseewagong Netum Anishinabek (ANA) (previously referred to as Grassy Narrows First Nation), Naotkamegwanning First Nation (NFN), Eagle Lake First Nation (ELFN) and Wabigoon Lake Ojibway Nation (WLON). Treasury Metals has continued dialogue with MNO, ANA, NFN, ELFN, and WLON as it relates to the potential effects of the Project, capacity for informed dialogue, acceptable protocols, plans and timelines, as well as the overall objectives and scope of engagement activities. Treasury Metals in good faith has proposed funding agreements to allow for continued dialogue, and execution and evaluation of critical support items to the development of the Project (TKLUS). Information from formal and informal traditional knowledge and traditional land and resource use studies or workshops from other Indigenous communities will be used to inform management plans and amendments to the follow up programs. Treasury Metals recognizes that the perception of risk, safety, and well-being is a concern to members Indigenous communities and has proposed to work with each Indigenous stakeholder community to develop a risk communication plan to help mitigate the perceptions of risk, safety and well-being associated with the Goliath Gold Project.

TMI_946-HE(2)-04B

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TMI_946-HE(2)-04B	HE(2)-04B	4	Eagle Lake First Nation Wabigoon Lake Ojibway Nation	**Reference to EIS Guidelines:**	Part 2, Section 10.1.3
				Reference to EIS / Appendix	Appendix W- 2, Section 3.1.1; Appendix EE, Figures 5.1 and 5.2; Section 5.9; Section 13
				Cross-reference to Round 1 IRs	TMI_879-AE(2)-03B, TMI_945-HE(2)-03C
				Context and Rationale: It is unclear whether the proponent considered the guidance document published by Health Canada in 2018 when evaluating human health impacts by country foods. This guidance should be followed by the proponent in the development of the final HHRA.	

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				Figure 3.1.1-1 of the June 2018 HHRA (Appendix W-2 of the revised EIS) does not clearly mark the locations of receptors being considered for the study. The locations of all receptors (including locations of traditional use of lands and resources, permanent residences, seasonal cottages/cabins, and recreational areas for determination of potential effects under subsection 5(2) of the *Canadian Environmental Assessment Act, 2012*) should be clearly identified to ensure that the receptors are selected in accordance with the land use in the area. Ensure that any new receptor locations identified through IR# AE(2)-03B are included in Figure 3.1.1-1. In areas where there would be a pathway that could impact human health, in relation to country food harvesting activities that would be permitted to continue, provide a detailed map. The map should include specific locations of country food harvesting activities (i.e., hunting, gathering, fishing etc.). This map, or series of maps, would consolidate and update the information provided in Appendix EE, Figure 5.1 and 5.2, and from maps showing locations of various plants in Section 5.9 of the revised EIS. Areas of potential fish harvesting should also be identified in waterbodies, given the bioaccumulative potential of metals, such as methylmercury. To reassure Indigenous groups that the environmental assessment predictions are accurate, in areas where there may be uncertainty in relation to human health or country foods, follow-up program measures should be identified, such as appropriate follow-up monitoring, notification and regular communication with Indigenous groups. These maps will be useful in developing these follow-up programs, to understand where potentially affected country foods may be found in the vicinity of the Project. It is unclear, at this time, what country foods will be monitored, and at what locations and times. The follow-up program measures should be developed in consultation with Indigenous groups, to ensure that the program can be responsive to their interests. Reference: Health Canada. 2018. Guidance for Evaluating Human Health Impacts in Environmental Assessments: Country Foods. https://www.canada.ca/en/health- canada/services/publications/healthy-living/guidance-evaluating-human-health-impacts-country-foods.html
				Specific Question / Request for Information: A. Use the 2018 Health Canada guidance for the final HHRA to evaluate the human health impacts by country foods. B. Update Figure 3.1.1-1 to clearly mark the locations of off-site receptors. Ensure that any new receptor locations identified through IR# AE(2)-03B are included in the figure. C. Categorize the receptor points located in question B to distinguish locations of traditional use of lands and resources, permanent residences, seasonal cottages/cabins, and recreational areas. D. Provide a detailed map of the country foods harvesting areas including areas of potential fish harvesting. The Agency recognizes that some of this information may be confidential, in which case the existence of such areas may be mentioned without locating on the map. E. Provide details of the follow-up programs related to human health and country foods, to confirm that EA predictions made about country foods are acceptable. In particular, describe how Indigenous groups will be consulted in the

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				development and implementation of the program. It is noted that the follow-up program related to wild rice would be provided in response to IR# HE(2)-03C. **THIS IR SUPERSEDES IR# HE(2)-04.**
				Response: **PART A-** At the time the EIS was submitted in April 2018, the Health Canada Guidance for Evaluating Human Health Impacts in Environmental Assessments: Country Foods was not available as it was released on June 11, 2018. However, the recommendations made in this guidance document have been incorporated into the HHERA (August, 2018) as part of the Round 2 Information Request Process and the Appendix A: Country Foods for Environmental Assessment Checklist tool used to confirm that the HHERA (August, 2018) meets the main requirements of the newly released 2018 Health Canada document. The checklist tool has been included as Figure II-1 in the HHERA (August, 2018) Report (August, 2018 to demonstrate compliance. The HHERA Report (August, 2018) identified that uncertainties associated with the estimation of potential risk for all assessment scenarios may be reduced with the inclusion of expanded baseline data including site specific uptake factors and measured concentrations in wider selection of country foods. This is consistent with the instructions provided it the 2018 Country Foods guidance document. However, given the timing of the EIS submission prior to the release of the 2018 Country Foods guidance, it was not feasible to collect additional baseline data specifically in support of the HHERA (August, 2018). Instead, and as described in Section 7 of the HHERA (August, 2018), additional baseline data may be collected as part of the Follow-Up Program. The 2018 Health Canada guidance suggests that, baseline levels of chemicals of concern in country foods should be measured as part of the EA prior to the project start, however if those levels were neither measured nor comprehensive, then it is recommended that they be identified prior to project start. As detailed in the Follow-Up Program Treasury Metals will measure concentrations of COCs in environmental and Project-specific media as well as country foods items. Given that this guidance was only made available following the submission of the EIS (April 2018), in an effort to satisfy the monitoring requirements described by Health Canada with respect to country foods, Treasury Metals will include a reference site (i.e. nearby site with similar environmental conditions, but outside the zone of influence of the Project) to established baseline conditions. This approach is considered acceptable as per the 2018 Health Canada country foods guidance document. Once the Project commences monitoring will be performed in support of the HHRA for all Project phases including Site Preparation and Construction, Operations, Closure, and Post-Closure to satisfy the requirements of Health

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				Canada guidance for evaluating human health impacts in environmental assessments for country foods, air, drinking and recreational water quality. **PART B** The revised air quality modelling grid in support of the HHERA (August, 2018) is shown relative to the Property Boundary and the three Study Areas, on Figure 3.1.1-1 (included as TMI_946-HE(2)-04B_Attachment 1). The sensitive receptor locations considered in Section 6.6 of the EIS have been added to Figure 3.1.1-1 in response to this Round 2 Information Request. Additional details with respect to the objectives of the revised air quality assessment in support of the HHERA (August, 2018) and receptors considered have been provided herein. Activities associated with each Project phase are expected to emit Criteria Air Contaminants (CACs) including CO, NOx, SO2, TSP, PM10, and PM2.5. Section 6.6 of the revised EIS (April 2018) provided an evaluation of the effects of the Project on air quality and considered the potential effects of the Project on air quality during the Site Preparation and Construction, Operations, and Closure phases of the Project. There are no air emission sources during the Post-Closure phase of the Project as such no predicted values were modelled. The air quality assessment presented in Section 6.6 of the revised EIS (April 2018) focused, appropriately on the maximum predicted concentrations at the property boundary, as well as at 43 identified sensitive receptors. The locations where air quality predictions were made was shown on, Figure 6.1.4.5-1 “Air Quality Local Study Area” provided in Section 6.1.4 of the revised EIS (April 2018). The property boundary predictions represented the appropriate values for determining compliance with Ontario Regulation 419/05, while the CCME (2006) identifies that the sensitive receptor which meet the CCME definition of community-based receptors, would be the most appropriate locations for determining compliance with ambient air quality criteria. In Section 6.19 of the EIS (April 2018) the air quality predictions were discussed in terms of potential health implications. Table 6.19.2.1-4 of Section 6.19 of the EIS (April 2018) provided a refined screening of CACs using the maximum modelled concentrations at the sensitive receptors, which correspond to the closest “community-oriented receptors” as defined by the CCME (2000). The results presented in Table 6.19.2.1-4 of the revised EIS indicated that none of the predicted concentrations exceed their respective ambient air quality criteria, with the exception of total suspended particulate (TSP). The maximum 24−hour TSP concentration during the Site Preparation and Construction Phase was shown to marginally exceed (by 2.6%) it’s Ontario Ambient Air Quality Objective. The Ontario Ambient Air Quality Objective was set based on visibility (i.e. aesthetic) criteria and not the protection of human health. Therefore, no CACs were identified as COCs relevant to human health and a quantitative assessment of potential human health risks via the inhalation pathway is not warranted.

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				Although the results presented in Section 6.19 of the EIS (April 2018) identify that there are no exceedances of the appropriate values for ambient air quality objectives, a number of Round 2 Information Requests were received regarding the potential risks to human receptors via the inhalation pathway. Treasury Metals' recognizes that Project Workers may be exposed to CACs within the Operations Area (Study Area No. 1), and members of Indigenous communities may visit areas that fall outside of the Operations Area, but within the property boundary of the Goliath Gold Project, to practice traditional uses of the lands and resources. Project work and traditional land use do not meet the CCME definition of a community-based receptor and thus determination of compliance with the application of Ambient Air Criteria is not appropriate for these receptors. To capture the possible risk to peoples using these areas, the air modelling was redone using the same emissions and methods as presented in Section 6.6 of the revised EIS (April 2018), but focusing on possible modelling receptors covering the HHERA (August, 2018) Study Areas. The refined modelling includes 308 modelling receptors located within the Operations Area (Study Area No. 1), 3,474 modelling receptor locations within the LSA (Study Area No. 2) 1,445 of which fall inside the Property Boundary, and at 46 modelling receptor locations within the Village of Wabigoon (Study Area No. 3). The revised air quality modelling grid in support of the HHERA (August, 2018) is shown relative to the Property Boundary and the three Study Areas, on Figure 3.1.1-1. The sensitive receptor locations considered in Section 6.6 of the EIS have been added to Figure 3.1.1-1 in response to this Round 2 Information Request. The results of the revised air quality predictions made specifically in support of the HHERA (August, 2018) indicated that the concentrations of metals modelled onto total suspended particulate matter met their respective ambient air quality criteria for all study areas, assessment scenarios, and available averaging periods. No residual effects were identified, and no mitigation measures are required. With respect to CACs, the results of the revised air quality predictions made specifically in support of the HHERA (August, 2018) indicated that within the Operations Area, predicted dustfall levels, and concentrations of NO2, PM2.5, PM10 and TSP were larger than the ambient air criteria appropriate for a sensitive receptor for one or more averaging period (Table 3.4.6.1 of the HHERA (August, 2018) Report (August, 2018)). The ambient air criteria for dustfall and TSP are based on aesthetic endpoints rather than human health, and therefore no potential health effects are anticipated as a result of dustfall levels and TSP concentrations. Risk management measures including an occupational health and safety plan will serve as an effective mitigation measure for Project Workers exposed to CACs in air within the Operations Area. As such no residual adverse effects are identified within Operations Area. Additionally, there would be no access to the Operations Area by members of the public or Indigenous communities

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				during the active life of the project and again highlight that there are no sensitive or community-based receptors within the Operations Area. The exposure point concentrations (EPC) all CACs were lower than the criteria appropriate for a sensitive receptor in the LSA (including in areas outside of the Operations Area but within the Property Boundary where traditional land and resource use may occur), and the Village of Wabigoon. Therefore, there are no potential health risks anticipated to human receptors who may access the areas within the Property Boundary but outside of the Operations Area or in the Village of Wabigoon via inhalation of CACs. **PART C** The air quality assessment presented in Section 6.6 of the revised EIS (April 2018) focussed, appropriately on the maximum predicted concentrations at the property boundary, as well as at 43 identified sensitive receptors. The locations where air quality predictions were made were shown on, Figure 6.1.4.5-1 "Air Quality Local Study Area" provided in Section 6.1.4 of the revised EIS (April 2018). To satisfy part B of this IR, Figure 3.1.1-1 (included as TMI_946-HE(2)-04B_Attachment 1) was revised to show the air quality modelling grid specific to the HHERA (August, 2018) (versus the one that is appropriate for determining compliance as per the CCME definition). The sensitive receptor locations have been added to this figure as well to satisfy Part C of the IR and no new sensitive or community-based receptors were identified. It is important to highlight that as per the Problem Formulation provided as Section 4.1 of the HHERA (August, 2018), Study Area No. 2 was selected to conservatively assess both residents assumed to live in this area and harvesters/visitors who practice current use of land and resources for traditional purposes. It was conservatively assumed that all areas in Study Area No. 2, including those areas outside of the Operations Area but within the Property Boundary may be used for residential land use and/or traditional use of lands and resources. This assumption was made in response to information shared by members of indigenous communities during engagement activities that they currently use areas within Study Area No. 2 to hunt, fish, gather plants, and for spiritual practices. The exposure scenarios defined in the HHERA (August, 2018) therefore conservatively capture all land use including traditional use of lands and resources, permanent residences, seasonal cottages/cabins, and recreational areas. **PART D** Section 3.6.2 of the HHERA (August, 2018) provides detailed information regarding Traditional Knowledge and Traditional Land and Resource Use that was shared with Treasury Metals by members of Indigenous communities as part of ongoing engagement activities. This includes specific details of where country foods including fish are harvested. For example, a member of Wabigoon Lake First Nation specifically shared *"Baitfish and minnow trapping conducted within the local area – 2 locations identified within Project area (i.e. Property Boundary) but outside Project footprint (i.e. Operations Area)*". It is therefore Treasury Metals' understanding that traditional land use is practiced in

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				areas within the Property Boundary, and Study Area No. 2 was specifically assessed in the HHERA (August, 2018) as an area where traditional land and resource use occurs by residents and visitors/harvesters. Study Area No. 1, the Operations Area was also considered in the country foods assessment. For safety purposes, access to Study Area No. 1 the Operations Area will be restricted to only employees of Treasury Metals during the active phases of the Project (i.e. Site Preparation and Construction, Operations, and Closure). Country foods harvesting may resume at Study Area No. 1 the Operations Area during the Post-Closure phase. To ensure that all areas with habitat capable of supporting traditional land and resource use were sufficiently assessed in the main body of the EIS, the baseline studies for terrestrial and aquatic environments were utilized to present figures showing spatial extents of residual effects on harvesting/gathering, hunting, trapping, and fishing. These figures have been re-produced within Section 3.4.7.2 of the HHERA (August, 2018) to satisfy this Information Request. Therefore, the Study Areas selected for assessment as part of the HHERA (August, 2018) (including the country foods assessment) were selected based on detailed information shared with Treasury Metals regarding the current use of land and resource for traditional purposes by members of Indigenous communities. The HHERA (August, 2018) has been revised in several locations to highlight this approach and the importance of including these considerations in the HHERA (August, 2018). **PART E** Section 7 of the HHERA (August, 2018) provides the Follow-Up Program for Human Health in accordance with *CEAA 2012* and the 2018 Health Canada country food guidance document. Section 7 of the HHERA (August, 2018) supersedes Section 13.19 of the EIS (April 2018). A brief summary of the Follow-Up Program including that for Wild Rice was provided in the response for IR# HE(2)-03C and the reviewer is directed to the HHERA Report (August, 2018) provided as part of the Round 2 Information Request Response package for full details. The revised Follow-Up Program for human health has also been included in the Follow-Up Program Addendum provided as part of the Round 2 Information Request response package. As stated in Section 12.22 of the revised EIS (April 2018), to ensure that Indigenous communities most affected by the Project have input into the effectiveness of the Environmental Management Plans and Follow-up Programs, Treasury Metals proposes to form an Environmental Management Committee. This committee would be made up of members from Indigenous communities and would meet with representatives from Treasury Metals on a to-be-determined basis, possibly quarterly or semi-annually. Treasury Metals would present any reportable information on the management plans as well as the results of the follow-up programs. If exceedances or issues arise that show mitigation measures have not been as effective as expected, the potential for further actions would be discussed with the committee. The Environmental Management Committee would also provide a forum for discussing other environmental matters with the potentially affected Indigenous communities such as upcoming permits, additional TK that might have been collected since completion of the EA process, and any other environmental matters of relevance to the committee including financial support for operation of the committee. Treasury Metals encourages and

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				welcomes participation by members of WLON as part of the proposed Environmental Management Committee so that requests such as "more baseline water quality studies" may be appropriately considered and completed.
				Agency Comment on Draft Response: D. The response indicates that in section 3.4.7.2 of the HHRA, figures have been re-produced to show spatial extent of residual effects on harvesting/gathering, hunting, trapping and fishing. However, the referenced figures (or section) could not be located. It is possible that the correct reference is Section 3.6.2. If this is the case, it is noted that these maps, copied from other parts of the EIS, contain abbreviations (particularly for vegetation types) that are not defined in the HHRA, and are not mentioned in the HHRA text. D. Clarify the location of the Figures showing spatial extent of residual effects on country foods collection locations, and ensure that the maps are understandable to a reader of the HHRA.
				Specific Response to Agency Comments: To clarify, the draft response erroneously referenced Section 3.4.7.2. The figures were located in Section 3.6.3 of the Draft 2018 HHERA report. Since the time of the Draft HHERA Report submission, meaningful feedback via engagement with the Métis Nation of Ontario (MNO) has occurred and the spatial extents of traditional land and resource use including country foods harvesting have been confirmed. Treasury Metals would like to take this opportunity to provide additional justification as to why it was appropriate to conservatively assume that all areas outside of the Operations Area (including within the Property Boundary) may continue to be used for traditional land and resource use including country foods harvesting. In addition, the figures in Section 3.6.3 if of the HHERA Report have been replaced with one comprehensive figure, Figure 3.6.3-1 (included as TMI_946-HE(2)-04B_Attachment 2) which shows the spatial extent of residual effects on country foods collection locations. At the request of the involved Rightsholders, the specific areas are to remain confidential however, there continue to remain no points of reception that would be defined as sensitive receptor locations by CCME, within the Property Boundary. **Additional Information** As part of the revised EIS (April 2018), Treasury Metals assessed how the Project could affect current uses of land and resources for traditional purposes including their ability to harvest country foods. A key component in Treasury Metals' approach to doing this was engagement with Indigenous communities. In 2017 Treasury Metals circulated, to all Indigenous stakeholders, a document entitled "Impact Footprints and Effect Areas", which provided a series of figures by technical discipline (e.g., soil, noise, air quality, surface water quality, fish, wetlands, vegetation, wildlife, access) with the objective of providing a visual representation of the areas where potential effects to traditional land and resources uses could occur. The objective of this 2017 document was to serve as a useful tool to help understand where the identified effects of the Project coincide with areas that are currently used by Aboriginal people for traditional land uses including country foods harvesting. The hope was that Indigenous communities would identify

more specific areas within the impacted footprints where traditional land and resource use was occurring. Figure 2.14-1 of the Impact Footprints and Effect Areas report showed the "Combined Impacts and Affects of the Project for the Active Project Life" (i.e. Site Preparation and Construction through Closure). This figure has been provided as TMI_946-HE(2)-04B_Attachment 2 and edited to include the overlay if the 3 Study Areas defined in the HHERA Report. As shown on TMI_946-HE(2)-04B_Attachment 1, all of Study Area 1 (Operations Area), and much of Study Area 2 (Local Study Area) overlap with areas where the Project may cause an Impact or Affect. It should be noted that only impacted areas are expected to alter the ability of traditional land use to be practiced.

At the time the revised EIS was submitted in April 2018, and the Draft HHERA Report had been submitted in August 2018, none of the stakeholders had provided specific feedback as to if the identified Impacts or Affects footprints overlapped with the areas where they currently practice traditional land and resource use including specific area where country foods may be harvested. Therefore, for both the revised EIS (April 2018) and the HHERA Report it was conservatively assumed that all areas where the Project is predicted to have an effect, traditional land use is currently being practiced in those areas and the Project would thereby have an effect on traditional land and resource use.

Since the time of the revised EIS submission, and submission of the draft HHERA report, Treasury Metals has received from the Métis Nation of Ontario a Traditional Knowledge and Land Use Study (TKLUS) for the Goliath Gold Project. Upon careful review of the MNO TKLUS study, it was identified that there is overlap of the impacts and affects areas (shown on TMI_946-HE(2)-04B_Attachment 2) with areas currently used by the MNO for hunting large game, non-commercial fishing and gathering of plant material. A detailed breakdown of overlap by traditional land use type is provided in Table 1. On October 10, 2018 Treasury Metals had a meeting with the MNO Consultation Committee who were clear in stating that the results presented in the TKLUS were just a snapshot of their community and although specific areas of country foods harvesting were identified confidentially, all areas are suitable for their members. Treasury Metals communicated to the MNO consultation committee that both the 2018 HHERA Report and revised EIS (April 2018) conservatively assumed that all areas where the Project was predicted to have an effect, would in turn have an effect on current use of land and resources for traditional purposes and thus require mitigation measures. The MNO Consultation Committee were satisfied with this conservative approach to ensure their Rights were appropriately considered and potential effects appropriately mitigated.

Table 1. Confirmed Areas of Current Use of Lands and Resources for Traditional Purposes

Traditional Land or Resource Use	Overlaps with Goliath Gold Project	
	Impacted Area (1)	Affected Area (2)
Small Game Hunting	×	×
Large Game Hunting	✓	✓
Trapping	×	×
Commercial Fishing	×	×
Non-Commercial Fishing	×	✓
Plant Harvesting	✓	✓
Overnight Stay Sites	×	×
Traditional Ecological Knowledge Sites	×	×
Métis Cultural Practice Sites/Routes	×	×
Notes		

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[1]	An Impacted Area corresponds to an area of effects that would in turn have an effect on the ability to continue to practice traditional land and resource use. Refer to HHERA Figure 3.6.3-1.
[2]	An Affected Area corresponds to an area of effects that would NOT have an effect on the ability to continue to practice traditional land and resource use. Refer to HHERA Figure 3.6.3-1.

FINA RESPONSE:

PART A

At the time the EIS was submitted in April 2018, the Health Canada Guidance for Evaluating Human Health Impacts in Environmental Assessments: Country Foods was not available as it was released on June 11, 2018. However, the recommendations made in this guidance document have been incorporated into the 2018 HHERA as part of the Round 2 Information Request Process and the Appendix A: Country Foods for Environmental Assessment Checklist tool used to confirm that the 2018 HHERA meets the main requirements of the newly released 2018 Health Canada document. The checklist tool has been included as Figure II-1 in the 2018 HHERA Report to demonstrate compliance.

The HHERA Report identified that uncertainties associated with the estimation of potential risk for all assessment scenarios may be reduced with the inclusion of expanded baseline data including site specific uptake factors and measured concentrations in wider selection of country foods. This is consistent with the instructions provided it the 2018 Country Foods guidance document. However, given the timing of the EIS submission prior to the release of the 2018 Country Foods guidance, it was not feasible to collect additional baseline data specifically in support of the 2018 HHERA. Instead, and as described in The Human Health Follow-Up Program provided in The Goliath Gold Follow-Up Addendum (supersedes Section 13 of the revised EIS), additional baseline data may be collected as part of the Follow-Up Program. The 2018 Health Canada guidance suggests that, baseline levels of chemicals of concern in country foods should be measured as part of the EA prior to the project start, however if those levels were neither measured nor comprehensive, then it is recommended that they be identified prior to project start. As detailed in the Follow-Up Program Treasury Metals has proposed to measure concentrations of COCs in environmental and Project-specific media as well as country foods items. Given that this guidance was only made available following the submission of the EIS (April 2018), in an effort to satisfy the monitoring requirements described by Health Canada with respect to country foods, Treasury Metals will include a reference site (i.e. nearby site with similar environmental conditions, but outside the zone of influence of the Project) to established baseline conditions. This approach is considered acceptable as per the 2018 Health Canada country foods guidance document.

Once the Project commences Follow-Up monitoring as described in the Goliath Gold Follow-Up Addendum will be performed in support of the HHRA for all Project phases including Site Preparation and Construction, Operations, Closure, and Post-Closure to satisfy the requirements of Health Canada guidance for evaluating human health impacts in environmental assessments for country foods, air, drinking and recreational water quality.

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				PART B The revised air quality modelling grid in support of the 2018 HHERA is shown relative to the Property Boundary and the three Study Areas, on Figure 3.1.1-1 (included as TMI_946-HE(2)-04B_Attachment 1). The locations of sensitive receptors for air quality considered in Section 6.6 of the EIS have been added to Figure 3.1.1-1 in response to this Round 2 Information Request. Additional details with respect to the objectives of the revised air quality assessment in support of the 2018 HHERA and locations of sensitive receptors for air quality considered have been provided herein. As shown on the Figure there are no sensitive receptors with respect to air quality within the Property Boundary or the Operations Area. The air quality assessment was revised as part of the Round 2 process and the results demonstrate that the ambient air quality objectives are met at all of the sensitive receptor air modeling locations as well as the MPOI. The results are provided in TMI_954-HHRA(2)-01 and a discussion added to the 2018 HHERA Report. Activities associated with each Project phase are expected to emit Criteria Air Contaminants (CACs) including CO, NOx, SO2, TSP, PM10, and PM2.5. Section 6.6 of the revised EIS (April 2018) provided an evaluation of the effects of the Project on air quality and considered the potential effects of the Project on air quality during the Site Preparation and Construction, Operations, and Closure phases of the Project. There are no air emission sources during the Post-Closure phase of the Project as such no predicted values were modelled. The air quality assessment presented in Section 6.6 of the revised EIS (April 2018) focused, appropriately on the maximum predicted concentrations at the property boundary, as well as at 43 identified sensitive receptors. The property boundary predictions represented the appropriate values for determining compliance with Ontario Regulation 419/05, while the CCME (2006) identifies that the sensitive receptor which meet the CCME definition of community-based receptors, would be the most appropriate locations for determining compliance with ambient air quality criteria. As stated above, all of the ambient air quality objectives were met at these locations, and there is subsequently no potential risk to humans at the sensitive receptor locations or the Property Boundary. These results were consistent with those presented in the revised EIS (April 2018). Although the results presented in Section 6.19 of the EIS (April 2018) identify that there are no exceedances of the appropriate values for ambient air quality objectives, a number of Round 2 Information Requests were received regarding the potential risks to human receptors via the inhalation pathway. Treasury Metals' recognizes that Project Workers may be exposed to CACs within the Operations Area (Study Area No. 1), and members of Indigenous communities may visit areas that fall outside of the Operations Area, but within the property boundary of the Goliath Gold Project, to practice traditional uses of the lands and resources. Project work and traditional land use do not meet the CCME definition of a community-based receptor and thus determination of compliance with the application of Ambient Air Criteria is not appropriate for these receptors. There are areas within the Property Boundary where humans would be exposed to prolonged exposure to CACs in air as there are no permanent homes, hunting cabins or other structure which would meet the CCME definition of a community-based or sensitive receptor within the Property Boundary. To capture the possible risk to people who may transiently use these areas for traditional land and resource use, or to those who work within the Operations Area, the air modelling was

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				redone specifically in support of the HHERA using the same emissions and methods as presented in Section 6.6 of the revised EIS (April 2018), but focusing on possible modelling receptors covering the 2018 HHERA Study Areas. The refined modelling includes 308 modelling receptor located within the Operations Area (Study Area No. 1), 3,474 modelling receptor locations within the LSA (Study Area No. 2) 1,445 of which fall inside the Property Boundary, and at 46 modelling receptor locations within the Village of Wabigoon (Study Area No. 3). The revised air quality modelling grid in support of the 2018 HHERA is shown relative to the Property Boundary and the three Study Areas, on Figure 3.1.1-1. The sensitive receptor locations that meet the appropriate CCME definition with respect to air quality considered in the HHERA have been added to Figure 3.1.1-1 in response to this Round 2 Information Request. The results of the revised air quality predictions made specifically in support of the 2018 HHERA indicated that the concentrations of metals modelled onto total suspended particulate matter met their respective ambient air quality criteria for all study areas, assessment scenarios, and available averaging periods. No potential risk was identified via the inhalation of fugitive dust at any of the Study Areas, no risk management measures are required. The fugitive dust pathway was considered in the calculation of total dose and potential risk via the sum of all exposure pathways for the determination of residual adverse effects as described I TMI_956-HHRA(2)-03. With respect to CACs, the results of the revised air quality predictions made specifically in support of the 2018 HHERA indicated that within the Operations Area, predicted dustfall levels, and concentrations of NO2, PM2.5, PM10 and TSP were larger than the ambient air criteria appropriate for a sensitive receptor for one or more averaging period (Table 3.4.6.1 of the 2018 HHERA Report). The ambient air criteria for dustfall and TSP are based on aesthetic endpoints rather than human health, and therefore no potential health effects are anticipated as a result of dustfall levels and TSP concentrations. Risk management measures including an occupational health and safety plan will serve as an effective mitigation measure for Project Workers exposed to CACs in air within the Operations Area. As such no residual adverse effects are identified within Operations Area. Additionally, there would be no access to the Operations Area by members of the public or Indigenous communities during the active life of the project and again highlight that there are no sensitive or community-based receptors within the Operations Area. The exposure point concentration (EPC) of all CACs were lower than the criteria appropriate for a sensitive receptor in the LSA (including in areas outside of the Operations Area but within the Property Boundary where traditional land and resource use may occur), and the Village of Wabigoon. Therefore, there are no potential health risks anticipated to human receptors that may access the areas within the Property Boundary but outside of the Operations Area or in the Village of Wabigoon via inhalation of CACs. **PART C** The air quality assessment presented in Section 6.6 of the revised EIS (April 2018) focussed, appropriately on the maximum predicted concentrations at the property boundary, as well as at 43 identified sensitive receptors. To satisfy

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				part B of this IR, Figure 3.1.1-1 (included as TMI_946-HE(2)-04B_Attachment 1) was revised to show the air quality modelling grid specific to the 2018 HHERA (versus the one that is appropriate for determining compliance as per the CCME definition). The locations of sensitive receptors that meet the CCME definition are included on the Figure to satisfy Part C of the IR and no new sensitive or community-based receptors were identified. The ambient air quality objectives were met at all of the 43 locations of sensitive receptors. It is important to highlight that as per the Problem Formulation provided as Section 4.1 of the 2018 HHERA, Study Area No. 2 was selected to conservatively assess both residents assumed to live in this area and harvesters/visitors who practice current use of land and resources for traditional purposes. It was conservatively assumed that all areas in Study Area No. 2, including those areas outside of the Operations Area but within the Property Boundary may be used for residential land use and/or traditional use of lands and resources. This assumption was made in response to information shared by members of indigenous communities during engagement activities that they currently use areas within Study Area No. 2 to hunt, fish, gather plants, and for spiritual practices. The exposure scenarios defined in the 2018 HHERA therefore conservatively capture all land use including traditional use of lands and resources, permanent residences, seasonal cottages/cabins, and recreational areas. **PART D** Figure 3.6.3-1 of the HHERA (included as TMI_946-HE(2)-04B_Attachment 2) provides a map of the spatial extent of the predicted effects of the Project on the ability of Indigenous communities to continue to practice their current use of land and resources for traditional purposes. The map identifies the areas of the Project where predicted effects are predicted to also have an effect on the ability of Indigenous communities to practice their current use of lands and resources for traditional purposes (i.e. impacted areas), and areas where the predicted effects of the Project will not have an effect on traditional land and resource use (i.e. affected areas). Since the time of the revised EIS (April 2018) and the Draft HHERA Report submissions, Treasury Metals has received from the Métis Nation of Ontario, a Traditional Knowledge and Land Use Study (TKLUS) for the Goliath Gold Project. At the request of the Métis Nation of Ontario and the involved stakeholders this report and the figures within it identifying specific areas of country foods harvesting are to remain confidential. However, upon careful review of the MNO TKLUS study, it was confirmed that there is overlap of the impacted and affected areas of the Project with some types of traditional land and resource use (as shown in the legend to Figure 3.6.3-1 and in Table 1 below) with areas currently used by the MNO for hunting large game, non-commercial fishing and gathering of plant material. Due to confidentiality Treasury Metals can only specify to the level detail of “purple” versus “green” shading provided in Figure 3.6.3-1 of the HHERA (included as TMI_946-HE(2)-04B_Attachment 2). Treasury Metals shared the information on Figure 3.6.3-1 with the MNO Consultation Committee on October 10, 2018, where it was further validated however, the MNO expressed the TKLUS study was just a snapshot of select community members and all areas must be assumed to be used for traditional purposes. Thus, although specific areas of traditional land and resource use have been confirmed, the

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assumption applied within the revised EIS (April 2018) and the HHERA Report that all areas outside of the Operations Area may be used for traditional land and resource use including country foods harvesting remains valid and this new information does not alter the conclusions of the revised EIS (April 2018) or the Draft HHERA Report.

Table 1. Confirmed Areas of Current Use of Lands and Resources for Traditional Purposes

Traditional Land or Resource Use	Overlaps with Goliath Gold Project	
	Impacted Area (1)	Affected Area (2)
Small Game Hunting	×	×
Large Game Hunting	✓	✓
Trapping	×	×
Commercial Fishing	×	×
Non-Commercial Fishing	×	✓
Plant Harvesting	✓	✓
Overnight Stay Sites	×	×
Traditional Ecological Knowledge Sites	×	×
Métis Cultural Practice Sites/Routes	×	×

Notes

1	An Impacted Area corresponds to an area of effects that would in turn have an effect on the ability to continue to practice traditional land and resource use. Refer to HHERA Figure 3.6.3-1.
2	An Affected Area corresponds to an area of effects that would NOT have an effect on the ability to continue to practice traditional land and resource use. Refer to HHERA Figure 3.6.3-1.

PART E

The Goliath Gold Follow-Up Addendum supersedes Section 13 of the revised EIS and provides a consolidated Follow-Up Program for Human Health in response to the conclusions of the 2018 HHERA Report.

As stated in Section 12.22 of the revised EIS (April 2018), to ensure that Indigenous communities most affected by the Project have input into the effectiveness of the Environmental Management Plans and Follow-up Programs, Treasury Metals proposes to form an Environmental Management Committee. This committee would be made up of members from Indigenous communities and would meet with representatives from Treasury Metals on a to-be-determined basis, possibly quarterly or semi-annually. Treasury Metals would present any reportable information on the management plans as well as the results of the follow-up programs. If exceedances or issues arise that show mitigation measures have not been as effective as expected, the potential for further actions would be discussed with the committee. The Environmental Management Committee would also provide a forum for discussing other environmental matters with the potentially affected Indigenous communities such as upcoming permits, additional TK that might have been collected since completion of the EA process, and any other environmental matters of relevance to the committee including financial support for operation of the committee. Treasury Metals encourages and

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				welcomes participation by members of WLON as part of the proposed Environmental Management Committee so that requests such as "more baseline water quality studies" may be appropriately considered and completed.

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TMI_954-HHRA(2)-01	HE(2)-01 HHRA(2)-01	3	CEA Agency	**Reference to EIS Guidelines:**	Section 3.2, 10.1.3
				Reference to EIS / Appendix	Section 6; Appendix W-2
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: The Agency is aware that additional data such as new receptor locations, not found in Section 6 or the appendices of the revised EIS, are used in the June 2018 HHRA (Appendix W-2 of the revised EIS). For example, Section 3.5.2.1 of the updated HHRA indicates that "the air modelling was redone using the same emissions and methods as presented in Section 6.6 of the revised EIS (April 2018), but focusing on possible modelling receptors covering the study areas described in Section 3.1.1." Where any exposure point concentrations used as inputs in the June 2018 HHRA are different from those presented in Section 6 or in appendices of the revised EIS, it is important to explain the factors, data sources, modelling scenarios and assumptions that have changed, such as new receptor locations, to identify the tables or sections in Section 6 or in appendices that are superseded by the new data, and to clearly present the new data in the final HHRA. Section 3.2 of the EIS Guidelines indicates that "Assumptions will be clearly identified and justified. All data, models and studies will be documented such that the analyses are transparent and reproducible."	
				Specific Question / Request for Information: A. Where exposure point concentrations provided in the final HHRA are different those provided in Section 6 of the revised EIS:	

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				• explain the factors, data sources, modelling scenarios and assumptions that have changed; • identify the tables or sections in Section 6 or in appendices of the revised EIS that are superseded by the new data; and • present the new data in the final HHRA.
				Draft Response: Section 6.6 of the revised EIS (April 2018) provided an evaluation of the effects of the Project on air quality and considered the potential effects of the Project on air quality during the Site Preparation and Construction, Operations, and Closure phases of the Project. There are no air emission sources during the Post-Closure phase of the Project as such no predicted values were modelled. The air quality assessment presented in Section 6.6 of the revised EIS (April 2018) focused, appropriately on the maximum predicted concentrations at the property boundary, as well as at 43 identified sensitive receptors. The locations where air quality predictions were made was shown on, Figure 6.1.4.5-1 "Air Quality Local Study Area" provided in Section 6.1.4 of the revised EIS (April 2018). The property boundary predictions represented the appropriate values for determining compliance with Ontario Regulation 419/05, while the CCME (2006) identifies that the sensitive receptor which meet the CCME definition of community-based receptors, would be the most appropriate locations for determining compliance with ambient air quality criteria. In Section 6.19 of the EIS (April 2018) the air quality predictions were discussed in terms of potential health implications. Table 6.19.2.1-4 of Section 6.19 of the EIS (April 2018) provided a refined screening of CACs using the maximum modelled concentrations at the sensitive receptors, which correspond to the closest "community-oriented receptors" as defined by the CCME (2000). The results presented in Table 6.19.2.1-4 of the revised EIS indicated that none of the predicted concentrations exceed their respective ambient air quality criteria, with the exception of total suspended particulate (TSP). The maximum 24-hour TSP concentration during the Site Preparation and Construction Phase was shown to marginally exceed (by 2.6%) it's Ontario Ambient Air Quality Objective. The Ontario Ambient Air Quality Objective was set based on visibility (i.e. aesthetic) criteria and not the protection of human health. Therefore, no CACs were identified as COCs relevant to human health and a quantitative assessment of potential human health risks via the inhalation pathway is not warranted. Although the results presented in Section 6.19 of the EIS (April 2018) identify that there are no exceedances of the appropriate values for ambient air quality objectives, a number of Round 2 Information Requests were received regarding the potential risks to human receptors via the inhalation pathway. Treasury Metals' recognizes that Project Workers may be exposed to CACs within the Operations Area (Study Area No. 1), and members of Indigenous communities may visit areas that fall outside of the Operations Area, but within the property boundary of the Goliath Gold Project, to practice traditional uses of the lands and resources. Project work and traditional land use do not meet the CCME definition of a community-based receptor and thus determination of compliance with the application of Ambient Air Criteria is not appropriate for these receptors. To capture the possible risk to peoples using these areas, the air modelling was redone using the same emissions and methods as presented in Section 6.6 of the revised EIS

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				(April 2018), but focusing on possible modelling receptors covering the HHERA (August, 2018) Study Areas. The refined modelling includes 308 modelling receptor located within the Operations Area (Study Area No. 1), 3,474 modelling receptor locations within the LSA (Study Area No. 2) 1,445 of which fall inside the Property Boundary, and at 46 modelling receptor locations within the Village of Wabigoon (Study Area No. 3). The revised air quality modelling grid in support of the HHERA (August, 2018) is shown relative to the Property Boundary and the three Study Areas, on Figure 3.1.1-1 of the HHERA (August, 2018) Report (August, 2018). The maximum concentrations for each parameter at each of the modelling receptors, and averaging periods evaluated were determined for the Site Preparation and Construction, Operations, and Closure phases of the Project. Given that this work was completed in support of the HHERA (August, 2018), the highest UCLM of the modelled receptors in each of the Study Areas, over the five-year period modelled was selected as the EPC for each parameter within each study area. Therefore: • The only factor that is different in the HHERA (August, 2018) than the EIS with respect to air quality modelling is the receptor grid which as shown on Figure 3.1.1-1 was revised to include all areas within the property boundary, including the operations area. All air quality modelling assumption were provided as Appendix J to the EIS (April 2018); • The tables related to air quality in Section 6.6 and 6.19 of the EIS (April 2018) remain valid for assessing the health implications for determining compliance with ambient air quality criteria (both Ontario Regulation 419/05 and CCME) and are not superseded by any table in the HHERA (August, 2018). In the HHERA (August, 2018), new tables are provided in Section 3.5 where the 95% UCLM concentrations of CACs and metals are qualitatively screened to the Canadian Ambient Air Quality Standards (CAAQS) or the Ontario Ambient Air Quality Criteria (AAQC) for all available averaging periods. It is noted however, that as per the definition of the CAAQS and AAQC, these are the criteria to be applied at “community-based” receptors including sensitive receptor locations and appropriate for determining regulatory compliance. There are no community-based receptor or sensitive receptor locations within the Property Boundary, as Project work and traditional land use do not meet the CCME definition of a community-based receptor and thus determination of compliance with the application of Ambient Air Criteria is not appropriate for these receptors. The results presented in the new tables in the HHERA (August, 2018) do not supersede any table presented in Section 6 of the EIS, but rather provide a complimentary screening specifically in support of the objectives of HHERA and to satisfy the Round 2 Information Requests received. The predicted EPCs of CACs and metals within the Operations Area, the LSA (including outside of the Operations Area but inside the Property Boundary where traditional land use is practiced), and in the Village of Wabigoon are appropriately assessed for their implications on potential health effects in the HHERA Report (August, 2018) (August, 2018).

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				• All new data are provided in Appendix I to the HHERA (August, 2018) Report (August, 2018)- Raw Data. All of the information provided in this IR is included in Section 3.5 of the HHERA (August, 2018) Report (August, 2018).
				Agency Comment on Draft Response: Additional detail on selected receptor locations for the HHRA was provided to Health Canada in an email on September 13, 2018. The proponent clarified that exposure point concentrations (EPCs) from the three study areas were used in the screening process for the HHRA. For clarity it would be beneficial to present contour maps similar to those in Appendix J-2 Figures 6 to19 of the EIS inclusive of the MPOI in all study areas. Annual NO2 should also be included (see AE(2)-01). Provide contour maps similar to those presented in Appendix J-2 of the Environmental Impact Statement, inclusive of the Maximum Point Of Impingement (MPOI) in each study area. The new maps should include the updated property boundary, and show the contours for areas beyond the Operations Area and within the updated property boundary where the use of lands and resources could by members of Indigenous communities could continue.
				Specific Response to Agency Comments: The modelled "receptor" locations used in the air quality assessment (as presented in Section 6.6 of the revised EIS (April 2018), as updated by the Round 2 responses) is consistent with the definition in Section 2 of the Ontario Regulation 419/05, specifically: • (a) any point off-site; • (b) any point on-site that is (i) on a child care facility; or (ii) on a structure that serves primarily as a health care facility, a senior citizens' residence or long-term care facility, or an educational facility; or • (c) any point on the same structure as the source of a contaminant that does not belong to the facility. Given that there are no child care, health care, or senior citizens' facilities within the Goliath Gold Project Property Boundary, there are no "receptors" as defined by O.Reg. 419/05 within the property boundary. As shown in the attachment to TMI_954-HHRA(2)-01, the ambient air quality objectives are met at the Property Boundary. Treasury Metals' recognizes that Project Workers may be exposed to air contaminants within the Operations Area (Study Area No. 1), and members of Indigenous communities may visit areas that fall outside of the Operations Area, but within the property boundary of the Goliath Gold Project (Study Area No. 2), to practice traditional uses of the lands and resources. As Project work within the operations area and traditional land use within the local study area do not meet the CCME (2006) definition of a community-based receptor, determination of achievement with the application of ambient air criteria is not appropriate for these locations. To capture the possible risk to peoples using these areas, the air modelling was redone using the same emissions and methods as presented in Section 6.6 of the revised EIS (April 2018), but focusing on a modelling grid covering all of the 2018 HHERA study areas (see Figure

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				3.1.1-1 of the 2018 HHERA). This additional air modelling includes 308 modelling nodes located within the Operations Area (Study Area No. 1), 3,474 modelling receptors located within the LSA (Study Area No. 2), 1,445 of which fall inside the Property Boundary, and at 46 modelling nodes within the Village of Wabigoon (Study Area No. 3). It should be restated that there are no "receptors", as defined by O.Reg. 419/05, located within the Goliath Gold Project Property Boundary. The Maximum Point of Impingement (MPOI) for the air modelling represents the "receptor" location, as defined by O.Reg. 419/05, where the maximum predicted concentration occurs. There is a single MPOI concentration determined for each of the compounds and averaging period modelled; however, the location of the MPOI may be different for each of the compounds and averaging periods modelled. As there are no "receptors", as defined by O.Reg. 419/05, within the Property Boundary, the MPOI concentrations, by definition, represent the maximum predicted concentrations for each compound and averaging period that that occur at, or beyond, the property boundary. As Study Area No. 1 (the Operations Area) is fully contained within the Property Boundary and does not contain any "receptors", as defined by O.Reg. 419/05, all of the MPOI concentrations will occur within Study Area No. 2. It should be noted that all of the MPOI concentrations predicted for the Goliath Gold Project fall on the Property Boundary (presented on Figure 3.1.1-1 of the 2018 HHERA). As the Property Boundary does not intersect with Study Area No. 3 (the Village of Wabigoon), there were no MPOI predictions in this study area. The maximum air quality predictions at gridded receptors (MPOI) (which intersects with Study Area No. 2) and the maximum at sensitive receptors were provided in TMI_877_AE(2)-01 and have been reproduced herein to include screening against the relevant ambient air criteria as TMI_954-HHRA(2)-01_Tables 1a, 1b, and 1c. A full set of updated contour maps for each project phase, similar to those presented in Appendix J-2 have been included in the revised response TMI_877_AE(2)-01_Attachment 1 (i.e. 46 new figures). Health Canada in their 2016 guidance document for assessing air quality and health for an EA, requires that "*the predicted or estimated COPC concentrations for the maximally exposed population, for the most sensitive receptors and at the point of maximum impingement"* be provided. TMI_954-HHRA(2)-01_Tables 1a, 1b, and 1c satisfy this requirement. As shown in the tables, the predicted air quality of all parameters at the MPOI and at all sensitive receptors satisfies their respective criteria. As such there is no potential human health risks predicted at the MPOI or at the sensitive receptor locations via the inhalation of air pathway. To ensure that potential risk was considered to those who may work within the operations area or utilize areas within the Property Boundary for traditional land and resource use, the HHERA considered the 95th upper confidence limit of the mean (UCLM) of each chemical of concern (COC) in all three Study Areas were calculated. The UCLM was an exposure point concentration as per Health Canada's Detailed Quantitative Risk Assessment (DQRA) guidance document. This approach is most appropriate for a detailed quantitative human health risk assessment (HHRA) (versus regulatory screening via comparison to air criteria), as concentrations of chemicals vary spatially and temporally in the media to which humans are exposed (e.g. indoor dust, soil, air, drinking water, diet). During long-term exposures, humans may move over areas, or in and out of an impacted area. As a result, individuals tend to integrate spatial and temporal variation in the chemical concentrations to which they are exposed. Therefore, estimates of the central tendency (e.g. arithmetic means, upper confidence limits) are generally used in human health

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				exposure models as an expression of the spatial and temporal averaging of chemical concentrations in different media (U.S. EPA, 1992, 2001). For example, for Project Workers within Study Area No 1., the operations area, an individual could be exposed to the maximum predicted concentrations anywhere within Study Area 1 and is likely to move throughout that area throughout their working day and year. To capture the likely exposure for an individual within this study area, an area maximum was calculated (as defined as the UCLM above). It is recognized that exposure can vary with time, therefore a full five year of air modelling results were used in calculating the area maximums. To capture the temporal variability to area maximums were calculated for those compounds and averaging period for which criteria were available including annual NO_2. In a similar manner, there are no sensitive receptor locations (as defined by CCME) outside of the Operations Area and within the Property Boundary, where individuals would be exposed for a prolonged period of time. Although Treasury Metals has indicated that they willing to provide access to these private and leased lands within the Property Boundary to members of Indigenous communities should they choose to practice traditional land and recourse use, the use of the area would involve movement throughout the area for the period they are practicing traditional uses. To capture this pattern of traditional land and resource use, an area maximum was calculated for Study Area 2. References: • Ontario Regulation 419/05: Air Quality- Local Air Quality (current July 1, 2018). https://www.ontario.ca/laws/regulation/050419 • Part V: Guidance on Human Health Detailed Quantitative Risk Assessment For Chemicals ($DQRA_{CHEM}$) (Health Canada 2010b) • Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality (Health Canada 2016);
				Revised Response: **NOTE: THIS RESPONSE SUPERCEDES TMI_921-HE(2)-01** **Part A:** Section 6.6 of the revised EIS (April 2018) provided an evaluation of the effects of the Project on air quality and considered the potential effects of the Project on air quality during the Site Preparation and Construction, Operations, and Closure phases of the Project. There are no air emission sources during the Post-Closure phase of the Project as such no predicted values were modelled. The air quality assessment presented in Section 6.6 of the revised EIS (April 2018) focused, appropriately on the maximum predicted concentrations at the property boundary, as well as at 43 identified sensitive receptors. The locations of the sensitive receptors that meet the CCME definition for the purposes of air quality are shown on Figure 3.1.1-1 of the 2018 HHERA (attached as TMI_946-HE(2)-04B_Attachment 1) relative to the 3 Study Areas defined in the 2918 HHERA. The property boundary predictions represented the appropriate values for determining compliance with Ontario Regulation 419/05, while the CCME (2006) identifies that

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				the sensitive receptor which meet the CCME definition of community-based receptors, would be the most appropriate locations for determining compliance with ambient air quality criteria. A full set of updated contour maps for each project phase, similar to those presented in Appendix J-2 have been included in the revised response TMI_877_AE(2)-01_Attachment 1 (i.e. 46 new figures). As part of the Round 2 process, the air quality modelling was revised and the results relative to the ambient air quality objectives provided as TMI_954-HHRA(2)-01_Tables 1a, 1b, and 1c. The results are consistent with those in the revised EIS (April 2018), that all air quality criteria are satisfied at the 43 sensitive receptor locations and the MPOI. As such no potential risk to human receptors is anticipated via the inhalation of air pathway at these sensitive receptor locations and the Property Boundary. The sensitive receptors locations correspond to the closest "community-oriented receptors" as defined by the CCME (2000). These receptors would correspond to Health Canada's definition of the "*maximally exposed population, for the most sensitive receptors"* as defined in "Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality" (Health Canada 2016). Although the results presented in Section 6.19 of the EIS (April 2018) as well as the results of the updated air quality assessment for Round 2 indicated that there are no exceedances of the appropriate values for ambient air quality objectives, a number of Round 2 Information Requests were received regarding the potential risks to human receptors via the inhalation pathway. Treasury Metals' recognizes that Project Workers may be exposed to CACs within the Operations Area (Study Area No. 1), and members of Indigenous communities may visit areas that fall outside of the Operations Area, but within the Property Boundary of the Goliath Gold Project, to practice traditional uses of the lands and resources. Project work and traditional land use do not meet the CCME definition of a community-based receptor and thus determination of compliance with the application of Ambient Air Criteria is not appropriate for these receptors. To ensure that potential risk was considered to those who may work within the operations area or utilize areas within the Property Boundary for traditional land and resource use, the HHERA considered the 95th upper confidence limit of the mean (UCLM) of each chemical of concern (COC) in all three Study Areas were calculated. The UCLM was an exposure point concentration as per Health Canada's Detailed Quantitative Risk Assessment (DQRA) guidance document. This approach is most appropriate for a detailed quantitative human health risk assessment (HHRA) (versus regulatory screening via comparison to air criteria), as concentrations of chemicals vary spatially and temporally in the media to which humans are exposed (e.g. indoor dust, soil, air, drinking water, diet). During long-term exposures, humans may move over areas, or in and out of an impacted area. As a result, individuals tend to integrate spatial and temporal variation in the chemical concentrations to which they are exposed. Therefore, estimates of the central tendency (e.g. arithmetic means, upper confidence limits) are generally used in human health exposure models as an expression of the spatial and temporal averaging of chemical concentrations in different media (U.S. EPA, 1992, 2001). For example, for Project Workers within Study Area No 1., the operations area, an individual could be exposed to the maximum predicted concentrations anywhere within Study Area 1 and is likely to move throughout that area throughout their working day and year. To capture the likely exposure for an individual within this study area, an area maximum was calculated (as defined as the UCLM above). It is recognized that exposure can vary with time,

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				therefore a full five year of air modelling results were used in calculating the area maximums. To capture the temporal variability to area maximums were calculated for those compounds and averaging period for which criteria were available including annual NO_2. In a similar manner, there are no sensitive receptor locations (as defined by CCME) outside of the Operations Area and within the Property Boundary, where individuals would be exposed for a prolonged period of time. Although Treasury Metals has indicated that they willing to provide access to these private and leased lands within the Property Boundary to members of Indigenous communities should they choose to practice traditional land and recourse use, the use of the area would involve movement throughout the area for the period they are practicing traditional uses. To capture this pattern of traditional land and resource use, an area maximum was calculated for Study Area 2. To calculate the UCLM for each Study Area, the air quality receptor grid relied on for predicting air quality in the revised EIS (April 2018), was expanded to include areas within the Property Boundary for the purposes of calculating a UCLM for the human health risk assessment. The refined modelling includes 308 modelling receptor located within the Operations Area (Study Area No. 1), 3,474 modelling receptor locations within the LSA (Study Area No. 2) 1,445 of which fall inside the Property Boundary, and at 46 modelling receptor locations within the Village of Wabigoon (Study Area No. 3). The revised air quality modelling grid in support of the 2018 HHERA is shown relative to the Property Boundary and the three Study Areas, on Figure 3.1.1-1 of the 2018 HHERA Report and as TMI_946-HE(2)-04B_Attachment 1. The maximum concentrations for each parameter at each of the modelling receptors, and averaging periods evaluated were determined for the Site Preparation and Construction, Operations, and Closure phases of the Project. The highest UCLM of the modelled receptors in each of the Study Areas, over the five-year period modelled was selected as the EPC for each parameter within each study area. Therefore: • The only factor that is different in the 2018 HHERA than the EIS with respect to air quality modelling is the receptor grid which as shown on Figure 3.1.1-1 was revised to include all areas within the property boundary, including the operations area. All air quality modelling assumptions were provided as Appendix J to the EIS (April 2018); • The tables related to air quality provided in TMI_877_AE(2)-01 are valid for presenting the predicted effects of the Project on Air Quality for determining compliance with ambient air quality criteria (both Ontario Regulation 419/05 and CCME). A full set of updated contour maps for each project phase, similar to those presented in Appendix J-2 have been included in the revised response TMI_877_AE(2)-01_Attachment 1 (i.e. 46 new figures). • The series of tables attached to this IR response (TMI_954-HHHRA(2)-01_Tables 1a, 1b, and 1c) meet the Health Canada requirement for assessing air quality and health for an EA, that *"the predicted or estimated COPC concentrations for the maximally exposed population, for the most sensitive receptors and at the point of maximum impingement"* be provided.

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				• In the HHERA, new tables are provided in Section 3.5 where the 95% UCLM concentrations of CACs and metals are qualitatively screened to the Canadian Ambient Air Quality Standards (CAAQS) or the Ontario Ambient Air Quality Criteria (AAQC) for all available averaging periods within all three Study Areas (i.e. including areas within the Property Boundary). It is noted however, that as per the definition of the CAAQS and AAQC, these are the criteria to be applied at "community-based" receptors including sensitive receptor locations and appropriate for determining regulatory compliance. There are no community-based receptor or sensitive receptor locations within the Property Boundary, as Project work and traditional land use do not meet the CCME definition of a community-based receptor and thus determination of compliance with the application of Ambient Air Criteria is not appropriate for these receptors. The predicted EPCs of CACs and metals within the Operations Area, the LSA (including outside of the Operations Area but inside the Property Boundary where traditional land use is practiced), and in the Village of Wabigoon are appropriately assessed for their implications on potential health effects in the HHERA Report. • All new data are provided in Appendix I to the HHER Report- Raw Data. All of the information provided in this IR is included in Section 3.5 of the 2018 HHERA Report. References: • Ontario Regulation 419/05: Air Quality- Local Air Quality (current July 1, 2018). https://www.ontario.ca/laws/regulation/050419 • Part V: Guidance on Human Health Detailed Quantitative Risk Assessment For Chemicals ($DQRA_{CHEM}$) (Health Canada 2010b) • Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality (Health Canada 2016);
				Agency Comment on Revised Response HC continues to request that the maximum predicted air concentration outside the fenced operations area be displayed by parameter. As shown in Figure 3.6.3-1 of the revised draft IR#2 responses, along with what was heard from First Nations during the August 16 through 20 2018 consultations, Indigenous peoples are known to utilize this area for traditional land use purposes and may be exposed to air emissions during the practice of these activities. It is important that maximum predicted air concentrations outside the fenced operations area be presented, especially as PM2.5 and NO2 are non-threshold contaminants where there is no safe level of exposure. **A1. It is suggested that the maximum predicted air concentrations outside of the fenced operations area, but within the property boundary, be provided to demonstrate the location of maximum potential human (non-worker) exposure to air contaminants. This can ideally be included in the contaminant contour maps in response to AE(2)-01 where the maximum predicted concentration outside the operations area could be shown in conjunction with the MPOI as defined by the proponent.**

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				A2. Pictorial presentation of these data points will better present the potential non-threshold contaminate exposure to receptors as well as facilitate selection of monitoring location recommendations as part of the FUP for air quality.
				Specific Comment to the Agency A1. It is recognized that Health Canada continues to request maximum air predictions within the Property Boundary and considers PM2.5 and NO2 non-threshold contaminants where there is "no safe level of exposure". Treasury Metals and their consultants remind the Agency that on August 1, 2018 an email was forwarded to Health Canada confirming the interpretation of the clarification received from Health Canada and the approach Treasury Metals would take to move the Project forward. The correspondence has been included as TMI_954-HHR(2)-01_Attachment 1. As shown in TMI_954-HHR(2)-01_Attachment 1, Treasury Metals provided the Agency and Health Canada the following approach with respect to PM2.5 and NO2: *"Given that Health Canada has stated that they are currently developing an approach for the quantitative assessment of PM2.5 and NO2, and that they no longer support the Sum25 and Sum15 approach for quantifying the effects of exposure to PM10 and PM2.5, Wood & Treasury Metals will proceed in completing a qualitative approach as proposed by Health Canada. This qualitative approach will include a screening of the exposure point concentrations of CACs in air defined as the 95th UCLM, to the CAAQS for PM2.5 and NO2, and the Ontario AAQC for PM10, understanding that these criteria are not intended for use and application within the Property Boundary"* On August 7, 2018 Health Canada responded to Treasury Metals and noted no objections with the use of the 95th UCLM as the exposure point concentration (see email response provide in TMI_954-HHR(2)-01_Attachment 1). At this time Health Canada does not have a process in place to support the quantitative risk assessment of PM2.5 (as per their own August 2018 correspondence), and the only regulatory guidance for NO2 are based on epidemiological studies in large urban centers with populations of 500,000 plus which should not be assumed at this time as appropriate for use in a remote rural area of Northern Ontario where land use in areas outside the operations area and inside the Property Boundary is infrequent and limited to a few individuals per year. Health Canada requested that Treasury Metals evaluate potential risk of NO2 using their 2016 guidance document entitled *"Human Health Risk Assessment for Ambient Nitrogen Dioxide*" on the following endpoints (see TMI_954-HHR(2)-01_Attachment 1); (i) Short-term (acute exposure) respiratory effects (asthma), (ii)Short-term (acute exposure) all-cause mortality, and (iii) Long-term (chronic exposure) respiratory mortality, which are all derived by definition in that document based on area averaged exposures, consistent with the approached used in the HHERA with the selection of the 95th UCLM. The NO2 guideline is not based on toxicological data but rather epidemiological data therefore it's application at an individual location using maximum prediction concentrations is not supported by the weight of evidence. While Treasury Metals is mindful that Health Canada is concerned about the risk to Indigenous people who may use areas outside the Operations Area, but within the Property Boundary for traditional land and resource use, Treasury Metals has applied and continues to apply the most appropriate regulatory guidance including choice of exposure

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				point concentration (i.e. the 95th UCLM concentration) to ensure human health risk are fully assessed for all human receptors including those who may practice traditional land and resource use within the Property Boundary. The results of the HHRA screening of the 95th UCLM concentrations in air, identified that three (3) valued components/criteria air contaminants; nitrogen dioxide, and both fractions of particulate matter (NO_2, PM_{10} and $PM_{2.5}$) exceeded their respective ambient air quality criteria inside the Operations Area and only during the active phases of mining, thereby indicating that potential risk to Project Workers via the inhalation pathway may not be considered negligible. At the request of Health Canada and the Agency, diesel particulate matter (DPM) was also included in the health assessment even though there are no federal or provincial criteria available within Canada. It is again noted that air quality is not typically modelled within the Property Boundary as part of the EA process unless sensitive receptors are present, as the federal and provincial criteria are only applicable at the Property Boundary or sensitive receptor locations. There are no sensitive receptors located within the Property Boundary of the Goliath Gold Project, however at the continued request of the Agency and Health Canada, modelling inside the Property Boundary was performed and used to determine the 95th UCLM concentrations. A Health and Safety Plan including the prescribe use of personal protective equipment including dust masks will be implemented for all Project Workers of the Goliath Gold Project. The Health and Safety Plan will serve as an appropriate risk management/ mitigation measure to mitigate any adverse health effect. With a Health and Safety Plan implemented as a risk management measure, exposure via the inhalation pathway is considered negligible and no residual adverse effects are identified to Project Workers. Concentrations of all CACs modelled in the LSA (including areas within the Property Boundary) and the Village of Wabigoon were below their criteria protective of human health, and the potential risk associated with exposure to DPM was determined to be essentially negligible. Therefore, health risks to residents or visitors/ harvesters who may practice traditional land and resource use are considered essentially negligible. No residual adverse effects were identified. Although the results of the HHERA do not indicate that risk management or mitigation measures are required during traditional land and resource use, as part of the sign in and access policy, Treasury Metals will offer appropriate personal protective equipment to those who prefer to wear it while within the Property Boundary. A2. Health Canada has requested pictorial presentation of data points to facilitate selection of monitoring location for air quality. A similar request was made from an Atmospheric Environment reviewer in TMI_877-AE(2)-01. In the response to TMI_877-AE(2)-01, Treasury Metals provided a series of isopleth figures to facilitate selection of monitoring location recommendations as part of the follow up program for air quality. The final follow up programs for air quality and all other technical disciplines are provided in the Final Goliath Gold Project Follow Up Addendum. These isopleth figures are provided as TMI_877-AE(2)-01_Attachment_1 (site preparation and construction), TMI_877-AE(2)-01_Attachment_2 (operations), and TMI_877-AE(2)-01_Attachment_3 (closure). The isopleth figures provided in TMI_877-AE(2)-01_Attachment_2 (operations) supersede Figures 6 through 19 of Appendix J-2 of the revised EIS (April 2018). Each of the attachments includes 15 isopleth figures, 14 which correspond to the compounds and averaging periods presented in Figures 6 through 19 of Appendix J-2 of the revised EIS (April 2018), plus a fifteenth figure that provides the annual NO2 predictions. The updated isopleth figures show concentrations

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				contours outside of the limit of private, patent and leased lands, which is consistent with the definition for property boundaries used for modelling in accordance with O.Reg. 419/05. It is important to highlight to the Agency and the technical reviewers that currently the EA requirements for assessment of the atmospheric environment and human health as two uniquely different disciplines, and both have been assessed accordingly to the most up to date regulatory guidance documents/regulatory requirements available for their unique disciplines. When assessing the effects of the Project on the ability of the Project to meet ambient air quality criteria it is appropriate to model at the Property Boundary and Sensitive Receptor Locations. When assessing the effects of air on human health, risk assessors may request modelled air quality to include predictions at gridded receptors within the Property Boundary and/or at specific receptor locations (as was the case for the Goliath Gold HHERA). The results of the gridded receptors within the Property Boundary may be used by risk assessors for the determination of the UCLM concentrations. The HHERA for the Goliath Gold Project was conducted following Health Canada's detailed quantitative risk assessment (DQRA) guidance and falls outside the scope of work applied for a preliminary quantitative risk assessment. As per Health Canada's guidance document, the upper 95% confidence limit of the arithmetic average (i.e. 95th UCLM) is the appropriate statistic to represent potential contaminants of concern rather than the maximum concentration which is applied at the preliminary level, and the results of the HHERA using this appropriate endpoint indicated that it would be safe for individuals to continue to practice traditional land use if they so choose. From an air quality perspective, areas where the maximum predicted air concentration within the property boundary exceeds is assumed to have an effect on traditional land use and in turn an effects assessment was conducted on access and on the land experience. Suggesting that there are health risks to Indigenous stakeholders based on a modelled maximum concentration (that occur infrequently within a 5 year period, see frequency analysis in TMI_880-AE(2)-04) rather than a statistical concentration representative of actual environmental conditions is overly conservative, will not cause a meaningful change to the results of the EIS (as changes in access and experience are already accounted for), and may only serve to instill unnecessary fear amongst the Indigenous stakeholders, especially when the current regulatory agencies within Canada do not have the toxicological data to support it in small populations or for specific individuals. Treasury Metals recognizes that the perception of risk, safety, and well-being is a concern to members Indigenous communities and has proposed to work with each Indigenous stakeholder community to develop a risk communication plan to help mitigate the perceptions of risk, safety and well-being associated with the Goliath Gold Project. Furthermore, as part of the follow up program Treasury Metals will develop contour plots for areas where traditional land use is occurring based on the results of follow up air quality modelling in support of CCME and O.Reg air quality modelling requirements. Given that currently there are not air quality criteria protective of intermittent and short-term exposures to $PM_{2.5}$ and NO_2 on an individual level, potential risk should not be assumed based on exceedances in air of criteria that have been developed based on population level effects and chronic exposure times, a specific monitoring station within these traditional land use areas would not serve any specific purpose with respect to human health. Regardless, all results from the air quality monitoring and isopleth predictions and prescribed precautionary risk management measures (i.e. requirement for dust masks or further restrictions on access) will be communicated to the community members via the community-specific risk communication plan. If during the active life

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				of the Project peer-reviewed and regulatory approved toxicological reference values for short-term exposures to $PM_{2.5}$ and NO_2 are developed, they will be included in the assessment of potential human health risks via the inhalation pathway. The details of the follow up program are provided in the Final Goliath Gold Project Follow Up Addendum.
				FINAL RESPONSE **NOTE: THIS RESPONSE SUPERCEDES TMI_921-HE(2)-01** **Part A:** Section 6.6 of the revised EIS (April 2018) provided an evaluation of the effects of the Project on air quality and considered the potential effects of the Project on air quality during the Site Preparation and Construction, Operations, and Closure phases of the Project. There are no air emission sources during the Post-Closure phase of the Project as such no predicted values were modelled. The air quality assessment presented in Section 6.6 of the revised EIS (April 2018) focused, appropriately on the maximum predicted concentrations at the property boundary, as well as at 43 identified sensitive receptors. The locations of the sensitive receptors that meet the CCME definition for the purposes of air quality are shown on Figure 3.1.1-1 of the 2018 HHERA (attached as TMI_946-HE(2)-04B_Attachment 1) relative to the 3 Study Areas defined in the 2918 HHERA. The property boundary predictions represented the appropriate values for determining compliance with Ontario Regulation 419/05, while the CCME (2006) identifies that the sensitive receptor which meet the CCME definition of community-based receptors, would be the most appropriate locations for determining compliance with ambient air quality criteria. A full set of updated contour maps for each project phase, similar to those presented in Appendix J-2 have been included in the revised response TMI_877_AE(2)-01 (i.e. 46 new figures). As part of the Round 2 process, the air quality modelling was revised and the results relative to the ambient air quality objectives provided as TMI_954-HHRA(2)-01_Tables 1a, 1b, and 1c. The results are consistent with those in the revised EIS (April 2018), that all air quality criteria are satisfied at the 43 sensitive receptor locations and the MPOI. As such no potential risk to human receptors is anticipated via the inhalation of air pathway at these sensitive receptor locations and the Property Boundary. The sensitive receptors locations correspond to the closest "community-oriented receptors" as defined by the CCME (2000). These receptors would correspond to Health Canada's definition of the "*maximally exposed population, for the most sensitive receptors"* as defined in "Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality" (Health Canada 2016). Although the results presented in Section 6.19 of the EIS (April 2018) as well as the results of the updated air quality assessment for Round 2 indicated that there are no exceedances of the appropriate values for ambient air quality objectives, a number of Round 2 Information Requests were received regarding the potential risks to human receptors via the inhalation pathway. Treasury Metals' recognizes that Project Workers may be exposed to CACs within the Operations Area (Study Area No. 1), and members of Indigenous communities may visit areas that fall outside of the Operations Area, but within the Property Boundary of the Goliath Gold Project, to practice traditional uses of the lands and resources. Project work and traditional land use do not meet the CCME definition of a community-based receptor

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				and thus determination of compliance with the application of Ambient Air Criteria is not appropriate for these receptors. To ensure that potential risk was considered to those who may work within the operations area or utilize areas within the Property Boundary for traditional land and resource use, the HHERA considered the 95th upper confidence limit of the mean (UCLM) of each chemical of concern (COC) in all three Study Areas were calculated. The UCLM was an exposure point concentration as per Health Canada's Detailed Quantitative Risk Assessment (DQRA) guidance document. This approach is most appropriate for a detailed quantitative human health risk assessment (HHRA) (versus regulatory screening via comparison to air criteria), as concentrations of chemicals vary spatially and temporally in the media to which humans are exposed (e.g. indoor dust, soil, air, drinking water, diet). During long-term exposures, humans may move over areas, or in and out of an impacted area. As a result, individuals tend to integrate spatial and temporal variation in the chemical concentrations to which they are exposed. Therefore, estimates of the central tendency (e.g. arithmetic means, upper confidence limits) are generally used in human health exposure models as an expression of the spatial and temporal averaging of chemical concentrations in different media (U.S. EPA, 1992, 2001). For example, for Project Workers within Study Area No 1, the operations area, an individual could be exposed to the maximum predicted concentrations anywhere within Study Area 1 and is likely to move throughout that area throughout their working day and year. To capture the likely exposure for an individual within this study area, an area maximum was calculated (as defined as the UCLM above). It is recognized that exposure can vary with time, therefore a full five year of air modelling results were used in calculating the area maximums. To capture the temporal variability of area maximums were calculated for those compounds and averaging period for which criteria were available including annual NO_2. In a similar manner, there are no sensitive receptor locations (as defined by CCME) outside of the Operations Area and within the Property Boundary, where individuals would be exposed for a prolonged period of time. Although Treasury Metals has indicated that they willing to provide access to these private and leased lands within the Property Boundary to members of Indigenous communities should they choose to practice traditional land and recourse use, the use of the area would involve movement throughout the area for the period they are practicing traditional uses. To capture this pattern of traditional land and resource use, an area maximum was calculated for Study Area 2. To calculate the UCLM for each Study Area, the air quality receptor grid relied on for predicting air quality in the revised EIS (April 2018), was expanded to include areas within the Property Boundary for the purposes of calculating a UCLM for the human health risk assessment. The refined modelling includes 308 modelling receptor located within the Operations Area (Study Area No. 1), 3,474 modelling receptor locations within the LSA (Study Area No. 2) 1,445 of which fall inside the Property Boundary, and at 46 modelling receptor locations within the Village of Wabigoon (Study Area No. 3). The revised air quality modelling grid in support of the 2018 HHERA is shown relative to the Property Boundary and the three Study Areas, on Figure 3.1.1-1 of the 2018 HHERA Report and as TMI_946-HE(2)-04B_Attachment 1. The maximum concentrations for each parameter at each of the modelling receptors, and averaging periods evaluated were determined for the Site Preparation and Construction, Operations, and Closure phases of the Project.

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				The highest UCLM of the modelled receptors in each of the Study Areas, over the five-year period modelled was selected as the EPC for each parameter within each study area. Therefore: • The only factor that is different between the HHERA and the revised EIS with respect to air quality modelling is the receptor grid which as shown on Figure 3.1.1-1 was revised to include all areas within the property boundary, including the operations area. All air quality modelling assumptions were provided as Appendix J to the EIS (April 2018); • The tables related to air quality provided in TMI_877_AE(2)-01 are valid for presenting the predicted effects of the Project on Air Quality for determining compliance with ambient air quality criteria (both Ontario Regulation 419/05 and CCME). A full set of updated contour maps for each project phase, similar to those presented in Appendix J-2 have been included in the revised response TMI_877_AE(2)-01_Attachment 1 (i.e. 46 new figures). • The series of tables attached to this IR response (TMI_954-HHHRA(2)-01_Tables 1a, 1b, and 1c) meet the Health Canada requirement for assessing air quality and health for an EA, that *"the predicted or estimated COPC concentrations for the maximally exposed population, for the most sensitive receptors and at the point of maximum impingement"* be provided. • In the HHERA, new tables are provided in Section 3.5 where the 95% UCLM concentrations of CACs and metals are qualitatively screened to the Canadian Ambient Air Quality Standards (CAAQS) or the Ontario Ambient Air Quality Criteria (AAQC) for all available averaging periods within all three Study Areas (i.e. including areas within the Property Boundary). It is noted however, that as per the definition of the CAAQS and AAQC, these are the criteria to be applied at "community-based" receptors including sensitive receptor locations and appropriate for determining regulatory compliance. There are no community-based receptors or sensitive receptor locations within the Property Boundary, as Project work and traditional land use do not meet the CCME definition of a community-based receptor and thus determination of compliance with the application of Ambient Air Criteria is not appropriate for these receptors. The predicted EPCs of CACs and metals within the Operations Area, the LSA (including outside of the Operations Area but inside the Property Boundary where traditional land use is practiced), and in the Village of Wabigoon are appropriately assessed for their implications on potential health effects in the HHERA Report. • All new data are provided in Appendix I to the HHER Report- Raw Data. All of the information provided in this IR is included in Section 3.5 of the 2018 HHERA Report. **<u>Additional Information Requested by the Agency</u>** It is recognized that Health Canada continues to request maximum air predictions within the Property Boundary and considers PM2.5 and NO2 non-threshold contaminants where there is "no safe level of exposure". Treasury Metals

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				and their consultants remind the Agency that on August 1, 2018 an email was forwarded to Health Canada confirming the interpretation of the clarification received from Health Canada and the approach Treasury Metals would take to move the Project forward. The correspondence has been included as TMI_954-HHR(2)-01_Attachment 1. As shown in TMI_954-HHR(2)-01_Attachment 1, Treasury Metals provided the Agency and Health Canada the following approach with respect to PM2.5 and NO2: *"Given that Health Canada has stated that they are currently developing an approach for the quantitative assessment of PM2.5 and NO2, and that they no longer support the Sum25 and Sum15 approach for quantifying the effects of exposure to PM10 and PM2.5, Wood & Treasury Metals will proceed in completing a qualitative approach as proposed by Health Canada. This qualitative approach will include a screening of the exposure point concentrations of CACs in air defined as the 95th UCLM, to the CAAQS for PM2.5 and NO2, and the Ontario AAQC for PM10, understanding that these criteria are not intended for use and application within the Property Boundary"* On August 7, 2018 Health Canada responded to Treasury Metals and noted no objections with the use of the 95th UCLM as the exposure point concentration (see email response provide in TMI_954-HHR(2)-01_Attachment 1). While Treasury Metals is mindful that Health Canada is concerned about the risk to Indigenous people who may use areas outside the Operations Area, but within the Property Boundary for traditional land and resource use, Treasury Metals has applied and continues to apply the most appropriate regulatory guidance including choice of exposure point concentration (i.e. the 95th UCLM concentration) to ensure human health risk are fully assessed for all human receptors including those who may practice traditional land and resource use within the Property Boundary. At this time Health Canada does not have a process in place to support the quantitative risk assessment of PM2.5 (as per their own August 2018 correspondence), and the only regulatory guidance for NO2 are based on epidemiological studies in large urban centers with populations of 500,000 plus which should not be assumed at this time as appropriate for use in a remote rural area of Northern Ontario where land use in areas outside the operations area and inside the Property Boundary is infrequent and limited to a few individuals per year. Health Canada requested that Treasury Metals evaluate potential risk of NO2 using their 2016 guidance document entitled *"Human Health Risk Assessment for Ambient Nitrogen Dioxide*" on the following endpoints (see TMI_954-HHR(2)-01_Attachment 1); (i) Short-term (acute exposure) respiratory effects (asthma), (ii)Short-term (acute exposure) all-cause mortality, and (iii) Long-term (chronic exposure) respiratory mortality, which are all derived by definition in that document based on area averaged exposures, consistent with the approached used in the HHERA with the selection of the 95th UCLM. The NO2 guideline is not based on toxicological data but rather epidemiological data therefore its application at an individual location using maximum prediction concentrations is not supported by the weight of evidence. The results of the Goliath Gold Project HHERA indicate that members of Indigenous communities who use areas within the Property Boundary for traditional land and resource use would not be at risk via the inhalation pathway. Treasury Metals has been working with the Indigenous communities to develop community-specific risk-communication, mitigation measures, and access plans (see TMI_938-AC(2)-05 and TMI_940-AC(2)-07) for areas within the Treasury Metal's Property Boundary which include a requirement to sign-in to ensure public safety. Although the results of the human health risk assessment of the inhalation pathway do not indicate risk management measures are necessary, personal protective equipment such as dust masks could be provided to those members of Indigenous communities who wish

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				to use lands within the Property Boundary for traditional purposes and are concerned about the perception of risk via inhalation of air. At the request of the Agency in TMI_940-AC(2)-07 areas where the air quality within the property boundary that is predicted to exceed the regulatory criteria applicable at the property boundary have already been assumed to be either removed from access or subject to restricted access to ensure that the revised EIS adequately captured the potential effects of the Project on access and "on the land experiences" as they relate to traditional land and resource use. Thus, although the HHERA assumed that all areas outside of the Operations Area would be available for continued traditional land and resource use, the other technical disciplines have conservatively assumed that anywhere where the Project results in impacts, access will be lost or altered and the significance of that loss assessed as per the EIS guidelines for the Project (refer to TMI_940-AC(2)-07_Table 1 and TMI_940-AC(2)-07_Table 2). The HHERA for the Goliath Gold Project was conducted following Health Canada's detailed quantitative risk assessment (DQRA) guidance and falls outside the scope of work applied for a preliminary quantitative risk assessment. As per Health Canada's guidance document, the upper 95% confidence limit of the arithmetic average (i.e. 95th UCLM) is the appropriate statistic to represent potential contaminants of concern rather than the maximum concentration which is applied at the preliminary level, and the results of the HHERA using this appropriate endpoint indicated that it would be safe for individuals to continue to practice traditional land use if they so choose. From an air quality perspective, areas where the maximum predicted air concentration within the property boundary exceeds are assumed to have an effect on traditional land use and in turn an effects assessment was conducted on access and on the land experience. Suggesting that there are health risks to Indigenous stakeholders based on a modelled maximum concentration (that occur infrequently within a 5 year period, see frequency analysis in TMI_880-AE(2)-04) rather than a statistical concentration representative of actual environmental conditions is overly conservative, will not cause a meaningful change to the results of the EIS (as changes in access and experience are already accounted for), and may only serve to instill unnecessary fear amongst the Indigenous stakeholders, especially when the current regulatory agencies within Canada do not have the toxicological data to support it in small populations or for specific individuals. Treasury Metals has committed to each indigenous community to provide community-specific risk communication and access plans and has provided the funding to all Indigenous communities to start the discussions to support this process. In addition, Treasury Metals has added to the follow up program for human health that during the active phases of mining when community members sign-in, dust masks will be offered to those who are concerned with the perception of safety. Furthermore, as part of the follow up program Treasury Metals will develop contour plots for areas where traditional land use is occurring based on the results of follow up air quality modelling in support of CCME and O.Reg air quality modelling requirements. Given that currently there are not air quality criteria protective of intermittent and short-term exposures to PM2.5 and NO2 on an individual level, potential risk should not be assumed based on exceedances in air of criteria that have been developed based on population level effects and chronic exposure times, a specific monitoring station within these traditional land use areas would not serve any specific purpose with respect to human health. Regardless, all results from the air quality monitoring and isopleth predictions and prescribed precautionary risk management measures (i.e. requirement for dust masks or further restrictions on access) will be communicated to the community members via the community-specific risk communication plan. If

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				during the active life of the Project, peer-reviewed and regulatory approved toxicological reference values for short-term exposures to PM2.5 and NO2 are developed, they will be included in the assessment of potential human health risks via the inhalation pathway. The details of the follow up program are provided in the Final Goliath Gold Project Follow Up Addendum. **References:** • Ontario Regulation 419/05: Air Quality- Local Air Quality (current July 1, 2018). https://www.ontario.ca/laws/regulation/050419 • Part V: Guidance on Human Health Detailed Quantitative Risk Assessment For Chemicals ($DQRA_{CHEM}$) (Health Canada 2010b) • Guidance for Evaluating Human Health Impacts in Environmental Assessment: Air Quality (Health Canada 2016);

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TMI_955-HHRA(2)-02	HE(2)-11	3	CEA Agency	**Reference to EIS Guidelines:**	Section 10.1.3, 12.1.1
				Reference to EIS / Appendix	Appendix W-2, Section 3.5.2.1
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: Section 3.5.2.1 of the June 2018 HHRA (Appendix W-2 of the revised EIS) does not provide predicted concentrations for total suspended particulate (TSP), PM10 and PM2.5 during each phase of the project. It is stated in this section that TSP was selected over PM10 and PM2.5 as the airborne particulate parameter to be evaluated, with a rationale that TSP includes both PM10 and PM2.5 and thus allows for a conservative estimation of the airborne particulate exposure. However, health effects are most often associated with smaller particle sizes. The risk associated with fine particles, particularly PM2.5, is higher than the health risk associated with PM10 or TSP (Health Canada, 2016). As such, it would be more appropriate to consider PM2.5 and PM10 as separate from TSP, or to	

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				consider all TSP as PM2.5. In addition, PM2.5 and PM10 are non-threshold substances below which there are no known non-effect levels; unlike TSP, which can have threshold and non-threshold effects depending on the particle size. This section also discusses PM10 and PM2.5 fractions of TSP that are "averaged over the site preparations and construction, operations and closure phases", which may underestimate health risks in a particular phase where a form of particulate would be more prevalent. Assessment of exceedances and health risks of the project during each phase will inform the determination of mitigation measures for each phase of the Project. As requested in IR# AE(2)-02, ensure that the final HHRA accounts for diesel particulate matter (DPM). Reference: Health Canada. 2016. Guidance for Evaluating Human Health Impacts in Environmental Assessment: AIR QUALITY, http://publications.gc.ca/site/eng/9.802343/publication.html
				Specific Question / Request for Information: A. Provide exposure point concentrations for TSP, PM10 and PM2.5 for each phase, using the same format as in Tables 3.5.2.1-1 to 3.5.2.1-3 of the June 2018 HHRA (Appendix W- 2). B. Ensure that the final HHRA accounts for diesel PM, PM10 and PM2.5 for each phase using all averaging times available (24-hour and annual). Include the incremental lifetime cancer risk (ILCR) of diesel PM as part of the final HHRA. Include a discussion on the contribution of this project to the overall ambient levels of TSP, PM10 and PM2.5 at the nearby receptor locations. C. In the final HHRA, consider PM10, PM2.5 and NO2 are non- threshold pollutants, as any exposure to these contaminants could be considered as a potential residual effect.
				Draft Response: **PART A** Exposure point concentrations for all CACs including TSP, PM10 and PM2.5 for all project phases and Study Areas are provided in Table 3.5.3.1-1. Raw data tables for all assessment scenarios are provided in Appendix 1- Raw Data. The potential effects of the Project on human health, specifically via the inhalation of inorganic COCs (specifically metals) associated with the inhalation of suspended particular matter (PM_{10}, $PM_{2.5}$ and TSP) are assessed in Section 3.5.3.2 of the HHERA (August, 2018) Report (August, 2018). Total suspended particulate (TSP) was selected as the particulate matter group to be used in determining possible chemical exposures to airborne COCs because it was the most conservative approach. As illustrated in Figure 3.5.3.2-1 of the HHERA (August, 2018) (and provided herein), the use of the TSP concentration will conservatively include both the PM_{10} and $PM_{2.5}$ fractions of the airborne particulate matter associated with the Project. Although Health Canada recommends the use of PM_{10} in their

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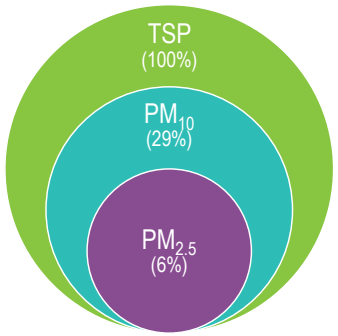
				DQRA$_{CHEM}$ guidance document, the PM_{10} emissions from the Project represent 29% of the TSP emissions (averaged over the site preparations and construction, operations and closure phases). The $PM_{2.5}$ fraction of the airborne particulate matter could represent the finer airborne particles known to pose a greater risk to human health, as they can be inhaled deeply into the lungs, are chemically reactive, and have complex characteristics. However, the use of $PM_{2.5}$ emissions from the Project represent 6% of the TSP emissions (averaged over the site preparations and construction, operations and closure phases). Therefore, while scientific logic may be used in support of the use of either PM_{10} or $PM_{2.5}$, for determining exposures for use in the HHERA (August, 2018), the choice to use TSP for calculating exposures for the HHERA (August, 2018) represents the most conservative approach, capturing 100% of the airborne particulate emissions and thus 100% of the possible exposure to airborne metals. The use of TSP may therefore overestimate potential risk given that PM10 and PM2.5 are more likely to be biologically available and capable of exerting health effects at the cellular level.  **Figure 3.5.3.2-1: Distribution of Airborne Particle Sizes** **PART B** As part of the Round 2 Information Request process, a number of information requests were received from the Canadian Environmental Assessment Agency (the Agency) and their technical review teams regarding the assessment of human health with respect to criteria air contaminants (CACs). An expanded assessment has been provided in the 2018 HHERA report to directly respond to those information requests. The assessment of CACs was performed in Section 3.5 of the HHERA. Activities associated with each Project phase are expected to emit Criteria Air Contaminants (CACs) including CO, NO_x, SO_2, TSP, PM_{10}, and $PM_{2.5}$. Section 6.6 of the revised EIS (April 2018) provided an evaluation of the effects of the Project on air quality and considered the potential effects of the Project on

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				air quality during the Site Preparation and Construction, Operations, and Closure phases of the Project. There are no air emission sources during the Post-Closure phase of the Project as such no predicted values were modelled. The air quality assessment presented in Section 6.6 of the revised EIS (April 2018) focussed, appropriately on the maximum predicted concentrations at the Property Boundary, as well as at 43 identified sensitive receptors. The Property Boundary predictions represented the appropriate values for determining compliance with Ontario Regulation 419/05, while the CCME (2006) identifies that the sensitive receptor which meet the CCME definition of community-based receptors, would be the most appropriate locations for determining compliance with ambient air quality criteria. In Section 6.19 of the EIS (April 2018) the air quality predictions were discussed in terms of potential health implications. Table 6.19.2.1-4 of Section 6.19 of the EIS (April 2018) provided a refined screening of CACs using the maximum modelled concentrations at the sensitive receptors, which correspond to the closest "community-oriented receptors" as defined by the CCME (2000). The results presented in Table 6.19.2.1-4 of the revised EIS (April 2018) indicated that none of the predicted concentrations exceed their respective ambient air quality criteria, with the exception of total suspended particulate (TSP). The maximum 24−hour TSP concentration during the Site Preparation and Construction Phase was shown to marginally exceed (by 2.6%) it's Ontario Ambient Air Quality Objective. The Ontario Ambient Air Quality Objective was set based on visibility (i.e. aesthetic) criteria and not the protection of human health. Therefore, no CACs were identified as COCs relevant to human health and a quantitative assessment of potential human health risks via the inhalation pathway is not warranted. Although the results presented in Section 6.19 of the EIS (April 2018) identify that there are no exceedances of the appropriate values for ambient air quality objectives, a number of Round 2 Information Requests were received regarding the potential risks to human receptors via the inhalation pathway. Treasury Metals' recognizes that Project Workers may be exposed to CACs within the Operations Area (Study Area No. 1), and members of Indigenous communities may visit areas outside of the Operations Area, but within the Property Boundary of the Goliath Gold Project, to practice traditional uses of the lands and resources. Project work and traditional land use do not meet the CCME definition of a community-based receptor and thus determination of compliance with the application of Ambient Air Criteria is not appropriate for these receptors. However, to capture the possible risk to peoples using these areas, the air modelling was redone using the same emissions and methods as presented in Section 6.6 of the revised EIS (April 2018), but focusing on possible modelling receptors covering the HHERA Study Areas. The refined modelling includes 308 modelling receptor located within the Operations Area (Study Area No. 1), 3,474 modelling receptor locations within the LSA (Study Area No. 2) 1,445 of which fall inside the Property Boundary, and at 46 modelling receptor locations within the Village of Wabigoon (Study Area No. 3). The assessment of the effects of CACs on human health was performed using the same two-step qualitative and quantitative approach defined above. At the request of Health Canada, predicted EPC of CACs were compared to the Canadian Ambient Air Quality Standards (CAAQS) or the Ontario Ambient Air Quality Criteria (AAQC) for all available averaging periods. As stated in the EIS, and in the section above, there were no CAC exceedances identified at the sensitive receptor locations which are appropriate for determining regulatory compliance. The results indicated that

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				the predicted EPC of CACs in the LSA and Village of Wabigoon were below the qualitative screening criteria. As such there are no potential health risks anticipated to human receptors who may access the areas within the Property Boundary but outside of the Operations Area via inhalation of CACs. There are no residual adverse effects identified to human receptors in the LSA or the Village of Wabigoon who may live, visit, or practice traditional use of land and resources via the inhalation of CACs in air as a result of the Project. Within the Operations Area, the predicted EPCs of NO_2, $PM_{2.5}$, and PM_{10} were larger than the CAAQS/AAQC (appropriate for use at sensitive receptors) for select averaging periods. Although a quantitative approach was considered for $PM_{2.5}$, PM_{10}, Treasury Metals was informed by Health Canada that they do not currently support a quantitative assessment of these forms of particulate matter, and the qualitative assessment would suffice at this time. The potential Health implications of NO_2 to a Project Worker within the Operation Area was quantitatively assessed. There is no access to the Operations Area by members of the public or Indigenous communities during the active life of the project and highlight that there are no sensitive or community-based receptors within the Operations Area. Under good health and safety practices, an occupational health and safety plan would be in place for Project Workers and serve as an appropriate risk management/ mitigation measure. As such no residual adverse effects are identified as a result of NO_2 concentrations within Operations Area. In addition to the CACs discussed above, for which there are regulatory criteria available in Canada, Round 2 Information Requests AE(2)-02 an HE(2)-11 requested that the human health risk include a quantitative assessment of incremental cancer risk from diesel particulate matter(DPM) using the unit risk and inhalation slope factor available from the California Office of Health Hazard Assessment, California EPA (2015). The HHERA included a quantitative assessment of the potential health implication of DPM as a result of the Project. The results indicated that there were no non-cancer risks associated with DMP emissions from the Project in any of the three Study Areas, identified. Estimated ILCRs marginally exceeded the Ontario target ILCR of 1×10^{-6}, and are within the Health Canada target of 1×10^{-5}, it is highlighted that predicted background concentrations of DPM in the three Study Areas were consistent with those defined by the California EPA. At background concentration the use of the California EPA slope factor resulted in ILCR estimates two orders of magnitude greater than Ontario's target and one order of magnitude larger than the Health Canada's target. The United States is less conservative than Canada when it comes to the definition of "essentially negligible" cancer risks. Therefore, while the application of a U.S. derived slope factor may be appropriate in the U.S., based on Health Canada's definition, it may not be feasible to obtain "essentially negligible" cancer risks at background concentrations of DPM in the environment. The results presented herein illustrate the need for additional consideration prior to adopting values provided by other regulatory agencies within Canada. Given that there is a relatively large level of uncertainty associated with the application of the California EPA cancer slope factor in Canada, that Health Canada has not adopted a quantitative approach for other forms of particulate matter (i.e. PM_{10} and $PM_{2.5}$ as discussed above), and that the non-cancer risk estimates for DPM were below levels anticipated to pose risk to human receptors, no potential risks from DPM are determined at this time.

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				Predicted EPCs of metals sorbed to particulate matter satisfied their respective qualitative screening criteria at Study Areas No. 1, 2 and 3. As such there are no potential risks anticipated to Project Workers, Residents, and/or Visitors/Harvesters via the inhalation of fugitive dust pathway. **PART C** In the HHERA (August 2018), PM_{10}, $PM_{2.5}$ and NO_2 were considered as non- threshold pollutants. As part of ongoing correspondence during the Round 2 Information Request Process, Treasury Metals was informed by Health Canada via email on August 1st that: *$PM_{2.5}$, and NO_2 have been assessed by Health Canada and the conclusions reached are that both exhibit widespread population-level health effects that indicate that they should be treated as non-threshold contaminants where any level of or increase in exposure can result in adverse health effects. Health Canada is currently developing an approach for the quantitative assessment of these contaminants. In the interim Health Canada would support an approach that includes an evaluation against the CAAQS and a discussion of the implications of the CAAQS-associated management levels, plus a robust qualitative analysis of the potential health effects of these non-threshold contaminants in relation to exposure throughout the project area and the potential to reduce emissions of pollutants that form these two air contaminants. For PM_{10}, evaluation against the Ontario AAQC may be used and considered in a similar manner (i.e., robust qualitative analysis and potential options to reduce emissions of this pollutant). Furthermore, Health Canada no longer supports the Sum25 and Sum15 approach for quantifying the effects of exposure to PM_{10} and $PM_{2.5}$.* In follow-up correspondence on August 7, 2018, Health Canada amended their response and stated the following: *With regards to a recommendation on the non-threshold end point that Health Canada wishes to see applied in the HHRA of potential health effects of NO_2, they suggest following the **following** endpoints described in the Human Health Risk Assessment for Ambient Nitrogen Dioxide (i.e. using the concentration response curve to quantify the effects). Specifically, the following endpoints may be considered:* • *Short-term (acute exposure) respiratory effects (asthma)* • *Short-term (acute exposure) all-cause mortality* • *Long-term (chronic exposure) respiratory mortality* *This approach should be considered in addition to the qualitative assessment previously described for NO2.* *Health Canada also confirmed that they no longer support the 1999 Sum25 and Sum15 guidance for assessing PM_{10} and $PM_{2.5}$.*

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				Therefore, PM_{10} and $PM_{2.5}$ are recognized as non-threshold chemicals however were not quantitatively assessed for potential risk in the HHERA Report (August, 2018), and instead a qualitative assessment was provided. NO_2 was both qualitatively and quantitatively assessed as a non-threshold chemical in the HHERA Report (August, 2018) using the endpoints provided by Health Canada in their correspondence on April 7, 2018.
				Agency Comment on Draft Response: The proposed air monitoring programs include monitoring for NO2 and either PM10 or PM2.5. Health Canada identifies that the fine particles pose a greater risk to human health than coarse ones, as the fine particles can be inhaled deeply into the lungs, are chemically reactive and have complex characteristics (Health Canada. 2016). In the absence of monitoring for both particulate matter sizes, $PM_{2.5}$ should be monitored to adequately assess the health risks of air-borne articulate matters. Health Canada. 2016. Guidance for Evaluating Human Health Impacts in Environmental Assessment: AIR QUALITY. Update the monitoring program to Include PM2.5 and NO2 monitoring at the MPOI. Describe how a notification system could be implemented to inform Indigenous land users about PM2.5 and NO2 levels.
				Specific Response to Agency Comments: **THIS RESPONSE SUPERCEDES TMI_931-HE(2)-11** The proposed air monitoring programs for the Goliath Gold Project would include a combination of periodic samplers (e.g., high volume samplers for TSP, and one of PM10 or PM2.5), passive samplers (e.g., dustfall), and a continuous monitoring station (e.g., samplers for NO_2 and fine particles [$PM_{2.5}$]). It is not usual for the continuous samplers to be configured to provide real time results, especially for fine particles (e.g. PM10 or PM2.5) that are regulated on a 24-hour integrated basis. The continuous monitoring station would only be configured to provide real-time air sampling results if such results are essential for the implementation of the mitigation strategies. If real time air sampling results are to be provided, the continuous monitors would be configured to provide Treasury Metals a warning of any exceedance. In the case of the NO_2 analyzer, warnings would be logged on the basis of the 1-hour readings, consistent with the new CAAQS to come into force in 2020 and 2025. In the case of fine particles (e.g. $PM_{2.5}$), warnings would be logged on a 24-hour basis. Treasury Metals would then review any of the logged warnings, the measurement information, and the meteorological records to determine whether the exceedance was due to activities on site (and the likely source of the emissions), or whether due to external influences (e.g., forest fires). As soon as practical, Treasury Metals would implement actions to reduce concentrations resulting from sources on-site, which may include increased road watering, reductions in vehicle speed, change in equipment, or reduction in plant

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				operations as a form of operational control. There are no locations within the Property Boundary where human receptors would experience prolonged exposure to particulate matter or other compounds in air (i.e. there are no permanent residences, hunting cabins, cottages etc.) therefore the potential risk to Indigenous land users as a result of Project emissions is intrinsically low. It should be noted that by definition of the MPOI (TMI_954-HHRA(2)-01) there is not a single MPOI for all air compounds and averaging periods. Instead the MPOI is specific to the air compound which is a function of the emission sources. The updated contour plots indicate that there is an area near tree nursery road that is representative of the MPOI for a number of compounds, is accessible, has a power supple and is within the secure perimeter. This additional information has been incorporated into the Follow-Up Program for Human Health as described in the Goliath Gold Follow-Up Addendum which supersedes Section 13 of the revised EIS (April 2018).
				Revised Response: **THIS RESPONSE SUPERCEDES TMI_931-HE(2)-11** **PART A** Exposure point concentrations for all CACs including TSP, PM10 and PM2.5 for all project phases and Study Areas are provided in Table 3.5.3.1-1. Raw data tables for all assessment scenarios are provided in Appendix 1- Raw Data. The potential effects of the Project on human health, specifically via the inhalation of inorganic COCs (specifically metals) associated with the inhalation of suspended particular matter (PM_{10}, $PM_{2.5}$ and TSP) are assessed in Section 3.5.3.2 of the HHERA) Report). Total suspended particulate (TSP) was selected as the particulate matter group to be used in determining possible chemical exposures to airborne COCs because it was the most conservative approach. As illustrated in Figure 3.5.3.2-1 of the 2018 HHERA (and provided herein), the use of the TSP concentration will conservatively include both the PM_{10} and $PM_{2.5}$ fractions of the airborne particulate matter associated with the Project. Although Health Canada recommends the use of PM_{10} in their $DQRA_{CHEM}$ guidance document, the PM_{10} emissions from the Project represent 29% of the TSP emissions (averaged over the site preparations and construction, operations and closure phases). The $PM_{2.5}$ fraction of the airborne particulate matter could represent the finer airborne particles known to pose a greater risk to human health, as they can be inhaled deeply into the lungs, are chemically reactive, and have complex characteristics. However, the use of $PM_{2.5}$ emissions from the Project represent 6% of the TSP emissions (averaged over the site preparations and construction, operations and closure phases). Therefore, while scientific logic may be used in support of the use of either PM_{10} or $PM_{2.5}$, for determining exposures for use in the 2018 HHERA, the choice to use TSP for calculating exposures for the 2018 HHERA represents the most conservative approach, capturing 100% of the airborne particulate emissions and thus 100% of the possible exposure to airborne metals. The use of TSP may therefore overestimate potential risk given that PM10 and PM2.5 are more likely to be biologically available and capable of exerting health effects at the cellular level.

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				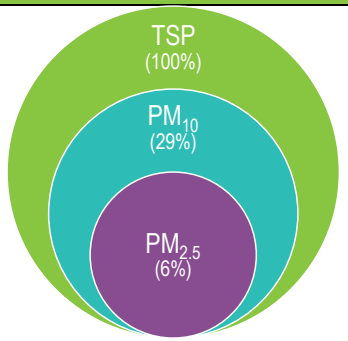 **Figure 3.5.3.2-1: Distribution of Airborne Particle Sizes** **PART B** As part of the Round 2 Information Request process, a number of information requests were received from the Canadian Environmental Assessment Agency (the Agency) and their technical review teams regarding the assessment of human health with respect to criteria air contaminants (CACs). An expanded assessment has been provided in the 2018 HHERA report to directly respond to those information requests. The assessment of CACs was performed in Section 3.5 of the HHERA. Activities associated with each Project phase are expected to emit Criteria Air Contaminants (CACs) including CO, NO_x, SO_2, TSP, PM_{10}, and $PM_{2.5}$. Section 6.6 of the revised EIS (April 2018) provided an evaluation of the effects of the Project on air quality and considered the potential effects of the Project on air quality during the Site Preparation and Construction, Operations, and Closure phases of the Project. There are no air emission sources during the Post-Closure phase of the Project as such no predicted values were modelled. The air quality assessment presented in the revised EIS (April 2018) focussed, appropriately on the maximum predicted concentrations at the Property Boundary, as well as at 43 identified sensitive receptors. The Property Boundary predictions represented the appropriate values for determining compliance with Ontario Regulation 419/05, while the CCME (2006) identifies that the sensitive receptor which meet the CCME definition of community-based receptors, would be the most appropriate locations for determining compliance with ambient air quality criteria. The air quality modeling was revised in support of the Round 2 information request however, the results remain consistent with the revised EIS (April 2018) that all ambient air criteria for human health are satisfied at the sensitive receptor locations and the MPOI. No potential risk is identified to human receptors at these locations Although the results presented in the revised EIS (April 2018) and confirmed as part of the Round 2 process identify that there are no exceedances of the appropriate values for ambient air quality objectives, a number of Round 2 Information Requests were received regarding the potential risks to human receptors via the inhalation pathway.

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				Treasury Metals' recognizes that Project Workers may be exposed to CACs within the Operations Area (Study Area No. 1), and members of Indigenous communities may visit areas outside of the Operations Area, but within the Property Boundary of the Goliath Gold Project, to practice traditional uses of the lands and resources. Project work and traditional land use do not meet the CCME definition of a community-based receptor and thus determination of compliance with the application of Ambient Air Criteria is not appropriate for these receptors. However, to capture the possible risk to peoples using these areas, the air modelling was redone using the same emissions and methods as presented in Section 6.6 of the revised EIS (April 2018), but focusing on possible modelling receptors covering the HHERA Study Areas. The refined modelling includes 308 modelling receptor located within the Operations Area (Study Area No. 1), 3,474 modelling receptor locations within the LSA (Study Area No. 2) 1,445 of which fall inside the Property Boundary, and at 46 modelling receptor locations within the Village of Wabigoon (Study Area No. 3). The assessment of the effects of CACs on human health was performed using the same two-step qualitative and quantitative approach defined above. At the request of Health Canada, predicted EPC of CACs were compared to the Canadian Ambient Air Quality Standards (CAAQS) or the Ontario Ambient Air Quality Criteria (AAQC) for all available averaging periods. As stated in the revised EIS, and in the section above, there were no CAC exceedances identified at the sensitive receptor locations which are appropriate for determining regulatory compliance. The results indicated that the predicted EPC of CACs in the LSA and Village of Wabigoon were below the qualitative screening criteria. As such there are no potential health risks anticipated to human receptors who may access the areas within the Property Boundary but outside of the Operations Area via inhalation of CACs. There are no residual adverse effects identified to human receptors in the LSA or the Village of Wabigoon who may live, visit, or practice traditional use of land and resources via the inhalation of CACs in air as a result of the Project. Within the Operations Area, the predicted EPCs of NO_2, $PM_{2.5}$, and PM_{10} were larger than the CAAQS/AAQC (appropriate for use at sensitive receptors) for select averaging periods. Although a quantitative approach was considered for $PM_{2.5}$, PM_{10}, Treasury Metals was informed by Health Canada that they do not currently support a quantitative assessment of these forms of particulate matter, and the qualitative assessment would suffice at this time. The potential Health implications of NO_2 to a Project Worker within the Operation Area was quantitatively assessed. There is no access to the Operations Area by members of the public or Indigenous communities during the active life of the project and highlight that there are no sensitive or community-based receptors within the Operations Area. Under good health and safety practices, an occupational health and safety plan would be in place for Project Workers and serve as an appropriate risk management/ mitigation measure. As such no residual adverse effects are identified as a result of NO_2 concentrations within Operations Area. In addition to the CACs discussed above, for which there are regulatory criteria available in Canada, Round 2 Information Requests AE(2)-02 an HE(2)-11 requested that the human health risk include a quantitative assessment of incremental cancer risk from diesel particulate matter(DPM) using the unit risk and inhalation slope factor available from the California Office of Health Hazard Assessment, California EPA (2015). The HHERA included a quantitative assessment of the potential health implication of DPM as a result of the Project. The results indicated that there were

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				no non-cancer risks associated with DMP emissions from the Project in any of the three Study Areas, identified. Estimated ILCRs marginally exceeded the Ontario target ILCR of 1×10^{-6}, and are within the Health Canada target of 1×10^{-5}. It is highlighted that predicted background concentrations of DPM in the three Study Areas were consistent with those defined by the California EPA. At background concentration the use of the California EPA slope factor resulted in ILCR estimates two orders of magnitude greater than Ontario's target and one order of magnitude larger than the Health Canada's target. The United States is less conservative than Canada when it comes to the definition of "essentially negligible" cancer risks. Therefore, while the application of a U.S. derived slope factor may be appropriate in the U.S., based on Health Canada's definition, it may not be feasible to obtain "essentially negligible" cancer risks at background concentrations of DPM in the environment. The results presented herein illustrate the need for additional consideration prior to adopting values provided by other regulatory agencies within Canada. Given that there is a relatively large level of uncertainty associated with the application of the California EPA cancer slope factor in Canada, that Health Canada has not adopted a quantitative approach for other forms of particulate matter (i.e. PM_{10} and $PM_{2.5}$ as discussed above), and that the non-cancer risk estimates for DPM were below levels anticipated to pose risk to human receptors, no potential risks from DPM are determined at this time. Predicted EPCs of metals sorbed to particulate matter satisfied their respective qualitative screening criteria at Study Areas No. 1, 2 and 3. As such there are no potential risks anticipated to Project Workers, Residents, and/or Visitors/Harvesters via the inhalation of fugitive dust pathway. The fugitive dust pathway was considered in the determination of residual adverse effects via the sum of all operable pathways as requested in TMI_956-HHRA(2)-03. **PART C** In the HHERA (August 2018), PM_{10}, $PM_{2.5}$ and NO_2 were considered as non- threshold pollutants. As part of ongoing correspondence during the Round 2 Information Request Process, Treasury Metals was informed by Health Canada via email on August 1st that: *$PM_{2.5}$, and NO_2 have been assessed by Health Canada and the conclusions reached are that both exhibit widespread population-level health effects that indicate that they should be treated as non-threshold contaminants where any level of or increase in exposure can result in adverse health effects. Health Canada is currently developing an approach for the quantitative assessment of these contaminants. In the interim Health Canada would support an approach that includes an evaluation against the CAAQS and a discussion of the implications of the CAAQS-associated management levels, plus a robust qualitative analysis of the potential health effects of these non-threshold contaminants in relation to exposure throughout the project area and the potential to reduce emissions of pollutants that form these two air contaminants. For PM_{10}, evaluation against the Ontario AAQC may be used and considered in a similar manner (i.e., robust qualitative analysis and potential options to reduce emissions of this pollutant).*

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				Furthermore, Health Canada no longer supports the Sum25 and Sum15 approach for quantifying the effects of exposure to PM_{10} and $PM_{2.5}$. In follow-up correspondence on August 7, 2018, Health Canada amended their response and stated the following: *With regards to a recommendation on the non-threshold end point that Health Canada wishes to see applied in the HHRA of potential health effects of NO_2, they suggest following the **following** endpoints described in the Human Health Risk Assessment for Ambient Nitrogen Dioxide (i.e. using the concentration response curve to quantify the effects). Specifically, the following endpoints may be considered:* • *Short-term (acute exposure) respiratory effects (asthma)* • *Short-term (acute exposure) all-cause mortality* • *Long-term (chronic exposure) respiratory mortality* *This approach should be considered in addition to the qualitative assessment previously described for NO2.* *Health Canada also confirmed that they no longer support the 1999 Sum25 and Sum15 guidance for assessing PM_{10} and $PM_{2.5}$.* Therefore, PM_{10} and $PM_{2.5}$ are recognized as non-threshold chemicals however were not quantitatively assessed for potential risk in the 2018 HHERA Report, and instead a qualitative assessment was provided. NO_2 was both qualitatively and quantitatively assessed as a non-threshold chemical in the 2018 HHERA Report using the endpoints provided by Health Canada in their correspondence on April 7, 2018. **REQUEST FOR ADDITIONAL INFORMATION** The proposed air monitoring programs for the Goliath Gold Project would include a combination of periodic samplers (e.g., high volume samplers for TSP, and one of PM10 or PM2.5), passive samplers (e.g., dustfall), and a continuous monitoring station (e.g., samplers for NO_2 and fine particles [$PM_{2.5}$]). It is not usual for the continuous samplers to be configured to provide real time results, especially for fine particles (e.g. PM10 or PM2.5) that are regulated on a 24-hour integrated basis. The continuous monitoring station would only be configured to provide real-time air sampling results if such results are essential for the implementation of the mitigation strategies. If real time air sampling results are to be provided, the continuous monitors would be configured to provide Treasury Metals a warning of any exceedance. In the case of the NO_2 analyzer, warnings would be logged on the basis of the 1-hour readings, consistent with the new CAAQS to come into force in 2020 and 2025. In the case of fine particles (e.g. $PM_{2.5}$), warnings would be logged on a 24-hour basis. Treasury Metals would then review any of the logged warnings, the measurement information, and the meteorological records to determine whether the exceedance was due to activities on site (and the likely source of the emissions), or whether due to external influences (e.g., forest fires). As soon as

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				practical, Treasury Metals would implement actions to reduce concentrations resulting from sources on-site, which may include increased road watering, reductions in vehicle speed, change in equipment, or reduction in plant operations as a form of operational control. There are no locations within the Property Boundary where human receptors would experience prolonged exposure to particulate matter or other compounds in air (i.e. there are no permanent residences, hunting cabins, cottages etc.) therefore the potential risk to Indigenous land users as a result of Project emissions is intrinsically low. It should be noted that by definition of the MPOI (TMI_954-HHRA(2)-01) there is not a single MPOI for all air compounds and averaging periods. Instead the MPOI is specific to the air compound which is a function of the emission sources. The updated contour plots indicate that there is an area near tree nursery road that is representative of the MPOI for a number of compounds, is accessible, has a power supple and is within the secure perimeter. This additional information has been incorporated into the Follow-Up Program for Human Health as described in the Goliath Gold Follow-Up Addendum which supersedes Section 13 of the revised EIS (April 2018).
				Agency Comment on Revised Response The concluding language in the executive summary that "*DPM were below levels anticipated to pose risk to human receptors, no potential risks from DPM were determined at this time*" is inappropriate. (This language is also included in HHRA section 6.1.1, pg. 309) There are non-threshold health effects from the inhalation of DPM at which there is no safe exposure level. Alternate language for Incremental Lifetime Cancer Risks (ILCR) that are below 1 x 10^{-5} can be described as *essentially negligible risk*. Health Canada. 2010. Part V: Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals (DQRACHEM). Contaminated Sites Division, Safe Environments Directorate, Health Canada. **A. Correct the DPM conclusions in the executive summary and in section 6.1.1 of the HHRA.**
				Comment to the Agency A. The language in the Final HHERA (February 2019) reads that risk from exposure to DPM was essentially negligible.

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				FINAL RESPONSE **THIS RESPONSE SUPERCEDES TMI_931-HE(2)-11** **PART A** Exposure point concentrations for all CACs including TSP, PM10 and PM2.5 for all project phases and Study Areas are provided in Table 3.5.3.1-1 of the Final HHERA (February 2019). Raw data tables for all assessment scenarios are provided in Appendix 1- Raw Data. The potential effects of the Project on human health, specifically via the inhalation of inorganic COCs (specifically metals) associated with the inhalation of suspended particular matter (PM_{10}, $PM_{2.5}$ and TSP) are assessed in Section 3.5.3.2 of the HHERA (August, 2018) Report (August, 2018). Total suspended particulate (TSP) was selected as the particulate matter group to be used in determining possible chemical exposures to airborne COCs because it was the most conservative approach. As illustrated in Figure 3.5.3.2-1 of the HHERA (August, 2018) (and provided herein), the use of the TSP concentration will conservatively include both the PM_{10} and $PM_{2.5}$ fractions of the airborne particulate matter associated with the Project. Although Health Canada recommends the use of PM_{10} in their $DQRA_{CHEM}$ guidance document, the PM_{10} emissions from the Project represent 29% of the TSP emissions (averaged over the site preparations and construction, operations and closure phases). The $PM_{2.5}$ fraction of the airborne particulate matter could represent the finer airborne particles known to pose a greater risk to human health, as they can be inhaled deeply into the lungs, are chemically reactive, and have complex characteristics. However, the use of $PM_{2.5}$ emissions from the Project represent 6% of the TSP emissions (averaged over the site preparations and construction, operations and closure phases). Therefore, while scientific logic may be used in support of the use of either PM_{10} or $PM_{2.5}$, for determining exposures for use in the HHERA (August, 2018), the choice to use TSP for calculating exposures for the HHERA (August, 2018) represents the most conservative approach, capturing 100% of the airborne particulate emissions and thus 100% of the possible exposure to airborne metals. The use of TSP may

therefore overestimate potential risk given that PM_{10} and $PM_{2.5}$ are more likely to be biologically available and capable of exerting health effects at the cellular level.

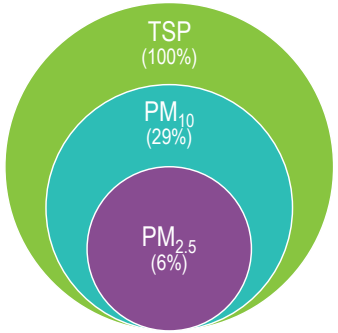

Figure 3.5.3.2-1: Distribution of Airborne Particle Sizes

The results of the Final HHERA indicate that potential risk to human health via inhalation of criteria air contaminants (including PM_{10} or $PM_{2.5)}$ is essentially negligible to those who may practice traditional land use outside of the Operations Area but within the Property Boundary. No residual adverse effects were identified. Although the results of the HHERA do not indicate that risk management or mitigation measures are required during traditional land and resource use, Treasury Metals will offer appropriate personal protective equipment to those who prefer to wear it while within the Property Boundary. Treasury Metals has committed to working with Indigenous communities to develop community specific risk communication plans to mitigate any perception of risk. For Health and Safety purposes, there will also be an access plan, where visitors to the property will be required to sign in. The personal protective equipment will be offered to those individuals during sign in. With these mitigation measures in place, no potential risk via exposure to particulate matter or other CACs is anticipated to those who practice traditional land and resource use.

PART B

Section 3.5 of the Final HHERA (February 2019) accounts for diesel PM, PM_{10} and $PM_{2.5}$for each phase using all averaging times available (24-hour and annual). The incremental lifetime cancer risk (ILCR) of diesel PM is included. The HHERA included a Base Case, Project Alone and Project Assessment scenario to ensure that a discussion on the contribution of this project to the overall ambient levels of TSP, PM_{10} and $PM_{2.5}$at the nearby receptor locations.

				PART C: In the final HHRA, PM_{10}, $PM_{2.5}$ and NO_2 were considered as non- threshold pollutants. Although the results of the HHERA do not indicate that risk management or mitigation measures are required during traditional land and resource use, as part of the sign in and access policy, Treasury Metals will offer appropriate personal protective equipment to those who prefer to wear it while within the Property Boundary.. Treasury Metals has also committed to consult with Indigenous communities regarding the placement of dustfall monitoring jars to target areas of potential impact that overlap with areas where traditional land and resource occurs (this information will be shared confidentially by the community in the formal Traditional Knowledge studies completed, underway or expected in the future). At this time Health Canada does not support the quantitative assessment of PM_{10} or $PM_{2.5}$. Furthermore, the Health Canada risk assessment guidance for NO_2 is not based on toxicological studies, but rather solely based on epidemiological studies in large urban centers with populations of 500,000 + and thus it is uncertain if the application of those epidemiological studies is appropriate for a small rural area of Northern Ontario where the population exposed is expected to be two orders of magnitude lower (max 500 per year). The Final HHERA (February 2019) states: *The results of the HHRA screening, identified that three (3) valued components/criteria air contaminants; nitrogen dioxide, and both fractions of particulate matter (NO_2, PM_{10} and $PM_{2.5}$) exceeded their respective ambient air quality criteria inside the Operations Area and only during the active phases of mining, thereby indicating that potential risk to Project Workers via the inhalation pathway may not be considered negligible. At the request of Health Canada and the Agency, diesel particulate matter (DPM) was also included in the health assessment even though there are no federal or provincial criteria available within Canada. It should be noted that air quality is not typically modelled within the Property Boundary as part of the EA process unless sensitive receptors are present, as the federal and provincial criteria are only applicable at the Property Boundary or sensitive receptor locations. There are no sensitive receptors located within the Property Boundary of the Goliath Gold Project, however at the continued request of the Agency and Health Canada, modelling inside the Property Boundary was performed and used to determine the 95th UCLM concentrations. A Health and Safety Plan including the prescribe use of personal protective equipment including dust masks will be implemented for all Project Workers of the Goliath Gold Project. The Health and Safety Plan will serve as an appropriate risk management/ mitigation measure to mitigate any adverse health effect. With a Health and Safety Plan implemented as a risk management measure, exposure via the inhalation pathway is considered negligible and no residual adverse effects are identified to Project Workers.* *Concentrations of all CACs modelled in the LSA (including areas within the Property Boundary) and the Village of Wabigoon were below their criteria protective of human health, and the potential risk associated with exposure to DPM was determined to be essentially negligible. Therefore, health risks to residents or visitors/ harvesters who may practice traditional land and resource use are considered essentially negligible. No residual adverse effects were identified. Although the results of the HHERA do not indicate that risk management or mitigation measures are required during traditional land and resource use, as part of the sign in and access policy, Treasury Metals will offer appropriate personal protective equipment to those who prefer to wear it while within the Property Boundary.* **REQUEST FOR ADDITIONAL INFORMATION**

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				The proposed air monitoring programs for the Goliath Gold Project would include a combination of periodic samplers (e.g., high volume samplers for TSP, and one of PM_{10} or $PM_{2.5}$), passive samplers (e.g., dustfall), and a continuous monitoring station (e.g., samplers for NO_2 and fine particles [$PM_{2.5}$]). It is not usual for the continuous samplers to be configured to provide real time results, especially for fine particles (e.g. PM_{10} or $PM_{2.5}$) that are regulated on a 24-hour integrated basis. The continuous monitoring station would only be configured to provide real-time air sampling results if such results are essential for the implementation of the mitigation strategies. If real time air sampling results are to be provided, the continuous monitors would be configured to provide Treasury Metals a warning of any exceedance. In the case of the NO_2 analyzer, warnings would be logged on the basis of the 1-hour readings, consistent with the new CAAQS to come into force in 2020 and 2025. In the case of fine particles (e.g. $PM_{2.5}$), warnings would be logged on a 24-hour basis. Treasury Metals would then review any of the logged warnings, the measurement information, and the meteorological records to determine whether the exceedance was due to activities on site (and the likely source of the emissions), or whether due to external influences (e.g., forest fires). As soon as practical, Treasury Metals would implement actions to reduce concentrations resulting from sources on-site, which may include increased road watering, reductions in vehicle speed, change in equipment, or reduction in plant operations as a form of operational control. There are no locations within the Property Boundary where human receptors would experience prolonged exposure to particulate matter or other compounds in air (i.e. there are no permanent residences, hunting cabins, cottages etc.) therefore the potential risk to Indigenous land users as a result of Project emissions is intrinsically low. It should be noted that by definition of the MPOI (TMI_954-HHRA(2)-01) there is not a single MPOI for all air compounds and averaging periods. Instead the MPOI is specific to the air compound which is a function of the emission sources. The updated contour plots indicate that there is an area near tree nursery road that is representative of the MPOI for a number of compounds, is accessible, has a power supple and is within the secure perimeter. This additional information has been incorporated into the Follow-Up Program for Air Quality and Human Health as described in the Final Goliath Gold Follow-Up Addendum which supersedes Section 13 of the revised EIS (April 2018). Treasury Metals has also committed to consult with Indigenous communities regarding the placement of dustfall monitoring jars to target areas of potential impact that overlap with areas where traditional land and resource occurs (this information will be shared confidentially by the community in the formal Traditional Knowledge studies completed, underway or expected in the future). This information is also reflected in the final Follow Up Program Addendum.

TMI_956-HHRA(2)-03

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TMI_956-HHRA(2)-03	HHRA(2)-03		CEA Agency	**Reference to EIS Guidelines:**	n/a
				Reference to EIS / Appendix	n/a
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: In order to adequately assess risks to human health at this site, it is recommended that the combined risk be assessed for of all chemicals via all exposure pathways. Conducting a comprehensive assessment of the health effects on local populations outside the operations area (e.g. traditional resource users) from all Contaminants of Potential Concern (COPC) found on site will provide a more complete and accurate picture of the potential risks to local communities anticipated at this site. As multiple COPC may act on a single target organ via multiple routes, it is prudent that all 14 COPC identified during the screening step are included in the evaluation as the addition of risk estimates to generate a sum total has the potential to alter the outcome of the assessment. • As per the HC DQRA guidance (2010), "[e]xposure estimates or risk estimates may be summed across exposure routes (ingestion, dermal, and inhalation routes) if there is evidence that the same mechanisms of toxicity occur or the same target organs are affected." To address whether there are actions on the same target organ across exposure routes, the proponent should identify where TRVs with the same key study or target organ have been applied to multiple media and sum the estimated concentration from these routes as appropriate to determine the overall dose being received by a single target organ. • As per the HC DQRA guidance (2010), "…exposure estimates for multiple pathways within the same exposure route (e.g. soil ingestion, water ingestion, and ingestion of backyard produce) should be summed; subsequent risks will be estimated from these summed exposures." To address whether a specific media type may present an unacceptable risk to human health, the proponent should sum the estimated concentration from all chemicals for each route as appropriate to determine the overall estimated dose from each exposure route. This will help to clarify whether specific exposure routes such as ingestion of country foods via traditional land use by the local population my present an unacceptable risk at this site.	

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				For example, health risks of antimony are assessed in surface water (Table 4.4.1.1-1A) and TSF supernatant water (Table 4.4.1.2-1) where they exceeded criteria values, but not for waste rock and pit-lake water as the levels remained below criteria values (Table 4.1.3-2 and Table 4.1.3-4). This method fails to consider additive effects, which can result in an underestimate of health risks at this site. Residual effects are not identified on the grounds that the incremental changes in project-associated health risks will have very little to no effects on the baseline conditions at all study areas. However, given that the residual effects should be identified using the total risk from all operable exposure pathways, routes, and environmental (or site-specific) media (see A and B above), the residual effects should be updated including these potential changes. Health Canada. 2010. Federal Contaminated Site Risk Assessment in Canada, Part V: Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals (DQRAChem).
				Specific Question / Request for Information: A. Include all 14 COPC selected in Section 3.5 and 3.6 and summarized in Section 4.2.3, regardless of screening criteria, and calculate the total exposure point concentration and associated risk for local population receptors (e.g., traditional resource users) across all exposure media identified. B. Re-evaluate the residual adverse health effects based on the results of A. C. Revise the mitigation measures and follow-up plans based on the results of A. and B.
				Draft Response: A. The 2018 HHERA has been revised to include all 14 contaminants of concern (COC), regardless of screening criteria, for the calculation of total exposure and associated potential risk via the sum of all operable media pathways for Project Workers, Residents (who may practice traditional land and resource use), and Visitors/Harvesters (who may practice traditional land and resource use). The results are provided in Section 4.6 of the revised 2018 HHERA. B. The residual adverse health effects were re-evaluated based on the sum of all operable exposure pathways and the results provides in Section 4.6 of the HHERA Report. For human health a residual adverse effect is defined when the risk for the Project Assessment Scenario via the sum of all operable pathways, exceeds the Health Canada acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario. In those cases where the potential risk via the sum of all operable exposure pathways is less than base, then the residual effect would not be adverse. The evaluation of residual adverse effects has focused on the Project Assessment Scenario recognizing that individuals cannot be exposed to the Project Alone Assessment Scenario under real world conditions. In keeping with the EIS Guidelines for the Goliath Gold Project, the estimated potential risk via the sum of all operable exposure pathways is based upon the predictions that incorporate the mitigation measures described in

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				the revised EIS (April 2018). In keeping with risk assessment methodology, the residual adverse effects for have been identified in the absence of risk management measures, however the implementation of a Health and Safety Plan at the Goliath Gold Project will be a mandatory requirement. C. A health and safety plan for the Goliath Gold Project will be required to mitigate the potential health effects to a Project Worker. For the Resident and Visitor/Harvester exposure scenarios the adverse residual effects identified for exposure to thallium, zinc, and arsenic were driven by the country foods pathway. Figure 1 on TMI_956-HHRA(2)-03)_Attachment 1 shows the relative contribution of each exposure pathway to the sum of potential risk for which the residual effects is based. As shown on Figure 1, the country foods pathway drives the residual effect for thallium and zinc. The current level of conservatism relied upon is the country foods assessment is not appropriate for basing mitigation measures on. With the exception of fish, no country foods were sampled as part of the baseline sampling efforts and subsequently all the concentrations in country foods were modelled via the use of literature derived uptake factors. It is unlikely that potential risk via exposure to thallium, zinc, and arsenic via in country foods exists in the existing environment, and instead the risk estimates in exceedance of Health Canada benchmarks are more likely to be an artifact of the conservatism relied upon in the HHERA. As shown on Figure 2 of TMI_956-HHRA(2)-03)_Attachment 1, the literature derived uptake factors for moose, macrophytes, duck and ruffed grouse are contributing greatest to the potential risk estimates observed in the Base Case Assessment Scenario. In all cases the Project Assessment Scenario was only exceeded when the Base Case Assessment Scenario also exceeded its respective Health Canada benchmark. By the nature of the risk assessment methodology, if the risk estimates in the existing environment are overly conservative, as are the predictions for the Project Assessment Scenario (i.e Project Alone + Base Case). The Follow-Up Program for Human Health as detailed in the Goliath Gold Project Follow Up Addendum should be used to verify the predictions presented in the HHERA, prior to making management decisions for potential exposure to thallium, zinc, and arsenic in country foods. The follow-Up Program should focus on the determination of site-specific uptake factors for thallium, zinc and arsenic in environmental and Project-specific media.
				Agency Comment on Draft Response A. Residual adverse effects were quantified for the baseline + project exposure scenario based on the exceedances of HC's risk benchmarks (i.e. HQ of 1.0 or ILCR of $1x10^{-5}$). The concluding discussion compared predicted project risks to the risk for the baseline scenario. However, it is not appropriate to determine the residual adverse effects in reference to the baseline risk level as this approach inherently considers the incremental (project) risk only. The residual effects should be determined based on the total risk level (i.e. baseline + project risks) without regard to the baseline risk level. Refer to the HC comment on IR#2 HE(2)-03 (September 2018). B. In Table 4.6.2-1 of the HHRA, the proponent re-assessed additive toxicological interactions of 14 select contaminants. However, the additive interactions are considered based on the non-identical (or dissimilar) toxicological endpoints and Toxicological Reference Values (TRVs). For example, both lead and zinc are grouped into the "*developmental*" toxicant category and their health risks are summed using their "*additive*" developmental toxicity. However, in Table 4.2-1 of the HHRA, lead and zinc TRVs are derived from a neurotoxicological endpoint (i.e. IQ

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				decrease) and a non-neurological toxicological endpoint, respectively. The TRVs for contaminants with different toxicological endpoints should not be used together to calculate the summed health risk or assess the additive toxicological effect [see HC comment on HHRA(2)-03 (September 2018)]. Contaminants should not be assumed to have additive toxicological effects, unless there are strong scientific evidences of such interactions and relevant TRVs are available. In previous HHRA(2)-03, HC has advised that the total risk "*across all exposure media*" be calculated for each contaminant rather than estimating additive interactions among contaminants. HC acknowledges that this correction is unlikely to change the result of the risk characterization. **A. Update the residual effects determination/discussion and follow-up monitoring plans based on the total risk (i.e. baseline + project risks) rather than on the incremental (project) risk alone.** **B. Provide the health risks of the 14 selected contaminants individually unless scientific evidences suggest additive toxicological interactions among the contaminants.**
				Comment to the Agency Part A. As defined in Section 3.2 "Assessment Scenarios" of all versions of the HHERA, the Project Assessment Scenario is defined as Project Alone + Baseline. In Section 4.6 of the HHERA, for human health a residual adverse effect is defined when the risk for the Project Assessment Scenario via the sum of all operable pathways, exceeds the Health Canada acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario. In those cases where the potential risk via the sum of all operable exposure pathways is less than base, then the residual effect would not be adverse. Therefore, by definition of the Project Assessment Scenario, the HHERA appropriately based the residual adverse effects on Project + Baseline Potential risk via an individual pathway as defined by an exceedance of a Health Canada risk benchmark (i.e. HQ > 0.2 or ILCR > 1×10^{-5}) may still exist without it resulting in a residual adverse effect. The conclusions have been updated to ensure when this is the case it is clear to the reader. Part B. Additive chemical interactions were included in the HHERA at the request of Health Canada to satisfy this IR specifically in addition to the assessment of each of the 14 COCs individually across all exposure media, which is the primary mechanism for which residual adverse effects were developed. The TRVs for human health relied on in the HHERA were largely the ones provided by Health Canada as provided in "Part II: Health Canada Toxicological Reference Values (TRVs) and Chemical-Specific Factors, Version 2.0" dated 2010. Zinc and lead are no longer grouped together as the assessment of lead was reassessed in the Final HHERA (February 2019) using a margin of exposure for developmental effects, nephrotoxicity, and cardio vascular effects as per the request of Health Canada. Given that this refinement would not meaningfully change the results of the HHERA or revised EIS (April 2018). No specific changes have been made to the HHERA or response to TMI_956-HHRA2)-03.

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				FINAL RESPONSE: Part A. The 2018 HHERA has been revised to include all 14 contaminants of concern (COC), regardless of screening criteria, for the calculation of total exposure and associated potential risk via the sum of all operable media pathways for Project Workers, Residents (who may practice traditional land and resource use), and Visitors/Harvesters (who may practice traditional land and resource use). The results are provided in Section 4.6 of the revised 2018 HHERA. Part B. In the HHERA, a residual adverse effect is defined when the risk for the Project Assessment Scenario (i.e. Project Alone + Base Case) via the sum of all operable pathways, exceeds the acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario. In those cases where the potential risk via the sum of all operable exposure pathways is less than Base Case, then the residual effect would not be adverse. The evaluation of residual adverse effects has focused on the Project Assessment Scenario recognizing that individuals cannot be exposed to the Project Alone Assessment Scenario under real world conditions. For human health exposure to criteria air contaminants (CACs) the only operable pathway is via the inhalation of air pathway and therefore residual adverse effects were characterized based on the inhalation pathway alone. Whereas, for inorganic metals (and methylmercury) human exposure may be via the inhalation and also via direct contact with soil, water, Project-specific media and ingestion of country foods, therefore residual adverse effects are characterized based on the sum of all operable exposure pathways. In keeping with the EIS Guidelines for the Goliath Gold Project, the estimated potential risk via the sum of all operable exposure pathways is based upon the predictions that incorporate the mitigation measures described in the revised EIS (April 2018). In keeping with risk assessment methodology, the residual adverse effects for have been identified in the absence of risk management measures, however the implementation of a Health and Safety Plan at the Goliath Gold Project will be a mandatory requirement. Where residual effects are identified (section 4.5), as per the EIS guidelines for the Goliath Gold Project, they were carried forward to for an assessment of cumulative effects (section 4.7) and determination of significance (section 4.8). The results of the Final HHERA (February 2019) state: *The results of the HHERA screening identified 14 contaminants of concern/valued components in soil, air, water and/or Project-specific media based on exceedances of their respective criteria/guidelines/standards. All 14 were carried forward for a quantitative human health risk assessment and assessment of residual adverse effects, cumulative effects, and significance (if required).*

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				The results of the HHRA identified residual adverse effects for three of the valued components; arsenic, zinc, and thallium. Residual adverse effects for human health were identified to both the resident and visitor/harvester receptors for thallium (non-cancer risk), zinc (non-cancer risk), and arsenic (cancer risk). Ingestion of country foods contributed the highest proportion to the overall characterization of residual adverse effects via the sum of risk from all operable exposure pathways. The country foods assessment relied solely on the use of modelled chemical concentration data as a baseline country foods study was not completed in support of the revised EIS (April 2018), as such there are uncertainties associated with the predictions which are likely to overestimate the calculations used to determine residual adverse effects. A detailed follow up program has been provided in the Final Goliath Gold Follow Up Program Addendum to verify the predictions related to country foods and other pathways used in the assessment of residual adverse effects on human health. The results of the HHRA indicated that there would be no residual adverse effects to a Project Worker with the implementation of a Health and Safety Plan which includes the prescribed use of personal protective equipment such as dust masks/respirator, long pants and sleeves, and gloves when working within the Operations Area of the Project. Where residual adverse effects were identified to either human health or ecological receptors, a qualitative cumulative effects assessment and significance assessment completed. The results indicated that the residual adverse effects would not overlap spatially or temporally with other Projects, therefore, cumulative effects associated with the identified residual adverse effects of the Project on human and ecological receptors are not likely to occur. All the residual adverse effects identified were determined to have a magnitude of "Level I". Effects with a magnitude level of I are not significant, therefore no significant adverse effects were identified to human health or ecological receptors. Part C. The results of the HHRA indicated that there would be no residual adverse effects to a Project Worker with the implementation of a Health and Safety Plan which includes the prescribed use of personal protective equipment such as dust masks/respirator, long pants and sleeves, and gloves when working within the Operations Area of the Project. The Health and Safety Plan is the only mitigation measure required for the protection of a Project Worker. As described in the final response to TMI_945-HE(2)-03B and shown on Figure 1 below, direct contact with arsenic in surface water contributed the highest proportion to the overall characterization of residual adverse effects via the sum of risk from all operable exposure pathways for arsenic, although the concentration of arsenic in the water bodies did not exceed PWQO or Health Canada's maximum acceptable criteria for drinking water. The source of arsenic in the surface water bodies is not from human activities, rather a consequence of the natural geology of the region which is a common occurrence in Northern Ontario. Therefore, potential risk to human health is not anticipated for the Base Case Assessment Scenario nor the Goliath Gold Project Assessment Scenario. No risk management measures/ mitigation measures are required for arsenic.

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				As described in the final response to TMI_945-HE(2)-03B and shown on Figure 1 below, exceedances of Health Canada's risk benchmarks (HQ or ILCR) for thallium and zinc in the Project Assessment Scenario were driven by the Base Case concentration of thallium and zinc in country foods. The country foods assessment relied solely on the use of modelled chemical concentration data as a baseline country foods study was not completed in support of the revised EIS (April 2018), as such there are uncertainties associated with the predictions which are likely to overestimate the calculations used to determine residual adverse effects. In all cases where the Project Assessment Scenario. The Final Goliath Gold Follow Up Addendum provides the country foods monitoring program designed to reflect the findings/uncertainty of the HHERA with explicit plans for specific contaminants to be monitored in environmental and project specific media. The follow up program for human health specifically states that metals and methylmercury will be analyzed in all environmental and project-specific media as well as in country foods including wild rice which would allow for the derivation of site-specific uptake factors to further reduce the uncertainty in the HHERA. Treasury Metals recognizes that the perception of risk, safety, and well-being is a concern to members Indigenous communities and has proposed to work with each Indigenous stakeholder community to develop a risk communication plan to help mitigate the perceptions of risk, safety and well-being associated with the Goliath Gold Project. 

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				Figure 1. Relative Contribution to Residual Adverse Effects via all Operable Exposure Pathways

TMI_957-HHRA(2)-04

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TMI_957-HHRA(2)-04	HHRA(2)-04		CEA Agency	**Reference to EIS Guidelines:**	n/a
				Reference to EIS / Appendix	n/a
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: It is not clear why surface water quality was not modeled for the "Project Alone Scenario", except for at Blackwater Creek, as presented in Appendix I (Tables I-19, 20, 23, and 24). In addition, the contaminants that exceeded their respective water quality criteria are not presented with their "Project Alone Scenario" concentrations in Table 3.5.3.4-1.	
				Specific Question / Request for Information: A. Provide a detailed rationale as to why the "Project Alone Scenario" concentrations are not modeled for all surface water locations (i.e. why has only Blackwater creek been selected).	
				Draft Response: The Project Alone Scenario was modelled concentrations for all parameters at all 9 surface water locations was provided in Appendix I- Raw Data of the 2018 HHERA Report. Appendix I provides the modelled surface water quality at each of the 9 surface water modeling nodes including Blackwater Creek, for the Project-Alone Scenario.	

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				The tables have been attached as TMI_957-HHRA(2)-04. A number of Round 2 responses were received related to groundwater quality, seepage, mine waste, surface water quality and ultimately the effects on fish and fish habitat. As such, the surface water quality model has been revised to capture those changes. All of the changes, as well as a revised prediction on surface water quality, have been incorporated in the revised surface water quality model described in detail in the Goliath Gold Project Water Addendum. As stated in the Water Addendum, the 2018 HHERA and many of the Round 2 information request responses, at this time Treasury Metals do not intend to move forward using the dry cover for the closure of the TSF and subsequently the revised surface water quality modelling and all of the Round 2 responses appropriately focused on the wet-cover TSF closure option only. The 2018 HHERA also focuses on the wet-cover closure option for the TSF and given the changes to the surface water model as part of the Round 2 process, the prediction for the dry cover as provided in the Draft HHERA (August 2018) are no longer valid. The revised surface water quality model used for evaluating the effects of the Project on surface water quality remains an integrated model that combines existing conditions, releases and discharges from the Project, seepage from the Project, and changes in surface water flow as a result of the Project. The Project will not result in releases to the environment during either the site preparation and construction, or closure phases. As such, an integrated model for surface water quality was not considered necessary for either the site preparation and construction, or closure phases. To clarify the context and rationale, the maximum worst case concentrations across all 9 nodes was selected as the exposure point concentrations in the HHERA, not simply the predictions from Blackwater Creek. In the body of the Draft HHERA (August 2018) there was a focus on Blackwater Creek as this watercourse was the only area where the concentrations of arsenic and antimony exceeded their Health Canada Maximum Acceptable Concentration for the protection of drinking water quality. As described above, given the number of Round 2 information requests related to surface water quality, the model was revised to include a substantial amount of new baseline water quality data and modelled effluent quality was provided. Based on this new data as part of the Round 2 process, the HHERA was revised to include it, and subsequently the predictions for arsenic and antimony in surface water were below the health-based criteria. No surface water contaminants of concern with respect to human health were identified requiring quantitative assessment as part of the HHERA, however the direct dermal contact and ingestion as drinking water pathways were considered as part of the determination of residual adverse effects via the sum of all operable exposure pathways requested in TMI_956-HHRA(2)-03.
				<u>Agency Comment on Draft Response</u> A previous iteration of the HHRA (August, 2018) showed exceedances of health based parameters for both arsenic and antimony in surface water, The response to HHRA(2)-04 indicates that “[i]n the body of the Draft HHERA (August 2018) there was a focus on Blackwater Creek as this watercourse was the only area where the concentrations of arsenic and antimony exceeded their Health Canada Maximum Acceptable Concentration for the protection of drinking water quality. As described above, given the number of Round 2 information requests related to surface water quality, the model was revised to include a substantial amount of new baseline water quality data and modelled effluent quality was provided. Based on this new data as part of the Round 2 process, the HHERA was revised to

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				include it, and subsequently the predictions for arsenic and antimony in surface water were below the health-based criteria". Given the frequent changes in model predictions and associated uncertainties, monitoring should be completed for arsenic and antimony during the operations and post-closure phases. **A. Provide a detailed explanation as to how additional baseline data has reduced the total (background + project) predicted surface water concentrations such that antimony and arsenic concentrations have decreased to below health based criteria.** **B. To validate the predictions of the HHRA, update the FUP for surface water during the operations and post-closure phase to explicitly include antimony and arsenic downstream of the effluent discharge location in Blackwater Creek Tributary. Compare results against the environmental quality guidelines for protection of human health.**
				Comment to the Agency Note: The final versions of all Round 2 responses and technical addendums should be relied on by the reviews as these final documents supersede all previous drafts submitted. Part A. As part of the Round 2 information requests, a number of questions were raised with respect to surface water quality and the changes required to the assessment of surface water quality using the surface water quality model subsequently resulted in changes to the HHERA. Specifically, TMI_884-SW(2)-01 which was later superseded by TMI_948-SW(2)-01B noted that the raw data and a summary of baseline water quality results was not provided for the data collected during the 2010/2011 sampling program and requested it be added to the surface water quality modelling. A detailed response was provided to address this concern in the response to Part B of TMI_948-SW(2)-01B. In summary, as part of the Round 2 process and following the submission of the August HHERA, Treasury Metals and their consultants updated the baseline surface water quality data set to include all data from both 2010-2011 and 2012-2013 datasets and performed a statistical analysis to determine the differences between the two. The additional baseline data and subsequent statistical analysis resulted in approximately 200 pages of raw data tables and summary statistics tables to respond to that one request alone (See TMI_948-SW(2)-01B_Table_B1 through TMI_948-SW(2)-01B_Table_B10). Although the Health Canada reviewer is encouraged to review those raw data and statistical analysis tables, the key statistical summary has been included in this response as TMI_957-HHRA(2)-04_Attachment 2. The statistical analysis indicates that the concentrations of antimony and arsenic were statistically different between the two data sets with ρ-values of 0.03 and 0.02 for antimony and arsenic, respectively. The 2012-2013 dataset reported statistically higher concentrations of arsenic and antimony than the 2010-2011 dataset. The revised EIS (April 2018) and August Draft of the HHERA relied on the 2012-2013 dataset alone. Given that the HHERA relied appropriately on the 95th UCLM concentrations as the exposure point concentration rather than

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				maximum concentrations, the inclusion of additional baseline data resulted in lower exposure point concentrations for arsenic and antimony in the final HHERA than the August Draft HHERA. Surface water quality as a result of the Project is a function of a number of parameters including baseline water quality, groundwater flow, seepage quality/quality and effluent quality/quantity. Full details of how surface water quality is modelled including all inputs and assumptions using the surface water quality model is provided in Appendix JJ (the Water Report) of the revised EIS (April 2018), and all changes to the surface water quality modelling required in support of the Round 2 process have been included in the Final Goliath Gold Project Water Addendum. Part B: The final follow up programs for all technical discipline including surface water quality and human health are provided in the Final Goliath Gold Project Follow Up Addendum. Treasury Metals has committed to monitoring multiple surface water locations for a full suite of metals by chemical analysis via ICP-MS. The suite of metals would include, but is not limited to arsenic and antimony. The final follow up program for human health specifically states that the measured concentrations in surface water will be compared to relevant health based criteria.
				FINAL RESPONSE: Part A: The Project Alone Scenario was modelled concentrations for all parameters at all 9 surface water locations was provided in Appendix I- Raw Data of the 2018 HHERA Report. Appendix I provides the modelled surface water quality at each of the 9 surface water modeling nodes including Blackwater Creek, for the Project-Alone Scenario. The tables have been attached as TMI_957-HHRA(2)-04_Attachment 1. A number of Round 2 responses were received related to groundwater quality, seepage, mine waste, surface water quality and ultimately the effects on fish and fish habitat. As such, the surface water quality model has been revised to capture those changes. All of the changes, as well as a revised prediction on surface water quality, have been incorporated in the revised surface water quality model described in detail in the Goliath Gold Project Water Addendum. The revised surface water quality model used for evaluating the effects of the Project on surface water quality remains an integrated model that combines existing conditions, releases and discharges from the Project, seepage from the Project, and changes in surface water flow as a result of the Project. The Project will not result in releases to the environment during either the site preparation and construction, or closure phases. As such, an integrated model for surface water quality was not considered necessary for either the site preparation and construction, or closure phases. To clarify the context and rationale, the maximum worst case concentrations across all 9 nodes were selected as the exposure point concentrations in the HHERA, not simply the predictions from Blackwater Creek. In the body of the Draft HHERA (August 2018) there was a focus on Blackwater Creek as this watercourse was the only area where the concentrations of arsenic and antimony exceeded their Health Canada Maximum Acceptable Concentration for the protection of drinking water quality. As part of the Round 2 information requests, a number of questions were raised with respect to surface water quality and the changes required to the assessment of surface water quality using the surface water quality model subsequently resulted in changes to the HHERA. Specifically, TMI_884-SW(2)-01 which

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				was later superseded by TMI_948-SW(2)-01B noted that the raw data and a summary of baseline water quality results was not provided for the data collected during the 2010/2011 sampling program and requested it be added to the surface water quality modelling. A detailed response was provided to address this concern in the response to Part B of TMI_948-SW(2)-01B. In summary, as part of the Round 2 process and following the submission of the August HHERA, Treasury Metals and their consultants have updated the baseline surface water quality data set to include all data from both 2010-2011 and 2012-2013 datasets and performed a statistical analysis to determine the differences between the two. The additional baseline data and subsequent statistical analysis resulted in approximately 200 pages of raw data tables and summary statistics tables to respond to that one request alone (See TMI_948-SW(2)-01B_Table_B1 through TMI_948-SW(2)-01B_Table_B10). Although the Health Canada reviewer is encouraged to review those raw data and statistical analysis tables, the key statistical summary has been included in this response as TMI_957-HHRA(2)-04_Attachment 2. The statistical analysis indicates that the concentrations of antimony and arsenic were statistically different between the two data sets with ρ-values of 0.03 and 0.02 for antimony and arsenic, respectively. The 2012-2013 dataset reported statistically higher concentrations of arsenic and antimony than the 2010-2011 dataset. The revised EIS (April 2018) and August Draft of the HHERA relied on the 2012-2013 dataset alone. Given that the HHERA relied appropriately on the 95th UCLM concentrations as the exposure point concentration rather than maximum concentrations, the inclusion of additional baseline data resulted in lower exposure point concentrations for arsenic and antimony in the final HHERA than the August Draft HHERA. Surface water quality as a result of the Project is a function of a number of parameters including baseline water quality, groundwater flow, seepage quality/quality and effluent quality/quantity. Full details of how surface water quality is modelled including all inputs and assumptions using the surface water quality model is provided in Appendix JJ (the Water Report) of the revised EIS (April 2018), and all changes to the surface water quality modelling required in support of the Round 2 process have been included in the Final Goliath Gold Project Water Addendum. The final follow up programs for all technical disciplines including surface water quality and human health are provided in the Final Goliath Gold Project Follow Up Addendum. Treasury Metals has committed to monitoring multiple surface water locations for a full suite of metals by chemical analysis via ICP-MS. The suite of metals would include, but is not limited to arsenic and antimony. The final follow up program for human health specifically states that the measured concentrations in surface water will be compared to relevant health based criteria.

TMI_958-HHRA(2)-05

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_958-HHRA(2)-05	HHRA(2)-05		CEA Agency	**Reference to EIS Guidelines:**	n/a
				Reference to EIS / Appendix	n/a
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: HE(2)-09C requested that the proponent provide details as to how bioaccumulation was considered in the screening process for contaminants in soil. The rationale for this request is that, as certain contaminants are highly bioaccumulative, their concentrations in environmental media may not necessarily be a good indicator of the contaminant accumulation in country food via the food chain (e.g., methylmercury). Therefore even though their concentrations are below the screening criteria, their characteristics may allow for bioaccumulation at high levels in country food and lead to significant adverse health effects.	
				Specific Question / Request for Information: A. Re-screen the country food contaminants based on their bioaccumulation potential, as well as exceedances of the environmental quality criteria. Alternatively, provide additional justification that these substances do not require quantitative evaluation in the HHRA.	
				Draft Response: The contaminants screening for country foods assessment considered not only exceedances but also bioaccumulation potential. The approach applied in the 2018 HHERA for the Goliath Gold Project followed the appropriate Health Canada DQRA methodology to screen chemicals in their respective media against their respective criteria during the problem formulation step as a mechanism to define the scope of the work. However, the 2018 HHERA also appropriately considered the bioaccumulation potential of select chemicals as well as chemicals that have been identified of particular concern to Indigenous communities. For example, the measured mercury concentration in baseline soil and predicted concentrations as a result of the Project did not exceed the respective soil quality guideline for the protection of human or ecological health. The predicted concentrations of mercury in surface water also did not exceed the PWQO for the protection of aquatic life, or the Health Canada drinking water quality guideline. Regardless of the predicted concentrations not exceeding their respective criteria, mercury and methyl-mercury were carried forward for quantitative assessment in the country foods risk assessment given their	

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				bioaccumulation potential. Methyl-mercury is well known to be bioaccumulative especially within the aquatic food web. A similar approach was applied for lead. Appendix II of the HHERA Report provides the details of how bioacummulation into country foods was modelled using the following equation: The general calculation for COC uptake into country foods is: $$\boldsymbol{Concentration_{Country\ Food(i)} = Concentration\ in\ Source\ Media \times Uptake\ Factor}$$ All bioaccumulation/uptake factors are provided within Appendix VI-Model Inputs, Table VI-22 Chemical Characteristics. The bioaccessibility, bioavailability, and bioaccumulation properties of inorganic metals in soil, sediments, and aquatic systems are complex. Similar to organic compounds (for example methyl-mercury), abiotic (e.g., organic carbon) and biotic (e.g., uptake and metabolism) modifying factors determine the amount of an inorganic metal that interacts at biological surfaces (e.g., at the gill, gut, or root-tip epithelium) and that binds to and is absorbed across these membranes. Metals are different from organic compounds in that they can be present as different species, with the parent element associating with different ligands, but never being irreversibly transformed or metabolized. Given the complex nature of contaminant transport and fate, a Follow-Up Program for Human Health including a Country Foods Assessment is provided in the Goliath Gold Follow Up Addendum. The follow-up program is procedural methodology for verifying the accuracy of the environmental assessment of a designated project. The Follow-Up Program for Country Foods as described in the Goliath Gold Follow-Up Addendum, includes metal analysis of country foods to confirm the bioaccumulation of metals and methyl-mercury modeled in the 2018 HHERA. The Follow-Up Program states the following with respect to chemical analysis: • Sampling of the environmental and Project-specific media to confirm the exposure point concentrations relied upon in the HHERA including the country foods assessment. The measured concentrations should then be used for revised modelling of uptake into country foods. • Inclusion of sediment and groundwater data collected as part of their respective Follow-Up Programs; • Collection of plants including medicinal plants, root vegetables, wild rice, and berries from each of the three Study Areas, as well as the soil/water/sediment directly from where these plants are growing for chemical analysis of metals to allow for determination of site-specific uptake factors and tissue concentrations; • Collection and chemical analysis of tissues are most representative of country food consumption (accounting for the fact that some species and tissues may have higher concentrations of COPCs due to bioaccumulation and biomagnification, and some plants are known hyperaccumulators); • Collection and chemical analysis of wild game samples including moose, grouse, duck and rabbit or other meat sources identified during ongoing engagement as representing an important food source; • Chemical speciation of arsenic and lead given that toxicity differs based on chemical speciation; • Inclusion of methyl-mercury analysis in all media and biota samples submitted for laboratory analysis; and

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				• Determination of exposure to chemicals through market food ingestion, as certain contaminants of concern associated with the proposed project may be present in commercially available foods, are naturally occurring (e.g., metals) or are associated with other anthropogenic processes unrelated to the proposed project.
				Agency Comment on Draft Response In order to consider the bioaccumulation potential of environmental contaminants, the fish bioconcentration factors (BCFs) were applied for estimating contaminant concentrations in fish [Table IV-22, Appendix IV Model Inputs (proponent identified the relevant data location as Appendix VI, Table VI-22, but this appears to be an error)]. However, the sources of these fish BCFs are not clearly referenced in the table. Furthermore, the fish BCF for methylmercury used in this study ($1x10^3$) is substantially smaller than the bioaccumulation factors (BAFs) for higher trophic level fish (> $1x10^6$; EC. 2003), which were used to derive the Canadian Water Quality Guidelines (CCME. 2003). The BCF used to estimate fish methylmercury concentrations may not be sufficiently conservative and this may have caused an under-prediction of methylmercury levels in fish and associated health risks (also see HC comment on HE(2)-06). • Environment Canada. 2003. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Inorganic Mercury and Methylmercury. Scientific Supporting Document. Ecosystem Health: Science-based Solutions Report No. 1-7. National Guidelines and Standards Office, Water Policy and Coordination Directorate, Environment Canada. Ottawa. pp. 107. • Canadian Council of Ministers of the Environment. 2003. Canadian water quality guidelines for the protection of aquatic life: Inorganic mercury and methylmercury. In: Canadian environmental quality guidelines, 1999. Canadian Council of Ministers of the Environment, Winnipeg. **A. Provide detailed rationale describing how the fish BCFs used in this study are sufficiently conservative and protective of human health from the ingestion of contaminants in country foods.**
				Comment to the Agency Part A. Model inputs are provided in Appendix IV which is solely intended to provide numerical inputs whereas information regarding how chemicals were modelled into country foods including fish with supporting rationale and literature is provided in Appendix II- Supplemental Information for the HHRA of Country Foods. The uptake factors relied on in the model provided in Table IV-22 of Appendix IV are provided with references in Appendix II- Country Foods Uptake. The reviewer did however catch an error. The water to fish bioconcentration factors for mercury and methylmercury have been corrected to 1×10^3 and 1×10^6 , respectively to reflect that both the US EPA and Environment Canada report these as typical and that methylmercury uptake is known for being 100-1000 times greater than for mercury. The methylmercury uptake factor has not been set to 1×10^7 as currently no baseline methylmercury data has been collected in water and sediment as part of the Goliath Gold Project. All assumptions of methylmercury have relied on generic conversion based on the mercury concentration collected as part of the

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				baseline sampling programs. It is important to note that 100% of the baseline water samples collected (n=62 in 2012-2013 and n=52 in 2010-2011) were reported as less than the method detection limit and the surface water quality modelling and HHERA assumed the detection limit as the exposure point concentration of mercury (See TMI_957-HHRA(2)-04_Attachment 2). Therefore, applying the maximum water to fish uptake factor of 10^7 to concentrations that are set to the detection limit rather than the actual environmental concentrations in the HHERA, would be overly conservative. An extensive follow up program has been provided for country foods in the Final Goliath Gold Project Follow Up Program Addendum which includes additional baseline sampling and chemical analysis of water, sediment and fish to develop site specific uptake factors. The follow up program also includes a statement that the analytical laboratory should be consulted first to ensure that lower method detection limits can be achieved to allow for meaningful data interpretation.
				FINAL RESPONSE: The contaminants screening for country foods assessment considered not only exceedances but also bioaccumulation potential. The approach applied in the 2018 HHERA for the Goliath Gold Project followed the appropriate Health Canada DQRA methodology to screen chemicals in their respective media against their respective criteria during the problem formulation step as a mechanism to define the scope of the work. However, the 2018 HHERA also appropriately considered the bioaccumulation potential of select chemicals as well as chemicals that have been identified of particular concern to Indigenous communities. For example, the measured mercury concentration in baseline soil and predicted concentrations as a result of the Project did not exceed the respective soil quality guideline for the protection of human or ecological health. The predicted concentrations of mercury in surface water also did not exceed the PWQO for the protection of aquatic life, or the Health Canada drinking water quality guideline. Regardless of the predicted concentrations not exceeding their respective criteria, mercury and methyl-mercury were carried forward for quantitative assessment in the country foods risk assessment given their bioaccumulation potential. Methyl-mercury is well known to be bioaccumulative especially within the aquatic food web. A similar approach was applied for lead. Appendix II of the HHERA Report provides the details of how bioacummulation into country foods was modelled using the following equation: The general calculation for COC uptake into country foods is: $$\boldsymbol{Concentration_{Country\ Food(i)} = Concentration\ in\ Source\ Media \times Uptake\ Factor}$$ All bioaccumulation/uptake factors used as model inputs are provided in Appendix IV-22 which is intended to provide numerical inputs whereas information regarding how chemicals were modelled into country foods including fish with supporting rationale and literature is provided in Appendix II- Supplemental Information for the HHRA of Country Foods. The bioaccessibility, bioavailability, and bioaccumulation properties of inorganic metals in soil, sediments, and aquatic systems are complex. Similar to organic compounds (for example methyl-mercury), abiotic (e.g., organic carbon) and biotic (e.g., uptake and metabolism) modifying factors determine the amount of an inorganic metal that interacts at

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				biological surfaces (e.g., at the gill, gut, or root-tip epithelium) and that binds to and is absorbed across these membranes. Metals are different from organic compounds in that they can be present as different species, with the parent element associating with different ligands, but never being irreversibly transformed or metabolized. The water to fish bioconcentration factors for mercury and methylmercury relied on in the HHERA were 1×10^3 and 1×10^6 , respectively to reflect that both the US EPA and Environment Canada report these as typical and that methylmercury uptake is known for being 100-1000 times greater than mercury. The methylmercury uptake factor has not been set to 1×10^7 as currently no baseline methylmercury data has been collected in water and sediment as part of the Goliath Gold Project. All assumptions of methylmercury have relied on generic conversion based on the mercury concentration collected as part of the baseline sampling programs. It is important to note that 100% of the baseline water samples collected (n=62 in 2012-2013 and n=52 in 2010-2011) were reported as less than the method detection limit and the surface water quality modelling and HHERA assumed the detection limit as the exposure point concentration of mercury (See TMI_957-HHRA(2)-04_Attachment 2). Therefore, applying the maximum water to fish uptake factor of 10^7 to concentrations that are set to the detection limit rather than the actual environmental concentrations in the HHERA, would be overly conservative. An extensive follow up program has been provided for country foods in the Final Goliath Gold Project Follow Up Program Addendum which includes additional baseline sampling and chemical analysis of water, sediment and fish to develop site specific uptake factors. The follow up program also includes a statement that the analytical laboratory should be consulted first to ensure that lower method detection limits can be achieved to allow for meaningful data interpretation.

TMI_959-HHRA(2)-06

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_959-HHRA(2)-06	HHRA(2)-06		CEA Agency	**Reference to EIS Guidelines:**	n/a
				Reference to EIS / Appendix	n/a

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				Cross-reference to Round 1 IRs: n/a
				Context and Rationale: In the wet cover TSF option during the post-closure phase, tailings are physically isolated by the granular materials and chemically isolated by water cover. However, it remains unclear whether the tailings will be isolated from the surface water with a barrier to prevent leaching of tailings into surface water. The overlying water layer may become contaminated by diffusion from the underlying tailings, and subsequently serve as an exposure source during the post-closure phase as human receptors and animals which may be consumed by humans as country foods, will have full access to the TSF.
				Specific Question / Request for Information: A. Provide a detailed rationale as to why this pathway is inoperable, or re-assess the potential exposure and health risks based on the assumption that TSF supernatant will remain as an operable exposure pathway to human and animal receptors during the post-closure phase.
				Draft Response: To clarify, the TSF supernatant water quality and the wet-cover water quality are not equal (further details are provided below). The TSF supernatant water only exists as part of the Project during the operations phase as all water is removed from the TSF and treated during the closure phase, prior to the implementation of a wet water cover (of clean non-process water) to initiate post-closure. Therefore, the TSF supernatant water and associated water quality is an inoperable pathway of exposure during site preparation and construction, closure, and post-closure. Following the end of mining operations, the supernatant water present in the tailings storage facility (TSF) at closure will be withdrawn, treated, and used to help fill the open pit. At closure the water cover for the TSF will be non-process water sourced from the minewater and runoff ponds (on-site). Overtime, rainfall onto the TSF will gradually replace the water present as the water cover. As such, the water quality would be comparable to background i.e. that of Blackwater Creek. As discussed in detail in the Round 2 responses for mine waste (MW(2)-01 through MW(2)-12), the intent of the wet cover option to close the TSF is to ensure tailings are in a saturated condition in perpetuity, thus effectively preventing acid rock drainage (ARD)/metal leaching (ML) conditions. Wet covers for closure of tailings storage facilities are a well-proven method of limiting ARD/ML in tailings, that is accepted as the best means of preventing ARD/ML. Note that during operations the TSF will remain in a saturated condition and therefore the onset of ARD is also not anticipated. The wet cover will be implemented in 3 main phases (described in the bullet list below) and will be completed well within the two-year onset tie of ARD/ML predicted as part of the baseline geochemical program

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				(confirmed in TMI_904-MW(2)-08). Therefore, the potential for metals to leach from the tailings into the wet cover over the tailings is intrinsically very low as the Project has been designed to specifically address this concern. Based on the TSF wet-cover design, the tailings remain isolated from the surrounding environment and cannot be accessed by human or animal receptors. Monitoring, detailed in the follow-up Program for Geochemistry as provided in the Goliath Gold Follow-Up Addendum, includes water quality monitoring of the TSF to confirm that ARD/ML is not occurring and to verify the water quality predictions thereby confirming that the wet-cover continues to prevent ARD/ML. Given that the water quality of the wet cover over the TSF during closure and post-closure is expected to be comparable to that in Blackwater Creek/ the pit lake, and that the Goliath Gold HHERA already presents risk estimates for human and ecological exposure to these sources of water during closure and post-closure, no further assessment is required. If the follow-up Program for geochemistry indicates that the water quality is different than the predictions made in the EIS, including that the wet cover is not serving as an effective mitigation measure for water quality, then a revised problem formulation for the HHERA may I turn be required. This language has been incorporated into the Follow-Up Program for Human Health as provided in the Goliath Gold Follow-Up Addendum which superseded Section 13 of the revised EIS (April 2018). **<u>Additional Information Regarding TSF Closure</u>** The placement of a wet cover option for closure of the TSF is anticipated to take approximately 1 year which is less than the predicted time of ARD onset, therefore the water quality of the wet cover over the TSF during post-closure will have quality comparable to that in Blackwater Creek and not pose a risk to human or ecological receptors. The closure of the TSF will likely follow the steps as outlined below: • **Withdrawal and treatment of supernatant water:** The estimated amount of supernatant water present in the TSF at closure is predicted to be 970,000 m³ (TMI_887-SW(2)-04_Table 3). Treasury Metals is confident that the volume of water present in the TSF at closure can be withdrawn and treated to a level suitable for discharge to the open pit as it is filling within a period of 4-6 months. If required, Treasury Metals will bring in commercially available packaged treatment units to augment the existing water treatment capacity. • **Placement of granular material:** For the wet cover option, granular material will be placed around the perimeter of the tailings during the first winter, to physically isolate the tailings at the edge of the TSF and reduce potential disturbance and entrainment of the tailings due to wave action. Perimeter granular covers have been successfully placed at other mine sites in Ontario. Experience on other mine sites, shows that placement of a full granular cover over saturated tailings may not be practicable, and should not be necessary to ensure the protection of the environment. Surfaces along the perimeter TSF should be sufficiently trafficable for the placement of the granular material using a low ground pressure (LGP) wide track bulldozer once the water is withdrawn. The trafficability will be further enhanced by placing the granular material during the winter months when the upper 0.3–0.6 m thickness is frozen. The volume of

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				granular material required for closure of the TSF is 55,671 m³ (30% coverage of the total TSF area of 618,569 m²; thickness of 0.3 m [TMI_040-MW(1)-02]). It would take less than 2 months to deliver this material using standard highway haul trucks (capacity of 17 m³; 100 trucks per day; 5 days per week). • **Placement of water cover:** In the wet cover scenario, the TSF will be covered with a layer of non-process water of sufficient depth to ensure a water cover is maintained during drought conditions. The volume of non-process water required to close the TSF is 300,000 m³ (Attachment JJ-1 to Appendix JJ of the revised EIS [April 2018]). At closure, there will be 320,000 m³ of water available in the minewater pond and collection ponds (Section 3.8.11 of the revised EIS [April 2018]) to be used as water cover for closure of the TSF. Treasury Metals would augment their available pumping capacity, as required, to transfer the required water to the TSF within 4 months.
				Agency Comment on Draft Response A: The response to HHRA(2)-06 indicates "*[i]f the follow-up Program for geochemistry indicates that the water quality is different than the predictions made in the EIS, including that the wet cover is not serving as an effective mitigation measure for water quality, then a revised problem formulation for the HHERA may I turn be required. This language has been incorporated into the Follow-Up Program for Human Health as provided in the Goliath Gold Follow-Up Addendum…*" this language could not be found in the FUP Addendum. B: Furthermore, the response to HHRA(2)-06 indicates "*[m]onitoring, detailed in the follow-up Program for Geochemistry as provided in the Goliath Gold Follow-Up Addendum, includes water quality monitoring of the TSF to confirm that ARD/ML is not occurring and to verify the water quality predictions thereby confirming that the wet- cover continues to prevent ARD/ML.*" Monitoring plans for TSF water cover could not be located in the FUP Addendum. Human and wildlife will resume full access to the TSF water cover area during post-closure. **A: Update the FUP to indicate a revised problem formulation, and subsequent HHRA, that may be required if TSF water concentrations during post-closure exceed the maximum surface water concentrations modelled in the HHRA. Provide more details of how the revised HHRA would be triggered in the FUP.** **B: Clarify if TSF post-closure water cover will be monitored as part of the FUP. Update the FUP to include TSF surface water monitoring during the post-closure phase to validate the predictions of the EA.**

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				Comment to the Agency A. On March 8, 2018 the Agency and Treasury Metals committed to working together to review the Round 2 documents in draft starting in mid-August 2018 with a target submission of all final Round 2 documents by October 1, 2018. The first draft of the HHERA was provided in August which included a Section of follow up measures. As ongoing refinements were made to the Round 2 process, a stand-alone draft Goliath Gold Project Follow Up Addendum was issued on September 14, 2018. Over the past 5 months there have been a number of technical meetings with federal technical review teams, community meetings with Indigenous groups and their consultants, and official Round 2 requests to revise the follow up programs for each of the technical details. In addition, Environment Canada has expressed concerns about the long term viability of the wet cover with climate change considered, whereas NRCan has expressed concerns regarding the saturation of the tailings and onset to ARD, therefore the final closure option for the TSF will be selected as part of the official closure plan (O. Reg 240/00). The final Goliath Gold Project Follow Up Program Addendum supersedes all previous versions of the follow up program and incorporated all requested revisions. The reviewer is directed to the final Follow Up Addendum where details regarding the follow up program for the water cover post-closure are provided in the follow up program for geochemistry and human health. B. Yes the TSF cover option will be monitored post-closure. As stated in the final Follow Up Program Addendum, project features will be monitored in post-closure for as long as the regulatory bodies deem necessary. Independent of the EA process, Treasury Metals will be required to develop and have approved an official closure plan with the Ontario Ministry of Energy, Northern Development and Mines under O. Reg 240/00: Mine Development and Closure Under Part VII of the Act. There is a formal review process for that which includes external technical review by federal agencies including NRCan and consultation with Indigenous stakeholders. There are requirements by the Ontario Ministry of Energy, Northern Development and Mines that the closure plan be reported on annually, and monitoring continue through post-closure until a time that they determine to be appropriate.
				FINAL RESPONSE: To clarify, the TSF supernatant water quality and the wet-cover water quality are not equal (further details are provided below). The TSF supernatant water only exists as part of the Project during the operations phase as all water is removed from the TSF and treated during the closure phase, prior to the implementation of a wet water cover (of clean non-process water) to initiate post-closure. Therefore, the TSF supernatant water and associated water quality is an inoperable pathway of exposure during site preparation and construction, closure, and post-closure. Following the end of mining operations, the proposed closure strategy is that the supernatant water present in the tailings storage facility (TSF) at closure will be withdrawn, treated, and used to help fill the open pit. At closure the water cover for the TSF will be non-process water sourced from the minewater and runoff ponds (on-site). Overtime, rainfall onto the TSF will gradually replace the water present as the water cover. As such, the water quality would be comparable to background i.e. that of Blackwater Creek. During the Round 2 process, Environment Canada has

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				expressed concerns about the long term viability of the wet cover with climate change considered, whereas NRCan has expressed concerns regarding the saturation of the tailings and onset to ARD, therefore the final closure option for the TSF will be selected as part of the official closure plan (O. Reg 240/00). Regardless of if a wet or dry cover is selected for the TSF, the TSF will be monitored during all project phases including post-closure to ensure the protection of the environment and the tailings will remain isolated from the surrounding environment and cannot be accessed by human or animal receptors. Details are provided in the Final Goliath Gold Project Follow Up Program Addendum for geochemistry supersedes all previous versions of the follow up program and incorporated all requested revisions. Given that the water quality of the wet cover over the TSF during closure and post-closure is expected to be comparable to that in Blackwater Creek/ the pit lake, and that the Goliath Gold HHERA already presents risk estimates for human and ecological exposure to these sources of water during closure and post-closure, no further assessment is required. If the follow-up Program for geochemistry indicates that the water quality is different than the predictions made in the EIS, including that the wet cover is not serving as an effective mitigation measure for water quality, then a revised problem formulation for the HHERA may in turn be required. This language has been incorporated into the Final Follow-Up Program for Human Health as provided in the Final Goliath Gold Follow-Up Addendum which superseded Section 13 of the revised EIS (April 2018). Independent of the EA process and follow up program for the EA, Treasury Metals will be required to develop and have approved an official closure plan with the Ontario Ministry of Energy, Northern Development and Mines under O. Reg 240/00: Mine Development and Closure Under Part VII of the Act. There is a formal review process for that which includes external technical review by federal agencies including NRCan and consultation with Indigenous stakeholders. There are requirements by the Ontario Ministry of Energy, Northern Development and Mines that the closure plan be reported on annually, and monitoring continue through post-closure until a time that they determine to be appropriate. Treasury Metals plans to incorporate details of the monitoring of project features in support of the regulatory closure plan process into the follow up program in support of the EA.

TMI_960-HHRA(2)-07

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_960-HHRA(2)-07	HHRA(2)-07		CEA Agency	**Reference to EIS Guidelines:**	n/a

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				Reference to EIS / Appendix	n/a
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: A. For the country foods assessment, contaminants are identified in three environmental (or site-specific) exposure media (i.e. waste rock, surface water, and TSF supernatant water) where the predicted chemical concentrations exceeded the respective environmental quality criteria (e.g. soil quality criteria used for waste rock and surface water quality criteria for surface water and TSF supernatant water). The EPC was modeled from the source media into country food only for contaminants where concentrations were found to exceed the relevant quality criteria. However, it is not clear whether the EPC of a contaminant in country food is modeled from a single exposure medium where the contaminant concentration exceeded the quality criteria or predicted from across all exposure media without regard to the criteria exceedance. B. The Operations Area, including waste rock storage and TSF, could be accessed by animals such as birds (e.g., grouse and duck) and small mammals (e.g., rabbit), that may serve as country foods for off-site human receptors either by direct consumption or through the food chain. It was assumed that 5% of the country foods consumed by off-site human receptors in Study Areas No. 2 (Local Study Area) and 3 (Village of Wabigoon) may come from the Operations Area during the Site Preparation and Construction, Operations, and Closure phases of the Project. However, no rationale was provided to support the use of 5% as the expected consumption rate for these areas.	
				Specific Question / Request for Information: A. Clarify whether the EPC of a contaminant in country food is modeled from a single environmental (or site-specific) exposure medium where the contaminant concentration exceeded the quality criteria or from across all exposure media without regard to the criteria exceedance (see HHRA-03). B. Provide detailed rationale for the assumption that 5% of country food consumed by off-site human receptors in Study Area 2 and 3 originates from the Operations Area.	
				Draft Response: **Part A.** The EPC of a contaminant in country food is modeled from across all exposure media without regard to the criteria exceedance and NOT from a single exposure medium where the contaminant concentration exceeded the quality	

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				criteria or predicted. Additional details on how EPCs were calculated in country foods including a sample calculation are provided in Appendix II of the HHERA Report. Additionally, Appendix IV of the HHERA report provides all of the model inputs including the country foods and shows the media modelled for each study area and project phase. For reference, Table IV-8 Chemical Concentrations in Berries from Appendix IV has been attached as TMI_960-HHRA(2)-07_Attachment 1 showing that at Location 1 (Operations Area), the COC concentrations from soil were modelled for the base phase and from waste rock for the operations phase and back to soil for post-closure. It is also worthy to note, that the post-closure soil considers the deposition of dust including metals as a result of the 2 years of site preparation and construction, and 12 years of project operations. Thus, as shown in TMI_960-HHRA(2)-07_Attachment 1, regardless of an exceedance, all media were considered for all COCs. **Part B.** The effects of the Project on wildlife and wildlife habitat, migratory birds, fish and fish habitat and wetlands and vegetation were assessed in the revised EIS (April 2018) assuming that 100% of the operations area will disturbed. During the active phases of the Project there will be 0% access to the operations area for traditional land and resource use including country foods harvesting. The Operations Area will be stripped to bedrock during the active phases of the Project and subject to heavy equipment use and is unlikely to be conducive to support the habitat required for primary producers and mobile mammals and birds. Given that there is no habitat and no access to the operations area, it may have been more appropriate to assume 0% of the country foods consumed off-site comes from the operations area. Instead, 5% was conservatively assumed in the HHERA to account for mobile mammals and birds who may periodically visit areas within the operations area and be harvested as food in study areas 2 or 3. An additional level of conservatism important to note is that it is not assumed that the food (i.e. mammal or bird) is only spending 5% of its time within the operations area, instead it is assumed the mammal or bird is spending 100% of their life within the operations area and are solely consuming food grown in waste rock and water from the TSF, and that the human receptor ultimately consumes 95% of their diet from country foods harvested in areas outside of the operations area. Therefore, the 5% value selected is considered conservative given than 0%-1% may have also reasonably been selected. As part of the Follow-Up Program for country foods, dietary consumption surveys have been suggested to confirm the proportion of country foods to supermarket purchased foods in the diet as well as sample country foods for chemical concentrations to confirm the modelled concentrations. Treasury Metals is already in talks with the Métis Nation of Ontario to perform such dietary surveys. Information regarding the Follow-Up Program for country foods is provided in the Goliath Gold Follow-Up Addendum which was provided in support of the Round 2 response process and supersedes Section 13 of the revised EIS (April 2018).
				Agency Comment on Draft Response None Received
				Specific Comment to Agency Comments Not required. Agency accepted draft response.

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				FINAL RESPONSE Agency accepted Revised Response as Final.

TMI_961-HHRA(2)-08

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_961-HHRA(2)-08	HHRA(2)-08		CEA Agency	**Reference to EIS Guidelines:**	n/a
				Reference to EIS / Appendix	n/a
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: On page 164, the HHRA states that "[a] site-specific uptake factor for thallium in all country foods including fish will be the target of a follow-up program…" However, the proposed follow-up programs (FUPs) appear to include the study of site-specific uptake factors for plants without clearly specifying fish as the study subject. Additionally, it is not clear whether "[c]ollection and chemical analysis of tissues are most representative of country food consumption" (Section 7.1.1) will include fish to validate the model predictions in Section 4.4.1.4. Given the uncertainties surrounding the generic uptake factors used for fish metal concentration predictions (Section 4.4.1.4) and the oversight of additive effects across all exposure media (HHRA-03), the revised HHRA should include all potential country food contaminants identified in the study (arsenic, cobalt, thallium, zinc) in the site-specific uptake factor study and fish tissue monitoring.	

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				Specific Question / Request for Information: A. Update the fish tissue monitoring as part of the country foods monitoring program to include arsenic, cobalt, thallium and zinc in commonly consumed fish species
				Draft Response: A. The follow-up program for human health and country foods is provided in the Goliath Gold Follow Up Addendum and states "the collection and chemical analysis" of plants, wild game, and fish. It is standard practice by analytical laboratories to analyze and report on a "suite" of metals via ICP-MS using the US EPA method 200.3. The follow-up program language has been revised to more clearly indicate "and chemical analysis of a metal suite" for plants, wild game and fish. As part of the country foods monitoring program metals including (but not limited to) arsenic, cobalt, thallium and zinc would be reported for the various country food tissues analyzed. These details would be requested on the chain of custody submitted to the analytical laboratory with the tissue samples.
				Agency Comment on Draft Response Comment is the same as TMI_922-HE(2)-02.
				Comment to the Agency The final Goliath Gold Project Follow Up Addendum captures all requested revisions with respect to the follow up program for country foods from Health Canada, the Agency, and the Indigenous stakeholders and their consultants. Fulsome details have been provided in the response to TMI_922-HE(2)-02 and a final response provided below.
				Final Response Part A: The follow-up program for human health and country foods is provided in the Final Goliath Gold Follow Up Addendum and states "the collection and chemical analysis" of plants, wild game, and fish. It is standard practice by analytical laboratories to analyze and report on a "suite" of metals via ICP-MS using the US EPA method 200.3. The follow-up program language has been revised to more clearly indicate "and chemical analysis of a metal suite" for plants, wild game and fish. As part of the country foods monitoring program metals including (but not limited to) arsenic, cobalt, thallium and zinc would be reported for the various country food tissues analyzed. These details would be requested on the chain of custody submitted to the analytical laboratory with the tissue samples. As stated above the follow up program for human health and country foods provided in the final Goliath Gold Follow Up Addendum. This statement has been updated to clearly identify mercury and methyl-mercury as well. It was never the intention for the follow up program for country foods to be triggered by effluent concentrations. Specific requirements for fish testing described by the Metal and Diamond Mine Effluent Regulation are independent of Treasury Metal's commitments to the protection of human health via the country foods pathway. Treasury Metals do recognize that there is uncertainty in

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				the estimate of country foods concentrations. Treasury Metals is committed to a comprehensive country foods monitoring program to confirm all assumptions relied upon in the HHERA model, including chemical concentrations in soil, water, sediment, project-specific media and country foods including fish and other factors such as dietary consumption patterns. To provide confidence in the post-closure predictions, Treasury Metals propose to update the country foods model on a regular basis (i.e. every three (3) years) to incorporate the actual monitoring results that reflect the data gathered. Review in this manner provides the opportunity to reassess and update the human health conceptual model and the predictions made for the impacts of the mine. This information has been incorporated into the Final Goliath Gold Follow-Up Addendum (which supersedes Section 13 of the revised EIS [April 2018]).

TMI_962-HHRA(2)-09

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_962-HHRA(2)-09	HHRA(2)-09		CEA Agency	**Reference to EIS Guidelines:**	n/a
				Reference to EIS / Appendix	n/a
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: Noted errors: • There is a discrepancy between the toxicological endpoint and associated exposure route (Table 4.2-1) for aluminum. The oral ingestion TRV used for aluminum is derived for neurotoxicity rather than for respiratory dysfunction presented in the table (ATSDR. 2008). • Multiple errors are observed in the health risk summary tables (4.4.1.1-1A, 4.4.1.2-1, 4.4.1.4-1A, 4.4.1.4-1B, 4.4.2.2-1, 4.4.2.3-1). For example, the HQ value of arsenic was presented as 3.3 x 100 in the Project Alone case (Table 4.4.1.1.-1A). If the numbers are meant to be presented in scientific notation, either use the format "3.3 x 10^0" or "3.3E0".	

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				• The table title and/or a column heading contain errors in Tables 4.4.2.2-1 and 4.4.2.3-1. For example, the 3rd column heading "Lifetime Average Daily Dose" should be corrected to "Incremental Lifetime Cancer Risk" in Table 4.4.2.2-1. *Agency for Toxic Substances and Disease Registry. 2008. Toxicological Profile for Aluminum*
				Specific Question / Request for Information: A. Update all tables and ensure that appropriate toxicological endpoints, exposure routes, and TRVs are presented. Thoroughly review the health risk summary tables and correct any errors.
				Draft Response: A. All tables have been updated to ensure that appropriate toxicological endpoints, exposure routes, and TRVs are presented. The health risk summary tables have been revised and reviewed to ensure errors are corrected. Specifically, aluminum has been grouped with neurotoxicity rather than respiratory dysfunction given the study used to derive the oral TRV. Note that the results of additive chemical interactions are based on the revised assessment for residual effects with includes the sum of risk via all operable exposure pathways as requested in TMI_956-HHRA(2)-03.
				Agency Comment on Draft Response The HHRA table titles and column headings contain errors. Tables 4.4.2.1-1 and 4.4.2.2-1. "Lifetime Average Daily Dose" should be corrected to "Incremental Lifetime Cancer Risk" **Update table titles and column headings.**
				Response to the Agency The titles of Tables 4.4.2.1-1 and 4.4.2.2-1. "Lifetime Average Daily Dose" have been corrected to "Incremental Lifetime Cancer Risk".
				FINAL RESPONSE A. All tables have been updated to ensure that appropriate toxicological endpoints, exposure routes, and TRVs are presented. The health risk summary tables have been revised and reviewed to ensure errors are corrected. Specifically, aluminum has been grouped with neurotoxicity rather than respiratory dysfunction given the study used to derive the oral TRV. Note that the results of additive chemical interactions are based on the revised assessment for residual effects with includes the sum of risk via all operable exposure pathways as requested in TMI_956-HHRA(2)-03.

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				The titles of Tables 4.4.2.1-1 and 4.4.2.2-1. “Lifetime Average Daily Dose” have been corrected to “Incremental Lifetime Cancer Risk”.

TMI_963-HHRA(2)-10

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TMI_963-HHRA(2)-10	HHRA(2)-10		CEA Agency	**Reference to EIS Guidelines:**	n/a
				Reference to EIS / Appendix	n/a
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: The HHRA states on page 67 (Section 3.5.3.4) that surface water quality is modeled for 9 locations (nodes). However, there are only 7 modeling locations identified in Figure 3.5.3.4-2.	
				Specific Question / Request for Information: A. Clearly indicate the locations of the water quality modeling and clarify the discrepancy in the number of modeling locations.	
				Draft Response: A. Section 3.5.3.4 has been updated to include a revised figure showing all 9 surface water quality modelling nodes (the nodes for Thunder Lake and Wabigoon Lake were missing from in the draft HHERA report [August 2018]). The figure is attached as TMI_963-HHRA(2)-10_Attachment 1 for reference. Appendix I of the HHERA appropriately	

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				provided data for all 9 modelling locations and the error on the figure does not translate to any meaningful changes to the report.
				Agency Comment on Draft Response Same as TMI_959-HHRA(2)-06 A: The response to HHRA(2)-06 indicates "*[i]f the follow-up Program for geochemistry indicates that the water quality is different than the predictions made in the EIS, including that the wet cover is not serving as an effective mitigation measure for water quality, then a revised problem formulation for the HHERA may I turn be required. This language has been incorporated into the Follow-Up Program for Human Health as provided in the Goliath Gold Follow-Up Addendum…*" this language could not be found in the FUP Addendum. B: Furthermore, the response to HHRA(2)-06 indicates "*[m]onitoring, detailed in the follow-up Program for Geochemistry as provided in the Goliath Gold Follow-Up Addendum, includes water quality monitoring of the TSF to confirm that ARD/ML is not occurring and to verify the water quality predictions thereby confirming that the wet- cover continues to prevent ARD/ML.*" Monitoring plans for TSF water cover could not be located in the FUP Addendum. Human and wildlife will resume full access to the TSF water cover area during post-closure. **A: Update the FUP to indicate a revised problem formulation, and subsequent HHRA, that may be required if TSF water concentrations during post-closure exceed the maximum surface water concentrations modelled in the HHRA. Provide more details of how the revised HHRA would be triggered in the FUP.** **B: Clarify if TSF post-closure water cover will be monitored as part of the FUP. Update the FUP to include TSF surface water monitoring during the post-closure phase to validate the predictions of the EA.**
				Comment to Agency Note: The original Round 2 information request for TMI_963-HHRA(2)-10 was in regards to surface water quality monitoring, where as the request to TMI_959-HHRA(2)-06 was with respect to the wet cover closure option for the TSF during post-closure, and the TSF supernatant water during operations. It is important to highlight that the wet cover closure of the TSF is not considered surface water. The TSF will not be connect hydraulically to surface water.

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				A. On March 8, 2018 the Agency and Treasury Metals committed to working together to review the Round 2 documents in draft starting in mid-August 2018 with a target submission of all final Round 2 documents by October 1, 2018. The first draft of the HHERA was provided in August which included a Section of follow up measures. As ongoing refinements were made to the Round 2 process, a stand-alone draft Goliath Gold Project Follow Up Addendum was issued on September 14, 2018. Over the past 5 months there have been a number of technical meetings with federal technical review teams, community meetings with Indigenous groups and their consultants, and official Round 2 requests to revise the follow up programs for each of the technical details. The final Goliath Gold Project Follow Up Program Addendum supersedes all previous versions of the follow up program and incorporated all requested revisions. The reviewer is directed to the final Follow Up Addendum where details regarding the follow up program for the water cover post-closure are provided in the follow up program for geochemistry. Details regarding the follow up program for surface water quality are provided in the surface water quality follow up program. Details regarding the follow up program for human health including that surface water quality data will be compared to health-based criteria is provided in the final follow up program for human health. B. Yes. As stated in the final Follow Up Program Addendum, project features will be monitored in post-closure for as long as the regulatory bodies deem necessary. Independent of the EA process, Treasury Metals will be required to develop and have approved an official closure plan with the Ontario Ministry of Energy, Northern Development and Mines under O. Reg 240/00: Mine Development and Closure Under Part VII of the Act. There is a formal review process for that which includes external technical review by federal agencies including NRCan and consultation with Indigenous stakeholders. There are requirements by the Ontario Ministry of Energy, Northern Development and Mines that the closure plan be reported on annually, and monitoring continue through post-closure until a time that they determine to be appropriate.
				FINAL RESPONSE: Part A. Section 3.5.3.4 has been updated to include a revised figure showing all 9 surface water quality modelling nodes (the nodes for Thunder Lake and Wabigoon Lake were missing from in the draft HHERA report [August 2018]). The figure is attached as TMI_963-HHRA(2)-10_Attachment 1 for reference. Appendix I of the HHERA appropriately provided data for all 9 modelling locations and the error on the figure does not translate to any meaningful changes to the report. Details regarding follow up programs for all technical discipline including surface water quality and human health are provided in the final Goliath Gold Project Follow Up Addendum provided in support of the Round 2 process. Independent of the EA process, Treasury Metals will be required to develop and have approved an official closure plan with the Ontario Ministry of Energy, Northern Development and Mines under O. Reg 240/00: Mine Development and Closure Under Part VII of the Act. There is a formal review process for that which includes external technical

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				review by federal agencies including NRCan and consultation with Indigenous stakeholders. There are requirements by the Ontario Ministry of Energy, Northern Development and Mines that the closure plan be reported on annually, and monitoring continue through post-closure until a time that they determine to be appropriate.

TMI_964-HHRA(2)-11

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_964-HHRA(2)-11	HHRA(2)-11		CEA Agency	**Reference to EIS Guidelines:**	n/a
				Reference to EIS / Appendix	n/a
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: Appendix W, Section 4.4.2, Table M of the revised EIS indicates a toxicological reference value (TRV) for lead of 0.0036 ug/kg- bw/day. It is assumed that the units are erroneous, and were meant to be “mg/kg- bw/day”. It is unclear whether this TRV was used in the June 2018 HHRA (Appendix W-2 of the revised EIS). The proponent does not appear to have considered the benchmark dose limit (BMDL) for lead of 0.5 µg/kg-bw/day) published by European Food Safety Authority in 2010, which is similar to the reference value proposed by the World Health Organization and the Joint FAO/WHO Expert Committee on Food Additives (WHO/JECFA) in 2011. These TRVs are substantially smaller than the proposed TRV employed by the proponent (3.6 µg/kg bw/day). As such, the health risk of lead exposure could have been underestimated. A Canadian Drinking Water Quality Guideline (CDWQG) threshold of 10 µg/L was provided for selenium in the June 2018 HHRA, Table 3.5.2.3-1, based on a Health Canada reference from 2012. Note that the CDWQG for selenium was updated in 2014 based on recent scientific findings, and is now 50 µg/L.	

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				References: European Food Safety Authority. 2010. Scientific Opinion on Lead in Food: EFSA Panel on Contaminants in the Food Chain (CONTAM). EFSA Journal; 8(4):1570. World Health Organization and Joint FAO/ WHO Expert Committee on Food Additives. 2011. Safety evaluation of certain food additives and contaminants: Lead (page 381-497). WHO, Geneva. Health Canada. 2014. Guidelines for Canadian Drinking Water Quality – Summary Table. Ottawa, Ontario. Health Canada. Available online at: https**://www.canada.ca/content/dam/hc-sc/migration/hc- sc/ewh-** semt/alt_formats/pdf/pubs/water-eau/sum_guide- res_recom/sum_guide-res_recom-eng.pdf
				Specific Question / Request for Information: A. Use the updated lead TRV and the updated Health Canada CDWQG threshold for selenium in the final HHRA.
				DRAFT Response A. The TRV selected for lead in the HHERA Report (August, 2018) was 5×10^{-4} mg/kg/ day provided by JECFA (2011) and EFSA (2013) based on developmental neurotoxicity in children and changes in systolic blood pressure in adults. Due to recent changes in regulatory guidance, lead (unlike any other COC) is no longer considered to be a threshold toxic chemical. Health Canada (2013) and other jurisdictions (California EPA 2009; WHO 2007) currently support the concept that lead and lead compounds are non-threshold substances. Evaluation of lead toxicity and risks based on exposure limits is no longer recommended by these agencies. The current scientific evidence suggests that previously published exposure limits may not adequately reflect the actual risk related to lead exposure. Unlike the other non-cancer COCs, the TRV for lead is based on a non-threshold effect. As such, it is not assessed based on a HQ of 0.2, but rather an exceedance of a risk specific dose. The lead exposure dose and risk characterization data set broken down by Project phase, receptor, and exposure pathway or each of the three Study Areas and all Assessment Scenarios, is provided in Appendix V of the HHERA (August, 2018). The updated Health Canada CDWQG threshold for selenium was included in the final HHERA. Given that the new guideline is less conservative than the former guideline no new exceedances were identified.
				Agency Feedback on Draft Response Health Canada acknowledges that the revised HHRA will provide a follow-up program for country foods to confirm the current predictions. Health Canada also acknowledges that the HHRA included the risk levels of lead for the off-site human receptors in Table 4.6-1 to 3. However, the HHRA did not characterize the non-threshold toxicological effects

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				of lead for these off-site receptors. As acknowledged by the proponent, a Tolerable Daily Intake (TDI) approach for lead is no longer considered appropriate as more recent scientific evidence suggest that there may be a risk at any level of exposure. Please note that the BMDL value used in the HHRA does not necessarily indicate that there are any 'safe' levels of lead exposure. A. Provide detailed characterizations about the adverse health risks of the off-site receptors (i.e., receptors that use areas beyond the Operations Area and within the updated property boundary) exposed to lead in country food.
				Specific Response to Agency Comment In the draft HHERA Report (August 2018), lead exposure via the ingestion of country foods (and all other exposure pathways) was assessed the following two ways: • Section 4.4.1: Results of Risk Characterization- Non-Carcinogens- lead was assessed "traditionally" as a threshold chemical and risk presented using a hazard quotient; and • Section 4.6: Special Considerations Lead- lead was assessed using the most up-to date consensus amount the scientific community that lead is a non-threshold contaminant and risk should be presented as an exceedance of a "risk-specific dose". Therefore, the requested information was provided in Section 4.6 of the draft HHERA report. The results provided in Table 4.6-3 of the draft HHERA (August 2018) indicated that the risk specific dose of 0.0005 mg/kg/day for lead was not exceeded via the ingestion of country foods pathway for receptors that use areas beyond the Operations Area (and including within the Property Boundary). As such no potential risk was identified to these receptors via lead exposure in food. It is agreed that the recent scientific evidence suggests that there may be a risk at any level of exposure to lead and it is noted that discussions are currently underway among the risk assessment scientific community and regulatory bodies to determine the most appropriate approach to address lead contamination the environment. Although it is recognized that in the future risk assessment guidance may evolve, given the results provided in Section 4.6, the HHERA for the Goliath Gold Project has been completed considering the most relevant and up-to-date approach for the assessment of potential risk via lead exposure.
				Revised Response: A. The TRV selected for lead in the HHERA Report (August, 2018) was 5×10^{-4} mg/kg/ day provided by JECFA (2011) and EFSA (2013) based on developmental neurotoxicity in children and changes in systolic blood pressure in adults. Due to recent changes in regulatory guidance, lead (unlike any other COC) is no longer considered to be a threshold toxic chemical. Health Canada (2013) and other jurisdictions (California EPA 2009; WHO 2007) currently support the concept that lead and lead compounds are non-threshold substances. Evaluation of lead toxicity and risks based on exposure limits is no longer recommended by these agencies. The current scientific evidence suggests that previously published exposure limits may not adequately reflect the actual risk related to lead exposure. Unlike the

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				other non-cancer COCs, the TRV for lead is based on a non-threshold effect. As such, it is not assessed based on a HQ of 0.2, but rather an exceedance of a risk specific dose (or an HQ > 1). In the 2018 HHERA Report (August 2018), lead exposure via the ingestion of country foods (and all other exposure pathways) was assessed the following two ways: • Section 4.4.1: Results of Risk Characterization- Non-Carcinogens- lead was assessed "traditionally" as a threshold chemical and risk presented using a hazard quotient; and • Section 4.5: Special Considerations Lead- lead was assessed using the most up-to date consensus amount the scientific community that lead is a non-threshold contaminant and risk should be presented as an exceedance of a "risk-specific dose". The results provided in Table 4.5-3 of the 2018 HHERA (August 2018) indicate that the risk specific dose of 0.0005 mg/kg/day for lead was not exceeded via the ingestion of country foods pathway for receptors that use areas beyond the Operations Area (and including within the Property Boundary). As such no potential risk was identified to these receptors via lead exposure in food. The detailed lead exposure dose and risk characterization data set broken down by Project phase, receptor, and exposure pathway or each of the three Study Areas and all Assessment Scenarios, is provided in Appendix V of the HHERA (August, 2018). The updated Health Canada CDWQG threshold for selenium was included in the final HHERA. Given that the new guideline is less conservative than the former guideline no new exceedances were identified.
				Agency Comment on Draft Response A. HC does not support the proponent's health risk assessment approach for lead [see HC comment on IR#2 HHRA(2)-11 (September 2018)]. Although the proponent acknowledged that the tolerable daily intake (TDI) approach is not appropriate, it still determined the health risk of lead based on the exceedance of the risk threshold (i.e. HQ of 1.0) with reference to a lead $BMDL_{01}$ value set for the developmental neurotoxicity (0.5 µg/kg-bw/day; EFSA. 2010). The $BMDL_{01}$ value is derived from a toxicological endpoint of a decrease of cognitive ability by 1 IQ point (EFSA. 2010). As there may be a risk at any level of exposure to lead, the potential adverse health effects cannot be properly determined by the exceedance (or non-exceedance) of the $BMDL_{01}$ value. It is more appropriate to include a detailed descriptive (qualitative or semi-quantitative) characterization of the health risks with reference to the BMDL value. For example, the EFSA report characterized the developmental neurotoxicity of lead using the margin of exposure (MOE) approach where "…*a margin of exposure of 10 or greater should be sufficient to ensure that there was no appreciable risk of a clinically significant effect on IQ. At lower MOEs, but greater than 1.0, the risk is likely to be low, but not such that it could be dismissed as of no potential concern*." Furthermore, the HHRA does not provide a detailed risk characterization of the Residents and Visitors/Harvesters in Study Areas 2 and 3. European Food Safety Authority. 2010. Scientific Opinion on Lead in Food: EFSA Panel on Contaminants in the Food Chain (CONTAM). EFSA Journal; 8(4):1570.

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				B. In Table 4.6-3 of the previous HHRA (August 2018), the health risks of lead via country food ingestion was estimated to be an HQ of $7.8x10^{-1}$ for toddler and $4.2x10^{-1}$ for adult in both Study Areas 2 and 3. In the revised HHRA (November 2018), the health risk of lead across all exposure pathways has drastically reduced to an HQ of $2.2x10^{-4}$ for adult in Study Area 2 (Table 4.6.3.2-1B) and $4.4x10^{-4}$ for toddler and $2.2x10^{-4}$ for adult in Study Area 3 (Table 4.6.3.2-1C), whereas the risk level for toddler in Study Area 2 remains relatively high at an HQ of $8.9x10^{-1}$ (Table 4.6.3.2-1B). Although HC does not support the HQ-based risk characterization for lead [see HC comment on HHRA(2)-11A], this risk characterization result appears to indicate that there has been a substantial change in the lead exposure estimates since the last HC review. Given that both HHRAs (August and November 2018) employed the identical benchmark dose (i.e. $BMDL_{01}$ of 0.5 µg/kg-bw/day), the steep decrease of the HQ values in the new HHRA could be explained by the decrease of the exposure term (e.g. exposure duration, frequency, concentration, etc.). However, it is not clear how the exposure term has decreased by almost 3 orders of magnitude for some human receptors in the November 2018 HHRA. **A. Provide a detailed descriptive (qualitative or semi-quantitative) characterization of the health risks for the Residents and Visitors/Harvesters in Study Areas 2 and 3 with reference to the BMDL value.** **B. Provide detailed explanation as to how the health risks of the exposure to lead (and other contaminants if applicable) has decreased substantially in the November 2018 HHRA.**
				Comment to the Agency In the Final HHERA (February 2019), the quantitative assessment of lead has been substantially revised. Section 4.2 "Toxicity Assessment" for lead reads: *An upper intake range of 0.5 µg/kg b.w. per day, from soil alone, has been used in this assessment. This value represents a risk specific dose based on non-threshold effects. The upper intake range of 0.5 µg/kg b.w. per day is considered to be equivalent to an approximate 1 IQ point decrement. This is based on findings from JECFA (2011) and EFSA (2013). The blood lead (B-Pb) to IQ relationship was developed by Lanphear et al., (2005) using a dose-response analysis of data from seven population studies (EFSA, 2013). A $BMDL_{01}$ of 12 µg/L B-Pb was identified as being associated with a decrease of cognitive ability by 1 IQ point. The $BMDL_{01}$ represents the 95th percentile lower confidence limit of the benchmark dose (BMD) of 1 % extra risk. With the use of the Integrated Exposure Uptake Biokinetic (IEUBK) model, a $BMDL_{01}$ of 12 µg/L B-Pb was*

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				identified as corresponding to a dietary intake of 0.5 µg/kg b.w. per day (EFSA, 2013) for developmental effects. *For the cardiovascular effects, a $BMDL_{01}$ intake value of 1.50 µg/kg b.w. per day was derived from the B-Pb levels. The benchmark response selected for this endpoint was a 1 % change in sysoltic blood pressure, corresponding to an increase of 1.2mmHg from the baseline value of 120 mmHg in a normotensive adult (EFSA, 2013). For effects on the kidney, a $BMDL_{10}$ intake value of 0.63 µg/kg b.w. per day was derived from an endpoint of chronic kidney disease (CKD), defined as a 50 % reduction in glomerular filtration rate (GFR), to below 60mL/1.73 m^2 body surface/min.* *In the HHERA, developmental, cardiovascular effects, and nephrotoxicity of lead are characterized on a receptor age group specific basis using the EFSA guidance document (EFSA, 2013).* Section 4.4 "Risk Characterization" reads: *Lead is assessed through the use of a risk specific dose/ benchmark dose limit (BMDL) based on non-threshold effects as per the European Food Safety Authority (EFSA) guidance document for which the lead TRV described in 4.2 was obtained. As part of the Round 2 information request process, Health Canada requested that the language used with respect to risk associated with exposure to lead. As per the EFSA guidance document, the use of a "margin of exposure (MOE)" is supported for the characterization of lead. MOEs are calculated by dividing the BMDL values derived from human data for the different endpoints by the estimates of dietary exposure, i.e.: $Margin\ of\ Exposure\ (MOE) = \frac{Benchmark\ Dose\ Limit\ (BMDL)}{Estimate\ Exposure}$ The EFSA guidance states that an MOE of 10 or greater should be sufficient to ensure that there was no appreciable risk of a clinically significant effect. At lower MOEs, but greater than 1.0, the risk is likely to be low, but not such that it could be dismissed as of no potential concern.* Section 4.5 "Special Considerations for Lead" provides a detailed quantitative risk characterization of exposure to lead using an MOE on a receptor age group specific basis. Section 4.5 Reads: *For a Project Worker (assumed to be an adult), the potential risk via lead exposure is characterized using the benchmark dose limit for the cardiovascular and nephrotoxicity endpoints of 0.0015 mg/kg/day and 0.00063 mg/kg/day, respectively. For Residents and Visitors/Harvesters who may be adults and children, exposure to lead via ingestion of country foods is characterized using the cardiovascular and nephrotoxicity endpoints for adults, and the developmental endpoint of 0.00050 mg/kg/day for children.* <u>Part A.</u> Section 4.5 of the Final HHERA (February 2019) states: *For a Project Worker exposure to lead via direct contact with waste rock and TSF supernatant water did not exceed the risk specific dose/BMDL of 0.00063 mg/kg b.w. per day for the nephrotoxicity endpoint or 0.0015 mg/kg b.w. per day protective of cardiovascular effects in adults and in all cases the MOE was greater than 1 indicating that the risk is likely to be low, but not such that it could be dismissed as of no potential concern. A*

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				Health and Safety Plan is good practice for Project Workers. At a minimum the Health and Safety Plan would require additional PPE such as long sleeves and pants, gloves, and a face shield for those Project Workers. For Residents and Visitors/Harvesters exposure to lead via ingestion of country foods did not exceed the risk specific dose/BMDL of 0.0005 mg/kg b.w. per day for the developmental endpoint, 0.0015 mg/kg b.w. per day protective of cardiovascular effects in adults and in all cases the MOE was greater than 1 indicating that the risk is likely to be low. No risk management measures are required. *Risk via exposure to lead for the Base Case, Project Alone and Project Assessment Scenarios is predicted to be low. A Follow-Up Program is proposed that developed includes country foods analysis of lead and determination of site-specific uptake factors to confirm these results.* Part B: On March 8, 2018, the Agency committed to working with Treasury Metals to review all Round 2 document in Draft prior to submission. The Agency requested that the HHERA be submitted first to allow for the longest review time, and this a Draft of the HHERA was submitted in August prior to technical meetings with ECCC, NRCan, DFO, MECP, EMDN and the Indigenous communities regarding surface water quality, geochemistry, hydrogeology, and fish and fish habitat. As part of the Round 2 information requests, a number of questions were raised with respect to surface water quality, seepage quality and mine waste. As part of the responses to those requests, Treasury Metals updated their surface water quality modelling as detailed in the Final Goliath Gold Project Water Addendum which was provided to the Agency in September 2018, however not reviewed until November 2018. Part of the revisions included the addition of another baseline data set which as per the Final Response to TMI_957_ HHRA(2)-04 resulted in statistically significant lower concentrations than with the single data set alone. The August HHERA relied on one data set, whereas the November and Final HHERA rely on both datasets. Furthermore, as part of the Round 2 requests, Treasury Metals was asked to include actual estimated effluent water quality rather than the commitments to water quality in the effects to surface water quality assessment. The HHERA was updated to reflect this request and given that as per the vender specifications, actual predicted effluent water quality is even better than the effluent quality Treasury Metals has committed to, further demonstrating that Treasury Metals is committed to protecting water quality. Based on back and forth correspondence with the Agency regarding the surface water data regarding the definition of water quality for the “Project Alone Assessment Scenario” the November and Final HHERAs provide the surface water data as zero (0) in those cases where the surface water quality will improve from the baseline levels as a result of the sophisticated water treatment plant Treasury Metals has designed in response to their strong commitments to protect water quality. TMI_964-HHRA(2)-11_Attachment 1 presents a comparison of the surface water exposure point concentrations in the November versus August HHERA and demonstrated that the concentrations in the November submission are much lower than the August submission given the requested changes made by other technical review agencies. For example, the UCLM concentration of lead during operations for the Project Alone Assessment Scenario decreased from 3.0×10^{-3} mg/L in the August HHERA to 4.34×10^{-19} mg/L in the November HHERA. The risk estimates in all the HHERA versions including the residual adverse effects predicted via the sum of all operable exposure pathways were largely driven by the ingestion of country foods pathway. As stated throughout the HHERA and the follow up program

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				for human health, no baseline country foods data were available and as such the HHERA relied on modelling chemical concentrations in country foods. Given that a number of the food items were modelled from the surface water pathway (wild rice/macrophytes duck, moose, fish) changes in the exposure point concentrations for chemicals in surface water between the August and November and Final HHERA, resulted in changes to the risk estimates and conclusions of the HHERA report. This highlights the importance of monitoring for the follow up programs of all technical disciplines including surface water quality, and human health (including country foods) to confirm the predictions in the EIS. The follow up program details for all technical disciplines are provided in the Final Goliath Gold Project Follow Up Addendum which supersedes Section 13 of the EIS and all previous draft versions of the Follow Up Addendum. The November 2018 Submission of the HHERA was revised to include the results of the updated surface water quality assessment to provide consistency amongst the technical disciplines. The November submission of the HHERA provided the following explanation in Section 3.5.3.4 “Surface Water” regarding the differences between the August and November HHERA: *“As part of the Round 2 information request process, the surface water quality model was modified as provided in the Goliath Gold Project Water Addendum. The modified water quality model was expanded to include all available baseline data, a small amount of seepage from the TSF during operations (6%), and an expanded list of chemical parameters. The updated surface water quality modelling has been relied upon herein. …* *Surface water quality was modelled at the nine nodes considering three flow scenarios: wet year, dry year, and average year. Water quality data were modelled for existing conditions (i.e., Base Case Assessment Scenario), and for the effects of the Project (i.e., Project Assessment Scenario) during Operations and Post-Closure phases of the Project. There are no discharges during Site Preparation and Closure phases, therefore, these Project phases did not require surface water quality modelling. During Operations, the only releases from the Project to the environment are a small quality of seepage from the TSF (as described in the Goliath Gold Project Water Addendum) and treated effluent discharged to Blackwater Creek. All excess water not required in the process will be treated and released to Blackwater Creek. The excess water will largely be comprised of water from dewatering of the open pit and underground mining, runoff, and a small volume of excess water from the TSF. As a result, influent water quality to the water treatment plant will reflective of the proportional water quality in the influent sources.* *As part of the Round 2 information request process, the Agency requested that Treasury Metals model effluent from the treatment plant. The modelled effluent quality, along with the UCLM of baseline water quality, were used to predict surface water quality at the 9 nodes, for use within the HHERA. As part of the Round 2 information response package, Treasury Metals indicated that at this time Treasury Metals do not intend to move forward using the dry cover for the closure of the TSF and instead is committed to implement the wet cover closure option for the TSF. Treasury Metals’ recognizes that this will likely be a condition of*

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				the environmental assessment process. As such, the Round 2 responses related to mine waste, groundwater, surface water quality, and fish and fish habitat focus on responding to the requested information relevant to the wet cover option. The HHERA has been updated to include the surface water quality predictions for the wet cover closure option for the TSF only. During Post-Closure, releases to the receiving environment from the Project, include seepage from the TSF and the WSRA, along with releases from the pit-lake. Treasury Metals has made the commitment to monitor the water quality of the pit-lake, and treat using batch treatment as required." This explanation remains valid with the exception that as part of the ongoing review of the mine waste series of Round 2 IRs, ECCC raised concerns regarding the viability of the wet cover due to climate change on time horizons greater than 400 years. To response to these concerns, Treasury Metals included sensitivity runs into the revised water quality modelling assuming that the TSF would be lined with a synthetic liner, however a dry covered placed during closure. The predicted surface water quality as a result of this sensitivity assessment has been used to also provide a sensitivity analysis in the HHERA to show the residual adverse effects on human health in the event the dry cover option is selected as the TSF closure option over the wet cover. The results are provided in Appendix VII- Sensitivity Analysis Results. It is important to note that outside of the EA process, Treasury Metals will be required to complete an official closure plan under O. Reg 240/00. The closure plan will undergo rigorous review by the Ontario Ministry of Energy, Northern Development, and Mines and NRCan and also require consultation with the Indigenous stakeholders.
				FINAL RESPONSE: Part A: Selenium: The updated Health Canada Canadian Drinking Water Quality Guideline threshold for selenium was included in the final HHERA. Given that the new guideline is less conservative than the former guideline no new exceedances were identified. Lead: For a Project Worker (assumed to be an adult), the potential risk via lead exposure is characterized using the benchmark dose limit for the cardiovascular and nephrotoxicity endpoints of 0.0015 mg/kg/day and 0.00063 mg/kg/day, respectively. For Residents and Visitors/Harvesters who may be adults and children, exposure to lead via ingestion of country foods is characterized using the cardiovascular and nephrotoxicity endpoints for adults, and the developmental endpoint of 0.00050 mg/kg/day for children. Note that the risk characterization data set provided as Model Outputs in Appendix V, present risk characterization of lead for infants, toddlers, and children using the developmental benchmark dose limit, and for output simplicity, teens, adults and project workers are reported using only the benchmark dose limit for cardiovascular effects. Nephrotoxicity for adults and workers has been included

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				within the body of the report only. As per the EFSA guidance document, the risk characterization is described using a "margin of exposure (MOE)" is supported for the characterization of lead. MOEs are calculated by dividing the BMDL values derived from human data for the different endpoints by the estimates of dietary exposure. The European Food Safety Authority (EFSA) guidance states that an MOE of 10 or greater should be sufficient to ensure that there was no appreciable risk of a clinically significant effect. At lower MOEs, but greater than 1.0, the risk is likely to be low, but not such that it could be dismissed as of no potential concern. The calculated MOEs of lead via exposure to TSF supernatant water, waste rock, and country foods are provided in Tables 4.5-1. 4.5-2, and 4.5-3, respectively. For a Project Worker exposure to lead via direct contact with waste rock and TSF supernatant water did not exceed the risk specific dose/BMDL of 0.00063 mg/kg b.w. per day for the nephrotoxicity endpoint or 0.0015 mg/kg b.w. per day protective of cardiovascular effects in adults and in all cases the MOE was greater than 1 indicating that the risk is likely to be low, but not such that it could be dismissed as of no potential concern. A Health and Safety Plan is good practice in the Mining Industry for protection of Project Workers. At a minimum the Health and Safety Plan would require additional PPE such as long sleeves and pants, gloves, and a face shield for those Project Workers. For Residents and Visitors/Harvesters exposure to lead via ingestion of country foods did not exceed the risk specific dose/BMDL of 0.0005 mg/kg b.w. per day for the developmental endpoint, 0.0015 mg/kg b.w. per day protective of cardiovascular effects in adults and in all cases the MOE was greater than 1 indicating that the risk is likely to be low. No risk management measures are required. Risk via exposure to lead for the Base Case, Project Alone and Project Assessment Scenarios is predicted to be low. A Follow-Up Program is proposed that developed includes country foods analysis of lead and determination of site-specific uptake factors to confirm these results. <u>Part B:</u> On March 8, 2018, the Agency committed to working with Treasury Metals to review all Round 2 document in Draft prior to submission. The Agency requested that the HHERA be submitted first to allow for the longest review time, and this a Draft of the HHERA was submitted in August prior to technical meetings with ECCC, NRCan, DFO, MECP, EMDN and the Indigenous communities regarding surface water quality, geochemistry, hydrogeology, and fish and fish habitat. As part of the Round 2 information requests, a number of questions were raised with respect to surface water quality, seepage quality and mine waste. As part of the responses to those requests, Treasury Metals updated their surface water quality modelling as detailed in the Final Goliath Gold Project Water Addendum which was provided to the Agency in September 2018, however not reviewed until November 2018. Part of the revisions included the addition of another baseline data set which as per the Final Response to TMI_957_ HHRA(2)-04 resulted in statistically significant lower concentrations than with the single data set alone. The August HHERA relied on one data set, whereas the November and Final HHERA rely on both datasets. Furthermore, as part of the Round 2 requests, Treasury Metals was asked to include actual estimated effluent water quality rather than the commitments to water quality in the effects to surface water quality assessment. The HHERA was updated to reflect this request and given that as per the vender specifications, actual predicted effluent water quality is even better than the effluent quality Treasury Metals has committed to, further demonstrating that Treasury Metals is committed to protecting water quality. Based on back and forth correspondence with the Agency regarding the surface water data regarding the definition of water quality for the "Project Alone Assessment Scenario" the November and Final HHERAs provide the

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				surface water data as zero (0) in those cases where the surface water quality will improve from the baseline levels as a result of the sophisticated water treatment plant Treasury Metals has designed in response to their strong commitments to protect water quality. TMI_964-HHRA(2)-11_Attachment 1 presents a comparison of the surface water exposure point concentrations in the November versus August HHERA and demonstrated that the concentrations in the November submission are much lower than the August submission given the requested changes made by other technical review agencies. For example, the UCLM concentration of lead during operations for the Project Alone Assessment Scenario decreased from 3.0×10^{-3} mg/L to 4.34×10^{-19} mg/L. The risk estimates in all the HHERA versions including the residual adverse effects predicted via the sum of all operable exposure pathways were largely driven by the ingestion of country foods pathway. As stated throughout the HHERA and the follow up program for human health, no baseline country foods data were available and as such the HHERA relied on modelling chemical concentrations in country foods. Given that a number of the food items were modelled from the surface water pathway (wild rice/macrophytes duck, moose, fish) changes in the exposure point concentrations for chemicals in surface water between the August and November and Final HHERAs, resulted in changes to the risk estimates and conclusions of the HHERA report. This highlights the importance of monitoring for the follow up programs of all technical disciplines including surface water quality, and human health (including country foods) to confirm the predictions in the EIS. The follow up program details for all technical disciplines are provided in the Final Goliath Gold Project Follow Up Addendum which supersedes Section 13 of the EIS and all previous draft versions of the Follow Up Addendum. The November 2018 Submission of the HHERA was revised to include the results of the updated surface water quality assessment to provide consistency amongst the technical disciplines. The November submission of the HHERA provided the following explanation in Section 3.5.3.4 “Surface Water” regarding the differences between the August and November HHERA: *“As part of the Round 2 information request process, the surface water quality model was modified as provided in the Goliath Gold Project Water Addendum. The modified water quality model was expanded to include all available baseline data, a small amount of seepage from the TSF during operations (6%), and an expanded list of chemical parameters. The updated surface water quality modelling has been relied upon herein. …* *Surface water quality was modelled at the nine nodes considering three flow scenarios: wet year, dry year, and average year. Water quality data were modelled for existing conditions (i.e., Base Case Assessment Scenario), and for the effects of the Project (i.e., Project Assessment Scenario) during Operations and Post-Closure phases of the Project. There are no discharges during Site Preparation and Closure phases, therefore, these Project phases did not require surface water quality modelling. During Operations, the only releases from the Project to the environment are a small quality of seepage from the TSF (as described in the Goliath Gold Project Water Addendum) and treated effluent discharged to Blackwater Creek. All excess water not required in the process will be treated and released to Blackwater Creek. The excess water will*

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				largely be comprised of water from dewatering of the open pit and underground mining, runoff, and a small volume of excess water from the TSF. As a result, influent water quality to the water treatment plant will reflective of the proportional water quality in the influent sources. *As part of the Round 2 information request process, the Agency requested that Treasury Metals model effluent from the treatment plant. The modelled effluent quality, along with the UCLM of baseline water quality, were used to predict surface water quality at the 9 nodes, for use within the HHERA. As part of the Round 2 information response package, Treasury Metals indicated that at this time Treasury Metals do not intend to move forward using the dry cover for the closure of the TSF and instead is committed to implement the wet cover closure option for the TSF. Treasury Metals' recognizes that this will likely be a condition of the environmental assessment process. As such, the Round 2 responses related to mine waste, groundwater, surface water quality, and fish and fish habitat focus on responding to the requested information relevant to the wet cover option. The HHERA has been updated to include the surface water quality predictions for the wet cover closure option for the TSF only. During Post-Closure, releases to the receiving environment from the Project, include seepage from the TSF and the WSRA, along with releases from the pit-lake. Treasury Metals has made the commitment to monitor the water quality of the pit-lake, and treat using batch treatment as required."* This explanation remains valid with the exception that as part of the ongoing review of the mine waste series of Round 2 IRs, ECCC raised concerns regarding the viability of the wet cover due to climate change on time horizons greater than 400 years. To response to these concerns, Treasury Metals included sensitivity runs into the revised water quality modelling assuming that the TSF would be lined with a synthetic liner and a dry covered placed during closure. The predicted surface water quality as a result of this sensitivity assessment has been used to also provide a sensitivity analysis in the HHERA to show the residual adverse effects on human health in the event the dry cover option is selected as the TSF closure option over the wet cover. The results are provided in Appendix VII- Sensitivity Analysis Results. It is important to note that outside of the EA process, Treasury Metals will be required to complete an official closure plan under O. Reg 240/00. The closure plan will undergo rigorous review by the Ontario Ministry of Energy, Northern Development, and Mines and NRCan and also require consultation with the Indigenous stakeholders.

TMI_965-HHRA(2)-12

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TMI_965-HHRA(2)-12	HHRA(2)-12		CEA Agency	**Reference to EIS Guidelines:**	n/a
				Reference to EIS / Appendix	n/a
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: PDF page 183 indicates, for the Project Assessment Scenario for thallium, that "potential risks identified are approximately two and a half times greater than the Base Case Assessment Scenario." This appears to represent the approximate difference between the hazard quotient (HQ) for the Project Case (16 or 17) and for the Base Case (7.2) for the toddler receptor in Table 4.4.1.4-1A (PDF page 185). It is also indicated in PDF page 183 that "the change in concentrations in food items was largely driven by exposure pathways related to surface water (e.g., macrophytes/aquatic plants and ducks). An exception is for thallium where the concentration in the moose was the predominant exposure pathway (i.e., due to ingestion of aquatic plants)." It is unclear from the HHERA how the calculated increase in HQ for thallium would be connected to consumption of moose. There are no predicted concentrations for thallium in aquatic plants in the HHERA, so it is unclear if these would have a high thallium content. Furthermore, according to PDF page 141, "thallium was identified as a COC [chemical of concern] requiring assessment as part of the HHRA based on surface water quality exceedances at baseline conditions (Base Case Assessment Scenario) and subsequently the Project Assessment Scenario". However, thallium in surface water in Operations and Post-Closure are not expected to be above the Base Case of 0.0009 mg/L (Table 3.5.3.4-1, PDF page 93). The concentration of thallium in TSF supernatant water is predicted to be 0.642 mg/L (Table 3.5.3.5-2, PDF page 97), above the PWQO of 0.0003 mg/L, but only the Project Worker is assumed to have contact with the TSF supernatant water (PDF page 150). It is unclear whether the moose would be exposed to the thallium from the TSF supernatant water. It is indicated in PDF page 260 that "within Study Area No. 1 potential risk may be identified to mammals and birds as a result of the Project and specifically exposure to Project-specific media including waste rock and TSF supernatant water", and that the ERA was completed assuming "receptors would spend 100% of their time within the Study Area". This may be a conservative assumption in the HHERA, as it is also noted on the same page that "during the active phases of the Project (i.e., Site Preparation and Construction, Operations, and Closure) access to the Operations Area will be fenced restricting access to medium and large mammals…"	

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				It is also noted, in PDF page 184, that "determination of a site-specific uptake factor for thallium in fish is required as part of the Follow- Up Program. Given that thallium has not been identified by the MECP in their Guide to Eating Ontario Fish, the HQ exceedances may be artifact of the conservative assumptions applied herein, and a generic uptake factor." If this were the case, the expectation would be that the HQ for thallium estimated in the Project Alone case would be low. However, where the Project Alone values for HQ are fairly high (Table 4.4.1.4-1A), it is unclear if there may be other exposure pathways to be mentioned.
				Specific Question / Request for Information: A. The Agency seeks clarification on the drivers such that "potential risks [for thallium] identified which are approximately two and a half times greater than the Base Case Assessment Scenario".
				Draft Response: The driver of potential risk of thallium is related in all cases to the uptake factors retrieved from literature and used to model thallium concentrations into country foods. Given the uncertainty associated with thallium uptake factors obtained from literature, there is a proportionally high level of uncertainty with the thallium predictions and the results are in turn a large overestimate of potential risk. Additional work is required as part of the Follow-Up Program to derive project specific uptake factors for thallium. Below provides detailed clarification for each point raised in the "Context and Rationale". **Predicted thallium concentrations in moose and relation to risk via country foods ingestion:** All inputs used in the Goliath Gold HHERA Model were provided in Appendix IV- Model Inputs. Table IV-22 provides the uptake factors relied upon for predicting contaminant concentrations in country foods including moose. A beef transfer coefficient was used as a surrogate for moose, and was used to model thallium uptake from the various media into moose. Table IV-13 of Appendix IV provided the modelled thallium concentrations in moose for all study sites and assessment scenarios. Table IV-22 and IV-13 have been included in TMI_965-HHRA(2)-12_Attachment 1. As shown in Table IV-13 (first page), the modeled baseline concentration of thallium in moose at Study Area No.1 is 0.0909 mg/kg and the modelled operations concentration of thallium in moose at Study Area No. 1 is 0.5158 mg/kg. Moose eat and forage on macrophytes, drink water and are incidentally exposed to soil, therefore any increase in thallium concentrations from these media from baseline would result in a proportional increase in thallium concentrations in moose and subsequently an increase in HQ from baseline as a result of the Project. In the Draft HHERA (August 2018) during operations, the Goliath Gold HHERA Model was set to model TSF supernatant water ([Tl]= 0.642 mg/L) as sole drinking water source for a moose, instead of a surface water concentration which is much lower ([Tl]=0.0006 mg/L), thereby resulting in the larger moose thallium concentrations and resultant HQs. This was an overly conservative approach as it is incredibly unlikely that a moose would be able to infiltrate the perimeter of the operations area and access the TSF for drinking water (let alone live 100% of its life drinking it as its sole drinking

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				water source), therefore the HHERA has been revised to remove the TSF as the drinking water source for a moose. The TSF remains an operable pathway for small birds and mammals. **Predicted thallium concentrations in aquatic plants:** All inputs used in the Goliath Gold HHERA Model were provided in Appendix IV- Model Inputs. Table IV-9 of Appendix IV provided the modelled thallium concentrations in aquatic plants (macrophytes) for all study sites and assessment scenarios. It has been included in TMI_965-HHRA(2)-12_Attachment 1. Table IV-22 provides the uptake factors relied upon for predicting contaminant concentrations in aquatic macrophytes and has also been included in the attachment. **Predicted Thallium Exceedances in Water:** The exposure point concentration (EPC) of thallium in surface water (defined as the UCLM) exceeded its respective PWQO/CCME guideline for the protection of freshwater aquatic life in the Base Case Assessment Scenario and subsequently the Project Assessment Scenario. The EPC of thallium in supernatant water (defined as the maximum worst-case concentration from the vender) also exceeded its respective PWQO/CCME guideline for the protection of freshwater aquatic life. The concentration of thallium in surface water did not exceed its drinking water quality guideline for the protection of human health provided by Health Canada. It is standard practice in a risk assessment to perform secondary screening of chemical concentrations as part of the problem formulation. The problem formulation for human health is provided in Section 4.1.3 of the HHERA Report. The secondary screening for surface water COCs (Table 4.1.3-1 of the HHERA) shows that the predicted thallium concentrations in surface water do not exceed the secondary screening criteria specific for human health of 0.002 mg/L, however the TSF supernatant concentration for thallium of 0.642 mg/L does (Table 4.1.3-3). Therefore, thallium was assessed to a Project Worker via the direct dermal contact and incidental ingestion pathway, as the Project Worker was the only human receptor assessed because they are the only human who will have access to the TSF during operations. As detailed in the response to Part A of TMI_960-HHRA(2)-07, the EPC of a contaminant (i.e. thallium) in country food is modeled from across all exposure media without regard to the criteria exceedance and NOT from a single exposure medium where the contaminant concentration exceeded the quality criteria or predicted. Therefore, regardless of which media thallium had an exceedance in, for country foods it was conservatively modelled based on its concentration in all media. The thallium concentration in surface water was modelled at its exposure point concentration into all country foods to ensure risk was not underestimated and a multimedia exposure assessment could be provided. Additional details on how EPCs were calculated in country foods including a sample calculation are provided in Appendix II of the HHERA Report. Additionally, Appendix IV of the HHERA report provides all of the model inputs including the country foods and shows the media modelled for each study area and project phase. For reference, Table IV-8 Chemical Concentrations in Berries from Appendix IV has been attached as TMI_960-HHRA(2)-07_Attachment 1 showing that at Location 1 (Operations Area), the COC concentrations from soil were modelled for the base phase and from waste rock for the operations phase and back to soil for post-closure. It is also worthy to note, that the post-closure soil considers the deposition of dust including metals as a result of the 2 years of site

<table>
<tr><th>Unique Identifier</th><th>Agency IR #</th><th>Annex</th><th>Agency / Group / Stakeholder</th><th>Cross Reference / Comment / Information Request / Response</th></tr>
<tr><td></td><td></td><td></td><td></td><td>
preparation and construction, and 12 years of project operations. Thus, as shown in TMI_960-HHRA(2)-07_Attachment 1, regardless of an exceedance, all media were considered for all COCs.

<u>Moose Exposure to TSF Supernatant Water</u>

It was assumed that a moose may have access to the TSF supernatant water. As stated above, this is an overly conservative approach as it is incredibly unlikely that a moose would be able to infiltrate the perimeter of the operations area during operations and access the TSF for drinking water (let alone live 100% of its life drinking it as its sole drinking water source). Therefore, the HHERA report was revised to remove this as an operable pathway of exposure. The TSF supernatant water remains an operable pathway for a small mammals and birds.

<u>Thallium Uptake Factor for Fish</u>

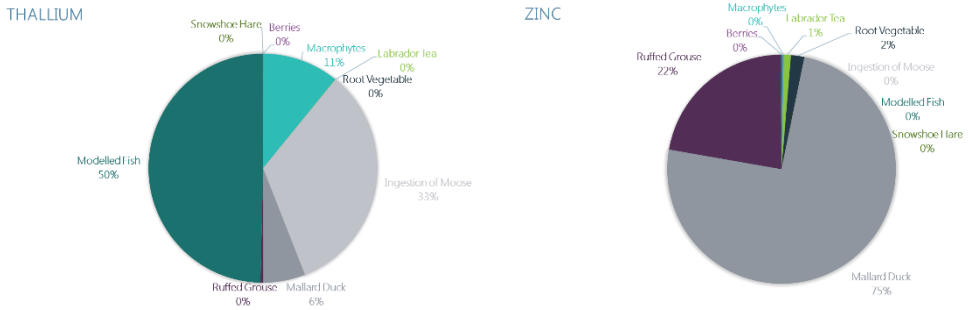
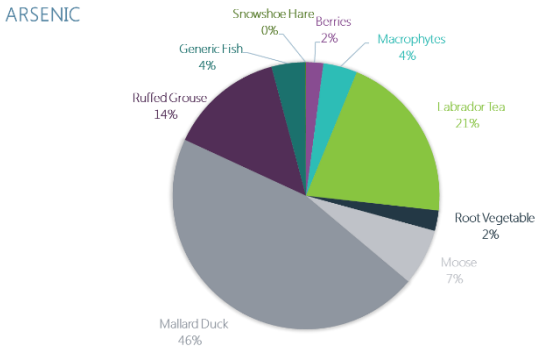
As with the uptake factor for moose and aquatic organisms, the thallium uptake factor for fish was retrieved from literature. Table IV-22 provides the uptake factors relied upon for predicting contaminant concentrations in aquatic macrophytes and has also been included in the attachment. The uptake factor for water to fish for thallium was 2900 which is much higher than a conversion factor based on measured data from Wabigoon Lake, thereby resulting in high concentrations of thallium in the modelled fish relative to the concentrations of thallium measured in the fish samples as shown in Table 1. The measured concentrations for thallium are only available for the existing environment or “Base Case” Assessment Scenario therefore modelled thallium concentrations were relied upon for site preparation and construction, operations, closure and post-closure for the Project Alone and Project Assessment Scenarios, thereby illustrating why the HQ values for the Project Alone are high.

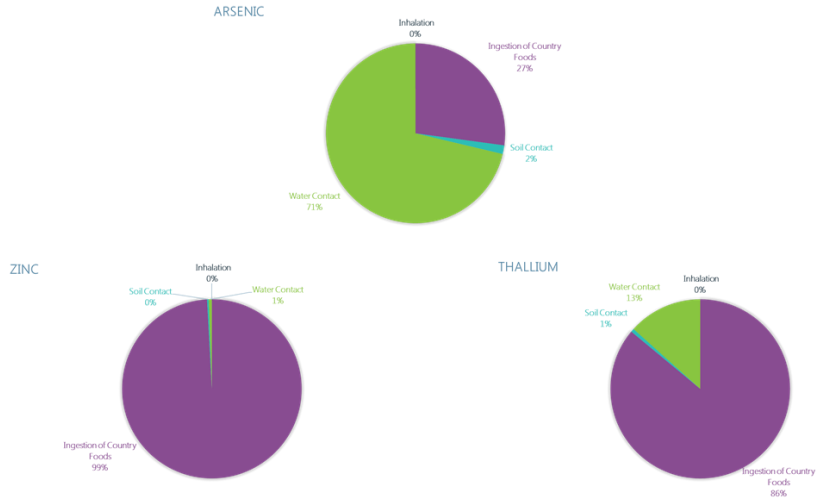
Table 1. Comparison of Directly Measured to Modelled Fish Concentrations of Thallium (ppm)
<table>
<tr><th>Parameter</th><th>Measured</th><th>Modelled</th></tr>
<tr><td>Fish Concentration</td><td>0.0044 (1)</td><td>0.4556 (2)</td></tr>
<tr><td>Surface Water Concentration</td><td>0.0003</td><td>0.0006</td></tr>
<tr><td>Uptake Factor</td><td>15</td><td>2900</td></tr>
</table>
(1) $Fish\ Concentration\ =\ Water\ concentration\ \times Uptake\ Factor$
(2) $Fish\ Concentration\ =\ Water\ concentration\ \times (Uptake\ Factor\ \times Wet\ Dry\ conversion\ factor\ of\ 0.25)$

<u>Agency Comment on Draft Response</u>

None Received.
</td></tr>
</table>

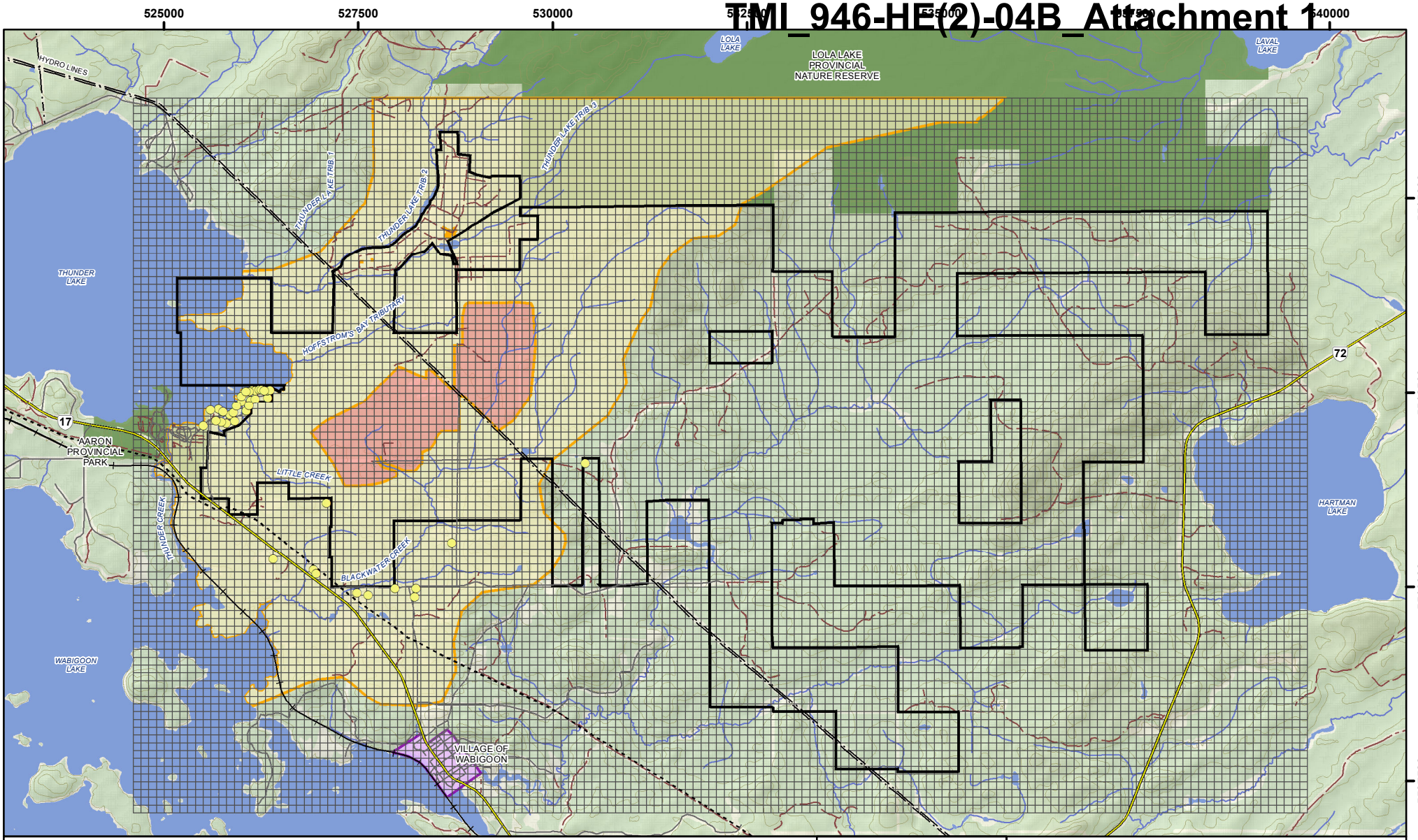
Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				Specific Comment to Agency Comments Not required. Agency accepted draft response. It is important to note that substantial changes have been made to the Final HHERA (February 2019). A final response has been provided to incorporate the new information/ changes.
				FINAL RESPONSE: Part A. In the final HHERA, a residual adverse effect is defined when the risk for the Project Assessment Scenario (i.e. Project Alone + Base Case) via the sum of all operable pathways, exceeds the acceptable risk benchmark and the estimated potential risk for the Base Case Assessment Scenario. In those cases where the potential risk via the sum of all operable exposure pathways is less than Base Case, then the residual effect would not be adverse. The results of the HHRA identified residual adverse effects for three of the valued components; arsenic, zinc, and thallium. Residual adverse effects for human health were identified to both the resident and visitor/harvester receptors for thallium (non-cancer risk), zinc (non-cancer risk), and arsenic (cancer risk). Ingestion of country foods contributed the highest proportion to the overall characterization of residual adverse effects via the sum of risk from all operable exposure pathways for thallium and zinc. Furthermore, although the residual adverse effects for thallium and zinc were driven by the country foods pathway, the residual effects associated with arsenic were largely attributed to the baseline surface water quality, although the surface water data indicated that arsenic was below the Health Canada drinking water standard and the PWQO protective of freshwater aquatic life (Figure 3). Exceedances of Health Canada's risk benchmarks (HQ or ILCR) for thallium in the Project Assessment Scenario were driven by the Base Case concentration of thallium in country foods. The country foods assessment relied solely on the use of modelled chemical concentration data as a baseline country foods study was not completed in support of the revised EIS (April 2018), as such there are uncertainties associated with the predictions which are likely to overestimate the calculations used to determine residual adverse effects in all cases of the Project Assessment Scenario. The Final Goliath Gold Follow Up Addendum provides the country foods monitoring program designed to reflect the findings/uncertainty of the HHERA with explicit plans for specific contaminants to be monitored in environmental and project specific media. The follow up program for human health specifically states that metals and methylmercury will be analyzed in all environmental and project-specific media as well as in country foods including wild rice which would allow for the derivation of site-specific uptake factors to further reduce the uncertainty in the HHERA. Treasury Metals recognizes that the perception of risk, safety, and well-being is a concern to members Indigenous communities and has proposed to work with each Indigenous stakeholder community to develop a risk communication plan to help mitigate the perceptions of risk, safety and well-being associated with the Goliath Gold Project.

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				 **Figure 1 (4.4.1.3-1) Relative Contributions to Hazard Quotient via Ingestion of Country Foods**  **Figure 2 (4.4.2.3-1) Relative Contributions to Incremental Lifetime Cancer Risk via Ingestion of Country Foods**

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				 **Figure 3. Relative Contribution to Residual Adverse Effects via all Operable Exposure Pathways** **<u>Thallium in Fish</u>** Hazard quotients of thallium in fish were numerically higher than the Health Canada benchmark of 0.2. The Agency requested that "modelled fish" be used consistently throughout the HHERA and replace the use of "measured fish" in the Base Case Assessment Scenario. As described in Section 3.6.1 of the HHERA, the use of the higher literature derived uptake factors results in "modelled fish" concentrations that are an order of magnitude higher than "measured fish" concentrations measured as part of the baseline studies for select parameters including thallium. Confirmation of thallium concentrations in fish tissue and determination of a site-specific uptake factor for thallium in fish will be completed as part of the follow up for country foods. Given that thallium has not been identified by the MECP in their Guide to Eating Ontario Fish (see below discussion on fish advisories), the HQ exceedances may be artifact of the conservative assumptions applied herein, and a generic uptake factor. As such, no potential risk is anticipated to human receptors via the ingestion of fish.

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response	
TMI_966-HHRA(2)-13	HHRA(2)-13		CEA Agency	**Reference to EIS Guidelines:**	n/a
				Reference to EIS / Appendix	n/a
				Cross-reference to Round 1 IRs	n/a
				Context and Rationale: It is unclear why, in Table 4.4.1.4-1A and -1B, that the "Project Case" HQ for each metal is not the sum of the "Base Case" HQ and "Project Alone Case" HQ for that metal. It would also be expected, in Table 4.4.2.4-1, that the Project Case ILCR would be the sum of the Base Case ILCR and the Project Alone Case ILCR, but it is not.	
				Draft Response: The foundation of the HHERA Model for the Goliath Gold Project is a function of the chemical concentrations in environmental and Project-specific media which are used as inputs, and relied upon for modelling chemical concentrations in country foods. As described in the HHERA report, the Model was run for three distinct Assessment Scenarios (i.e. Base Case, Project Alone, and Project). For some media (e.g. soil, air) the concentrations for the Project Alone Assessment Scenario are equal to the concentrations in Project Assessment Scenario minus the Base Case Assessment Scenario. For Project-specific media (e.g. TSF supernatant water and waste rock) the chemical concentrations for the Project Alone Assessment Scenario, are equal to the Project Assessment scenario as there is no applicable media in the existing environment (i.e. Base Case Assessment Scenario). In the case of surface water quality, the concentrations for the Project Alone Assessment Scenario are generally equal to the concentrations in Project Assessment Scenario minus the Base Case Assessment Scenario. However, for some compounds the Base Case Concentrations are larger than the predictions for the Project Assessment Scenario given that the effluent quality will be cleaner than the existing water quality. In these cases, the concentrations for the Project Alone Assessment Scenario were set to zero, rather than the negative numbers calculated. Therefore, calculated HQs and ILCRs for each of the Base Case, Project Alone, and Project Assessment Scenarios will reflect the calculated concentrations in country foods modelled from the relevant exposure media. This approach was considered to be more comprehensive than calculating only the Base Case and Project Case HQs and ILCRs and calculating Project-Alone as the arithmetic difference.	

Unique Identifier	Agency IR #	Annex	Agency / Group / Stakeholder	Cross Reference / Comment / Information Request / Response
				Agency Comment on Draft Response None Received.
				Specific Comment to Agency Comments Not required. Agency accepted draft response.
				FINAL RESPONSE: The foundation of the HHERA Model for the Goliath Gold Project is a function of the chemical concentrations in environmental and Project-specific media which are used as inputs, and relied upon for modelling chemical concentrations in country foods. As described in the HHERA report, the Model was run for three distinct Assessment Scenarios (i.e. Base Case, Project Alone, and Project). For some media (e.g. soil, air) the concentrations for the Project Alone Assessment Scenario are equal to the concentrations in Project Assessment Scenario minus the Base Case Assessment Scenario. For Project-specific media (e.g. TSF supernatant water and waste rock) the chemical concentrations for the Project Alone Assessment Scenario, are equal to the Project Assessment scenario as there is no applicable media in the existing environment (i.e. Base Case Assessment Scenario). In the case of surface water quality, the concentrations for the Project Alone Assessment Scenario are generally equal to the concentrations in Project Assessment Scenario minus the Base Case Assessment Scenario. However, for some compounds the Base Case Concentrations are larger than the predictions for the Project Assessment Scenario given that the effluent quality will be cleaner than the existing water quality. In these cases, the concentrations for the Project Alone Assessment Scenario were set to zero, rather than the negative numbers calculated. Therefore, calculated HQs and ILCRs for each of the Base Case, Project Alone, and Project Assessment Scenarios will reflect the calculated concentrations in country foods modelled from the relevant exposure media. This approach was considered to be more comprehensive than calculating only the Base Case and Project Case HQs and ILCRs and calculating Project-Alone as the arithmetic difference.



P:\2016\Projects\TC160516_TML_GGP_Support_JRs\02_Work_Files\GIS\Human_Health_Risk_Assessment\MXD\Human_Helth_Risk_Assess_Study_Areas_7.mxd

LEGEND

- Air Modelling Grid
- Sensitive Receptors
- Railway
- Hydro Line
- Natural Gas Pipeline
- Highway
- Local Street
- Resource / Recreation Trail
- Provinical Park
- Watercourse
- Waterbody
- Contours (10 m interval)
- Property Boundary

Human Health and Ecological Risk Assessment Study Areas

- 1. Operations Area
- 2. Local Study Area
- 3. Village of Wabigoon

NOTES:
- Topographic data extracted from Land Information Ontario (LIO), MNRF.
- Watercourses represent pre-development conditions based on LIO database, as modified by KBM.

Datum: NAD83
Projection: UTM Zone 15N

N W E S

0 1 2 4 6 8 10 Kilometres

TREASURY METALS Inc. wood.

GOLIATH GOLD PROJECT

Human Health and Ecological Risk Assessment Study Areas

PROJECT N°: TC160516	**FIGURE: 3.1.1-1**
SCALE: 1:68,000	DATE: August 2018

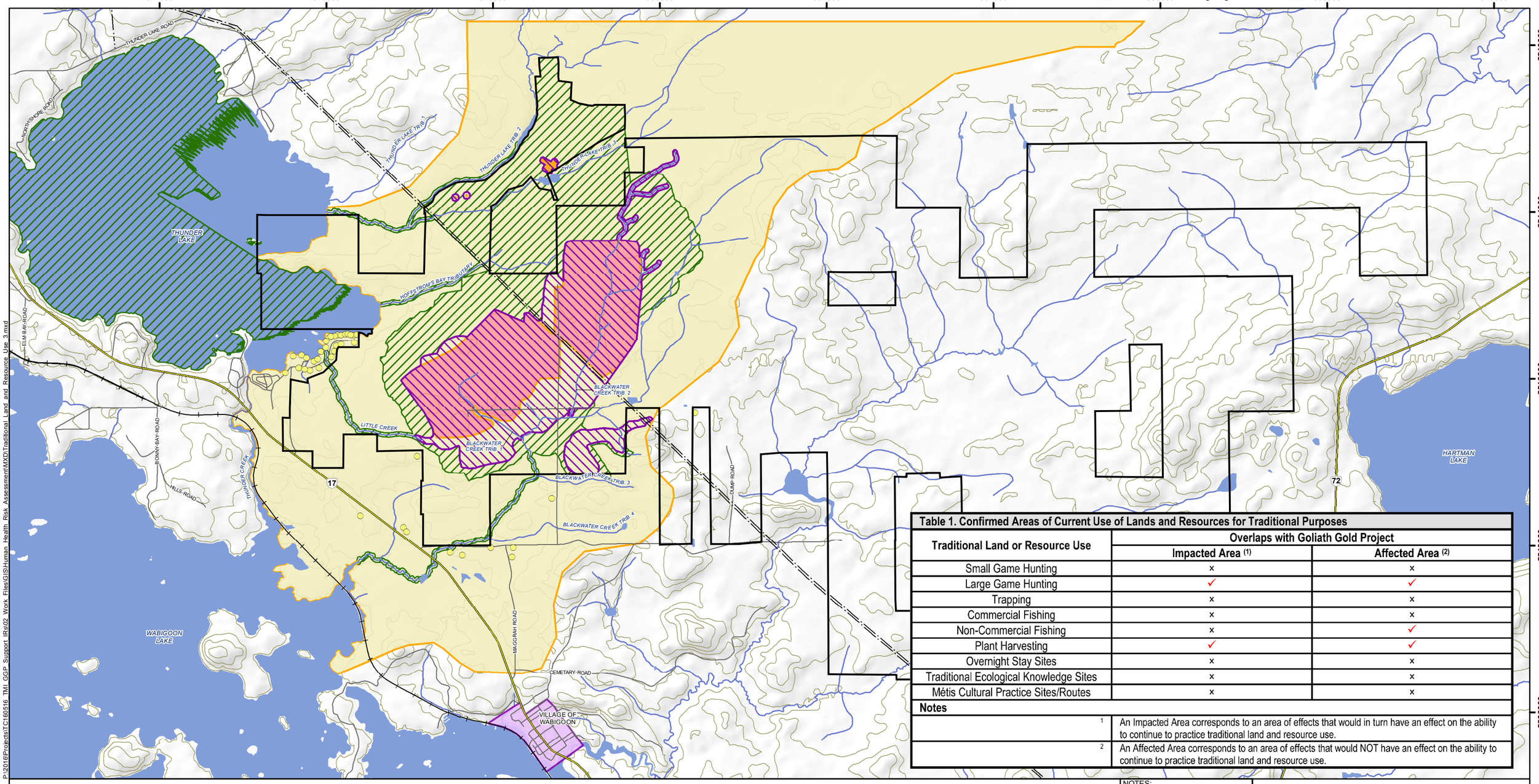


Table 1. Confirmed Areas of Current Use of Lands and Resources for Traditional Purposes

Traditional Land or Resource Use	Overlaps with Goliath Gold Project	
	Impacted Area (1)	Affected Area (2)
Small Game Hunting	×	×
Large Game Hunting	✓	✓
Trapping	×	×
Commercial Fishing	×	×
Non-Commercial Fishing	×	✓
Plant Harvesting	✓	✓
Overnight Stay Sites	×	×
Traditional Ecological Knowledge Sites	×	×
Métis Cultural Practice Sites/Routes	×	×

Notes

1. An Impacted Area corresponds to an area of effects that would in turn have an effect on the ability to continue to practice traditional land and resource use.
2. An Affected Area corresponds to an area of effects that would NOT have an effect on the ability to continue to practice traditional land and resource use.

LEGEND

- Sensitive Receptors
- Property Boundary
- Combined Impact Footprint
- Combined Affected Areas
- Highway
- Local Street
- Hydro Line

Human Health and Ecological Risk Assessment Study Areas

- 1. Operations Area
- 2. Local Study Area
- 3. Village of Wabigoon

0 0.5 1 2 3 4 5 Kilometres

NOTES:
- Topographic data extracted from Land Information Ontario (LIO), MNRF.
- Watercourses represent pre-development conditions based on LIO database, as modified by KBM.

Datum: NAD83
Projection: UTM Zone 15N

TREASURY wood. METALS Inc.

GOLIATH GOLD PROJECT

Spatial Extent of Effects on Traditional Land and Resource Use Including Country Foods

PROJECT N°: TC160516 | **FIGURE: 3.6.3-1**

SCALE: 1:44,000 | DATE: November 2018

P:\2016\Projects\TC160516_TMI_GGP_Support_IRs\02_Work_Files\GIS\Human_Health_Risk_Assessment\MXD\Traditional_Land_and_Resource_Use_3.mxd

From: Goliath Mine / Mine Goliath (CEAA/ACEE)
To: Denyes, Mackenzie
Cc: "Mark Wheeler"; Rawlings, Martin; Phaneuf, Marcelle (CEAA/ACEE)
Subject: RE: Clarification from Health Canada for IR# HE(2)-11C
Date: August-07-18 2:48:10 PM
Attachments: image001.png

Mackenzie,

I apologize for again changing a detail on you, there is a small change that needs to be done, and I show it below. Instead of "they suggest following one of the endpoints described…", it was meant to read "they suggest the following endpoints described…".

Thanks,
Marc

Marc Léger

Project Manager, Ontario Regional Office
Canadian Environmental Assessment Agency / Government of Canada
Marc.Leger@canada.ca / Tel: 647-262-8219

Gestionnaire de projets, Bureau régional de l'Ontario
Agence canadienne d'évaluation environnementale / Gouvernement du Canada
Marc.Leger@canada.ca / Tél. : 647-262-8219

From: Goliath Mine / Mine Goliath (CEAA/ACEE)
Sent: August 7, 2018 13:36
To: 'Denyes, Mackenzie' <mackenzie.denyes@woodplc.com>
Cc: 'Mark Wheeler' <mark@treasurymetals.com>; 'Rawlings, Martin' <martin.rawlings@woodplc.com>; Phaneuf, Marcelle (CEAA/ACEE) <marcelle.phaneuf@canada.ca>
Subject: RE: Clarification from Health Canada for IR# HE(2)-11C

Mackenzie,

I have received responses to your questions to Health Canada.

With regards to a recommendation on the non-threshold end point that Health Canada wishes to see applied in the HHRA of potential health effects of NO_2, they suggest ~~following one of~~ the **following** endpoints described in the Human Health Risk Assessment for Ambient Nitrogen Dioxide (i.e. using the concentration response curve to quantify the effects). Specifically the following endpoints may be considered:

- Short-term (acute exposure) respiratory effects (asthma)
- Short-term (acute exposure) all-cause mortality
- Long-term (chronic exposure) respiratory mortality

This approach should be considered in addition to the qualitative assessment previously described for NO2.

Health Canada also confirmed that they no longer support the 1999 Sum25 and Sum15 guidance for assessing PM_{10} and $PM_{2.5}$.

Health Canada also wishes to remind you, based on discussion from the July 26th meeting and in IR# AE(2)-02, it was recommended that the proponent quantify DPM using the unit risk and inhalation slope factor available from the California Office of Health Hazard Assessment, CalEPA (2015).

Marc

Marc Léger

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Marc.Leger@canada.ca / Tél. : 647-262-8219

From: Denyes, Mackenzie <mackenzie.denyes@woodplc.com>
Sent: August 2, 2018 10:17
To: Goliath Mine / Mine Goliath (CEAA/ACEE) <ceaa.goliathmine-minegoliath.acee@canada.ca>; 'Denyes, Mackenzie' <mackenzie.denyes@woodplc.com>
Cc: 'Mark Wheeler' <mark@treasurymetals.com>; 'Rawlings, Martin' <martin.rawlings@woodplc.com>; Phaneuf, Marcelle (CEAA/ACEE) <marcelle.phaneuf@canada.ca>
Subject: RE: Clarification from Health Canada for IR# HE(2)-11C

Thank you Marc.

Would you please confirm that Health Canada has also requested that we go back to the original plan of applying the 1999 guidance and proceeding with a Sum 25 and Sum 15 approach for PM?

Many thanks,

Mackenzie Denyes, PhD
Intermediate Environmental Scientist
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wood.

From: Goliath Mine / Mine Goliath (CEAA/ACEE) <ceaa.goliathmine-minegoliath.acee@canada.ca>
Sent: August-02-18 9:24 AM
To: 'Denyes, Mackenzie' <mackenzie.denyes@woodplc.com>
Cc: 'Mark Wheeler' <mark@treasurymetals.com>; 'Rawlings, Martin' <martin.rawlings@woodplc.com>; Phaneuf, Marcelle (CEAA/ACEE) <marcelle.phaneuf@canada.ca>
Subject: RE: Clarification from Health Canada for IR# HE(2)-11C

Mackenzie,

As we have discussed on the phone, Health Canada has indicated to me this morning that they would like for you to consider the response curves for NO_2, and have committed to providing them to me to forward on to you by the end of today.

I apologize for the confusion that this has caused, and thank you for your understanding as we continue to work on this EA.

Marc

Marc Léger

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From: Goliath Mine / Mine Goliath (CEAA/ACEE)
Sent: August 1, 2018 16:22
To: 'Denyes, Mackenzie' <mackenzie.denyes@woodplc.com>
Cc: 'Mark Wheeler' <mark@treasurymetals.com>; Rawlings, Martin <martin.rawlings@woodplc.com>; Phaneuf, Marcelle (CEAA/ACEE) <marcelle.phaneuf@canada.ca>
Subject: RE: Clarification from Health Canada for IR# HE(2)-11C

Thank you Mackenzie for this email. I had a quick phone call with our Health Canada representative, she believes that your interpretation and approach is correct, and will review your email to confirm.

Marc

Marc Léger

Project Manager, Ontario Regional Office

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Marc.Leger@canada.ca / Tél. : 647-262-8219

From: Denyes, Mackenzie <mackenzie.denyes@woodplc.com>
Sent: August 1, 2018 14:36
To: Goliath Mine / Mine Goliath (CEAA/ACEE) <ceaa.goliathmine-minegoliath.acee@canada.ca>; 'Denyes, Mackenzie' <mackenzie.denyes@woodplc.com>
Cc: 'Mark Wheeler' <mark@treasurymetals.com>; Rawlings, Martin <martin.rawlings@woodplc.com>; Phaneuf, Marcelle (CEAA/ACEE) <marcelle.phaneuf@canada.ca>
Subject: RE: Clarification from Health Canada for IR# HE(2)-11C

Marc,
Thank you for taking the time to discuss with us our approach moving forward in response to the Health Canada clarification received and provided below. I'm sending this email to confirm our interpretation of the clarification received from Health Canada today and our approach moving forward.

Our Interpretation

As Wood and Treasury Metals presented on Thursday, in order to quantify potential health effects, the predicted concentrations would be converted to a potential health outcome using appropriate concentrations response relationships. For PM_{10} and $PM_{2.5}$ the relationships are based upon the 1999 Federal - Provincial Working Group on Air Quality Objectives and Guidelines report. Specifically, a SUM25 relationship is used for evaluating PM_{10} and a SUM15 relationship for $PM_{2.5}$. For 1-hr NO_2, the recent Health Canada report entitled Human Health Risk Assessment for Ambient Nitrogen Dioxide, dated 2016, suggests that concentrations response curves should be used for determining health effects of NO2.

Based on the clarification received from Health Canada today, it seems as though Health Canada no longer supports this approach for $PM_{2.5}$, PM_{10}, and NO_2 and instead recommends performing a qualitative screening in the interim.

Our Approach

Given that Health Canada has stated that they are currently developing an approach for the quantitative assessment of $PM_{2.5}$ and NO_2, and that they no longer support the Sum25 and Sum15 approach for quantifying the effects of exposure to PM_{10} and $PM_{2.5}$, Wood & Treasury Metals will proceed in completing a qualitative approach as proposed by Health Canada. This qualitative approach will include a screening of the exposure point concentrations of CACs in air defined as the 95^{th} UCLM, to the CAAQS for $PM_{2.5}$ and NO_2, and the Ontario AAQC for PM_{10}, understanding that these criteria are not intended for use and application within the Property Boundary.

To answer part C of HE(2)-11 which stated ***"In the final HHRA, consider PM_{10}, $PM_{2.5}$ and NO_2 are non-threshold pollutants, as any exposure to these contaminants could be considered as a potential residual effect"***, exposure to these CACs will therefore be discussed qualitatively, rather than quantitatively.

If the Agency has any issues or concerns regarding our interpretation or approach please let myself or Treasury Metals know asap as it will affect the timing of the HHERA submission. Otherwise we will provide the Draft HHERA report no later than Friday August 17, 2018.

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From: Goliath Mine / Mine Goliath (CEAA/ACEE) <ceaa.goliathmine-minegoliath.acee@canada.ca>
Sent: August-01-18 10:49 AM
To: 'Denyes, Mackenzie' <mackenzie.denyes@woodplc.com>
Cc: 'Mark Wheeler' <mark@treasurymetals.com>; Rawlings, Martin <martin.rawlings@woodplc.com>; Phaneuf, Marcelle (CEAA/ACEE) <marcelle.phaneuf@canada.ca>
Subject: Clarification from Health Canada for IR# HE(2)-11C

Mackenzie,

Please find the following clarification from Health Canada related to IR# HE(2)-11C.

$PM_{2.5}$, and NO_2 have been assessed by Health Canada and the conclusions reached are that both exhibit widespread population-level health effects that indicate that they should be treated as non-threshold contaminants where any level of or increase in exposure can result in adverse health effects. Health Canada is currently developing an approach for the quantitative assessment of these contaminants. In the interim Health Canada would support an approach that includes an evaluation against the CAAQS and a discussion of the implications of the CAAQS-associated management levels, plus a robust qualitative analysis of the potential health effects of these non-threshold contaminants in relation to exposure throughout the project area and the potential to reduce emissions of pollutants that form these two air contaminants. For PM_{10}, evaluation against the Ontario AAQC may be used and considered in a similar manner (i.e., robust qualitative analysis and potential options to reduce emissions of this pollutant). Furthermore, Health Canada no longer supports the Sum25 and Sum15 approach for quantifying the effects of exposure to PM_{10} and $PM_{2.5}$.

Please let me know if you have any further questions on this clarification.

I would also appreciate an update on timing for your submission of the final HHRA, for review by the Agency and Health Canada.

Thank you,
Marc

Marc Léger

Project Manager, Ontario Regional Office
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Gestionnaire de projets, Bureau régional de l'Ontario
Agence canadienne d'évaluation environnementale / Gouvernement du Canada
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TMI_954-HHRA(2)-01_Table_1a: Human Health Screening of Predicted Air Quality– Site Preparation and Construction

Compound	Averaging Period	Ambient Air Criteria (µg/m³)	Maximum at Gridded Receptors (MPOI)			Maximum at Sensitive Receptors		
			Modelled Prediction	Background (1)	Cumulative Prediction	Modelled Prediction	Background (1)	Cumulative Prediction
TSP	24-hour	120	22	33	55	17	33	50
	Annual	60	3.8	14	18	2.7	14	17
PM_{10}	24-hour	50	6.2	15	21	4.7	15	20
$PM_{2.5}$	24-hour	27	0.90	10	11	0.76	10	11
	Annual	8.8	0.15	4.3	4.5	0.12	4.3	4.4
Dustfall (2)	30 day	7.0	0.96	— (3)	0.96	0.65	—	0.65
	Annual	4.6	0.76	—	0.76	0.51	—	0.51
CO	1-hour	36,200	15	1,248	1263	8.6	1,248	1,257
	8-hour (4)	15,700	5.1	1,248	1253	2.5	1,248	1,251
NO_2	1-hour	80	50	29	79	36	29	65
	24-hour	200	7.2	25	32	5.9	25	30
	Annual	23	1.0	14	15	0.84	14	15
SO_2	1-hour	170	0.77	4.0	4.8	0.65	4.0	4.7
	24-hour	275	0.11	4.0	4.1	0.082	4.0	4.1
	Annual	8	0.013	1.0	1.0	0.010	1.0	1.0
Arsenic	24-hour	0.3	0.00072	0.001	0.0017	0.00054	0.001	0.0015
Barium	24-hour	10	0.011	—	0.011	0.0079	—	0.008
Beryllium	24-hour	0.1	0.000053	—	0.000053	0.000040	—	0.000040
Cadmium	24-hour	0.025	0.000076	—	0.000076	0.000057	—	0.000057
Chromium	24-hour	0.1	0.0032	0.005	0.0082	0.0024	0.005	0.0074
Cobalt	24-hour	0.5	0.00027	—	0.00027	0.00020	—	0.00020
Lead	24-hour	0.5	0.0025	0.005	0.0075	0.0019	0.005	0.0069
Manganese	24-hour	0.4	0.013	0.019	0.032	0.0095	0.019	0.028
Nickel	24-hour	0.2	0.00086	—	0.00086	0.00065	—	0.00065
	Annual	0.04	0.00086	—	0.00086	0.00065	—	0.00065
Phosphorous	24-hour	0.35 (*)	0.011	—	0.011	0.0085	—	0.0085
Platinum	24-hour	0.03	0.00045	—	0.00045	0.00034	—	0.00034
Rhodium	24-hour	2	0.00013	—	0.00013	0.00010	—	0.00010
Thallium	24-hour	0.4 (*)	0.00038	—	0.00038	0.00028	—	0.00028
Titanium	24-hour	0.2	0.041	—	0.041	0.031	—	0.031
Uranium	24-hour	0.3	0.00022	—	0.00022	0.00017	—	0.00017
	Annual	0.06	0.00022	—	0.00022	0.00017	—	0.00017
Vanadium	24-hour	0.24	0.0011	—	0.0011	0.00081	—	0.00081

Notes:

The above table supersedes Table 6.19.2.1-4 of the revised EIS (April 2018).

(1) The 1-hour and 24-hour background values were based on 90th percentile of the monitoring data. The annual background values were based on the highest of the annual mean value over the latest 5 years of available monitoring data (see Section 5.2.4)

(2) Predicted dustfall values are in units of g/m²/30 days. Annual values are averaged over 12 months.

(3) The "—" in the table indicates that background values were not available for the compound.

(4) The 8-hour predicted CO concentration is calculated from 1-hr predicted concentration using a published conversion factor [Ontario Regulation 419/05, 17(2)].

(*) Background metals per TMI_163-AE(1)-01.

TMI_954-HHRA(2)-01_Table_1b: Human Health Screening of Predicted Air Quality– Operations

Compound	Averaging Period	Ambient Air Criteria (µg/m³)	Maximum at Gridded Receptors (MPOI)			Maximum at Sensitive Receptors		
			Modelled Prediction	Background (1)	Cumulative Prediction	Modelled Prediction	Background (1)	Cumulative Prediction
TSP	24-hour	120	28	33	61	14	33	47
	Annual	60	3.6	14	18	2.3	14	16.3
PM_{10}	24-hour	50	22	15	37	3.9	15	19
$PM_{2.5}$	24-hour	27	13	10	23	0.95	10	11
	Annual	8.8	0.73	4.3	5.0	0.16	4.3	4.5
Dustfall (2)	30 day	7.0	1.5	— (3)	1.52	0.57	—	0.57
	Annual	4.6	0.95	—	0.95	0.45	—	0.45
CO	1-hour	36,200	25	1,248	1273	10	1,248	1258
	8-hour	15,700	13	1,248	1261	4.5	1,248	1253
NO_2	1-hour	80	80	29	110	28	29	57
	24-hour	200	35	25	60	6.6	25	31
	Annual	23	9.2	14	23	0.99	14	15
SO_2	1-hour	170	4.6	4.0	8.6	0.18	4.0	4.2
	24-hour	275	2.2	4.0	6.2	0.022	4.0	4.0
	Annual	8	0.58	1.0	1.6	0.0024	1.0	1.0
Arsenic	24-hour	0.3	0.00090	0.001	0.0019	0.00044	0.001	0.0014
Barium	24-hour	10	0.013	—	0.013	0.0065	—	0.0065
Beryllium	24-hour	0.1	0.000066	—	0.000066	0.000033	—	0.000033
Cadmium	24-hour	0.025	0.000095	—	0.000095	0.000047	—	0.000047
Chromium	24-hour	0.1	0.0040	0.005	0.0090	0.0020	0.005	0.0070
Cobalt	24-hour	0.5	0.00033	—	0.00033	0.00016	—	0.00016
Lead	24-hour	0.5	0.0031	0.005	0.0081	0.0015	0.005	0.0065
Manganese	24-hour	0.4	0.016	0.019	0.035	0.0078	0.019	0.027
Nickel	24-hour	0.2	0.0011	—	0.0011	0.00053	—	0.00053
	Annual	0.04	0.0011	—	0.0011	0.00053	—	0.00053
Phosphorous	24-hour	0.35 (*)	0.014	—	0.014	0.0070	—	0.0070
Platinum	24-hour	0.03	0.00057	—	0.00057	0.00028	—	0.00028
Rhodium	24-hour	2	0.00017	—	0.00017	0.00008	—	0.00008
Thallium	24-hour	0.4 (*)	0.00048	—	0.00048	0.00023	—	0.00023
Titanium	24-hour	0.2	0.051	—	0.051	0.025	—	0.025
Uranium	24-hour	0.3	0.00028	—	0.00028	0.00014	—	0.00014
	Annual	0.06	0.00028	—	0.00028	0.00014	—	0.00014
Vanadium	24-hour	0.24	0.0014	—	0.0014	0.00066	—	0.00066

Notes:

The above table supersedes Table 6.19.2.1-4 of the revised EIS (April 2018).

(1) The 1-hour and 24-hour background values were based on 90th percentile of the monitoring data. The annual background values were based on the highest of the annual mean value over the latest 5 years of available monitoring data (see Section 5.2.4)

(2) Predicted dustfall values are in units of g/m²/30 days. Annual values are averaged over 12 months.

(3) The "—" in the table indicates that background values were not available for the compound.

(*) Background metals per TMI_163-AE(1)-01.

TMI_954-HHRA(2)-01_Table_1c: Human Health Screening of Predicted Air Quality— Closure

Compound	Averaging Period	Ambient Air Criteria (µg/m³)	Maximum at Gridded Receptors (MPOI)			Maximum at Sensitive Receptors		
			Modelled Prediction	Background (1)	Cumulative Prediction	Modelled Prediction	Background (1)	Cumulative Prediction
TSP	24-hour	120	23	33	56	17	33	50
	Annual	60	3.8	14	18	2.7	14	16.7
PM_{10}	24-hour	50	6.2	15	21	4.5	15	20
$PM_{2.5}$	24-hour	27	0.83	10	11	0.65	10	11
	Annual	8.8	0.15	4.3	4.5	0.11	4.3	4.4
Dustfall (2)	30 day	7.0	0.95	— (3)	0.95	0.63	—	0.63
	Annual	4.6	0.76	—	0.76	0.49	—	0.49
CO	1-hour	36,200	11	1248	1259	3.5	1,248	1251
	8-hour	15,700	3.3	1,248	1,251	1.4	1,248	1249
NO_2	1-hour	80	30	29	59	12	29	41
	24-hour	200	4.0	25	29	3.3	25	28
	Annual	23	0.70	14	14	0.48	14	14
SO_2	1-hour	170	0.78	4.0	4.8	0.60	4.0	4.6
	24-hour	275	0.14	4.0	4.1	0.11	4.0	4.1
	Annual	8	0.015	1.0	1.0	0.0092	1.0	1.0
Arsenic	24-hour	0.3	0.00072	0.001	0.0017	0.00053	0.001	0.0015
Barium	24-hour	10	0.011	—	0.011	0.0078	—	0.0078
Beryllium	24-hour	0.1	0.000053	—	0.000053	0.000039	—	0.000039
Cadmium	24-hour	0.025	0.000077	—	0.000077	0.000056	—	0.000056
Chromium	24-hour	0.1	0.0033	0.005	0.0083	0.0024	0.005	0.0074
Cobalt	24-hour	0.5	0.00027	—	0.00027	0.00020	—	0.00020
Lead	24-hour	0.5	0.0025	0.005	0.0075	0.0018	0.005	0.0068
Manganese	24-hour	0.4	0.013	0.019	0.032	0.0093	0.019	0.028
Nickel	24-hour	0.2	0.00087	—	0.00087	0.00063	—	0.00063
	Annual	0.04	0.00087	—	0.00087	0.00063	—	0.00063
Phosphorous	24-hour	0.35 (*)	0.011	—	0.011	0.0084	—	0.0084
Platinum	24-hour	0.03	0.00046	—	0.00046	0.00033	—	0.00033
Rhodium	24-hour	2	0.00014	—	0.00014	0.00010	—	0.00010
Thallium	24-hour	0.4 (*)	0.00038	—	0.00038	0.00028	—	0.00028
Titanium	24-hour	0.2	0.041	—	0.041	0.030	—	0.030
Uranium	24-hour	0.3	0.00023	—	0.00023	0.00017	—	0.00017
	Annual	0.06	0.00023	—	0.00023	0.00017	—	0.00017
Vanadium	24-hour	0.24	0.0011	—	0.0011	0.00079	—	0.00079

Notes:

The above table supersedes Table 6.19.2.1-4 of the revised EIS (April 2018).

(1) The 1-hour and 24-hour background values were based on 90th percentile of the monitoring data. The annual background values were based on the highest of the annual mean value over the latest 5 years of available monitoring data (see Section 5.2.4)

(2) Predicted dustfall values are in units of g/m²/30 days. Annual values are averaged over 12 months.

(3) The "—" in the table indicates that background values were not available for the compound.

(*) Background metals per TMI_163-AE(1)-01.