Stantec

Memo

To:	Nicola Banton KGHM Ajax Kamloops BC	From:	Bryan Leece, Peter Reid Stantec Consulting Ltd. Kamloops, BC
File:	123510762	Date:	March 23, 2017

Reference: Response to City of Kamloops Comments on the HHERA Reassessment for the Ajax Project

The following memo provides responses to the comments and questions arising from the review of the HHERA Reassessment completed by SLR on behalf of the City of Kamloops. For clarity, the review comments from SLR and the City of Kamloops have been reproduced herein. The response to each comment is provided immediately following the comment itself.

SLR-COK Comment 1:

Section 2.2 Changes in Particulate Inhalation Risk

The Reassessment results show that the Application Case for all three haul road dust mitigation scenarios (90, 80, 70% mitigation effectiveness) do not result in human health risks from inhalation of PM2.5 at any receptor location in Upper Aberdeen based on meeting the BC Ambient Air Quality Objective. For assessment of potential human health effects from PM10 exposure, it would be helpful if Table 2-4 included baseline concentrations at the special receptor locations and CR values, similar to how results were presented for PM2.5 in the Reassessment or in the original assessment. The reassessment of PM10 highlights correctly that inhalation of PM10 could represent potential human health risks in Aberdeen in the absence of mitigation measures to control the release of dust from Project activities. The mitigation measures need to be able to achieve the proposed 90% minimum dust mitigation effectiveness, and monitoring at receptor locations that the predicted PM2.5 and PM10 levels are achieved will be critical.

Response:

Table 2-4 of the HHERA Reassessment does not provide concentration ratio data as indicated in the title of the table. Rather, Table 2-4 provides the PM_{10} concentration data (µg PM_{10}/m^3) for the various discrete receptor locations for the Application Case. Because the results represent the Application Case, they incorporate the Baseline Case data. This is consistent with the presentation of the Application Case data for $PM_{2.5}$ (Table 2-3d of the HHERA Reassessment). The data in Table 2-4 is intended to provide information related to the frequency and pattern of exceedances of the PM_{10} 24-hour objective of 50 µg/m^3 to demonstrate the potential changes in PM_{10} air quality associated with the various dust mitigation sensitivity scenarios so that the potential changes in human health risk associated with these scenarios can be better understood. Baseline Case data will not change from the Baseline Case data presented in the original EIS submission.

Reference: Response to City of Kamloops Comments on the HHERA Reassessment for the Ajax Project

SLR-COK Comment 2:

Section 4.0 Revision of Water Quality-Related Direct Contact Exposures and Risks

Assessment of potential health risks associated with a change in surface water quality resulting from changes in metal deposition to surface water and lands immediately adjacent to surface water (300 m buffer) assumes a 90% dust suppression effectiveness. This was considered adequate based on information provided in an email from BC MOE to BC EAO (October 14, 2016). This email should be appended to the Reassessment report or provided. Currently, I have no means to assess whether 90% dust suppression effectiveness can be considered sufficiently conservative.

Response:

The contribution that dustfall makes to water quality is a function of the amount of dust that fall on the surface water and on the land immediately surrounding the surface water bodies. The HHERA reassessment calculated metal increases in soil in the area surrounding Jacko Lake, where dustfall is predicted to be the highest. The HHERA based its predictions on a full 25 years of operation and assumed no loss of metal from the soil. Over 25 years of dust deposition, changes in metal concentrations in soil between the 90% and 70% dust mitigation scenarios were less than 10% and generally in the 2% to 3% range indicating relatively small differences in metal accumulation between the two dust mitigation scenarios. The water quality assessment calculated changes in surface water quality on a monthly basis meaning that dust deposited to the lands within 50 m of the surface water were removed from the soil to the surface water on a regular basis. The water quality assessment did consider dust deposition to snow and the release of that dust to surface water during the spring freshet. The removal of metal from soil to surface water on a monthly or annual basis means that the relative change in metal concentrations in soil would be lower than the 10% (or less) differences in metal concentrations predicted for the 90% and 70% mitigation scenarios. On an annual basis, the predicted differences in metal accumulation in soil between the 90% and 70% mitigation scenarios is less than 1% for each of the 14 metals considered in the assessment. The appropriateness of the dustfall assumptions in the water quality modelling was raised in a number of review comments (e.g., MOE-046; MOE-059; MOE-081; FLNRO-285; FLNRO-246; COK-SLR782; COK-SLR786) and the associated proponent responses. This issue was also addressed in a letter from Ralph Adams to EAO/CEAA (October 14, 2016) which notes that the consensus within the BC MOE that the 90% mitigation scenario used in making the water quality predictions would provide very conservative estimates of the contribution that dustfall would make to water quality. It should also be noted that the water quality modelling approach was explicitly discussed during the December 20th, 2016 meeting with EAO/CEAA and that the January 12th, 2017 letter from EAO/CEAA did not require the evaluation of additional dustfall scenarios for the water quality predictions. Based on this, it is reasonable to conclude that the 90% dust mitigation scenario provides a reasonable and conservative assessment of changes in water quality and that the inclusion of additional dust mitigation scenarios would not alter the water quality predictions in a meaningful way.

Reference: Response to City of Kamloops Comments on the HHERA Reassessment for the Ajax Project

SLR-COK Comment 3:

0302_KAM_Fish_Data_Tables (Stantec to KGHM, March 2, 2017)

This memo was provided in support of the assessment of changes in human health risks associated with fish consumption (**Report section 4.1.2**). Table 2 Metal Concentrations in Fish Muscle Tissue has two lines of data for Uranium and Methyl Mercury. Please confirm which data were used in the calculations for the 95% UCLM concentrations used for estimating human and wildlife health risks.

Response:

Response: Uranium was non-detect in fish tissue and the detection limit concentration of 0.0004 mg/kg wet weight was used in the calculation of the 95% UCLM for combined fillet and whole body data. The line of methyl mercury data reporting concentrations of 0.0004 mg/kg- wet weight were presented in error in Table 2 and were not used in the calculation of the 95% UCLM. The last line of data for methyl mercury in fish muscle tissue was used in the calculation of the 95% UCLM for methyl mercury in whole body/muscle for the human health and ecological risk assessments.

SLR-COK Comment 4 (Part 1):

Section 4.2 Changes in Groundwater Quality-Related Exposures – Knutsford Drinking Water

Re-assessment of potential non-cancer health risks from new Future Case surface water and groundwater concentrations against the HQ of 0.2 resulted in the potential for non-cancer health risks from exposure to antimony, arsenic, and molybdenum for the toddler receptor (Table 4-4a, Column 3). The calculation incorporated the highest of either the future groundwater or surface water concentration. As stated correctly, the exceedance of a benchmark does not mean unacceptable risks exist, but rather is a trigger for further evaluation of the significance of the estimated risk (as well as assumptions that went into the risk calculation). Further evaluation assumed that Peterson Creek is unlikely used as a source for drinking water during the dry months, when metal concentrations are highest, and that groundwater is the primary source of drinking water in the Knutsford area. This is likely an acceptable assumption, but confirmation would be preferable.

When groundwater is re-assessed for potential health risks from consumption as the only source of drinking water, arsenic is the only metal where the HQ of 0.2 is exceeded in the Future Case (0.22, Table 4-4a, Column 5). This is an increase from a HQ below 0.2 (0.11, Column 4) to one above 0.2. The Proponent qualifies (for this and other exposure HQs throughout the Reassessment) that Project residual effects are only considered a human health risk if the *increase in HQ between Baseline and Future Case* conditions is greater than 0.2. Please provide a justification within applicable Health Canada guidelines for this risk assessment approach.

Response:

There is no specific guidance from Health Canada or other agencies relating to the interpretation of Project-related risks when Baseline Case exposures exceed the benchmarks set by these agencies. However, Alberta Health and Wellness provides some general guidance on the interpretation of results when HQs exceed 1.0 (Alberta Health and Wellness: Guidance on Human Health Risk Assessment for Environmental Impact Assessment in Alberta, August 2011). The Alberta

guidance notes that when the Application Case HQs exceed 1.0 the assessment of potential effects should focus on the Project-Alone case. This approach has been applied in the current assessment and the Project-Alone HQs (calculated as Application Case HQs – Baseline Case HQs) have been compared to the Health Canada risk acceptability benchmark 0f 0.2 This is consistent with the approach recommended by Health Canada for assessing site-related exposures to contaminants in the environment (Health Canada 2012: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA), Version 2.0)

SLR-COK Comment 4 (Part 2):

Section 4.2 Changes in Groundwater Quality-Related Exposures – Knutsford Drinking Water

It should be noted that the ILCR from exposure to arsenic in DW from groundwater in Knutsford is already above the acceptable level during Baseline (approximately 3×10^{-5}), and increases to approximately 6×10^{-5} due to Project Residual Effects on groundwater. The Canadian Drinking Water Quality Guideline of 0.01 mg/L is based on what is technically achievable and is not an "essentially negligible risk" guideline, in contrast to the slope factor (0.0003 mg/L), on which the ILCR is based. Therefore, provide justification that the increase in ILCR is considered "negligible".

Response:

The discussion of the cancer risk associated with the presence of arsenic in the drinking water provided in Section 4.2 of the HHERA Reassessment does not suggest that the Project-Alone cancer risk associated with arsenic in groundwater in Knutsford would be considered essentially negligible. Rather the discussion notes that the predicted future case arsenic concentration (0.0018 mg/L) in groundwater in Knutsford falls within the range (0.001 to 0.002 mg/L) naturally found in groundwater supplies in Canada (https://www.canada.ca/content/dam/canada/health-canada/migration/healthy-canadians/publications/healthy-living-vie-saine/water-arsenic-eau/alt/water-arsenic-eau-eng.pdf), and is well below the Canadian Drinking Water Quality Guideline value of 0.01 mg/L. As such residents using the groundwater as a source of domestic water would not experience lifetime cancer risks that are higher than the general Canadian population. It should also be noted that in setting the Canadian Drinking Water Quality Guideline for arsenic the Federal- Provincial-Territorial Committee on Drinking Water considered both treatment costs and the health risks associated with the presence of arsenic in the water supply in the derivation of the Maximum Acceptable Concentration (MAC) of 0.01 mg/L. The derivation of the MAC is not based solely on considerations of treatment but rather it weighs the costs of treatment against the potential human health risks in deriving a MAC that is protective of human health. As such, it is reasonable to conclude that the presence of arsenic in groundwater in Knutsford and concentrations that are below the Canadian Drinking Water Quality Guideline represent an acceptable human health risk that is consistent with what is considered acceptable in the general Canadian population.

Reference: Response to City of Kamloops Comments on the HHERA Reassessment for the Ajax Project

SLR-COK Comment 5 (Part 1):

Integration of Direct Contact Exposures and Risks

It should be clarified whether the Integration of Direct Contact Exposures and Risks incorporates ingestion and direct (dermal) contact exposures. Integration should include ingestion of country foods (garden produce, berries, and wild meats), fish, soil, water, and dermal uptake from soil, according to Figure 1-1 Conceptual Site Model and the statement on page 3.14. Is this correct? (Note: Dermal uptake of metals from water was not included as exposure was considered less significant - see Proponent response to COK-SLR538).

Response:
The integrated risk estimates provided in Section 5 of the HHERA reassessment are the combined risks from the direct contact exposures (soil ingestion, dermal contact, backyard garden produce, wild meat and traditional vegetation consumption) presented in Section 3 and the drinking water and fish consumption risks presented in Section 4 of the HHERA Reassessment.

SLR-COK Comment 5 (Part 2):

Integration of Direct Contact Exposures and Risks

Page 5.2, Bullet i) The list of metals where HQ are greater than 0.2 for the integrated exposures for toddlers (i.e., aluminum, arsenic, cobalt, lead, and thallium) should also include molybdenum (for the toddler receptor at Knutsford) and mercury (for the toddler receptor at the Kamloops Indian Reserve #1).

Response:
Molybdenum should be added to the list for toddler in Knutsford. Although the HQs for mercury for the Aboriginal toddler are above 0.2 in the restated Project cases, the baseline Case HQ is marginally below the 0.2 benchmark requested by Health Canada.

SLR-COK Comment 5 (Part 3):

Integration of Direct Contact Exposures and Risks

Exposure of the toddler receptor on the Kamloops Indian Reserve #1 to mercury appears to be the only case for integrated exposures where the Baseline HQ is below 0.2, whereas the Restated Project Case HQ (under all dust mitigation efficiencies) is above 0.2. The sources, confidence, and significance should be discussed.

Response:
The Baseline Case HQ shown in Column 1 of Table 5-1g represents the original Baseline Case HQ presented in the original EIS submission. The Future Case HQs provided in Table 5-1g (Column 3, Column 4, Column 5 and Column 6) represent the combined HQs for deposition/soil-related exposures (incidental soil ingestion, dermal contact with soil, consumption of backyard garden produce, consumption of wild meat and traditional vegetation) and water-related exposures (fish

and drinking water consumption) for the Restated Project Cases for the various dust mitigation sensitivity scenarios. Table 3-4g presents the original Baseline Case HQs for deposition/soil-related exposures (Column 1 of Table 3-4g) and the HQs for the restated Project Cases (Column 4 through Column 7). These data show a slight increase in deposition/soil related HQs between the Baseline Case and Restated Project Case conditions. For mercury the Baseline Case HQ is 0.0132 and this is predicted to increase to 0.0135 under the 90% dust mitigation and 0.0137 under the 70% dust mitigation scenario. For the Aboriginal receptor changes in water-related HQs would be limited to fish consumption because the drinking water supply for Kamloops Indian Reserve #1 will not be affected by Project activities. Table 4-2c of the HHERA Reassessment report provides the corrected Baseline Case HQ calculated using whole body and fillet metal data (Column 3 of Table 4-2c) and the Future Case HQ (Column 4 of Table 4-2c). These data show that considering the whole body and fish fillet consumption, HQs for the Aboriginal Toddler would be above 0.2 under Baseline Case conditions (HQ = 0.245) and under Future Case conditions (HQ = 0.245).

The original Baseline Case HQ for mercury, presented in Column 1 of Table 5-1g was provided to facilitate the comparison between the HQs presented in the original EIS submission and the HQs Future Case HQs that incorporate all of the changes outlined in the HHERA Reassessment Report. The significance of the increase in HQ between Baseline Case and Future Case conditions is properly based on a comparison between the recalculated Baseline Case (incorporating whole body and fillet consumption for fish) and the recalculated Project Case. The recalculated Baseline Case HQ for the Aboriginal toddler would be above 0.2 and the increase between the recalculated Baseline Case and restated Project Cases would be less than 0.2. meaning that the Project Contribution is below the hazard acceptability benchmark set by Health Canada for assessing site-related exposures to contaminants in the environment (Health Canada 2012: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA), Version 2.0).

The source of the change in HQ between the original Baseline Case and the restated Project Cases is due largely to the change in the assessment of fish consumption to include both whole body and fillet data. The HQs have been calculated using conservative assumptions of potential exposure and are expected to overestimate exposures and risks. The small change in HQ predicted to occur between the recalculated Baseline Case and restated Project Cases would represent a negligible change in human health risks. The conservatism incorporated into the assessment means that there is a high degree of confidence in this conclusion.

SLR-COK Comment 5 (Part 4): (Minor Comment)

Table 2-2: Concentration Ratios for exposure to CO are missing. However, the text states that the maximum 1-hour CR is 0.07 near the Project and CO is not considered a human health risk.

Response:

Response: Table 2.2 included the CRs for CO but this column was omitted in error during document production. Table 2.2, including the CRs for CO is provided below.

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Table 2-1 Calculation of CRs for SO_2, NO_2 and CO for the Restated Application Case (m90%)

Community Area	SO_2			NO_2			CO		
	Maximum 99th percentile 1-hour (µg/m³)	Human Health-Based AAQO (µg/m³)	CR	Maximum 98th percentile 1-hour (µg/m³)	Human Health-Based AAQO (µg/m³)	CR	Maximum 8-hour (µg/m³)	AAQO (µg/m³)	CR
Aberdeen	12.57	200	0.06	100.45	188	0.53	885.67	14300	0.06
Brocklehurst	13.83	200	0.07	63.29	188	0.34	864.95	14300	0.06
Sahali	14.28	200	0.07	78.71	188	0.42	1105.10	14300	0.08
Knutsford	3.74	200	0.02	86.02	188	0.46	454.76	14300	0.03
North Shore	15.76	200	0.08	67.25	188	0.36	1025.66	14300	0.07
West End/Downtown	14.60	200	0.07	68.03	188	0.36	924.34	14300	0.06
Jacko Lake	3.90	200	0.02	146.28	188	0.78	1025.54	14300	0.07

We trust the information addresses your needs. Should you have any questions please contact either Peter Reid or myself.

Sincerely

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