Canadian Environmental Assessment Agency
Agence canadienne d'évaluation environnementale

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October 14, 2016

Mr. Don MacDonald
Chief Executive Officer
KGHM Ajax Mining Inc.
800 West Pender Street, Suite 615
Vancouver BC V6C 2V6

Dear Mr. MacDonald:

Re: KGHM Ajax Mining Inc.'s responses to the Information Requests relating to the Environmental Impact Statement for the Ajax Mine Project

The Canadian Environmental Assessment Agency (the Agency) has reviewed KGHM Ajax Mining Inc.'s (KGHM) response to item 58 included in the information request issued on April 25, 2016, for adequacy. This item relates to the mandate of Environment and Climate Change Canada (ECCC). The Agency, with input from advice and comments from ECCC, has determined KGHM's response to item 58 is not adequate. The outstanding information is outlined in Annex 1 (attached).

The Agency continues to review KGHM's responses to items 47-57 included in the information request dated April 25 for adequacy, and will notify you of the outcome once this review is completed.

Health Canada's comments on KGHM's responses to Annex 2 of the Agency's letter of March 21, 2016, are included for your consideration.

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Please do not hesitate to contact me at 604-666-1491 or at kevin.inouye@ceaa-acee.gc.ca should you have any questions or concerns.

Sincerely,

Kevin Inouye
Project Manager
Canadian Environmental Assessment Agency

Attachments:

Annex 1 – Adequacy Review of Ajax Information Request Responses
Annex 2 – Health Canada Technical Comments

c.c.: Stephen Sheehan, Environment and Climate Change Canada
Jennifer Dorr, Natural Resources Canada
Lucille Lukey, Health Canada
Corrinne Gibson, Fisheries and Oceans Canada
Megan Masters, Major Projects Management Office
Nicola Banton, KGHM Ajax Mining Inc.
Tracy James, British Columbia Environmental Assessment Office
Kukpi7 Ron Ignace, Stk'emlupsemc te Secwepemc Nation
Kukpi7 Fred Seymour, Stk'emlupsemc te Secwepemc Nation

#	Topic	References	Rationale/Context	Information Request	Proponent response	Context for Missing Information	Adequacy of Response / Missing Information
58	Air quality	EIS Guidelines- Section 10.1 EIS - Section 10.1	Applying water to haul roads can be an effective method of dust control for haul roads. However as the roads dry, the dust control efficiency quickly decreases. In Section 4.6.1 the proponent states the "Based on the guidance outlined in US EPA AP-42 (Chapter 13.2.2 Figure 13.2.2-2), the control mitigation is assumed to be a minimum of 90% dust suppression through unpaved road surface dust management (US EPA 2006)". The AP-42 Figure 13.2.2-2 present a relationship between fugitive dust control efficiency and Moisture Ratio (M) of the road surface. Moisture Ratio (M) found by dividing surface moisture content of the watered road by the moisture content of the uncontrolled road. The maximum dust control efficiency is 90% for Moisture Ratio M=5. M=5 means that the moisture content of the watered road 5 times the moisture content of uncontrolled road. As the watered road surface dries, both ratio M and predicted control efficiencies decrease. At M=2 the control efficiency decreases to 75%, when M=1 control efficiency is zero.	Provide a description of each mitigation measure, including the timing and frequency of the mitigation measure (if any), that would be applied to each emission source in order to meet the proposed dust control efficiency of 90%. Provide examples of other operating mines similar in geological and climatic zones and circumstances that have applied similar mitigation and the dust control efficiency reached in applying those mitigation measures. Develop a follow-up program for air quality that includes an approach to monitoring results and verifying against the predictions in the EIS, and a conceptual contingency plan that outlines the approach that KGHM would take in the event that the expected results are not achieved. Provide the results, including from sensitivity analysis of the updated air dispersion model that take into account the direction provided by BC EAO.	These issues are comprehensively addressed in three memorandums that have been prepared in response to the April 28, 2016 letter from the BC EAO (**0428_Air Quality Information Request_EAO-001-006.pdf**). Please see responses to EAO 001, EAO 002, and EAO 003 (**0725_KAM_Combined Stantec Responses to EAO 001-006**).	Given the proximity of the mine to the City of Kamloops, a thorough understanding of the air quality effects and measures to mitigate these effects are an important consideration in the environmental assessment. <u>Details of Mitigation Measures and Examples</u> ECCC acknowledges a range of mitigation measures were provided by the proponent as described and referenced in the documents "Stantec Response to Request for Information EAO 001" and the "KGHM Ajax Mining Inc. Fugitive Dust Management Plan." The studies in the cited literature demonstrate that a range of control efficiencies (CEs) may be achieved, which are highly dependent on site conditions such as mine activities and meteorology. For example, in the Golder et al. study cited, CEs of >90% were achieved with road watering at the Victor mine site, but only 80% was achieved at the Snap Lake Mine, even with a watering frequency of 4 times per hour. Temperatures, solar radiation, and relative humidity in this study were typical of a taiga/arctic climate, which is generally more favourable to higher CEs than in the Interior of BC. Other cited studies also show CEs both above and below 90%. It is important to note that the modelling results provided in the EIS are based on a CE for haul roads of 90% at a minimum, achieved continuously throughout the life of the mine. The literature review provided by the proponent further demonstrates that there is significant uncertainty associated with the continuous achievement of a minimum 90% CE for haul roads. Also noteworthy is that there is the potential for adverse environmental effects associated with the mitigation measures themselves (e.g., runoff of water used for haul roads, release of chemical dust suppressants into waterways). As a result, if the proponent intends to maintain that a minimum 90% CE is achievable throughout the life of the mine, then more specific details regarding the planned mitigation measures and their environmental effects are needed. <u>Sensitivity Analysis/ Updated Dispersion Model</u> ECCC has reviewed the sensitivity analysis provided in the proponent's memo, "Additional Information Required to Support an Examination of the Air Dispersion Model Behaviour" and is satisfied that the sensitivity of the model to changes in haul road control efficiency has been adequately demonstrated. <u>Air Quality Monitoring Program and Contingency Plan</u> The proponent presented a basic outline of air quality monitoring and contingencies in the memo, "Stantec Response to Request for Information EAO 002" and in the "KGHM Ajax Mining Inc. Fugitive Dust Management Plan." Results of the sensitivity analysis provided by the proponent clearly demonstrate that, should mitigation measures for haul roads fail to achieve 90% CE, there will be potential for particulate matter concentrations (TSP, PM10, PM2.5) to exceed Provincial and Federal guidelines within the City of Kamloops. As a result, a thorough air quality monitoring plan is needed to ensure that mitigation strategies employed during operations are effective. An attendant contingency plan is needed to ensure responsive actions to remediate shortfalls in CE. The Fugitive Dust Management Plan provides a conceptual outline of this planning but is lacking sufficient detail to give assurance at the EA stage that fugitive dust will be managed effectively.	<u>Details of Mitigation Measures and Examples</u> Provide a detailed plan on the specific mitigation measures that will be used to achieve 90% CE for haul roads. Specify the methods used and their timing and frequency. Also, provide details of any environmental effects arising from the use of the mitigation measure themselves. <u>Air Quality Monitoring Program and Contingency Plan</u> Identify how monitoring will be conducted to ensure that mitigation measures achieve the committed control efficiencies. This includes the types of monitoring technology employed, parameters assessed, and their locations. Provide action (trigger) levels for particulate matter (TSP, PM10, and PM2.5) along with the specific short-term and long-term actions that will be performed in response to those exceedances. Should particulate matter concentrations reach trigger levels, how will the sources of the pollution (haul roads, pit, tailing storage facility) be identified so that the appropriate action can be taken to reduce PM concentrations?

ID#	Subject or VC	Section of EIS	Comment	Proponent Response	Comment
HC-001	Country Foods - Local Dietary Consumption Rates	10.3.2.1 Regional Overview	Rationale: The EIS Guidelines require the proponent to provide information about reliance on country foods for each identified Aboriginal group (in Part C). The EIS states that information on traditional harvesting of country foods from these Aboriginal Groups was included in the country foods effects assessment, which was used to inform the selection of plant and animal species to assess, however, does not provide a discussion of consumption levels or the reliance on country foods for each Aboriginal group. In addition, country foods consumption patterns of non-Aboriginal communities, identified as potentially impacted by the Project, could not be located in the EIS. Failure to incorporate local dietary consumption information on country foods may result in an underestimation of the potential health risk associated with the Project. Health Canada suggests that a tiered risk assessment methodology be applied, incorporating site-specific local and First Nations traditional knowledge, baseline data on contaminant levels in appropriate country foods (i.e. country foods most frequently consumed by Aboriginal groups and non-Aboriginal groups), and dietary consumptions levels, to the extent possible. Health Canada requests that baseline information about the reliance on country foods for each Aboriginal group identified in Part C of the EIS Guidelines be provided.	Information on the types of country foods typically harvested from the Jacko Lake area (the area where Project effects are expected to be greatest) by the Aboriginal groups identified in Part C of the EIS submission is provided in Section 12 of the EIS submission (Background and Aboriginal Group Setting). Aboriginal group-specific country food consumption patterns and rates were not available. In the absence of group-specific information, country food consumption rates for First Nations peoples recommended by Health Canada and additional First Nations country food consumption rates specific to the region were selected from the First Nations Food, Nutrition and Environment Study (Chan 2011) for assessing potential country food exposures for Aboriginal receptors under Baseline Case and Future Case conditions. With the exception of fish, country foods were considered to be harvested within the area around Jacko Lake. The information provided in Section 12, suggests that country food harvesting by local Aboriginal groups is not restricted to the Jacko Lake area but occurs across a wide area that extend well beyond the area that could potentially be affected by Project activities. Information provided in Part C indicates that country food harvesting occurs over a much wider area than the area around Jacko Lake. Thus, assuming that all country foods are harvested from within the immediate vicinity of Jacko Lake maximizes the estimate of potential Project effects on country foods and represents a conservative estimate of both Baseline Case and Future Case exposures and maximizes the potential change in exposure and risk that could result from Project activities. The inclusion of group-specific country food consumption rates and patterns would likely serve to lower Project-related country food exposures by reducing the proportion of the country food diet that is harvested from within the area surrounding Jacko Lake. Fish consumption from Jacko Lake was limited to 10% of the total fish yearly fish intake for the Aboriginal and general populations due to the size of Jacko Lake. In addition, information suggests that local Aboriginal peoples have a greater reliance on salmon from the Thompson River system than trout from Jacko Lake and that salmon represents the bulk of the fish consumed on a yearly basis.	25-Aug-2016: Health Canada suggests that any additional information, provided in relation to Aboriginal group-specific country food consumption patterns and rates (e.g. information provided during the SSN panel process in May 2016) during the course of the EA, be incorporated into the HHRA. HC notes that It would valuable to reflect this information If there is an opportunity to incorporate this information into the HHRA.
HC-003	Country Foods and HHRA - Screening Methodology	10.3	Rationale: The EIS Guidelines require that the assessment provide scientifically sound rationales to support the exclusion of exposure pathways that do not contribute to exposures to Project-related chemicals in the Application/EIS. Polycyclic aromatic hydrocarbons (PAHs) were included in the human health risk assessment as a contaminant of potential concern on the basis that they were identified as chemicals of concern with respect to human health. While PAHs from diesel particulate were included in the inhalation exposure pathway, their potential transfer to country foods was not considered. Lack of consideration of PAH accumulation in country foods may result in an under-estimation of the potential health risks from exposure to PAHs through consumption of country foods. Health Canada requests that a rationale be provided for the exclusion of PAHs from consideration as a COPC in country foods.	Table 3.3-6 of the Human Health and Ecological Risk Assessment Technical Data Report (Appendix 10.4-A) calculates a benzo[a]pyrene toxic potency equivalency (B[a]P TPE) of 1.99 x 10-5 µg B[a]P TPE/µg PM2.5 for diesel particulate which is equivalent to 19.9 mg B[a]P TPE/kg particulate. The maximum predicted diesel particulate deposition occurs in the recreational area around Jacko Lake (on the Project boundary) where the annual particulate deposition rate is 13 mg/m2/year (see Community-Specific Dustfall Calculations Technical Memo: 0518_KAM_Community-Specific Dustfall Calculations). Based on the annual deposition rate, a total of 325 mg of diesel particulate/m would accumulate in the soil. Therefore, at the location of maximum dust/particulate deposition, a total of 0.00647 mg B[a]P TPE would be deposited on surface soil over the 25 year operational life of the Project (19.9 mg B[a]P TPE/kg particulate x 325 mg particulate deposited/m2 x 10-6 kg particulate/mg particulate = 0.00647 mg B[a]P TPE)/m2. Over a 10 cm soil mixing horizon (with a mass of 100 kg), the deposition would increase the B[a]P TPE concentration in the soil by 6.47 x 10-5 mg/kg ((0.00647 mg B[a]P TPE/m2 x 1 m2)/(1000kg/m3 x 0.1 m3)). The CCME B[a]P TPE guideline for soil for all land uses is 5.3 mg/kg at the 10-5 risk level. The predicted increase in B[a]P TPE concentration in soil resulting from the deposition of diesel particulate is approximately 82,000 times lower than this value((5.3 mg/kg)/0.0000647 mg/kg)). In addition, the Ontario Ministry of the Environment (OMOE) lists background concentrations for individual PAHs that can be used to calculate a background B[a]P TPE concentration in soils in non-urban areas. Using the OMOE Table 1 data for other land uses, for the individual PAH (available at: https://dr6j45jk9xcmk.cloudfront.net/documents/998/3-6-3-sediment-standards-en.pdf) it is possible to calculate a B[a]P TPE background concentration of 0.368 mg B[a]P TPE/kg soil. This value is approximately 5600-fold higher than the 0.0000647 mg B[a]P TPE/kg soil increase predicted to occur. This suggests that the deposition of PAH to surface soil in the area surrounding the project will not measurably alter exiting PAH concentrations in soil and will not make a measureable contribution to exposures. Diesel particulate deposition in the community areas of Kamloops, Knutsford and the Kamloops Indian Reserve #1 are lower than what is predicted to occur around the Project and thus, the change in PAH concentrations in soil would be lower than those estimated herein. PAH do not accumulate in plants and are readily metabolized in animal species such as mammals, fish and birds. Therefore the consumption of country food does not represent a potentially complete exposure pathway for PAH. As a result, exposure to PAH through the consumption of country foods appropriately has not been included in the assessment.	25-Aug-2016: Health Canada reiterates its comment that lack of consideration of PAH accumulation in country foods may result in an under-estimation of the potential health risks from exposure to PAHs through consumption of country foods. Health Canada requests further justification (with references) to support the exclusion of PAHs from consideration as a COPC in country foods. Also, if the existing network of air monitoring stations in the proposed Project area does not include PAHs, Health Canada would strongly suggest that the Proponent's air monitoring program include PAHs to enable detection of increased environmental concentrations throughout the life of the Project. Should elevated PAH levels be detected, Health Canada would support Proponent implementation of a country foods monitoring program to assess the extent of transfer of COPCs, including PAHs, to foods and evaluate the potential risk to human health.
HC-011	Noise	Appendix 10.5A - Table 3-1 (Noise Receptor Permissible Sound Level)	The EIS Guidelines require that the Proponent identify and analyse potential adverse effects resulting from the Project. It will include effects of construction, operation, and decommissioning and closure activities, as well as post-closure; and describe measures the Proponent will commit to undertaking to mitigate the potential adverse effects identified. No daytime permissible noise levels are presented in the EIS for Dufferin Elementary school, Pacific Way Elementary school , Sahali Secondary school, and Tots and Teddies daycare. According to the World Health Organization (WHO) Guidelines for Community Noise, *'noise interferes with speech intelligibility, and since the sound pressure levels of normal speech is 50 dB(a), noise with sound levels of 35 dB(A) will interfere with the intelligibility of speech in smaller rooms* ". The WHO (1999) also states that "*it has been shown, mainly in workers and children, that noise can adversely affect performance of cognitive tasks… reading, attention, problem solving and memorization are among the cognitive effects most strongly affected by noise* ". The American National Standards Institute (ANSI) standard S12.60-2010/Part 1, Table 1, states that acceptable sound levels of background noise in learning spaces are 35 dB(A)/55 dB(C). Health Canada advises that a indoor noise level of 35 dB(A)/55 dB(C) during regular school hours (i.e. daytime) be used as the standard to determine acceptability of future noise levels at these school and daycare locations. With an expected reduction in noise levels of approximately 15 dBA between indoors and outdoors with windows partially open (WHO, 1999), outdoor sound levels should therefore not exceed 50 dBA. According to Table 10.5-9 of the EIS (Operation Phase (Year 2 and Years 4 and 8) Comparison to BC OGC PSL), predicted cumulative daytime noise levels (Ld) at Dufferin Elementary and Pacific Way Elementary schools were as high as 53 dB(A), and as such, noise levels inside the classroom(s) may exceed 35 dBA. Health Canada advises that comparison of predicted daytime noise levels be made, using ANSI/WHO acceptable criteria. Should results of this evaluation indicate that noise levels inside the school classrooms may exceed 35 dBA, Health Canada advises that the proponent propose additional mitigation measures to mitigate noise effects at these (Elementary school) receptor locations to ensure noise levels inside the classroom(s) do not exceed 35 dBA.	The BC OGC Permissible Sound Level is only applicable to residential dwellings. In order to meet the indoor level of 35 dBA, the outdoor sound levels should therefore not exceed 50 dBA (assume 15 dB noise reduction between indoors and outdoors with windows partially open). All prediction results in Table 10.5-9 are outdoor levels. The predicted cumulative sound level at Dufferin Elementary school of 53 dBA is the combined effect of the daytime baseline sound level and project only noise effect. The daytime baseline sound level of 53 dBA was used for Dufferin Elementary school (Table 2-7, Noise and Vibration Technical Data Report), based on method prescribed in BC OGC. This baseline sound level represents the existing acoustic environment without any contribution from the project. The baseline sound level value of 53 dBA exceeds the WHO outdoor noise threshold of 50 dBA. The predicted project only noise effect at Dufferin Elementary school was 25.4 dBA during Year 2 and 25.6 dBA during Year 4 and 8 (Table 10.5-6, Section 10.5 of EA). The project only noise effect is at least 27 dB below the baseline sound level, resulting in no measureable increase to the cumulative sound level (i.e. logarithmic additional of 53 dBA and 25.6 dBA is 53 dBA. In addition, the project only noise effect (i.e. 25.6 dB) is well below the noise threshold of 50 dBA. If the baseline sound level of 50 dBA (Table 2-7, Noise and Vibration Technical Data Report) is used for Dufferin Elementary school, the project only noise effect will result in no measureable increase to the cumulative sound level. This lower baseline sound level is based on measurements at monitoring location ID#3. The project only noise effect is 29.6 dBA, 22.7 dBA, and 25.4 dBA at the Pacific Way Elementary school, Sahali Secondary school, and Tots and Teddies daycare, respectively. The daytime baseline sound level of 56 dBA was used for all three receptor locations. Similar to the Dufferin Elementary school, the project only noise effect is well below the baseline sound level and the noise threshold of 50 dBA. If the 15 dB outside to inside noise reduction is applied to the project only sound level (i.e. 29.6 dBA, highest level in comparison to other schools and daycare) at the Pacific Way Elementary School, the inside sound level will be 14.6 dBA. The cumulative effect of adding 14.6 dBA and 35 dBA (assume the inside classroom ambient sound level is 35 dBA) is negligible. The project only noise effect will not result in noise levels inside the school classrooms to exceed 35 dBA.	05-Aug-2016: Noise monitoring during operations, particularly in the event of public complaints, would be useful in order to validate noise model predictions and inform the implementation of mitigation measures.
HC-013	Noise - Current Use of Lands and Resources for Traditional Purposes	Appendix 10.5A - EIS Table 5-2 (Construction Phase Piling Noise Modelling Results) and Table 5-3 (Operation Phase (Year 2 and Years 4 and 8) Noise Modelling Results) of Appendix 10.5A	The EIS Guidelines require that background information will include traditional ecological or community knowledge relating to the VC (noise), where publically available or provided by Aboriginal groups. The EIS Guidelines also require that a description of measures the Proponent will commit to undertaking to mitigate potential adverse effects be included in the EIS. Appendix 10.5A - EIS Table 5-2 (Construction Phase Piling Noise Modelling Results) of the EIS indicates that construction phase piling noise modelling results will equate to approximately an Ldn of 81.6 dB(A). Table 5-3 (Operation Phase (Year 2 and Years 4 and 8) Noise Modelling Results) of Appendix 10.5A indicates that during the operational phase of the project (years 4 and 8), day-night sound levels (Ldn) at the Jacko Lake Prayer Tree are predicted to be 55.6 dB(A). Although it is stated that the noise levels at the Jacko Lake Prayer Tree will meet with regulatory criteria during construction and operation (except for the two months when piling noise will be high), given that it is a ceremonial site, there may be a higher expectation of peace and quiet at that location than what is required in the regulatory guidelines. Additional justification is needed to validate the appropriateness of using the BC OGC ASL and Health Canada's % change in highly annoyed (HA) to evaluate the acceptability of noise levels at ceremonial sites. Health Canada requests that additional justification be provided on the appropriateness of using "acceptable" regulatory noise levels (as opposed to using more protective noise reduction target levels) when considering the importance of effectively preserving/protecting First Nations' ceremonial/sacred sites and traditional practices, where a higher level of peace and quiet may be warranted/requested and where consideration of additional mitigation measures may be appropriate.	**Long term operation and construction** Health Canada's (2010) Useful Information document provides the most appropriate noise guidance on noise-induced health effects for both long-term operation and construction noise effect. The provincial BC OGC noise guideline does not provide any quantitative threshold for construction noise effect. For long-term operation noise effect, the BC OGC noise guideline focuses on residential receptors. In the Health Canada 2010 noise guidance, the %HA approach is recommended for operation and construction noise at receptors with durations of more than one year (i.e. long-term). The Health Canada noise guidance also considers a variety of internationally recognized standards for acoustics (EPA 1974 and CSA/ISO 1996). The CSA-ISO 1996 noise guidance indicates that there is a greater expectation for "peace and quiet" in quiet rural settings. This greater expectation for "peace and quiet" may be equivalent to up to 10 dB. Therefore, a +10 dB adjustment to the baseline Ldn and Project only Ldn can be applied in the determination of change in %HA. This approach produces increasing larger change in %HA, which can be used as a more protective noise reduction target level. In comparing long term operation and construction scenarios, the Operation (year 4 and 8) was considered as a predictable worst case with highest noise emission based on the quantity of the equipment fleet, haulage lengths, total amount of material moved, and the location of the active mine rock storage facilities. In the Operation (year 4 and 8) scenario, the implementation of this +10 dB adjustment will result in a change in %HA of 12.1% at the Jacko Lake Prayer Tree location (TLU9. In order to meet the threshold of 6.5%, the Project only noise effect (i.e. Ldn) should be reduced from 55.6 dBA to 51.2 dBA, a 4.4 dB reduction. In this case, the dominant noise contributions at TLU9 are mine pit equipment and haul truck traffic from mine pit to the TSF mine rock storage area. The noise effect can be reduced by the implementation of mitigation measures to the dominant noise emission equipment. The mitigation measures methods are presented in the EIS (Section 10.5.4.2). **Short-term Construction** For construction noise at receptors with duration of less than one year (i.e. short-term), Health Canada advise that mitigation be proposed if the results levels are predicted to result in widespread complaints or a strong community reaction, based on the US EPA 1974 noise guidance method. In the US EPA 1974 noise guidance, the Ldn level of 55 dBA (Table 1 in the EPA 1974 noise guidance) is the noise level identified as requisite to protect public health and welfare with an adequate margin of safety, at outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use. In the "Summary of Annoyance Survey Results" section of the US EPA 1974, the results indicate that below an outdoor day-night sound level of 55 dB, "No reaction" would be expected in the average community, and noise would be the least important factor in attitude towards neighborhood. At Ldn level of 60 dBA or above, some reaction to vigorous community reaction could be expected. The Ldn level of 55 dBA can be considered as the appropriate noise guidance for short term construction activities such as piling, with consideration of a higher level of peace and quiet during ceremonial/scared sites and traditional practices. During the 2 months of piling activities, KAM will consider the following additional mitigation measures at TLU9 to reduce the noise effect: • Temporary barrier/shielding for the piling equipment • Use of vibratory piling equipment • piling activity can be scheduled (where possible) to avoid ceremonial activities. In short-term construction activities, KGHM can consider other protective noise reduction target levels and would appreciate guidance on the quantitative thresholds for environment where a higher level of peace and quiet may be requested. There will be permanent sound level meter installed near TLU 9 to monitor noise effect from the Project during the construction and operation phases. If the noise monitoring results indicate noise effect exceeding the %HA or the US EPA threshold for short-term construction, KGHM will identify the dominate noise sources and apply corrective actions (i.e. mitigation measures or administrative controls) to meet the target. **Reference:** CSA-ISO 1996. Canadian Standard Association CSA-ISO 1996-1:05 standards "Acoustics — Description, measurement and assessment of environmental noise - Part 1: Basic quantities and assessment procedures" US EPA. 1974. United States Environmental Protection Agency (EPA). Office of Noise Abatement and Control. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. At TLU9, the BC OGC ASL was not used in the determination of baseline %HA. The baseline measurement result at Jacko Lake (i.e. Ldn of 43 dBA) was used to determine the Baseline %HA (Appendix 10.5A – EIS Table 5-6) of 0.88. The BC OGC ASL was presented in the table for comparison purpose only. For long term operation and construction activities, KGHM will consider other protective noise reduction target levels, and would appreciate guidance on the quantitative thresholds for environment where a higher level of peace and quiet may be requested.	05-Aug-2016: Health Canada does not have specific thresholds for acceptable noise levels at sacred or ceremonial sites. However, depending on site usage, for quiet outdoor activities such as prayers or conversations, the World Health Organization (1999) states that for clear speech perception the background noise level should not exceed 35 dBA. For meditation-type activities requiring a very quiet environment, the WHO (1999) sleep disturbance guidance could be applied. The WHO (1999) indicates that for continuous noise, the equivalent sound pressure level should not exceed 30 dBA to be protective against sleep disturbance. As such, in recognition of outdoor activities that require a high level of 'peace and quiet,' consideration should be given to maintaining outdoor noise levels in the range of 30-35 dBA.

ID#	Subject or VC	Section of EIS	Comment	Proponent Response	Comment
HC-015	Noise	10.5	Information on potential vibration effects upon existing off-site underground infrastructure (e.g. domestic water distribution lines) could not be located in the EIS, and is required, given the potential health risks that could result from such damage in allowing the introduction of contaminants into the drinking water distribution system. Health Canada suggests that the Proponent confirm if potentially damaging vibration effects to off-site underground infrastructure such as domestic water distribution lines was considered in the noise effects assessment, or provide a defensible rationale as to why this was not required.	The closest off-site underground infrastructure such as domestic water distribution lines is located at the city development boundary (Vibration receptor ID#3), approximately 1.5 km from the mine pit. Similar underground infrastructure will be located at the mine facility located 1.5 km away. The predicted ground vibration effect at vibration receptor ID#3 is 2.1 mm/s. The US Bureau of Mine RI9523 "Surface Mine Blasting Near Pressurized Transmission Pipeline " is the most comprehensive summary of damage protection for buries pipeline. The study concludes that no vibration damage to the pipelines occurred at amplitude up to 600 mm/s. Other research (David Siskind, 2000: Vibration from Blasting, International Society of Explosives Engineers) recommends a threshold of 127 mm/s for buried utilities including wells and pipelines. Vibration damage to water well casing or borehole is not possible below 50.8 mm/s. The predicted ground vibration level of 2.1 mm/s at the urban development boundary is well below the thresholds for potential damage of off-site underground infrastructure.	In the event of public complaints about water quality, the proponent should investigate and mitigate if water wells have been damaged or water quality is reduced and parameters exceed the *Guidelines for Canadian Drinking Water Quality.*
HC-037	HHRA	Section 10.4 Human Health Risk Assessment, 3.3.3.Existing and Predicted Future Conditions	The proportioning approach shown in the future media calculation for fish appears to simplify to a site specific uptake factor, not literature-based values as proposed in the text. The literature-based uptake factors cancel out of the equations. Generally, site-specific uptake factors are preferred over literature-based values; however the site-specific uptake factors should be compared to literature values to ensure they are appropriately conservative, especially, when media are substituted for other (e.g. beef substituted for wild game), or undersize samples are collected (10 - 130 g fish), or a small sample size is use to estimate concentrations. Please clarify what uptake factors were used to estimate future media concentrations. Clarify what uptake factors were used to estimate future media concentrations.	Please see **Annex 3** for the proponent response.	23-Aug-2016: The issue about sample size (of fish collected) does not appear to be addressed and thus remains. Specifically, the sample size may be too small a sample size to allow for any meaningful risk estimates and conclusions to be made or that the uncertainties associated with such a small sample size may be significant relative to actual site conditions. Also, the size of the fish that were collected are not reflective of what would typically be consumed by local populations and as such would not be representative to estimate risks to human health. If improved fish sampling and analysis is conducted to address CEAA-IR 0023 (using eating size fish), this comment will be considered addressed.
HC-052	Health - Air Quality	Section 2.2.3 Respirable Particulate Matter (PM2.5) Trends	Section 10.1.1.3 mentions that VOCs are "pollutants of concern" in the City of Kamloops' Airshed Management Plan (AMP). However, this section does not make any reference to volatile organic chemicals (VOCs), including airborne emissions from diesel equipment and vehicles, and their potential effects on human health. Provide a discussion of VOCs, identifying the composition of airborne emissions from diesel equipment and vehicles (PM composition, VOCs), and their potential impact on human health. The omission of this information from the assessment could result in an underestimation of human health effects.	In Section 3.2 of Appendix 10.1-A Polynuclear Aromatic Hydrocarbon species (PAH) expressed as B(a)P equivalent are indicated as a Hazardous Air Pollutant (HAP) considered in the HHERA. PAH's are the sole VOC species considered. Other VOCs are either low in toxicity, or are emitted in small quantities, and are thus not included in the assessment.	17-Aug-2016: Using PAHs as a surrogate for VOCs is inappropriate. PAHs are substances that require analysis in this setting and are HAPs as noted. However, they are not by most definitions VOCs, and an assessment of the potential human health impact of VOCs is still outstanding.
HC-054	Health - Air Quality	Appendix 10.1-A 2.1.2.4 Line Sources and Volume Sources	It is stated in Section 2.1.2.4 that "The access road should be ready before the construction year that is assessed, so only the dust and exhaust due to travel on the access road will be considered for both Construction and Operations." Please explain why the construction of this access road is not being considered as a part of the proposed project. Provide an explanation as to why the construction of the access road described in Section 2.1.2.4 is not considered as a part of the proposed Project.	The peak construction year was determined to be year -1 (year "minus" 1). During this peak year there are the majority of the construction emissions. During the year when the access road is being constructed the total construction emissions would be much lower than during peak construction year -1.	17-Aug-2016: Health Canada understands that emissions would be lower during the year where access roads are constructed, but they should be considered and be quantified as accurately as possible.
HC-055	Health - Air Quality	EIS Volume 10 10.1.2.3 Baseline studies	Section 10.1.2.3 states that "Unpaved road dust emissions are less than 16% of the paved road emissions (Zhang 2015, pers. comm.) and are not included" in the modelled Base Case. More context is needed to understand this statement, because it is unexpected that road dust emissions from an unpaved road would be a lot less than on a paved road, unless some other variable is at play (e.g. traffic volume, or the sheer number of paved roads is many times greater than unpaved roads). Regardless, all road dust emissions, from both paved and unpaved roads, should be included in the assessment, and the proponent's statement does not form a valid reason to exclude unpaved roads. Provide context for the statement that "dust emissions are less than 16% of the paved road emissions". All road dust emissions, from both paved and unpaved roads, should be included in the assessment.	The primary influences on air quality in the study area are emissions from urban heating and traffic emissions on the major paved highways and urban paved roads. Traffic volume on paved roads is orders of magnitude larger than unpaved roads in the study area. The non-industrial emissions for the model domain (30 km x 30 km) were extracted from 10 km by 10 km emission database provided by Environment Canada (EC) for the year 2008 (the most recently available version). The gridded 2008 emissions were updated for year 2011 using project emission factors based on BC provincial level 2008 and 2011 emission inventories. Compared to the paved road dust emissions, the unpaved road dust emissions are small. They are 11.1%, 20.7%, and 12.2% of paved road dust emissions in terms of TPM, PM10, and PM2.5, respectively. The majority of the study area is composed of paved roads. Essentially all of the roads within the City of Kamloops are paved. The main roadways near the project site are all paved. Areas with unpaved roads in the study area are primarily located in sparsely populated rural areas near the edges of the air quality study area, well away from the areas of highest predicted pollutant concentrations. Thus unpaved road dust emissions were not included in the modelling as emissions from unpaved roads are much smaller than paved roads and are located well away from the areas of highest predicted pollutant concentrations. Inclusion of unpaved road emissions in the model would not result in any meaningful difference in maximum predicted concentrations and will not change the conclusions of the air quality assessment	17-Aug-2016: It is inappropriate to not consider such a source in modelling. The source for the estimate of the relative importance of unpaved road emissions appears to originate within the company (Zhang pers comm) and should not be considered a valid source without substantial objective backup information: pers comm citations are rarely suitable. The proponent indicates that almost all the roads in the study area are paved and yet the unpaved road dust emissions represent up to 20% of the total for PM10. This shows a fairly large impact over the study area for what is characterized as a small ("orders of magnitude") source in comparison to paved roads. If, as it appears, the proponent is averaging the unpaved road emissions over the entire study area it could indicate that localized impacts near the unpaved roads would still be significant. Therefore, while area wide averaging is useful, localized analysis of impacts on receptors living near unpaved roads is necessary, or it must be proven that there are no such receptors.
HC-056	Health - Air Quality	Appendix 10.1-A Executive Summary	The Appendix states that "a City-wide analysis shows that the predicted average annual PM2.5 is 6.4 µg/m3, and that can vary by 14% annually. City wide, the project is predicted to add 2.3%—a sixth of the normal year-to-year variation. Project Operations has a limited effect on air quality in Kamloops." Predicted Project-related impacts on ambient air quality are presented in the document's "Executive Summary" and elsewhere with inadequate context. The report compares annual PM2.5 in Kamloops to other Canadian cities relying on out-of-date data (Table 2-9, 1999 publication, values averaged for 3-yr period of 1992 - 1994). The statement that "This work reveals that exposure to ambient respirable PM2.5 in Kamloops is better than any of the 18 cities studied" is not based on recent data and should be verified/updated and presented alongside revised recent data (Table 2-9). It is also important to acknowledge that any increase in PM2.5 concentrations is going to have health impacts, as there is no evidence of a threshold for health effects at the population level. Predicted exceedances of the 24-hour AAQO for PM2.5 are also a concern, as they indicate that 16 days will have daily averages above the objective, with elevated health risks for exposed populations. Update the data in Table 2-9, to support the statements made about predicted project-related impacts to PM2.5, with recent data. Include an acknowledgement that any increase in PM2.5 concentrations will result in health impacts, as there is no evidence of a threshold for health effects at the population level.	Section 2.2 of Appendix 10.1-A (Background Air Quality) provides a comprehensive summary of Air Quality in Kamloops, including summaries of continuously measured particulate and gaseous substances (Tables 2.1, 2.2, and 2.7) and intermittently monitored particulate matter (Tables 2.3, 2.4) and dustfall (tables 2.5, 2.6). Tables 2.8 and 2.9 summarize the PM2.5 (CAAQS metric) and Health Canadas SUM15 metric. The PM2.5 CAAQS data and the SUM15 metric in Table 2.8 are presented for information purposes to show the relative magnitude of these metrics, and trends over time. Table 2.9 shows, for reference purposes, the SUM15 metric, published by Health Canada (1999) at eighteen Canadian sites, simply to illustrate Kamloops has relatively good air quality. It is not meant as an exhaustive paired in time analysis, but simply to illustrate a general fact - that Kamloops has relatively good air quality. The health effects attriutabe to inhalation of particulate matter are considered in detail in Appendix 10.4-A and Chapter 10 of the EIS/Application.	17-Aug-2016: The EIS and proponent response, regarding $PM_{2.5}$ health effects in Section 4.4.3.1 (Appendix 10.4-A), fail to properly acknowledge that any increase in $PM_{2.5}$ concentrations is going to have health impacts, as there is no evidence of a threshold for health effects at the population level.

ID#	Subject or VC	Section of EIS	Comment	Proponent Response	Comment
HC-057	Health - Air Quality	Appendix 10.1-A Executive Summary	The Appendix states that “an analysis of the predicted change in the Federal Air Quality Health Index (AQHI) demonstrates that the Project has little effect on the overall air quality in Kamloops.” As the AQHI focuses solely on PM2.5, ozone, and NO2, and the project contributes other air pollutants to the airshed, it is not appropriate to state that the project will have little effect on overall air quality in Kamloops based only on the AQHI, as there are other pollutants and factors to consider. The assertion that the AQHI analysis “demonstrates that the Project has little effect on the overall air quality in Kamloops” is also not valid. When comparing AQHI results for Application Case Construction (Table 5-10) and Application Case Operations (Table 5-15) against the Base Case (Table 5-3), the effects of the project are apparent in showing a deterioration of air quality, especially at Sites 1-3. Looking at Site 2 for example, the amount of time at moderate health risk rises from 0.3% to 2.0% of the year for construction (an additional 6 days), and from 0.3% to 4.5% of the year for operations (an additional 15 days). At this site there is also an additional 3 days of high health risk due to project operation (0.8% vs. 0%). These results demonstrate definite air quality effects, also keeping in mind that this analysis only considers 2 pollutants when the project is a source of many more pollutants. Additionally, it is noted that ozone as a result of the project is not included in the calculation; background ozone from a monitoring station was used instead; therefore the AQHI impacts from the project may be underestimated. Remove or revise the statement that “an analysis of the predicted change in the Federal Air Quality Health Index (AQHI) demonstrates that the Project has little effect on the overall air quality in Kamloops”. This assertion is not valid, as the effects of the project are apparent in showing a deterioration of air quality, especially at Sites 1 to 3.	Environment Canada’s website states that “The Air Quality Health Index (AQHI) is a public information tool that helps Canadians protect their health on a daily basis from the negative effects of air pollution. This tool has been developed by Health Canada and Environment and Climate Change Canada, in collaboration with the provinces and key health and environment stakeholders.” The AQHI takes into account the additive effects of exposure to PM2.5 plus nitrogen dioxide plus ozone. The AQHI was employed as a supplemental analysis to illustrate general air quality trends at six representative locations in a north-south transect across the City. This supplements an analysis which looks specifically at PM2.5 at these same locations (Table 5.2, and Figures 5.1-2 and 5.6-1). These analyses focus on attribution of base case effects on PM2.5 and between base case and the project case contributions. These analyses make it clear what effects the proposed Project may have on particulate air quality, and that there is a measure of deterioration of particulate air quality near the sources. The Background air quality section (2.2) shows that particulate matter (PM2.5 specifically) and NO2 are the two most important substances of concern in Kamloops, as other substances are present a very small fraction of the most stringent ambient Obective. The inclusion of measured Ozone in the AQHI from the year 2003 was viewed as an acceptable substitute to not having ozone present at all, seeing as how nautural background levels of ozone dominate the AQHI. The inclusion of ozone in the AQHI helps place these other substances (PM2.5 and NO2) in perspective.	17-Aug-2016: As mentioned previously, aside from using AQHI, there are other pollutants and factors to consider when assessing Air Quality effects in the project study area. The Proponent's response continues to fail to acknowledge Health Canada's request that they remove or modify the statement: “the Project will have little effect on overall air quality in Kamloops.”