TO: Stefan Crampton, Impact Assessment Agency of Canada (IAAC)
FROM: Impact Assessment Team, Health Canada (HC)
DATE: March 5, 2024 (extension granted by IAAC)
SUBJECT: Crown Mountain Coking Coal Project – Technical Review of Environmental Impact Statement (EIS)

ANNEX 2: Information requests directed to the Proponent

Table 1: Comments and suggestions for information requests to be directed to the Proponent

IR #	Project Effects Link to CEAA 2012	Reference to EIS/A guidelines	Reference to EIS/A	Context and Rationale	Specific Question/ Request for Information
HC-IR-01	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 6 Atmospheric Environment Assessment	Chapter 6: Atmospheric Environment Assessment 6.2.3 Assessment Boundaries PDF p. 12	**Diesel Particulate Matter (DPM) was not assessed.** Table 6.2-2 states that "Diesel particulate matter [DPM] was quantified in the modelling." Health Canada (HC) agrees that DPM could be produced from diesel engines and equipment during Project activities. However, HC is unable to locate the assessment in the EIS.	HC recommends the following: Provide a non-carcinogenic and carcinogenic assessment of project-related DPM. Please note that HC's 2016 guidance (HC, 2016) provides short-term and long-term guidelines for the assessment of non-carcinogenic effects of DPM. In addition, HC's 2023 guidance (Appendix C) provides a sample calculation on how to conduct a carcinogenic assessment of DPM (HC, 2023). HC. 2016. Human Health Risk Assessment for Diesel Exhaust. Available online at: http://publications.gc.ca/site/eng/9.810907/publication.html HC. 2023. Guidance for Evaluating Human Health Effects in Impact Assessment: Air Quality. Available online at: https://publications.gc.ca/collections/collection_2024/sc-hc/H129-54-1-2023-eng.pdf
HC-IR-02	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 6 Atmospheric Environment Assessment	Chapter 6: Atmospheric Environment Assessment 6.5.2 Project Effects	**Volatile Organic Compounds (VOCs) were not assessed.** Table 6.5-4 (PDF p. 55) predicts the ground-level concentrations of volatile organic compounds (VOCs) for the Project case, but no further assessment is conducted due to the minimal Project emissions and lack of provincial or federal criteria for ambient	HC recommends the following: Assess the health risks of project-related VOCs using Health Canada Toxicological Reference Values (HC, 2021) and Indoor Air Reference Levels (HC, 2018). Where criteria are not available from a Canadian jurisdiction, criteria from other jurisdictions (e.g., U.S. EPA) may be

			PDF p. 43	VOCs. HC notes in cases where there are no screening criteria available, contaminants of potential concern (COPCs) may be carried forward into a quantitative risk assessment to determine whether there may be health risks associated with the predicted concentrations. Given VOCs could be emitted from the Project, instead of considering the concentration of total VOCs (for which there is no applicable toxicological reference value) when assessing health risk, individual VOCs could be assessed.	used, along with sufficient justification. HC. 2021. Federal Contaminated Site Risk Assessment in Canada: Toxicological Reference Values (TRVs), version 3.0. Available online at: https://publications.gc.ca/collections/collection_2021/sc-hc/H129-108-2021-eng.pdf HC. 2018. Indoor Air Reference Levels. Available online at: https://www.canada.ca/en/health-canada/services/publications/healthy-living/indoor-air-reference-levels.html
HC-IR-03	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 6 Atmospheric Environment Assessment	Chapter 6: Atmospheric Environment Assessment 6.5.4.3.1 Change in Ambient Criteria Air Contaminant Concentration PDF pp. 64-65 Appendix 6-C: Air Quality and Greenhouse Gas Assessment Table 31 PDF p. 109	**The predicted regular exceedance of ambient air quality criteria does not support the conclusion of "not significant" residual effects.** Section 6.5.4.3.1 of Chapter 6 predicts regular exceedances of the British Columbia (BC) Ambient Air Quality Objectives (AAQO) for certain air pollutants (e.g., nitrogen dioxide: NO_2, fine particulate matter: $PM_{2.5}$) at some of the sensitive receptors located to the northwest of the rail loadout (e.g., Receptor S202 PDF p. 65, S200 PDF p. 57). For NO_2 (1-hour), PDF p. 55 indicates that the average and maximum exceedances of the Canadian Ambient Air Quality Objectives (CAAQS) could occur less than 5% and 24% of the time, respectively. For NO_2 (annual metrics), Appendix 6-C (Table 31, PDF p. 109) indicates there will be potential 2025 CAAQS exceedances. Regarding $PM_{2.5}$ (24-hour), the average and maximum exceedances of BC AAQO are 10% and 100%, respectively. For $PM_{2.5}$ (annual), the average and maximum exceedances of BC AAQO are both 100% of the time. However, the Proponent concludes in Chapter 6 that, given the conservatism of the assessment (e.g., using the worst-case scenario) and the commitment to implement mitigation and monitoring measures, the residual effect regarding ambient air quality is rated as "not significant". HC is of the opinion that regular exceedances of the guidelines should not be considered as "not significant". In addition to the regular exceedances, HC notes that the provincial	HC recommends the following: a) Provide additional justification to support the conclusion of "not significant" residual effects on human health from exposure to NO_2 and $PM_{2.5}$. b) Include NO_2 and $PM_{2.5}$ in the Human Health and Environmental Risk Assessment (HHERA), especially given the non-threshold nature of these air pollutants (e.g., potential health effects could occur at any level of exposure to the air pollutants). c) Given the AQMS designation, identify additional mitigation measures that could be implemented to reduce the project's NO_2 and $PM_{2.5}$ emissions to as low as reasonably achievable.

				air zone report (2018-2020)* for the southern interior of BC (where the Project is located) has assigned the Air Quality Management System (AQMS) level of "red" for $PM_{2.5}$ and sulphur dioxide ($SO_{2)}$, and "orange" for NO_2. For red management level, the most stringent air quality action is recommended to achieve the CAAQS in the future (given CAAQS exceedances in certain areas). The orange management level means NO_2-related actions are recommended to prevent future exceedances of CAAQS. * BC Ministry of Environment and Climate Change Strategy. Southern Interior Air Zone Report (2018-2020). Available online at: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/air-zone-reports/2018-to-2020/southern_interior_air_zone_report_2018_to_2020.pdf	
HC-IR-04	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 6 Atmospheric Environment Assessment	Chapter 6: Atmospheric Environment Assessment S6.7.1 Ambient Air Quality Monitoring Program PDF p. 90-94	**It is unclear what action will be taken if monitoring results exceed the ambient air quality predictions.** Section 6.7.1 commits to conduct Project-specific air quality follow-up monitoring , and one of the objectives is to verify the environmental assessment (EA) predictions related to air quality. However, it is unclear what action will be taken if and when the EA predictions are exceeded. PDF p. 93 states: "If monitoring results exceed the relevant criteria at a monitoring location, appropriate NWP Coal Canada Ltd (NWP) personnel will be notified immediately so that appropriate steps can be taken, including an investigation to identify the potential cause(s) of the exceedance." There is however no discussion of other scenarios (e.g., exceedances of EA predictions) in relation to action and adaptive management measures. When developing a monitoring plan and mitigation measures, the most conservative approach for dealing with exposure to non-threshold air pollutants such as NO_2 and $PM_{2.5}$ is to use existing concentrations as benchmark levels. Trigger levels for non-threshold air pollutants are not only informed by relevant ambient air quality standards (e.g., CAAQS), but also by pre-Project baseline concentrations and the analysis of local air quality in relation to the air zone management levels for each pollutant. Therefore, the Proponent can respond to any deterioration of air quality relative to	HC recommends the following: a) Clarify what action will be taken if monitoring results differ from the ambient air quality predictions. b) Confirm that baseline concentrations and guidelines such as CAAQS also inform the trigger levels for implementing adaptive measures.

				pre-project pollution levels.	
HC-IR-05	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 6 Atmospheric Environment Assessment	Appendix 6-C: Air Quality and Greenhouse Gas Assessment Table 31 PDF p. 109	**Incomplete information is provided on NO_2 and SO_2 CAAQS exceedances.** Appendix 6-C (Table 31) compares air pollutants (i.e., NO_2 and SO_2) with the 2025 CAAQS. For NO_2 (1-hour), the table indicates that "% of receptors which exceed objective" is 0.2%, but for "Maximum frequency of exceedance of objective" and "Average exceedance frequency for receptors with exceedances" are described as "N/A". It is unclear why no numeric values were calculated for the frequency of exceedances. In addition, it is unclear whether this scenario refers to the Application case (i.e., Project + baseline).	HC recommends the following: Include a comparison of predicted concentrations of air pollutants (e.g., NO_2, SO_2) against the most updated CAAQS in Chapter 6 of the EIS including Table 6.5-4 (PDF p. 55).
HC-IR-06	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 7 Acoustic Environment Assessment	Chapter 7: Acoustic Environment Assessment 7.2.2 Indigenous and Stakeholder Consultation PDF p. 7 7.4.2.1.3 Additional Representative Human Receptors PDF p. 16	**Background sound level measurements were not taken at locations identified by potentially affected Indigenous groups.** Chapter 7 indicates that the Ktunaxa Nation Council (KTC) provided the locations of sensitive receptors within the Project footprint that relate to current and rights-based use in order to inform various assessments, including the acoustic assessment. However, because these sensitive receptor locations were provided after the baseline noise monitoring program was completed, background sound level measurements were not taken at these locations. Instead, it was assumed that the results from the closest ambient monitoring locations (ML1-6) would be representative of the sensitive receptor locations (R7-12). HC notes that although many of the ambient monitoring locations are near the sensitive receptors identified by the KTC, Receptor R9 (a trapline cabin located in the north-east part of the Project area) is 4-5 km north-west of the monitoring location (ML2) that is assumed to represent it. Additionally, R9 is closer to the existing Line Creek Operations coal mine north of the Project, and will be near the junction of various future Project components near Grave Creek Road. Therefore, R9 does not appear to be well-represented by monitoring location ML2. HC also notes in Table 7.4-2 (PDF p. 16) that the baseline for ML2 has Ld and Ln of 47 dBA. However, for ML4 the Ld and Ln are 36	HC recommends the following: a) Collect background sound level measurements at R9 or provide detailed rationale to support using ML2 measurements to represent R9. The rationale should include a list of all the key noise sources that contribute to the baseline at each location, and a characterization of noise types with descriptors (e.g., continuous, intermittent, regular impulsive, highly impulsive, high-energy impulsive, continuous tonal and intermittent tonal). b) Alternatively, the most conservative baseline for a quiet rural area (e.g., 45 dBA during the day and 35 dBA during the night) could be considered for R9. c) Clarify why the noise baseline for ML2 is higher than ML4.

				and 29 dBA, respectively, even though ML4 (a campground and boat launch site) appears to be closer to more human activities in comparison with ML2 (a snowmobile cabin).	
HC-IR-07	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 7 Acoustic Environment Assessment	Chapter 7: Acoustic Environment Assessment 7.2.3.1 Spatial Boundaries PDF p. 9 7.6 Cumulative Effects Assessment PDF p. 49	**Regional noise sources were not considered in the establishment of the study area boundaries for acoustics.** Chapter 7 indicates that the boundary of the acoustic Local Study Area (LSA) is based on identified sensitive receptors and environments within a 3 km radius surrounding the boundary of the Project footprint. A Regional Study Area (RSA) for the Project was not assessed for noise and vibration effects, owing to "…the fact that noise and vibration levels from a source are generally not distinguishable from background levels beyond 2 to 3 km of the source…". As well, "… given that there are no other substantial sources of human-made noise and vibration within the immediate vicinity of the Project, there would be no spatial and temporal overlap of the Project with other past, present, or reasonably foreseeable future project activities that would lead to cumulative effects" (PDF p. 9). However, HC notes the presence of several existing mining operations (e.g., Elkview Operations, 8 km southwest of the Project), various transportation routes (e.g., Highway 43 to the immediate west of the LSA), and the local community of Sparwood (pop. 4,148 [2021], 12 km southwest of the Project), which may justify establishing a larger, more conservative study area for acoustics, beyond which Project-related noise levels would not be expected to exceed guidelines. In addition, low frequency noise (LFN) travels further than higher frequencies and this may also need to be considered when establishing the study area boundaries for acoustics.	HC recommends the following: a) Discuss the types of noise produced regionally, and justify why there is no potential for these to interact cumulatively with Project-related noise at receptor locations. b) Specify how LFN was considered when developing the study area boundaries for acoustics.
HC-IR-08	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 7 Acoustic Environment Assessment	Chapter 7: Acoustic Environment Assessment 7.2.3.2 Temporal Boundaries PDF p. 10	**Noise effects were only assessed for the operational phase of the Project.** For the purposes of the acoustic assessment, operational Year 10 of the Project was used as the single worst-case year for noise and vibration effects from the Project on surrounding sensitive receptors. This was to ensure that "Project-related noise and	HC recommends the following: a) Assess construction and operation noise separately, otherwise explain how the noise assessment results are representative of all Project phases given the different noise sources between phases.

				vibration levels during other Project phases, along with the resulting environmental effects, are not underestimated." Although the potential change to the acoustic environment from construction and pre-production activities is generally described in Section 7.5.2.2.1, HC guidance (HC, 2023) recommends that the worst-case year for each Project phase (e.g., both construction and operations) be fully assessed and presented, since there will be different noise sources at each Project phase (as indicated in Table 7.5-4). HC. 2023. Guidance for Evaluating Human Health Effects in Impact Assessment: Noise. Available at: https://publications.gc.ca/collections/collection_2024/sc-hc/H129-54-3-2023-eng.pdf	b) Describe any tonal, regularly impulsive, highly impulsive, or high-energy impulsive noise anticipated during each Project phase.
HC-IR-09	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 7 Acoustic Environment Assessment	Chapter 7: Acoustic Environment Assessment 7.4.2.1.1 Monitoring Methodology PDF p. 13 S7.7.2 Noise and Vibration Monitoring PDF p. 50	**Noise monitoring did not record C-weighted decibels that are more appropriate for low frequency sounds.** Chapter 7 indicates that an ambient noise monitoring program was undertaken by gathering hourly A-weighted sound level equivalents, and that A-weighted decibels (dBA) are sound levels (as measured on a sound meter) that emphasize the middle-frequency components of sound that is similar to the response of the human ear. If the potential for LFN exists (e.g., from regional rail activity, nearby mining activities), HC recommends that ambient measurements also be recorded using C-weighted decibels (dBC) using the criteria of 60 dBC (Broner, 2011). C-weighting represents the response of the human ear to very loud sounds and emphasizes the low frequencies of sound much more than the A-weighting (HC, 2023). Measurements for dBC can be made using two concurrently monitoring sound level meters, a dual-channel sound level meter, or other equipment capable of obtaining both the C- and A-weighting of sound levels simultaneously. Regarding LFN, HC (2023) also recommends the American National Standards Institute (ANSI, 2005) standard on environmental sound for guidance on assessing low-frequency sound (or infrasound) in	HC recommends the following: a) Specify whether the Project is expected to generate LFN, and how the baseline monitoring results will be used to assess Project-related effects. b) Assess the effects of Project-related LFN using C-weighted decibels (dBC) or Z-weighted decibels (dBZ) – thresholds: 60 dBC and 70 dBZ, respectively.

				the 16–63 Hz octave bands. To prevent rattles from LFN and the associated annoyance from this effect, ANSI indicates that the (energy) sum of the sound levels in the 16-, 31.5- and 63-Hz octave bands be less than 70 dBZ. If this 70-dBZ "rattle criterion" is exceeded, HC may suggest the implementation of feasible mitigation measures. Broner N. 2011. A simple Outdoor Criterion for Assessment of Low Frequency Noise Emissions. Acoustics Australia, 39(1): 7-14. https://www.acoustics.asn.au/journal/2011/2011_39_1_Broner.pdf HC. 2023. Guidance for Evaluating Human Health Effects in Impact Assessment: Noise. Available at: https://publications.gc.ca/collections/collection_2024/sc-hc/H129-54-3-2023-eng.pdf ANSI. 2005. Quantities and Procedures for Description and Measurement of Environmental Sound Part 4: Noise Assessment and Prediction of Long-Term Community Response (ANSI S12.9–2005/Part 4). Standards Secretariat Acoustical Society of America.	
HC-IR-10	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 7 Acoustic Environment Assessment	Chapter 7: Acoustic Environment Assessment Table 7.5-1 Human Receptor Thresholds PDF p. 19 Appendix 7-A: Noise and Vibration Assessment Table 2.1-1 PDF p. 13	**The potential for sleep disturbance was not assessed. HC has additional guidance for assessing blasting effects.** Table 7.5-1 provides noise criteria and thresholds that were used in the acoustic assessment for human receptors. This included only the following two metrics from HC's (2023) noise guidance: • Change in percent highly annoyed (%HA) – threshold: 6.5%; and • Day-night sound level (Ldn) from the Project that demands mitigation – threshold: 75 dBA. With respect to the potential for sleep disturbance, HC notes that human receptor R7 (a representative location of a possible Indigenous seasonal dwelling), may be expected to experience sleep disturbance during continuous operations, since the predicted Project nighttime noise (without baseline) at this location is 47.7 dBA (Chapter 7, Figure 7.5-4, PDF p. 34). With respect to the effects of blasting, vibration guidelines (peak particle velocity) and noise levels (air overpressure) from the	HC recommends the following: a) Assess the potential for sleep disturbance as per World Health Organization (WHO, 1999, 2009) guidelines, using the following criteria and thresholds: • Nighttime equivalent sound level (LAeq) – threshold: 45 dBA outdoors (for continuous noise); and • Maximum A-weighted sound level (LAmax) – threshold: 60 dBA outdoors (for intermittent noises, 10-15 times per night). b) For blasting activities greater than a year, assess noise impacts through a calculation of the change in percent of highly annoyed (%HA) using ISO 1996-1:2016 (as specified in Appendix E and F of HC's 2023 noise guidance). WHO. 1999. Guidelines for Community Noise. Berglund, B., Lindvall,

				Ontario Ministry of the Environment (1985) were used to determine vibration limits for the assessment. However, additional guidance for assessing the effects of blasting is available from HC (2023). HC. 2023. Guidance for Evaluating Human Health Effects in Impact Assessment: Noise. Available at: https://publications.gc.ca/collections/collection_2024/sc-hc/H129-54-3-2023-eng.pdf	T. and Schwela, D.H (Eds.). Available at: https://www.who.int/publications/i/item/a68672 WHO. 2009. Night Noise Guidelines for Europe. Hurtley, C. (Ed). Available at: https://apps.who.int/iris/handle/10665/326486 HC. 2023. Guidance for Evaluating Human Health Effects in Impact Assessment: Noise. Available at: https://publications.gc.ca/collections/collection_2024/sc-hc/H129-54-3-2023-eng.pdf
HC-IR-11	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 7 Acoustic Environment Assessment	Chapter 7: Acoustic Environment Assessment 7.5.3 Mitigation Measures PDF p. 26 Appendix 7-A: Noise and Vibration Assessment 9.5 Best Management Practices and Mitigation Measures PDF pp. 49-50 Appendix 7-A: Noise and Vibration Assessment 9.7 Noise and Vibration Monitoring PDF p. 52	**A noise complaint mechanism hasn't been specified. The noise mitigation and best management practises also do not include a community consultation plan.** Appendix 7-A indicates that there will be regular continuous noise monitoring to assess noise impacts associated with the normal operation of the Project, with data downloads at regular weekly intervals or upon receipt of a noise complaint. Community consultation can be helpful when a project predicts noisy work outside of normal working hours or extended work that produces high levels of noise, such as blasting. When the community receives information about expected changes in sound levels through a consultation process, and feels that concerns with respect to noise will be addressed, the incidence of noise-related complaints is often reduced (HC, 2023). HC. 2023. Guidance for Evaluating Human Health Effects in Impact Assessment: Noise. Available at: https://publications.gc.ca/collections/collection_2024/sc-hc/H129-54-3-2023-eng.pdf	HC recommends the following: a) Describe whether and how a noise complaint mechanism will be made available and advertised to community members (e.g., phone line, website), allowing noise concerns to be reported for further investigation. b) Develop a community consultation plan to mitigate Project-related noise impacts, as per HC (2023).
HC-IR-12	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic	Ch 9 Groundwater Assessment	Chapter 9: Groundwater Assessment 9.1.1 Regulatory and Policy Setting	**The assessment locations do not represent current drinking water users.** Chapter 9 indicates there are four nearby drinking water wells within the regional study area (RSA) (used by the nearby Teck	HC recommends the following: a) Assess groundwater quality impacts at additional Control Points reflective of nearby drinking water well(s) to better understand potential Project-related and cumulative

	conditions		PDF p. 7 9.4.1.1 Regional Groundwater Resources and Users PDF pp. 30-34	Resources Ltd. mines), as well as municipal wells (likely in close proximity to the RSA). However, the five Control Points (as outlined in PDF p. 92) selected to assess potential Project impacts on groundwater did not include any of the above-mentioned drinking water wells near the Project. HC notes that Control 2 ("Podrasky Cabin") is identified as a potential groundwater user (PDF p. 30). It is unclear whether the Control Points are representative of all identified drinking water users. This is particularly important given that baseline water quality data for the local study area (PDF p. 59) indicates there are elevated concentrations above guidelines for several COPCs (e.g., cobalt, lithium, sodium, chloride, fluoride). In addition, there are cumulative effects related to selenium, cadmium, nitrate, and sulfate concentrations in water, which led to the requirement to develop an Elk Valley Water Quality Plan.	impacts on drinking water supplies and health. b) Alternatively, provide an appropriate rationale to justify the exclusion of these wells in the groundwater assessment.
HC-IR-13	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Ch 9 Groundwater Assessment	Chapter 9: Groundwater Assessment 9.4.3.4.3 Other Elements of Interest PDF p. 59	**The groundwater quality assessment does not use the most stringent criteria.** HC notes that manganese is listed as a key constituent of concern due to elevated baseline concentrations in local groundwater (Table 9.5-7, PDF p. 115). Manganese is reported to exceed the BC Drinking Water Quality Guideline of 0.12 mg/L in the baseline groundwater quality assessment at several of the 26 monitoring wells sampled between 2018 and 2020 (Table 9.4-12, PDF pp. 63-65). However, on PDF p. 59, only parameters exceeding the BC Contaminated Sites Regulation (CSR) drinking water criteria are noted: "Within the LSA, baseline groundwater quality exceeds B.C. CSR drinking water criteria for several parameters (cobalt, lithium, sodium, chloride, and fluoride)." HC is of the opinion that the most stringent drinking water quality criterion should be applied. For example, in the case of manganese the BC CSR standard is 1.5 mg/L while the BC drinking water criterion is a health-based maximum acceptable concentration of 0.12 mg/L, adopted from the Canadian drinking water quality guidelines.	HC recommends the following: Compare baseline and predicted groundwater quality against the most stringent drinking water criteria.
HC-IR-14	5(1)(c)(i) Aboriginal	Ch 9 Groundwater	Chapter 9: Groundwater	**The groundwater quality predictions use average baseline concentrations rather than worst case scenarios.**	HC recommends the following:

	Peoples Health/ socio-economic conditions	Assessment	Assessment 9.4.3 Baseline Program and Groundwater Modelling Results PDF pp. 63-65 Table 9.4-12	In Table 9.4-12, HC notes that there are some exceedances over the health-based guidelines for certain COPCs (e.g., manganese, fluoride) in the baseline monitoring data for individual well samples. However, these values are not reflected in the modelled baseline data that are assumed for each of the five selected control points (Appendix 9-E, Table 9-D.1) and used in the effects assessment. This is likely due to the following: "Baseline concentrations for each control point were chosen based on groundwater quality from the closest monitoring well. Average concentrations were used to represent baseline conditions for each control point" (Chapter 9, PDF p. 116). In particular, HC notes that manganese concentrations approach the BC drinking water maximum acceptable concentration (MAC) of 0.12 mg/L (BC MOE, 2020) at Control Point 2 (potential groundwater user) for the modelled baseline and predicted concentrations at year 17 and 101 (0.11 mg/L) (Appendix 9-E). Since Control Point 2 has the potential to be used as a drinking water source, the 95th percentile of the baseline dataset should be used rather than average concentrations to better evaluate and account for the health risk. BC Ministry of Environment & Climate Change Strategy (MOE). 2020. Source Drinking Water Quality Guidelines. Available online at: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/drinking-water-and-recreation/source_drinking_water_quality_guidelines_bcenv.pdf	Assess the health risks to drinking water users by using the 95th percentile of the baseline dataset for Control Point 2 (and any additional control points as per HC-IR-14).
HC-IR-15	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Ch 9 Groundwater Assessment	Chapter 9 9.4.3.4.3 Other Elements of Interest PDF p. 66	**It is possible that selenium exceedances have not been captured.** Section 9.4.3.4.3 (PDF p. 66) states: “Monitoring wells that exceed selenium are also located below the confluence between West Alexander and Alexander creeks and are clearly explained by a regional groundwater signature." However, the selenium exceedance is not reflected in Table 9.4-12 - Summary of Groundwater Quality Exceedances of the British Columbia Guidelines and EVWQP WQT (PDF pp. 63-65).	HC recommends the following: Clarify if this statement is in reference to existing local water quality data that were reviewed as part of the desktop assessment of background information (described on PDF p. 30).

HC-IR-16	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Ch 9 Groundwater Assessment	Chapter 9: Groundwater Assessment 9.5.4.2 Screening of Constituents of Potential Concern PDF pp. 119-122 Appendix 9-E: Predictive Groundwater Quality - Modelling Results for 43 Parameters	**The Cumulative Effects Assessment does not consider the incremental effect of the Project on groundwater quality, including regional drinking water wells.** Chapter 9 (Section 9.5.4.2) and Appendix 9-E conclude that regarding groundwater quality, there will be guideline exceedances related to cobalt, lithium, phosphorus and vanadium. Except for cobalt, the exceedances (for the remaining COPCs noted above) are a result of elevated baseline. In addition, Chapter 9, Section 9.5.4.4 characterizes the residual effects for groundwater quality as "not significant", assuming the proposed mitigation measures would be working effectively to alleviate the Project-related impacts (including above noted guideline exceedances). The outputs of the water quality model assume the mine rock layering approach is successful at reducing oxidation of pyrite, thereby minimizing the release of sulphate, acidity, and trace elements including selenium and other metals.	HC recommends the following: a) Conduct a cumulative effects assessment in the regional study area (RSA) to better understand the Project-related impacts on groundwater quality including drinking water wells. b) Provide rationale supporting the plan to mitigate groundwater quality effects through a mine rock layering approach, including the basis for assuming its effectiveness and success. Consider whether it would be beneficial to present several scenarios of efficiency (e.g., 70%, 95%). Consider alternate mitigation approaches should the rock layering prove less effective than expected, to prevent further impact on elevated baseline levels.
HC-IR-17	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 21 Accidents and Malfunctions Assessment	Chapter 21: Accidents and Malfunctions Assessment 21.4.8 Vehicle or Equipment Collision PDF p. 47 21.4.8.4.2 Socio-Community PDF p. 50	**It is unclear how the existing limited health services would respond to project-related vehicle or equipment accident scenarios.** Although motorized and non-motorized recreational activities are acknowledged, PDF p. 50 concludes: "[a]s with any other vehicle collision that might occur along the provincial highway system, it is unlikely that any vehicle collision scenario would exceed the capacity of area emergency response services." However, Chapter 18, Section 18.3 (PDF p. 12) states that "[h]ealth services overall are lacking in the Socio-Community LSA communities."	HC recommends the following: a) Consult with local health authorities (e.g., Interior Health Authority and First Nations Health Authority) and other local health and emergency service providers to verify the current status of the area's response services, and their ability to cope with any future impacts from the Project. b) If emergency response services are found to be constrained in the LSA, discuss the mitigation measures that will address a potential impact on these services from Project activities.
HC-IR-18	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 22 Human and Ecological Health Assessment	Chapter 22: HHERA 22.4.2 Baseline (Risk Assessment) Studies PDF pp. 25-26	**While the use of a food chain model is appropriate for predicting future concentrations in the Application case (baseline plus Project), HC recommends considering the collection of tissue samples of country foods that are being consumed by local communities to determine baseline concentrations.** Regarding baseline studies, Section 22.4.2.1 states that "…baseline	HC recommends the following: Describe whether and how potentially impacted Indigenous groups were engaged in developing the baseline conditions for country food quality, as per HC (2010, 2023). HC. 2010. Federal Contaminated Site Risk Assessment in Canada, Part

				food chain modelling was conducted to ascertain the baseline dietary exposure and risk to wildlife health and human health." HC is of the opinion that a more accurate assessment of baseline concentrations in country food tissues would result from the Proponent's collaboration with local First Nation members to obtain representative samples of tissues during the hunting season(s), where possible. This method reduces costs, tends to be more reflective of the actual species and tissues that are consumed, and makes use of traditional ecological knowledge (HC, 2023). Food chain models (which use bioconcentration or biotransfer factors to relate chemical concentrations in soil or water to chemical concentrations in plants or animals) may be subject to greater uncertainty as bioconcentration factors have been shown to vary by several orders of magnitude for the same chemical for different species, soil conditions, and chemical concentrations in the source medium (HC, 2010). Establishing reliable baseline levels for COPCs in country foods is important given the various existing projects in Elk Valley and that certain COPCs (e.g., arsenic and selenium) are known to be present at higher concentrations in the area.	V: Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals ($DQRA_{Chem}$). Available at: https://publications.gc.ca/collections/collection_2011/sc-hc/H128-1-11-639-eng.pdf HC. 2023. Guidance for Evaluating Human Health Effects in Impact Assessment: Country Foods. Available at: https://publications.gc.ca/collections/collection_2024/sc-hc/H129-54-5-2023-eng.pdf
HC-IR-19	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 22 Human and Ecological Health Assessment	Chapter 22: HHERA 22.5.2.2.6 Activities Potentially Affecting Food Quality and Health Risk PDF p. 39 Appendix 22-A: DQERA 6.1.5 Conceptual Exposure Model PDF p. 68	**The conceptual exposure model for human receptors does not identify mine effluent transport to surface water or groundwater as an exposure pathway.** Additional justification is needed to support exclusion of this exposure pathway, which can lead to an underestimation of health risks from all contaminant sources. HC notes that the same symbol (an 'x') is used to define both the "incomplete pathway" and the "complete but insignificant" pathway in the conceptual exposure model, which creates confusion.	HC recommends the following: Justify why the mine effluent transport to surface water or groundwater pathway has not been included in the conceptual exposure model as a potential exposure route.
HC-IR-20	5(1)(c)(i) Aboriginal Peoples Health/ socio-	Chapter 22 Human and Ecological Health	Chapter 22: HHERA General Comment	**Emerging concerns regarding per- and polyfluoroalkyl substances (PFAS) do not appear to be considered in the HHERA.** It is unclear if PFAS or PFAS containing materials/products etc. will	HC recommends the following: a) If any PFAS-containing products will be used or produced as a result of the Project, consider assessing PFAS as part of the

	economic conditions	Assessment		be used as part of any activities (e.g. drilling, ore processing or fire suppression systems) related to this Project. For example, HC is aware that PFAS uses may include ore flotation, and as fluoropolymer in pipes, cables, hoses, and conveyor belts, among other uses. Additionally, PFAS may be present for uses that are ancillary to mining operations, such as in aqueous film forming foams for fire suppression/firefighting activities, for cleaning of metal surfaces, and for use as a foaming agent in drilling fluids, paints, and coatings.	HHERA. b) Given the concerns associated with these COPCs, like other hazardous chemicals/substances that might be used on-site during any phase of the Project, a site management plan for these substances may be warranted.
HC-IR-21	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 22 Human and Ecological Health Assessment	Appendix 22-A: DQERA 2.1 Study Objectives PDF p. 20	**Sediment was omitted from the Key Question respecting potential impacts to the VCs of human and ecological health.** The HHERA indicates that dermal contact with sediment will be considered as an exposure route for human health (PDF p. 65); however, this was not included in the key question and Figure 2-1 (PDF p. 20).	HC recommends the following: Include sediment in the key question and Figure 2-1.
HC-IR-22	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 22 Human and Ecological Health Assessment	Appendix 22-A: DQERA 2.1 Study Objectives PDF p. 20	**Insufficient rationale is provided for using the operations phase as the worst case scenario.** The description of Figure 2-1 states "[i]t was assumed that potential health risk associated with optimal production during the mine Operation phase would be more significant than the Construction and Closure phases, hence the HHERA focused on Operational scenarios". However, little rationale was provided for this assumption.	HC recommends the following: Strengthen the rationale for assuming the operation phase represents the most conservative exposure scenario. For example, in addition to the volume of emissions, provide a discussion on whether the operation phase has the same emissions inventory and sources as the other project phases.
HC-IR-23	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 22 Human and Ecological Health Assessment	Appendix 22-A: DQERA 2.4.3 Cumulative Case PDF p. 25	**Section 2.4.3 does not indicate which projects were considered for cumulative effects or where a list of projects can be found.**	HC recommends the following: Provide a list of the current and reasonably foreseeable projects that have been considered in the cumulative case.
HC-IR-24	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 22 Human and Ecological Health Assessment	Appendix 22-A: DQERA 6.3.2 Defining Negligible Human Health Risk PDF p. 71	**Insufficient rationale is provided for using an hazard quotient of 1.0 to assess health risks.** Section 6.3.2 states "In the present study, as described in subsequent sections, the HHRA evaluates exposure from a traditional food diet that is based on Aboriginal data, and also	HC recommends the following: Use a target HQ of 0.2 or provide additional rationale for each COPC to support the use of an HQ of 1.0.

				includes additional background contributions from sources that are not considered to be potentially affected by the Project (e.g., Elk meat). Accordingly, the benchmark for acceptable risk as expressed by the HQ metric is a value equal to or less than unity (1.0), in alignment with Health Canada policy respecting a comprehensive dietary exposure." HC HHRA guidance (HC, 2023) states "[f]or HHRAs, a target HQ of 1.0 is considered applicable for threshold chemicals, assuming all potential exposure media and pathways are considered, including background dietary intake. Where an HHRA evaluates only project-related exposures (excluding background estimated daily intake for sources not related to the project, including consumer products, food, air, and water), a target HQ of less than or equal to 0.2 will be deemed negligible to compensate for the exposures not taken into consideration." Health Canada (HC). 2023. Guidance for Evaluating Human Health Effects in Impact Assessment: Human Health Risk Assessment. Available online at: https://publications.gc.ca/collections/collection_2024/sc-hc/H129-54-6-2023-eng.pdf	
HC-IR-25	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 22 Human and Ecological Health Assessment	Appendix 22-A: DQERA 6.3.3 Criteria Used for Interpretation of Project Risk PDF p. 72	**HC does not support the characterization of effects as "low", "moderate" and "high" given this is open to interpretation without additional discussion.** Table 6-1 defines categories of magnitude of effect for human health risk using Hazard Quotients (HQ) > 1 and ILCRs > $1x10^{-5}$.	HC recommends the following: Where the target values are exceeded (e.g., HQ > 0.2, ILCR > $1x10^{-5}$), refine the HHERA to reduce uncertainty and/or identify mitigation measures that would reduce exposure to COPCs in media which may result in unacceptable risks.
HC-IR-26	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 22 Human and Ecological Health Assessment	Appendix 22-A: DQERA 6.5.1.2 Non-threshold Cancer Risks PDF p. 77	**HC notes that the use of "small" in the following context is open to interpretation and additional discussion is needed.** Under the determination of significance section for arsenic, it states: "Predicted lLCRs at all critical receptor locations are reported to have a small (<10%) increase relative to the Base Case for the high consuming rights-based receptor under the Application and Cumulative assessment cases". HC notes that for arsenic, every effort should be made to maintain arsenic levels in drinking water as low as reasonably achievable (or ALARA).	HC recommends the following: Provide context for what is meant by a "small increase". Discuss why an increase of <10% relative to the Base Case would be acceptable for each COPC.

HC-IR-27	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 22 Human and Ecological Health Assessment	Appendix 22-A: DQERA 6.5 Risk Characterization and Uncertainty Analysis PDF p. 77-90	**The conservatism inherent in a selected TRV is not considered a valid rationale on its own for considering the use of other, less conservative TRVs to calculate the risk to human health.** In some cases, the HHERA argues that human health risk is overestimated due (in part) to the more conservative toxicity reference values (TRV) selected. The HHERA provides rationale for why a less conservative TRV would be more appropriate. For example, cadmium slope factor (PDF p. 81), cobalt tolerable daily intake (PDF p. 84), and nickel tolerable daily intake (PDF p. 88). HC notes that conservatism is built into TRVs to be protective of human health. For chromium (Cr), the HHERA uses the HC number for CrVI in drinking water but argues that a CrIII number might be more relevant. HC notes that updated TRVs for chromium were published in version 3.0 of the Federal Contaminated Site Risk Assessment in Canada TRV list (published in 2021), including a TRV for trivalent chromium. However, the maximum acceptable concentration (MAC) for chromium based on the toxicity of Cr(VI) is still the most appropriate and relevant value to assess human health risk from exposure to chromium in drinking water. **A sensitivity analysis could reduce uncertainty in the HHERA.** The HHERA also argues that several of the selected receptor characteristics (e.g., time spent outdoors: 24 h/d, time spent onsite 365 d/y, country foods ingestion 365 d/y, all food from the one location) resulted in an overly conservative calculation of human health risk. Health Canada. 2021. Federal Contaminated Site Risk Assessment in Canada: Toxicological Reference Values (TRVs), Version 3.0.	HC recommends the following: a) In regards to receptor characteristics, refine the HHERA scenarios where overly conservative assumptions are made, to reduce uncertainty (e.g., sensitivity analysis). b) Identify mitigation measures that would reduce exposure to COPCs in media which result in unacceptable risks.
HC-IR-28	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 22 Human and Ecological Health Assessment	Appendix 22-A: DQERA Appendix A Multimedia Food-web and Exposure Model	**It is difficult to review the risk characterization and conclusions of the HHERA without accessing the data.** Regarding the data and methodology used to calculate the estimated exposure doses for different pathways, Appendices A and J refer readers to the GoldSim player file and (associated	HC recommends the following: a) Provide example calculations for one carcinogen and one non-carcinogen for each of the applicable pathways. These examples should provide a step-by-step method showing the exposure dose calculations and how the results were

			PDF p. 96-97 Appendix 22-A: DQERA Appendix H Sediment Ingestion Rate PDF pp. 131-133 Appendix J Calculated Dose and Risk Estimates for Human Receptors PDF p. 139	software) for details. Unfortunately the GoldSim software is not available to HC at this time. At a minimum, data summaries should be provided in an accessible format.	derived. b) Provide summary tables of the exposure estimates, HQs and ILCRs. c) Provide a sample calculation of how the sediment ingestion rate was derived in kg/d for each receptor (toddler, child, teen adult).
HC-IR-29	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 22 Human and Ecological Health Assessment	Appendix 22-A: DQERA Appendix F Multimedia Contaminant Screening PDF pp. 120-126	**Insufficient rationale is provided for the exclusion of certain contaminants.** The screening framework outlined on PDF p. 121 was applied to Tables 1 and 3. However, it is unclear why several COPCs (e.g., acridine and titanium in soil, bismuth, and benzo(a)pyrene in surface water) were excluded from the risk assessment. It is also unclear if PAHs were considered for consumption of country foods. Thallium was identified as a COPC but not carried forward in the HHRA. HC does not consider the rationale (PDF p. 67) for excluding thallium ("toxicological data set relevant to human health is considered weak") to be sufficient. Toxicological data is available and should be used. A discussion of the adequacy of the toxicological data can be included in the uncertainty assessment.	HC recommends the following: a) Discuss the emissions inventory for the Project to understand how the COPCs were selected. b) For subsistence foods, at a minimum, assess the risks of exposures to inorganic arsenic (assessed, clarify if "arsenic" refers to total arsenic), methylmercury, cadmium (assessed) and lead. c) Clarify how potential risks from exposure to PAHs were assessed based on direct contact with water and ingestion of country foods. d) Assess thallium in the HHRA.
HC-IR-30	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 22 Human and Ecological Health Assessment	Appendix 22-A: DQERA Appendix F Multimedia Contaminant Screening PDF pp. 123-126	Tables 1 to 4 have not been fully explained.	HC recommends the following: a) include units of measurement b) define acronyms (e.g., NA, NV, NP, AC, GC, etc.). c) define special symbols such as asterisks, and formatting such as indentation, bolding, shading

HC-IR-31		Chapter 22 Human and Ecological Health Assessment	Appendix 22-A DQERA Appendix I Human Health Toxicological Profiles PDF pp. 136-137	**The most recent TRVs published by Health Canada have not been used.** HC notes that several of the TRVs were sourced from the Federal Contaminated Site Risk Assessment in Canada, Part II: Health Canada Toxicological Reference Values TRVs and Chemical Specific Factors, Version 2.0, guidance document which was published in 2010. Version 3.0 of this document was published in 2021, in which several of the TRVs cited in this HHERA have been updated or removed (e.g., benzo(a)pyrene, arsenic, cadmium, chromium, nickel). Version 3.0 was published in March of 2021 and would have been available prior to publication of the HHERA and Appendix 22-A in November 2021. The footnotes for several of the TRVs listed in Table 1 of Appendix I are either missing or incorrect. Specifically, footnote "e" indicating the source of the thallium TRV is missing from the list and the footnote indicating the source of the arsenic tolerable daily intake (TDI) is incorrect and instead refers the source of the benzo(a)pyrene TRV.	HC recommends the following: Confirm that the most recent TRVs are used to assess human health risks.
HC-IR-32	5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions	Chapter 22 Human and Ecological Health Assessment	Appendix 22-A: DQERA General Comment	**Based on the DQERA, there is currently no discussion of mitigation measures for human health and no commitment has been made to conduct follow-up monitoring.**	HC recommends the following: Identify mitigation and follow-up measures that would reduce exposure to COPCs in media which are predicted to result in unacceptable risks (e.g., HQ > 0.2, ILCR > $1x10^{-5}$).