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## *ANNEX 1: Advice to the Agency*

### Table 1: Advice for the Agency's consideration in its recommendation to the Minister of Environment and Climate Change and preparation of draft potential conditions

| **Questions** | **Responses/Comments** |
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| • Has the Proponent described all project components and activities in sufficient detail to understand all relevant project-environment interactions? If not, identify what additional information is needed. | No. The outline of the pit was not included in the geological cross-sections, which limits NRCan's ability to thoroughly review the assessment of potential metal leaching and acid rock drainage generation from the pit walls, consequently impacting the evaluation of site water quality. |
| • Were the study areas sufficient to predict potential effects from all relevant Project-environment interactions, and to consider the effects within a local and regional context?<br>• Is the baseline information sufficient to characterize the existing environment, predict potential effects and obtain monitoring objectives? If not, identify what additional information is needed. | No. The geochemical sampling and testing program was insufficient (See comments below). |
| **Alternatives Assessment** | |
| • Has the Proponent adequately described the criteria it used to determine the technically and economically feasible alternative means?<br>• Has the Proponent listed the potential effects to valued components (VCs) within your mandate that could be affected by the technically and economically feasible alternative means? | The alternative assessment proposes backfilling mine rock to the extent possible and storing the remaining mine rock on the surface in a designated facility, which is acceptable to NRCan at this point. With that said, NRCan has some questions regarding |

| Questions | Responses/Comments |
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| • Has the Proponent adequately described why it chose each preferred alternative means?<br>• Are there other alternative means that could have been presented? If so, please describe. | the layered cake approach to the mine rock storage facility. |
| **Environmental Effects Assessment** | |
| • Has the Proponent clearly described all relevant pathways of effects to be taken into account under section 5 of CEAA 2012?<br>• Has the Proponent identified all potential effects to VCs, including species at risk, within your mandate?<br>• Were all potential receptors considered? | |
| • Were the methodologies used by the Proponent appropriate to collect baseline data and predict effects, why or why not?<br>• Has the Proponent explicitly addressed the degree of scientific uncertainty related to the data and methods used within the assessment? If there are unaccounted for scientific uncertainties, describe them and indicate the options for increasing certainty in the predictions? | |
| • Are the predicted effects described in objective and reasonable terms (e.g., beneficial or adverse, temporary or permanent, reversible or irreversible)? | |
| • Has the Proponent adequately assessed the potential cumulative environmental effects, including using appropriate temporal and spatial boundaries , examining physical activities that have been and will be carried out, and proposing mitigation and follow-up program requirements? Provide rationale. | |

| Questions | Responses/Comments |
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| • Has the Proponent adequately described the potential for environmental effects caused by accidents and malfunctions, including the types of accidents and malfunctions, their likelihood and severity and the associated potential environmental effects? If not, identify what additional information is needed. | |
| • Are you satisfied with the Proponent's assessment of effects of the environment on the Project?<br>• Has the Proponent characterized the likelihood and severity appropriately? Provide rationale. | |
| • Has the Proponent sufficiently described and characterized the Project activities and components as they relate to federal decisions within your mandate? If not, identify what additional information is needed.<br>• Are changes to the environment, as they relate to federal decisions within your mandate, sufficiently described? If not, identify what additional information is needed. | |
| **Mitigation** | |
| • Has the degree of uncertainty regarding the effectiveness of the proposed mitigation measures been described? If not, identify what information is needed.<br>• Is it clear how each proposed mitigation measure links to each potential pathway of effect? | No. The Proponent reports bench-scale experiments designed to evaluate the potential of mine rock and process rejects to inhibit Selenium and nitrate mobilization. However, as outlined in our comments below, the reliability of these tests is limited, and they cannot be solely relied upon to predict the effectiveness of the Mine Rock Storage Facility (MRSF) design. Although the Environmental Impact |

| Questions | Responses/Comments |
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| | Statement (EIS) mentions the initiation of a test dump to monitor the MRSF's performance during operations, neither the test dump nor any alternative smaller-scale field tests (e.g., field cells) have been initiated to date. Consequently, no results have been reported at this stage to demonstrate the efficacy of the MRSF design. Additionally, initiation of the test dump at the on-set of mining is not expected to provide sufficient lead-time for results to be obtained in time before MSRF construction begins. |
| • Would you propose different or additional mitigation measures? If so, provide a description of the mitigation measure(s), with rationale. | |
| • Which of the proposed mitigation measures and/or project design elements do you consider to be necessary to reduce the likelihood of significant adverse environmental effects? Provide rationale. | |
| **Residual Adverse Environmental Effects** | |
| • Are the identification and documentation of residual environmental effects described by the Proponent adequate? If not, what are the aspects for which there is uncertainty and, where possible, indicate how these residual effects can be best described. If there is uncertainty, what are the options for increasing certainty? | |

| Questions | Responses/Comments |
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| • Did the Proponent provide a sufficiently precise, ideally quantitative, description of the residual environmental effects related to your mandate? Identify any areas that are insufficient. | |
| **Determination of Significance** | |
| • Are the conclusions on significance in the EIS/A supported by the analysis that is provided?<br>• Are the Proponent's proposed criteria for assessing significance appropriate? This includes how the criteria were characterized, ranked, and weighted. Provide rationale. Where the Proponent has *not* used one of the Agency's recommended key criteria (magnitude, geographic extent, duration, frequency, reversibility, and social/ecological context), has a rationale been provided? | |
| • Were appropriate methodologies used in developing the conclusions on significance? | |
| • Do you agree with the Proponent's analysis and conclusions on significance? Provide rationale. | |
| **Monitoring and Follow-up** | |
| • Does the proposed monitoring and follow-up program verify the predictions of the environmental assessment as they relate to section 5? Please explain additional monitoring or follow-up needed to address uncertainty in the effects assessment. | |

| Questions | Responses/Comments |
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| • Does the proposed monitoring and follow-up program verify the effectiveness of proposed mitigations as they relate to section 5? Please explain additional monitoring or follow-up needed to address uncertainty in the proposed mitigation. | Considering the current mine waste management plan relies on the performance of the mine rock storage facility (MRSF) for the mitigation of selenium, nitrate, and metal leaching, NRCan recommends a follow-up program by the Agency to address the deficiency raised in the mitigation section mentioned above (i.e., lack of initiation of test dump, lack of field cells). |
| • Is the objective of the follow-up program clear and measurable?<br>• Does the follow-up program include sufficient detail, and technical merit, for the Agency to achieve the stated objective through a condition (e.g., sufficient baseline dataset, monitoring plans, acceptable thresholds of change, contingency procedures)? | |
| • Are you aware of any federal or provincial authorizations or regulations that will achieve the same follow-up program objective(s)? If so, how do these achieve the objective(s)? | |
| **Additional comments, views, advice** | |
| • Provide any other comments. | |

## *ANNEX 2: Information requests directed to the Proponent*

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

| IR Number (e.g. HC-IR-01) | Project Effects Link to CEAA 2012 | Reference to EIS/A guidelines | Reference to EIS/A | Context and Rationale | Specific Question/ Request for Information |
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| | Select the section 5 effect to which your comment applies:<br>5(1)(a)(i) Fish and Fish Habitat<br>5(1)(a)(ii) Aquatic Species<br>5(1)(a)(iii) Migratory Birds<br>5(1)(b) Federal Lands /Transboundary<br>5(1)(c)(i) Aboriginal Peoples Health/ socio-economic conditions<br>5(1)(c)(ii) Aboriginal Physical and Cultural Heritage<br>5(1)(c)(iii) Current Use of Lands and Resources for traditional purposes<br>5(1)(c)(iv) any Structure, Site or Thing of Historical, Archaeological, Paleontological or Architectural Significance<br><br>5(2) Linked to Regulatory Permits/Authorizations (specify which legislation)<br><br>If the interaction between the issue of concern and a section 5 effect is unclear, indicate the interaction pathway in the Rationale column. | Identify which section(s) of the EIS/A Guidelines are related to the comment. | Identify which section(s) of the EIS/A and appendices are related to the comment (Volume, section, page number). | Provide applicable background or rationale for requesting the information and why it is important for understanding the effects of the Project or for developing a follow-up program to verify the accuracy of EA predictions or the effectiveness of mitigation measures | Ask a specific question, or request specific additional information or clarification. |

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| NRCan-IR-01 | Characterization of residual effects of landslides | 6.1.2 - geological hazards | Chapter 20, Section 20.4.3.3 and Appendix 8C | In section 20.4.3.3, the proponent states: “Further, the severity of effects on the Project by landslides is predicted to be low. Therefore, the residual effects of landslides on the Project are not expected to be significant.” | NRCan would like a clarification as to how the Proponent was able to make this assessment for landslides as the Terrain Stability and Geohazards Mapping Report (Appendix 8C) seems to indicate the opposite, i.e., that the severity of the effects of landslides is not low.<br><br>For example, in Table 3.1, Distribution of Terrain Stability Classes within the LSA, shows 46% of the terrain in the project footprint is rated as a level IV (20%=potentially unstable) or V (26% =unstable). Furthermore, and similarly, in Appendix 8C, the Executive Summary mentions that (p.ii, 1st para. 1st line): “Almost half of the study area lies within TS Class IV |

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| | | | | | and V terrain and most of the infrastructure overlaps at least portions of the TS Class IV and/or V terrain”. |
| NRCan-IR-02 | Landslides | 6.1.2 - geological hazards | Chapter 20 and Appendix 8C, Section 5.2 Assessment Framework (Fig. 5.1), P. 26 | Appendix 8C Section 5.2, the consultant recommends detailed geohazards risk assessments throughout the duration of the project following the Risk Management Framework (Fig. 5.1; D. VanDine 2012). Ref: VanDine, D.F. (2012). Risk Management – Canadian Technical Guidelines and Best Practices Related to Landslides; Geological Survey of Canada, Open File 6996, 8 p. | NRCan would like a clarification on the Proponent’s approach to geohazard risk assessment as NRCan did not find this information. |
| NRCan-IR-03 | Assessment of Climate Change on the Project<br>Regional Climate Change projections<br>Potential effects on the Project | 6.1.2 - geological hazards | Chapter 20, Sections 20.6 including 20.6.3, 20.6.4, Figure 20.6.1 | Sections listed address the potential effects of climate on the Project.<br><br>The Proponent has considered several climate hazards listed and shown in Figure 20.6.1. e.g., high and low temperatures, heavy precipitation, freeze thaw cycles, etc., but has not included landslides. | NRCan would like a clarification/ reasoning as to why landslides are not included or addressed as a potential climate hazard. |

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| NRCan-IR-04 | Effects of the Environment on the Project | 6.1.2 - geological hazards, 6.6.2 effects of the environment on the project | Chapter 20, Section 20.4.2.2, P. 18 | The proponent states: "Buildings at the site will be constructed such that they are compliant with the National Building Code of Canada (National Research Council Canada, 2015)". | Please clarify that the latest National Building Code of Canada (NBCC) will be considered in design. Note that there is now a 2020 NBCC. https://earthquakescanada.nrcan.gc.ca/hazard-alea/zoning-zonage/NBCC2020maps-en.php |
| NRCan-IR-05 | Effects of the Environment on the Project – seismic events | 6.1.2 - geological hazards, 6.6.2 effects of the environment on the project | Chapter 20, section 20.4.2 | Faulting | Please confirm that there is no evidence for active (Holocene) faulting at the project site. |
| NRCan-IR-06 | Effects of the Environment on the Project – seismic events | 6.1.2 - geological hazards, 6.6.2 effects of the environment on the project | Chapter 20, section 20.4.2 | Seismicity | Please confirm if there are any hydraulic-fracturing activities underway in the area that may produce induced seismicity? |
| NRCan-IR-07 | Project Description | 6.1.2 geological hazards | Chapter 3, section 3.7.3.3 Geotechnical considerations. p. 3-50. | The proponent states p. 3-50: “NWP acknowledges that while the Layer Cake method is becoming more common, limited publicly available data currently exists.” P. 3-51 “The design criteria are adopted from the | Have the cited design criteria (p. 3-51) been used before for the Layer Cake Method? |

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| | | | | Guidelines for Mine Waste Dump and Stockpile Design (Hawley and Cunning, 2017) and consistent with the British Columbia regulatory guidance, including the Interim Guidelines for Mine Waste Rock (BCMWRPRC, 1991, as cited in Stantec, 2020)." | |
| NRCan-IR-08 | 5(1)(a)(i) Fish and Fish Habitat | 6.1.4 – Groundwater and surface water | Chapter 9, Appendix 9A, Section 4.1.1, Table 4-1,<br><br>Appendix B of Appendix 9A, Section B.8, Table B-1, Page B-8<br><br>Appendix B of Appendix 9A, Section B.8, Figure B-5, Table B-2, Page B-9<br><br>Appendix D of Appendix B of Appendix 9A, Figure 3-3, Figure 3-7 | As a component of the hydrostratigraphical context of the project (Guidelines 6.1.4), hydraulic conductivity is a primary parameter in the determination of groundwater flow direction, and groundwater quantity. Groundwater quantity in turn impacts fish and fish habitat through groundwater discharge to surface water. Understanding of the bedrock hydraulic conductivity representation, and the relationship between stratigraphy and hydraulic conductivity is required.<br><br>The proponent has collected detailed hydraulic conductivity data, and presented a hydrostratigraphic | a) Please provide the rationale for representing the bedrock as a single hydrostratigraphic unit with anisotropic/depth dependant hydraulic conductivity.<br><br>b) Please provide a plan view map and cross-sections through the entire model domain showing the areas where each anisotropy tensor in Table B-2 is applied. Include cross-sectional maps of the entire model domain showing the hydraulic conductivity in each primary direction. |

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| | | | | conceptual model that includes fractured bedrock, coal seams, and competent bedrock (Table 4-1).<br><br>However, the numerical groundwater model appears to represent these units as a single anisotropic hydrostratigraphic unit, that has decreasing hydraulic conductivity with depth (Table B-1, Figure 3-7). Table 4-1 appears to state that the calibrated bedrock hydraulic conductivity is $9x10^{-3}$ m/d for all bedrock units. Table B-1 is consistent with that value ($1x10^{-7}$ m/s), however, a single bedrock unit is represented that decreases hydraulic conductivity with depth. Finally, Figure 3-7 shows the decrease in bedrock hydraulic conductivity with depth, but it does not seem to match the site-specific data used to generate the conceptual model.<br><br>Based on this information it is not clear whether an upper fractured bedrock unit was | c) Please provide north-south, and east-west cross-sections through the RSA showing the stratigraphic sequence of the units shown on Figure 3-3 of Appendix 9A. |

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| | | | | considered in the calibration, and the degree to which site data supports the use of the literature derived decrease in hydraulic conductivity with depth.<br><br>Additionally, as bedding has a strong control on the anisotropy of hydraulic conductivity in this geological context, the direction of the anisotropy has been assigned based on the image in Figure B-5 and the parameters in Table B-2. Section B.8 states that these anisotropy tensors are applied for the local mine site, while table B-2 specifies that horizontal bedding is presumed “Elsewhere”. It is not clear which portions of the model include bedding aligned anisotropy and which are assumed horizontal. | |
| NRCan-IR-09 | 5(1)(a)(i) Fish and Fish Habitat | 6.2.2 - Changes to groundwater and surface water | Chapter 9, Appendix 9A, Section 4.1.2, Section 5.1.2, and Table 5-2<br><br>Appendix B of Appendix 9A, Chapter 9, Section | Groundwater discharge to surface water regulates stream temperature and maintains flow during low flow periods, impacting fish and fish habitat.<br><br>The conceptual model of groundwater flow includes | Please provide additional details on the understanding of groundwater surface water interactions in West Alexander Creek. Please ensure that the text accurately describes the model |

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| | | | B.9, Figure B-10, Figure B-16<br><br>Appendix D or Appendix B of Appendix 9A, Chapter 9, Figure 4-7 | delineation of stream segments that are losing (surface water is entering the groundwater system) and gaining (groundwater is entering the surface water flow system). These zones are noted as groundwater discharge zones (gaining), and groundwater recharge zones (losing) on Figure 4-7 for Alexander and West Alexander Creeks. On this figure the losing reach of West Alexander Creek appears to begin just south of the south pit.<br><br>The numerical representation of these creeks is shown on Figure B-16 for the Base Case. This figure shows that a significant portion of West Alexander Creek, upstream of the confluence with Alexander Creek to the mid-point of the south pit behaves as a losing reach. It is the station associated with this reach (SW7.1) for which modelled flows are lower than simulated, and calibration could not improve the match. This portion of West | boundary conditions used to represent West Alexander Creek (i.e., are constant head nodes used for a portion). Also, include a discussion of the potential source of water that results in the high baseflows in the lower reaches of West Alexander Creek.<br><br>Please characterize Grave Creek to the same extent as Alexander Greek and West Alexander Creek by including:<br>a) a description of, and cross-sectional figure showing the subsurface materials underlying the creek<br><br>b) a characterization of gaining and losing segments within the LSA<br><br>c) the rational for the northern boundary of |

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| | | | | Alexander Creek does not appear to be well represented within the conceptual or numerical models.<br><br>While only a small portion of Graves Creek is within the LSA, and mine workings only represent 0.2% of the Grave Creek Catchment, the headwaters of this creek are proximal to the north pit and should be characterized.<br><br>Section 4.1.2 states that the area around Grave Creek is a groundwater recharge zone, with a transition to a discharge zone during fall high water levels. Groundwater recharge/discharge zones (gaining/losing segments) are not characterized for this Creek (Figure 4-7), and Figure B-16 shows that these reaches are groundwater discharge zones under annual average conditions. Additionally, while a baseflow measurement location for Grave Creek is provided in Section 5.1.2 and Table 5-2, it does not appear | the LSA in proximity to Grave Creek<br><br>d) an assessment of the calibration of the groundwater model to baseflow within Grave Creek |

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| | | | | to have been used in the calibration of the model. Given the proximity of Grave Creek to the North Pit, and the backfilling of this pit in closure, additional details are needed on groundwater surface water interaction in Grave Creek. | |
| NRCan-IR-10 | 5(1)(a)(i) Fish and Fish Habitat | 6.2.2 - Changes to groundwater and surface water | Appendix 9A of Chapter 9, Section 5.1.2, Table 5-2<br><br>Appendix B of Appendix 9A of Chapter 9, Figures B-18 Figure B-24, Figure B-26 | Seepage from mine rock disposal can become groundwater discharge to surface water. Water quality within surface water can be a function of the quantity of seepage discharge relative to other groundwater discharge. This can impact fish and fish habitat.<br><br>Although changes to baseflow in Alexander Creek, West Alexander Creek, and Grave Creek are reported in Table 5-2, the source of the baseflow at the end of mine and long-term closure is not clear.<br><br>At closure, waste rock will be backfilled in the north and east pits. Details of the pit closure are shown in Figure B-18. The table at the bottom of this figure appears to | Please provide the following:<br>a) Steady-state particle tracking results for surface and in-pit waste rock disposal under long-term closure conditions<br><br>b) Discuss the plan for waste rock backfill into the mined-out pits including the planned elevation of the backfill relative to the spill point elevation, and confirming whether portions of the waste rock will be present above the water level in the pits. Confirm whether saturated rock treatment of mine water is planned for |

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| | | | | indicate that the spill elevation of the pits will be below the backfill elevation of the pits. It is not clear whether a portion of the backfilled waste rock is planned to remain unsaturated.<br><br>Figure B-24 shows end of mining particle tracks, but there is not an associated long-term closure particle tracking figure. As such there is no particle tracking for the waste rock placed in the mined-out pits.<br><br>Solute transport modelling is completed for long-term closure and includes the waste rock backfilled into the mined-out pits (Figure B-26); however, this simulation is terminated at 100 years, and this does not illustrate the ultimate discharge point of the mine impacted seepage. Additionally, while concentration may be shown for the groundwater entering the streams, it is not discussed what the quantity of this seepage is. This information | within the backfilled pits.<br><br>c) Provide the quantity of seepage from the surface and in-pit waste rock dumps that reports to Alexander Creek, West Alexander Creek, and Grave Creek under long term closure. Compare those quantities to the total baseflow in long term closure, and baseline baseflow prior to mining. |

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| | | | | is required for the assessment of surface water quality. | |
| NRCan-IR-11 | 5(1)(a)(i) Fish and Fish Habitat | 6.1.2 Geology and Geochemistry<br><br>geochemical characterisation of leaching potential, including, but not limited to, contaminants of concern from waste rock, pit walls, coal stockpiles, coarse coal rejects, and tailings. | Table 4-1 of Appendix 11C | Table 4-1 of Appendix 11C lists sixteen drill holes selected as part of the sampling plan for the geochemical characterization of waste rock. Four of those drillholes, including two of the three drill holes from the East block, do not have any samples associated with them. | Clarify whether the four drillholes without samples associated with them in Table 4-1 of Appendix 11C were included in the geochemical sampling plan or not. If they were included, update the EIS with their information and results. If they weren't included, clarify what the intentions are with these drillholes and why they are included in this table. Please also include information on any intentions to further sample the East block. |
| NRCan-IR-12 | 5(1)(a)(i) Fish and Fish Habitat | 6.1.2 Geology and Geochemistry<br><br>the bedrock and host rock geology of the deposit, including a table of geologic descriptions, geological maps, and cross-sections | Chapter 3 and Appendix 11C;<br><br>Section 4.3.1 of Appendix 11C;<br><br>Appendix C of Appendix 11C;<br><br>Table 3.7-7 in Chapter 3 and | As detailed in MEND report 1.20.1 (Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials, 2009), the waste rock sampling program must be representative of the spatial, geological, and geochemical variability of the deposit. MEND (2009) recommends that samples collected from | a. Provide cross sections or block model images that show the source location of all samples used in the geochemical testing program. At a minimum, the images must clearly show the borehole traces, |

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| | | of appropriate scale.<br><br>the geochemical characterisation of expected mine material such as waste rock, tailings, coal, reject material, overburden, and potential construction material in order to predict metal leaching and acid rock drainage. | Appendix 11C (pp 22-23) | drill core be recorded in block models and shown on cross sections and plan view maps in order to best display how the sample spatially fits within the material it was intended to represent.<br><br>Figure 3.3-4 of Chapter 3 provides a plan view of the project surface geology, the location of all drill holes, and the project outline. Geological cross sections with associated borehole locations are given in Figures 3.3-5, 3.3-6, 3.3-7 and 3.3-8 of Chapter 3, with the location of those cross-sections identified in Figure 2-2 of Appendix 11C.<br>The waste rock sampling plan described in section 4.3.1 of Appendix 11C identifies 6 stratigraphic packages sampled by the boreholes selected for geochemical characterization.<br><br>Volumes of material to be disturbed for select lithologies of the Mist Mountain Formation, Morrissey Formation and Fernie Formation are provided in | stratigraphy, coal seams, the anticipated location of the open pit, and a legend to allow for interpretation of these images. The images must be accompanied by a plan geological map, similar to Figure 3.3-4 of Chapter 3, identifying drillholes from which samples used in the geochemical testing program were sourced. Drill hole IDs should be clearly identified and should correlate to drill hole IDs associated with sample IDs provided in the EIS.<br><br>b. Provide tonnages for each of the lithologies identified in the formations listed in Tables 5-1, 5-2. and 5-3 in Appendix 11C (pp 22-23). Provide a comparison of the tonnages against the |

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| | | | | Table 3.7-7 in Chapter 3 - Project Description. To evaluate sampling representativeness, the tonnages of each lithology being disturbed needs to be compared to the number of samples analysed. To do this, tonnages for all lithologies are needed.<br><br>The location of samples along borehole depth relative to formation and lithology is provided for 8 out of 12 boreholes used in geochemical sampling in Appendix C of Appendix 11C. | number of samples analysed for each lithology. Provide summations of the lithology tonnages by stratigraphic package, separated by block (i.e., North, East, South) to complement the sample distribution information provided in Table 4-3 of Appendix 11C.<br><br>c. Provide quantitative justification for the number of samples collected in each stratigraphic package of each block taking into consideration the initial sampling frequency provided in MEND (2009). A statistical analysis of each lithology is recommended to demonstrate that sufficient samples were collected to capture the potential compositional variability of each sample group with |

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| | | | | | respect to the parameters of environmental interest.<br><br>d. Provide a detailed summary of the method for sample selection, including if the site geologist selected the samples alone or through consultation with third party; how samples were collected from intervals where visible sulphide was identified; justification for the length of the sampling intervals; and how it was ensured that sampling was representative and complete.<br><br>e. Provide downhole plots similar to those provided in Appendix C of Appendix 11C for all boreholes used for geochemical sampling. |

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| | | | | | f. Justify using plant reject samples from the North and South blocks and not from East block. Also include further testing of the East block in the rock management program. |
| NRCan-IR-13 | 5(1)(a)(i) Fish and Fish Habitat | 6.1.2. Geology and Geochemistry<br><br>the geochemical characterisation of expected mine material such as waste rock, tailings, coal, reject material, overburden, and potential construction material in order to predict metal leaching and acid rock drainage. | Tables 4-1, 4-3, 5-2 in Appendix 11C | Tables 4-1 and 4-3 in Appendix 11C indicate 9 samples taken from the Morrissey Formation. The results of 12 samples from the Morrissey Formation are presented in Table 5-2 of the same Appendix. Tables 4-1 and 4-3 in Appendix 11C indicate 221 samples collected from the Mist Mountain Fm. Table 5-2 of the same Appendix presents data for 214 samples. | Verify the accuracy of the values provided in Tables 4-1 and 4-3 in Appendix 11C and provide any necessary corrections to the tables. |
| NRCan-IR-14 | 5(1)(a)(i) Fish and Fish Habitat | 6.1.2. Geology and Geochemistry<br><br>the bedrock and host rock geology of the deposit, | Section 4.3 of Appendix 11C | The Fernie Formation appears in the geological cross-sections for the North, East and South blocks in both the footwall and hangwall units. Although the outline of the pit | a. Detail where the five samples listed in Table 4-3 in Appendix 11C were sourced. Include their sampling locations on |

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| | | including a table of geologic descriptions, geological maps, and cross-sections of appropriate scale.<br><br>the geochemical characterisation of expected mine material such as waste rock, tailings, coal, reject material, overburden, and potential construction material in order to predict metal leaching and acid rock drainage. | | was not included on the geological cross-sections, the potential exposure of the Fernie Formation on the pitwall cannot be excluded.<br><br>Table 5-4 of Appendix 11C reports test results for two samples in the sampling package "8U Hangingwall". In Figure 2-1 of Appendix 11C, the hanging wall represented by these samples comprises the Fernie Formation, suggesting that these two samples represent Fernie Formation. This sampling package generated acid during the modified Sobek NP test procedure, resulting in an NP/AP ratio of -2.0, consistent with the paste pH of 5.6. Following MEND (2009), this sampling package is considered acid-generating once disturbed and, if left unmanaged, has the potential to generate acid rock drainage. Appropriate and complete characterization of the Fernie Formation is needed to assess this risk and to inform plans for its appropriate management. | geological plan and cross-section maps, as requested in NRCan-IR-12.<br><br>b. Provide justification for why drillholes through the Fernie Formation within the planned pits from the North, East, and South blocks were not selected as part of the geochemical sampling plan.<br><br>c. Describe plans to further sample the Fernie Formation to ensure its complete and representative characterization. |

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| | | | | The sampling plan presented in Section 4.3 of Appendix 11C reports that Fernie Formation samples were difficult to obtain based on the drillholes selected for sampling. Table 4-1 in Appendix 11C indicates that no samples of the Fernie Formation were sourced from drillholes in the area of the planned pits in the North, East, and South blocks. Samples of the Fernie Formation were instead sourced from a test pit and from boreholes in the proposed plant area. Table 4-3 in Appendix 11C indicates that five samples from the Fernie Formation were sourced from the North and East blocks, but no samples were sourced from the South block.<br><br>Since the Fernie Formation has a tonnage 7x larger than the Morrissey Formation, and the Fernie Formation is expected to have more heterogeneity based on the stratigraphy presented in Fig. | |

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| | | | | 2-1 (Appendix 11C), MEND (2009) guidelines suggest increasing the number of samples from the Fernie Formation proportionally. | |
| NRCan-IR-15 | 5(1)(a)(i) Fish and Fish Habitat | 6.1.2. Geology and Geochemistry<br><br>the geochemical characterisation of expected mine material such as waste rock, tailings, coal, reject material, overburden, and potential construction material in order to predict metal leaching and acid rock drainage. | Section 4.4.3 of Appendix 11C;<br><br>Figs. 5-14, 5-15, and 5-16 in Appendix 11C | MEND (2009) provides detailed considerations to support the design of a kinetic test program. This includes sample representativeness with respect to the material type and lithology they represent, particularly mineralogy, ARD potential, metal(loid) content, and elevated metal leaching potential.<br><br>Section 4.4.3 of Appendix 11C reports that the samples for kinetic testing (i.e., HCT) were selected using the static test results and that the selection was designed to represent typical and upper limit characteristics and rock types. The kinetic test program includes 12 samples of waste rock and 2 plant reject samples, along with 1 duplicate and 1 blank.  Based on this number of tests, it is not possible to test both a | a. Provide a clear and complete rationale for the selection of kinetic test samples including a detailed quantitative review of the representativeness of each kinetic test sample with respect to the material type / lithology that they represent and parameters of interest with respect to ML/ARD. Specify the selection criteria used and how typical and upper limit values for those criteria were selected.<br><br>b. Highlight samples selected for kinetic testing on Figs. 5-14, 5-15, and 5-16 in Appendix 11C to support the evaluation of their selection. |

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| | | | | typical and upper limit characteristics of all rock types (16 lithologies were distinguished in static test results figures presented in Appendix 11C).<br><br>A kinetic test sample selection rationale was not provided to justify the representativeness of the tested samples. This review should present the static test data for the kinetic test samples in relation to the overall static test database for the same material type. For waste rock this should be completed for each lithology. Tables or figures can be used to present the percentile rankings of the kinetic test sample against the appropriate static test database for each kinetic test sample. This evaluation must be completed for ABA, trace metal, and SFE results for parameters of interest, including but not limited to NP, total sulphur, NPR, Ag, Al, As, Cd, Cu, F, Mo, Ni, Pb, Se, and U. | |

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| NRCan-IR-16 | 5(1)(a)(i) Fish and Fish Habitat | 3.1. Project Components<br><br>waste rock, overburden, topsoil, tailings, coal storage, and stock piles (footprint, locations, volumes, UTM coordinates, height from ground of each component, development plans, and design criteria).<br><br>6.1.2. Geology and Geochemistry<br><br>the geochemical characterisation of expected mine material such as waste rock, tailings, coal, reject material, overburden, and potential construction material in order to predict metal | Appendix A1 of Appendix 3B;<br><br>Appendix B of Appendix 11C | Tabulated static testing results are reported in Appendix A1 of Appendix 3B with associated metadata, such as formation, lithology, location type, etc. Drillhole ID and stratigraphic sampling package information is absent from the data. Based on the information provided, it was not possible to associate tabulated results with information provided in the sampling plan. Cole et al. (2023) provides NRCan's recommendations for information provision to enable efficient reviews of impact assessment data.<br><br>Cole, J., Cleaver, A., Berryman, E., Price, B., Goulet, R. (2023, December 6-7). Lessons Learned in the Reporting of Geochemical Characterization Studies in Canada [Conference presentation]. 30th Annual BC MEND Metal Leaching/Acid Rock Drainage Workshop, Vancouver, BC, Canada. https://bc-mlard.ca/files/presentations/2023-13-COLE-ETAL- | a. Update Appendix A1 of Appendix 3B with drillhole ID, from-to data, and the stratigraphic package from which each sample was sourced.<br><br>b. Provide analysis of the split duplicate results.<br><br>c. Clarify if the five samples labelled 'Fernie Formation?' in Appendix A1 of Appendix 3B are Fernie Formation samples and provide the original lab certificates for their analysis. |

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| | | leaching and acid rock drainage. | | lessons-learned-reporting-geochemical-characterization.pdf<br><br>Lab certificates associated with data in Appendix A1 of Appendix 3B are provided in Appendix B of Appendix 11C. The data in Appendix B of Appendix 11C includes split duplicate analyses. These results are not included in the tabulated static testing results reported in Appendix A1 of Appendix 3B. It is not clear how or if these results were used in any analysis.<br><br>Five samples in Appendix A1 of Appendix 3B have the formation label "Fernie Formation?". The data for these five samples does not appear in the lab certificates from Maxxam Analytics presented in Appendix B of Appendix 11C. | |
| NRCan-IR-17 | 5(1)(a)(i) Fish and Fish Habitat | 6.1.2. Geology and Geochemistry<br><br>the geochemical characterisation of | Table 3-1 of Appendix 11C, Appendix A of Appendix 11C | The study design components summarized in Table 3-1 of Appendix 11C report that mineralogical testing (X-ray diffraction, i.e., XRD) of | a. Provide complete information on the samples selected and their selection criteria for the mineralogical |

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| | | expected mine material such as waste rock, tailings, coal, reject material, overburden, and potential construction material in order to predict metal leaching and acid rock drainage.<br><br>geochemical characterisation of leaching potential, including, but not limited to, contaminants of concern from waste rock, pit walls, coal stockpiles, coarse coal rejects, and tailings. | | representative waste rock samples covering the range of observed characteristics would be done to support ABA, as well as mineralogical testing (XRD, optical mineralogy and Electron Probe Micro Analysis, i.e., EPMA) of all samples undergoing Humidity Cell Testing is planned. However, only the XRD results for the two process plant reject samples are presented in the EIS (Appendix A of Appendix 11C). Mineralogy data to justify the source of AP and NP is therefore currently absent. | testing done in support of ABA.<br><br>b. Provide all mineralogical data to justify the source of acid potential and neutralization potential, including any data that has become available since the generation of the report in Appendix 11C in 2021. |
| NRCan-IR-18 | 5(1)(a)(i) Fish and Fish Habitat | 6.1.2. Geology and Geochemistry<br><br>the geochemical characterisation of expected mine material such as waste rock, tailings, coal, | Appendix 11C;<br><br>Section 5.1.3 Acid Rock Drainage Potential of Appendix 11C | Section 5.1.3 Acid Rock Drainage Potential of Appendix 11C details how ARD potential was classified as PAG, uncertain, or non-PAG. Specifically, it describes how samples with concentrations below 0.1% ICP-MS sulfur were classified | a. Provide justification for the classification of samples as non-PAG based on <0.1% sulfide sulfur<br><br>b. Elaborate how the neutralization potential of samples |

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| | | reject material, overburden, and potential construction material in order to predict metal leaching and acid rock drainage.<br><br>geochemical characterisation of leaching potential, including, but not limited to, contaminants of concern from waste rock, pit walls, coal stockpiles, coarse coal rejects, and tailings. | | as non-PAG, regardless of the modified NP/AP ratio, with the justification that acid generated during the oxidation of the low concentrations of sulfide would be readily neutralized by the host rock.<br><br>This is not consistent with the classification of non-PAG and PAG material in MEND (2009) and it should be noted that a small amount of sulfide in a rock can produce deleterious amounts of acid given the scale of waste rock being displaced if insufficient reaction of neutralizing minerals takes place to neutralize the acid. It should also be noted that the neutralization potential for some of the samples is reported as low, sometimes negative. A negative neutralization potential is indicative of the absence of neutralization potential in the material. As a result, the material has the potential to generate acid once disturbed. If not managed, this can result | with <0.1% sulfide sulfur concentrations was determined to be sufficient to neutralize any acid generated during weathering, particularly in the case of samples with low or negative NP/AP. |

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| | | | | in the onset of acid rock drainage.<br><br>For example, Table 5-4 of Appendix 11C reports two samples in the sampling package 8U Hangingwall. These samples are classified as non-PAG by the classification scheme described because of the package's low sulfide content (0.03%), which corresponds to an AP of 0.9 kg CaCO3/t. This sampling package generated acid during the modified Sobek NP test procedure, resulting in an NP/AP ratio of -2.0, consistent with the paste pH of 5.6. Following MEND (2009), these samples are considered acid-generating. Notably, in Figure 2-1 of Appendix 11C, the hanging wall represented by these samples comprises the Fernie Formation. | |
| NRCan-IR-19 | 5(1)(a)(i) Fish and Fish Habitat | 6.1.2. Geology and Geochemistry<br><br>geochemical characterisation of leaching potential, | Figures 5-14, 5-15, 5-16 in Appendix 11C; Appendix A1 of Appendix 3-B | Samples with negative modified NP values generated acid during modified Sobek NP testing. Following MEND (2009), these samples are considered acid generating | Include results for all samples in figures reporting results. If the figure axes are not compatible with all results for all samples, |

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| | | including, but not limited to, contaminants of concern from waste rock, pit walls, coal stockpiles, coarse coal rejects, and tailings. | | and may need extra consideration during waste management.<br>Figures 5-14, 5-15, 5-16 in Appendix 11C do not include the samples with reported negative modified NP values. | NRCan recommends that an inset figure is included. |
| NRCan-IR-20 | 5(1)(a)(i) Fish and Fish Habitat | 6.1.2. Geology and Geochemistry<br><br>geochemical characterisation of leaching potential, including, but not limited to, contaminants of concern from waste rock, pit walls, coal stockpiles, coarse coal rejects, and tailings. | Appendix A3 Downhole Test Data of Appendix 3B; Appendix A1 Static Test Data of Appendix 3B | The NP/AP values presented in Appendix A3 Downhole Test Data of Appendix 3B do not appear to be consistent with the values presented in Appendix A1 Static Test Data of Appendix 3B. | Verify values reported in Appendix A3 of Appendix 3B and those reported in Appendix A1 of Appendix 3B for consistency and provide any adjustments as needed. |
| NRCan-IR-21 | 5(1)(a)(i) Fish and Fish Habitat | 6.2.2 Changes to Groundwater and Surface Water<br><br>changes to groundwater and surface water quality attributed | Appendix 3C section 2.1 | Experiments are reported to assess the oxygen consumption and the reduction of nitrate and selenate in bench-scale column tests designed to simulate the proposed layer cake waste rock storage | Detail how the waste rock samples from Sukunka mine site were established to be comparable to waste rock expected to be produced at Crown Mountain mine in |

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| | | to acid or neutral rock drainage and metal leaching associated with the storage of waste rock, coal, tailings, overburden, and potential construction material:<br><br>surface and seepage water quality from the waste rock dumps, tailings/waste rock impoundment facility, stockpiles, and other infrastructure during operation and post-closure; | | facility. These bench scale experiments are the only reported tests by which the performance and efficacy of the mine rock storage facility design is evaluated. Mine rock samples for the experiments are reported to be sourced from a waste rock facility at the Sukunka mine site and coarse coal reject samples are reported to be sourced from metallurgical testing of Crown Mountain Coal samples. | terms of its geochemistry, mineralogy, and microbiology. |
| NRCan-IR-22 | 5(1)(a)(i) Fish and Fish Habitat | 6.2.2 Changes to Groundwater and Surface Water<br><br>changes to groundwater and surface water quality attributed to acid or neutral rock drainage and metal leaching associated with the | Chapter 33, Section 33.5.1.6.11 and Section 33.4.1.8 | Section 33.5.1.6.11 of the EIS describes " a test dump to be constructed using the same techniques as other mine rock dumps on site as part of pit development". The purpose of the test dump is to provide performance data on the mine rock storage facility and the efficacy of the proposed "Layer Cake" approach to | a. Provide a study plan to initiate the test dump and possible smaller scale field tests (e.g., field cells) to evaluate the geochemical performance of the proposed "Layer Cake" approach. Justify the timing for the construction of the |

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| | | storage of waste rock, coal, tailings, overburden, and potential construction material:<br><br>surface and seepage water quality from the waste rock dumps, tailings/waste rock impoundment facility, stockpiles, and other infrastructure during operation and post-closure; | | mitigating selenium, nitrate, and metal leaching.<br><br>Lead times on the collection of leachate from test dumps can take years (e.g., Diavik Waste Rock Project (Wilson et al., 2018), (Deilmann North Waste Rock Pile, Key Lake Operations). For results from the test dump to be available to support detailed design and adaptive management of the mine rock storage facility, it is necessary for the test dump to be initiated as far in advance of the onset of mining as possible.<br><br>Section 33.4.1.8 reports the Key Performance Indicators (KPI) to be used to assess water quality in the far-from-mine receiving environment, including parameters targeted at assessing the risk of acid rock drainage from the mine rock and reject materials. Monitoring of the leachate from the test dump, ongoing comparison of the results to predictions based on a geochemical model and KPI, as well as action triggers with | test dump at the onset of mining.<br><br>b. The Study Plan should describe how leachate from the test dump will be monitored (i.e. sampling frequency and duration and MLARD indicators). The study plan should also describe how the leachate data will be used to update the geochemical model predictions.<br><br>c. The proponent should then explain how these test dump predictions and monitoring data will be used to propose Key Performance Indicators and Action Triggers for the management of the Mine Rock Storage Facility. The placement of the compliance monitoring point must |

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| | | | | associated mitigation plans are essential for the validation of source terms for the water quality predictions and the adaptive management of the mine rock storage facility and the mitigation of selenium, nitrate, and metal leaching. Section 33.4.1.8.9 indicates plans to do gas monitoring of the test dump and the MRSF, but plans for leachate characterization were not identified.<br><br>The EIS also indicates that "if conditions arise that lead to the mobilization of selenium, or other harmful trace elements or constituents (as a secondary effect), the placement of low-permeability barrier downslope from the initial MRSF area and upgradient of the Interim Sediment Pond would facilitate retention of the affected water much like a saturated rock fill". However, details on leachate monitoring and levels that would trigger this response (i.e., action triggers) are not described. | be explicitly defined, located within and at the base of the test pile and MRSF, rather than situated at a considerable distance from the mine site in the receiving environment. Additionally, it is crucial to specify the MLARD indicators to be utilized and establish the threshold levels that will prompt the implementation of the specified mitigatory measures. For instance, this may involve installing a low-permeability barrier downhill from the initial MRSF zone and uphill from the Interim Sediment Pond. |

## *ANNEX 3: Advice to the Proponent*

### Table 1: Additional advice to the Proponent, such as guidance or standard advice related to your departmental mandate

| Departmental number (e.g. HC-01) | Reference to EIS/A | Context and Rationale | Advice to the Proponent |
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| | Identify which section(s) of the EIS/A report and appendices are related to the comment (Volume, section, page number). | Provide the context of why you are providing the advice to the Proponent. | Provide specific advice to the Proponent that would not be considered an information request (Annex 2) to help determine the sufficiency of the EIS/A. This may include the guidance or standard advice related to your departmental mandate. Make clear whether this information pertains to the environmental assessment or the regulatory phase. |
| NRCan-01 | Table 3.7-7 of Chapter 3 | The volumes provided in Table 3.7-7 of Chapter 3 allow for the volumes across the 3 principal formations to be evaluated as 2,173 kbcm for the Morrisey Formation, 15,481 kbcm for the Fernie Formation, and 251,585 kbcm (sum of the lithologies presented) for the Mist Mountain Formation. Data for 5 samples from the Fernie Formation are presented in Table 5-3 of Appendix 11C and 12 samples for the Morrissey Formation and 214 samples for the Mist Mountain Formation. Since the Fernie Formation has a tonnage | NRCan suggests that the Proponent consider additional samples from the Fernie Formation taken from the drillholes passing through the Fernie Formation within the proposed pit locations for the North, East, and South blocks. |

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| | | 7x larger than the Morrissey Formation and the Fernie Formation is expected to have more heterogeneity based on the stratigraphy presented in Fig. 2-1 (Appendix 11C), MEND report 1.20.1 (Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials, 2009)MEND guidelines suggests increasing the number of samples from the Fernie Formation proportionally. | |
| NRCan-02 | Chapter 33, Section 33.5.1.6.11 | Section 33.5.1.6.11 of the EIS describes a test dump to be constructed using the same “Layer Cake” technique as the Mine Rock Storage Facility (MRSF). The purpose of the test dump is to provide performance data for the MRSF. The EIS reports that the test dump will be initiated at the onset of mining.<br><br>Initiation of the test dump and its monitoring is essential for the evaluation of the effectiveness of the “Layer Cake” design in mitigating oxidation and mobilization of selenium, nitrate, and other metals. | NRCan recommends that the test dump construction and monitoring be initiated as soon as possible. The test dump leachate should be predicted using a geochemical model and used to identify Key performance indicators (KPIs) and action triggers. During monitoring of the test dump, leachate at the toe of the test pile should be collected using lysimeters or other means necessary or practicable and regularly compared to the KPIs and used to validate or correct the geochemical model. Exceedance of action triggers should initiate alternative mitigation measures. |

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| NRCan-03 | Chapter 1 – Table 1.41: Applicable Federal Permitting and Approval Requirements | Natural Resources Canada has been named incorrectly as the Regulatory Authority for an applicable project activity or component relating to the authorization for nuclear devices such as slurry flow meters.<br><br>With the information provided, Natural Resources Canada understands the Canadian Nuclear Safety Commission is the Regulatory Authority for the issuing of permits to use nuclear devices. | Natural Resources Canada suggests the proponent contact the Nuclear Substances and Radiation Devices Licensing Division (NSRDLD) of the Canadian Nuclear Safety Commission at Licence-Permis@cnsc-ccsn.gc.ca for further information on obtaining a license to operate nuclear devices. |