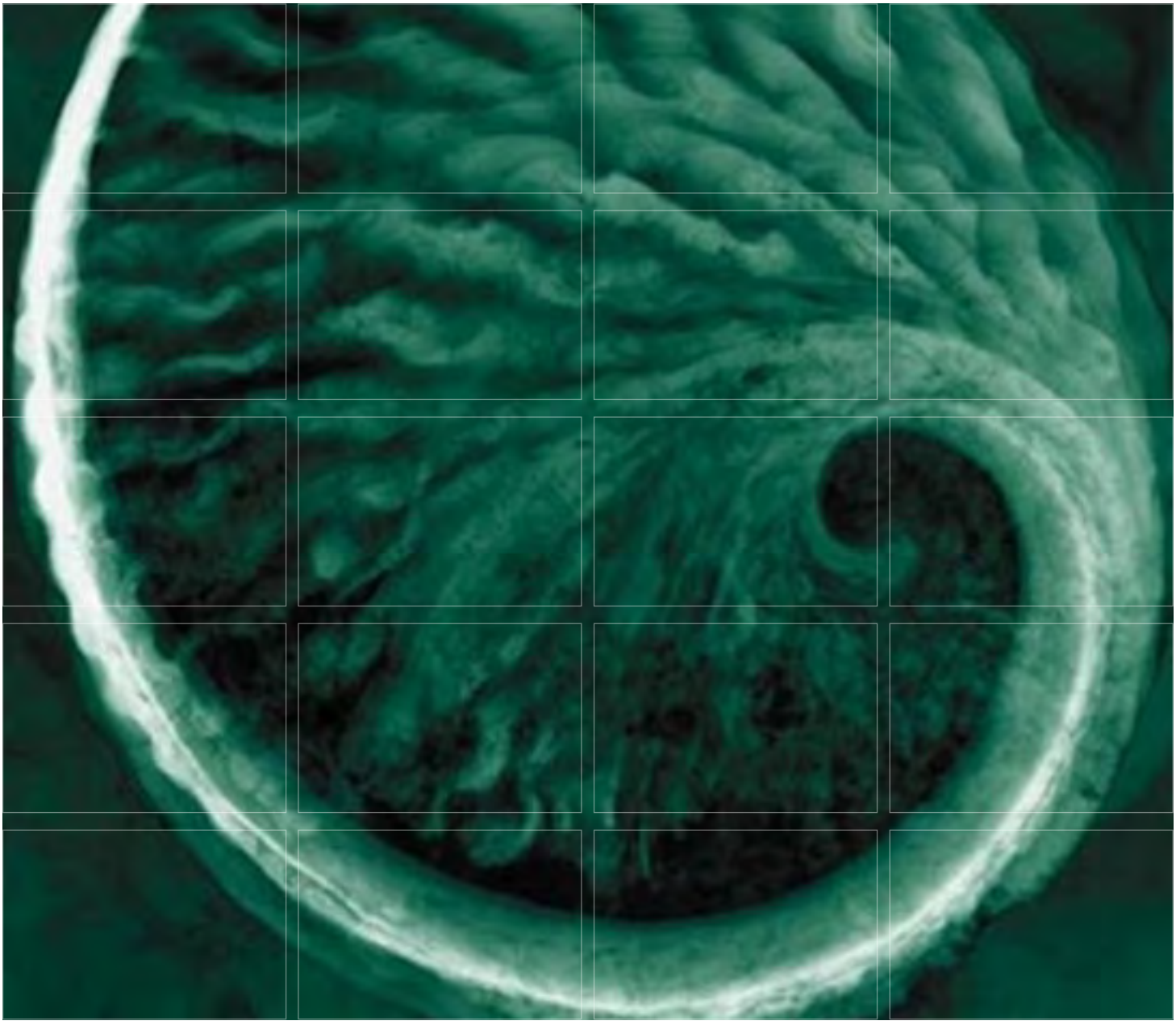

Prepared for:

Saulteau First Nations,
McLeod Lake Indian Band,
West Moberly First Nations

SUKUNKA THIRD PARTY REVIEW

First Nations Independent Technical Review of the Glencore Sukunka Coal Project

December 2016

ERM

The business of sustainability

Saulteau First Nations, McLeod Lake Indian Band, West Moberly First Nations

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Project #0256585

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SUKUNKA THIRD PARTY REVIEW

First Nations Independent Technical Review of the Glencore Sukunka Coal Project

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GLOSSARY AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

BC	Province of British Columbia
Aboriginal Participants	West Moberly First Nations, McLeod Lake Indian Band, and Saulteau First Nations
AIA	Archaeological Impact Assessment
AIR	Application Information Requirements
BAC	Bioaccumulation Factor
BCF	Bioconcentration Factor
CCME	Canadian Council of Ministers of the Environment
CMMP	Caribou Mitigation and Monitoring Plan
COPC	Contaminants of Potential Concern
CR	Cancer Risk
EA	Environmental Assessment
EAC	Environmental Assessment Certificate
EAO	Environmental Assessment Office
ERM	ERM Canada Consultants Ltd.
GHG	Greenhouse Gases
HEWR	High Elevation Winter Range
HQ	Health Quotient
ILCR	Incremental Lifetime Cancer Risk
KI	Key Indicator
LAA	Local Assessment Area
LEWR	Low Elevation Winter Range
MAPA	*Mines Act* Permit Application
MOE	Ministry of Environment

MFLNRO	Ministry of Forests Lands and Natural Resource Operations
MPOI	Maximum Point of Impingement
PAH	Polycyclic Aromatic Hydrocarbon
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
Project	Sukunka Coal Mine Project
Proponent	Glencore
RAA	Regional Assessment Area
RISC	Resource Inventory Standards Committee
SBEB	Science-based Environmental Benchmark
SPO	Site Performance Objective
TK/TLU	Traditional Knowledge/Traditional Land Use
TRD	Technical Data Report
TRV	Toxicity Reference Value
TSP	Total Suspended Particulate
UCLM	Upper Confidence Limit of the Mean
UWR	Ungulate Winter Range
VC	Valued Component
WNS	white nose syndrome
WPMP	Wildlife Protection and Monitoring Plan

1. SUMMARY

ERM Canada Consultants Ltd. (ERM) was retained by Treaty 8 First Nations in Northeast British Columbia (BC) to conduct an independent technical review of the Application for an Environmental Assessment Certificate (EAC Application) of the proposed Sukunka Coal Mine Project (the Project) submitted by Glencore, Coal Assets Canada (Glencore or Proponent) in August 2015. ERM's technical review is intended to support First Nations' participation in the EA process, and ensure that all potential effects have been appropriately characterized and mitigated. The overall objective is to ensure the Project is developed in a sustainable manner should it receive the necessary approvals to proceed, with due consideration for concerns raised by First Nations communities regarding the potential impacts to exercising their Treaty Rights.

ERM's review identified 61 key issues that left unaddressed introduce uncertainties in the effects assessment, and reduce confidence in the conclusions about impacts to the receiving environment and the effectiveness of proposed mitigation measures. An additional 366 secondary issues were identified that are related to the key issues, but focus on specific technical aspects of the EAC Application, which may include questions regarding model parameters, assumptions used in modeling approaches, clarification regarding baseline methodologies and results or the application of particular guidelines and standards. Discussion and resolution of the secondary issues will support resolution of the key items and may occur concurrently.

The scope of the review included the following topics in the EAC Application:

- Wildlife and Wildlife Habitat;
- Archeology;
- Terrain and Soils;
- Terrestrial Vegetation;
- Air Quality;
- Greenhouse Gases;
- Noise;
- Hydrology;
- Hydrogeology/Groundwater;
- Water Quality and Aquatic Biota (Geochemistry);
- Water Quality and Aquatic Biota (Toxicology);
- Fish and Fish Habitat; and
- Human and Ecological Health.

ERM's review evaluated the conformity of the EAC Application with the Application Information Requirements (AIR) and considered the adequacy of baseline studies, rationale for the selection of

Valued Components and spatial areas for the effects assessment, characterization of the significance of residual effects, characterization of the significance of cumulative effects, and effectiveness of proposed mitigation measures. It should be noted that the EAC Application has been accepted for review, and therefore, comments regarding the AIR are presented for information purposes only and not presented as issues for resolution, unless otherwise requested by the Aboriginal Participants.

To date, Glencore has not responded directly to the review comments. ERM began an analysis of working group IRs and responses. The results to date indicate that information presented to the working group is insufficient to address the technical items identified. In summary, of the 61 key issues identified during the review, only 3 were considered fully addressed by information provided to the working group and 11 partially addressed. Of the 366 secondary issues, 33 were considered fully addressed and 30 were considered partially addressed by information provided to the working group. It should be noted that given budgetary constraints, the assessment of working group information related to Hydrology, Hydrogeology/Groundwater, Geochemistry, and Toxicology is still pending.

This report will be provided to the First Nations and will inform discussions with the Proponent to determine how, and to what extent, the comments can be addressed during the EAC Application review phase and/or subsequent permitting stage. The First Nations are interested in discussing the issues identified in this report with the Proponent through a series of technical workshops. When the review has been completed and pending approval of a report detailing the results and outcomes of this process by the Aboriginal Participants and the Proponent, a final report may be submitted to the BC Environmental Assessment Office (EAO) for their consideration.

2. KEY ISSUES IDENTIED DURING THE TECHNICAL REVIEW

This section identifies the key issues raised by ERM reviewers during the review of the EAC Application. These issues are generally broader in scope, and were determined to introduce uncertainties in the effects assessment, reduce confidence in the conclusions about impacts to the receiving environment and Valued Ecosystem Components (VECs), and question the effectiveness of proposed mitigation measures. These issues will be discussed with the Proponent in the technical workshops to identify the issues that need to be addressed as part of the Application review stage, included as conditions in the EAC certificate and/or addressed in the permitting stage, assuming an EAC is issued by the provincial government. The timing for resolution of these issues will be wholly determined by the Aboriginal Participants and the Proponent. It should be noted that the secondary issues presented in Section 3 generally deal with technical details; however, the discussion of the secondary issues may provide additional information to support the resolution of the key issues, and the secondary issues may be discussed concurrently as required.

2.1 WILDLIFE AND WILDLIFE HABITAT

1. Habitat Mapping Accuracy

   The habitat mapping provides the basis for the wildlife and wildlife habitat effects assessment (Section 4.12 of the Habitat Suitability Technical report). The EAC Application notes that the results of the modeling have low accuracy; however, based on the assumptions used to develop the models for most of the VECs, with the exception of mountain goat, it is unclear why the models have low accuracy. This suggests other factors have influenced the mapping and these factors should be identified given the reliance on these models in the effects assessment for the wildlife Key Indicators (KIs).

   Change in habitat availability is one of the five wildlife environmental effects assessed. The current habitat models cannot be relied upon to inform the assessment as field evaluation, consistent with Resource Inventory Standards Committee (RISC) standards, is required to assess their reliability and determine why the models have low accuracy. Updates to the models may require updates to the effects assessment.

   Analysis of Glencore Responses to Working Group Comments:

   Not Addressed *by information provided to the EAO working group. A direct response to issues identified during the FNITR has not been provided by the proponent to date.*

   Responses to working group IRs 404 and 406 do not resolve FNITR key issue #1 related to the accuracy of habitat mapping. The response to working group IR 406 contradicts the analysis of habitat accuracy in section 4.12 of the Habitat Suitability Technical report. The working group also expressed concerns that more than 10 biologists with varying and unknown levels of local knowledge of species and habitat relationships were involved in

the mapping. These concerns were not addressed and limit confidence in the models accuracy.

As a result, the issue of habitat mapping accuracy has been addressed. Field verification and subsequent updates to the models are recommended.

2. Mountain Goat Baseline Information

The mountain goat habitat models appear to be missing some key components. The slope values used for escape terrain is consistent with the literature; however, there is no additional identification of barren cover (e.g., rock, talus, cliff), which is another key indicator used to identify escape terrain. The result is that a substantial area of steep forested habitat is included as high value mountain goat habitat, potentially overestimating the availability of suitable mountain goat habitat across the landscape. Field surveys were not conducted for mountain goats to verify the models or confirm their distribution.

It is recommended that the habitat suitability model for mountain goats be refined to include additional components of escape terrain, and that aerial surveys be conducted to evaluate use by mountain goats in the Local Assessment Area (LAA) to validate the models.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. A direct response to issues identified during the FNITR has not been provided by the proponent to date.*

No relevant information found in the working group comment responses related to mountain goat habitat modeling. The models need to consider appropriate features of escape terrain, forage quality and distance between forage and escape terrain. Field verify the models with observations made from the goat aerial survey.

3. Waterfowl Spring Survey

Waterfowl spring staging surveys were not conducted in the LAA. Potentially suitable areas for waterfowl were not surveyed at all (E.g., Meikle Creek); therefore, potential effects to waterfowl in the LAA may be understated during spring staging, and potentially other parts of the year in the LAA without any baseline information.

It is recommended that waterfowl spring staging surveys be conducted. Additional surveys in the LAA in areas that could support waterfowl will provide the necessary information to complete the effects assessment on waterfowl in the EAC Application.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. A direct response to issues identified during the FNITR has not been provided by the proponent to date.*

Reviewers expressed concerns over the timing and intensity of waterfowl surveys. The proponent conducted additional surveys and the results were provided in the Sept 30, 2015 memo; *Reference: Supplemental Wildlife Surveys Along the Meikle Creek Road within the Tumbler Ridge Options Local Assessment Area Information Request #132*. The memo identifies that an aerial brood survey was conducted on August 1, 2015 in the Meikle Creek Road area. The request was for a spring staging survey in addition to inventory of Meikle Creek. No spring survey was conducted. The response to comment ID 253 related to baseline information on waterfowl does not address FNITR key issue #3.

As a result, the responses to the wildlife working group comments only partially address FNITR key issue #3. Waterfowl staging surveys are recommended in spring and fall along Meikle Creek, and spring staging surveys are required for the LAA to fully catalogue waterfowl activity relative to the Project.

4. Inventory of Ungulates and Predators

An inventory of ungulates (i.e., moose and elk) has not been conducted in the LAA or Regional Assessment Area (RAA). The assessment of potential effects to changes in population dynamics relies on data from areas adjacent to the Project that may be out of date or extrapolated from density estimates for the entire Peace 7b region. In addition, an inventory of predators (i.e., wolf), consistent with RISC standards, has not been conducted in the RAA.

The lack of recent and local baseline information on predator (i.e., wolves) and prey (i.e., caribou, moose and elk) populations and their interactions limits confidence in the effects assessment, and does not provide a benchmark against which to evaluate the success of proposed mitigation and management outlined in the Wildlife Protection and Monitoring Plan (WPMP) and Caribou Mitigation and Monitoring Plan (CMMP), and inform adaptive management, if required.

It is recommended that field inventories, consistent with provincial RISC standards, be conducted for moose, elk and wolves in the LAA and RAA. The timing of these surveys is to be determined by the parties to this review. Alternatively, field programs may support research implemented by the SFN at the Management Unit level.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. A direct response to issues identified during the FNITR has not been provided by the proponent to date.*

There was no information in the working group comment responses related to ungulate and predator baseline information.

Given the significance to caribou, additional surveys to understand elk, moose and wolf dynamics relative to the Project are recommended.

5. Assessment of Road Density Impacts on Caribou and Grizzly Bear

Road density in the RAA is currently higher than published thresholds recommended for the conservation and sustainability of grizzly bear and caribou populations. Road and linear feature density is currently 2.18 km/km^2 (section 5.3.7.4.2.3) in the RAA, well above the cautionary threshold for grizzly bears (0.6 km/km^2) and caribou (1.2 km/km^2; section 5.3.6.3.4.1), and approaching the critical threshold of 2.4 km/km^2 for grizzly bears (section 5.3.7.4.2.3). Considering the inventory of forest roads is not updated regularly, current linear density is likely higher than reported in the EAC Application.

Road density is well established as a KI for the long term viability of large mammal populations, particular caribou and grizzly bears, through effects associated with habitat fragmentation, creating barriers to movement, increased vehicle collisions, and increased access by predators and hunters. The cumulative effects assessment in the EAC Application suggests the situation will worsen.

The CMMP does not provide any mitigation options for reducing road density to a level that would benefit caribou within the 10 year period that is specified in the provincial Peace Northern Caribou Plan. Mitigation focuses on access management after development of the Project.

Consistent with the notion of offsetting, mitigation for road density might include the decommissioning and reclamation of linear features elsewhere in the RAA prior to development and ongoing during life of mine. It is recognized that effectively addressing road density at a regional scale is beyond the responsibility of one proponent to address. It is recommended that the Proponent explore opportunities to facilitate and/or support regional initiatives that address road density and access management, in partnership with First Nations, other industry proponents, and provincial and federal agencies.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. A direct response to issues identified during the FNITR has not been provided by the proponent to date.*

The responses to working group IR 101 and 102 regarding caribou mitigation and monitoring do not address FNITR key issue #5.

The response to working group IR 310 on road reclamation does not address FNITR key issue #5 as no commitment to reduce road density has been made.

Responses to working group IRs 705 to 707 regarding caribou do not address FNITR key issue #5.

The response to working group IR 340 regarding bear sensitivity to road density does not address FNITR key issue #5.

The responses (round 1 and 2) to working group IRs 353, 354 and 355 regarding grizzly bear and road density do not address FNITR key issue #5.

The response to working group 443 regarding under-calculation of risk does not address FNITR key issue #5.

The response to working group IR 479 on grizzly road density issues does not address FNITR key issue #5.

A memo submitted by the proponent to the working group on February 14, 2016 in response to working group IRs 95, 104 and 770 partially addresses FNITR key issue #5. While several new mitigation activities are outlined in the memo, the current road density in the RAA exceeds road density thresholds. There are new roads and linear corridors proposed that will further exceed the threshold, but there is no commitment to undertake activities that would contribute to reducing road density to below threshold, which is ultimately required to ensure sustainability of caribou and grizzly bears.

A memo submitted by the proponent to the working group on April 29, 2016 in response to IR 94 provides quantifies the road length to be rehabilitated and partially addresses FNITR key issue #5. The time required for rehabilitation is much longer than the immediate need to reduce reducing road density, and the length of road to be rehabilitated has not been reported relative to road density at the RAA or Local Population Unit (LPU) scale.

A commitment to support predator control initiatives in conjunction with reforestation will promote caribou recovery. While predator reduction initiatives are proposed, there is no commitment to supporting predator control in the short term, which is necessary to sustain caribou while habitat recovers.

Considering the responses submitted to working group comments, road density is partially addressed; however, there are still outstanding issues regarding the reduction of road density to below thresholds (0.6 km/km^2 and 1.2 km/km^2). There is also the issue of managing predators while habitat is recovering, which has not been addressed. These key items remain to be resolved.

6. Conclusion of Impacts to Caribou and Effectiveness of Mitigation

The EAC Application concluded that the indicators used to assess caribou population structure and dynamics, including population size, calf survival, and adult survival, are anticipated to decline during mine operations. The impact to High Elevation Winter Range (HEWR) and other caribou habitat (i.e., UWR U-9-2 high elevation polygons SPC-013, -014, and low elevation polygon SPC -009) is also predicted to have a residual and long-term effect on these indicators. The proposed mitigation for habitat reclamation is predicted to take 100 to 250 years to implement. Given the current population trajectory, caribou are unlikely to benefit from proposed reclamation.

It is unlikely the proposed offset cost of $92,000 will mitigate the potential extirpation of the Quintette herd, which the assessment suggests may occur. It is also unclear how the provincial government will utilize these funds to promote recovery of the Quintette herd specifically, or the central population of southern mountain caribou in general.

Given these uncertainties, it is recommended that the Proponent explore opportunities to facilitate and/or support regional initiatives that support caribou recovery at the herd and/or population level, in partnership with First Nations, other industry proponents, and provincial and federal agencies. Some examples of these initiatives include support for maternal penning programs, wolf control programs, and native seed collections.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. A direct response to the FNITR issues has not been provided by the proponent to date.*

Responses (round 1 and 2) to working group IRs 101 and 102 on caribou mitigation and monitoring do not address FNITR key issue #6.

The response to working group IR 350 does not address concerns about linear access for predators to High Elevation Winter Range (HEWR) post closure.

The response to working group IR 351 related to predator-prey dynamics does not address FNITR key issue #6.

The response to working group IR 373 does not address FNITR key issue #6.

The response to working group IR 308 related to offsetting does not address FNITR key issue #6.

Responses to working group IRs 705 to 707 related to caribou do not address FNITR key issue #6.

A working group member provided information in working group IR 707 that suggested a 500 m buffer was inadequate, and that a buffer of 2 km was more appropriate, which further questions the effectiveness of mitigation and reduces the confidence in the effects assessment.

The response to working group IR 711 requesting more detailed evaluation of impacts to critical habitat does not address FNITR key issue #6.

A memo submitted by the proponent to the working group on March 8, 2016 in response to working group IR 95 entitled '*Comparison Area of Cumulative Effects"* identifies impacts to HEWR and Low Elevation Winter Range (LEWR) in the LPU that are significant. No additional mitigation has been proposed.

Consistent with the 2014 federal recovery strategy for southern mountain caribou, mitigation needs to ensure that Project related effects needs to be identified that reduces impacts to below 35 % threshold prior to additional habitat impacts occurring in Matrix and LEWR and offsetting of impacts to HEWR must occur prior to development.

A memo submitted by the proponent to the working group on February 14, 2016 in response to working group IRs 94, 95, 104 and 770 partially addresses FNITR key issue #6. While several new mitigation activities are outlined, the current condition of the RAA suggest that both access and disturbance of Matrix habitat currently exceeds thresholds for sustaining caribou and supporting their recovery. There is no commitment to reduce road density or the areas of disturbed Matrix habitat prior to development. Proposed vegetation management will not provide functional habitat within a suitable timeframe. There is no evidence to support the potential success of managing vegetation to reduce alternate prey and no evidence that success of alternate prey management will work. There is also no baseline against which to evaluate the success of alternate prey management and wolf density. Finally there is no commitment to actively participate or fund wolf /predator control initiatives.

A memo submitted by the proponent to the working group on April 29, 2016 during round 3 memo in response to IR 94 provides additional information on mitigation and partially addresses FNITR key issue #6. The time frame to reclaim habitat (> 100 years) is too long to mitigate for habitat loss within an area that already exceeds disturbance thresholds. Active wolf management is required to stop the decline in caribou populations, and a commitment to support predator management is required.

A mem submitted by the proponent to the working group in response to IRs 94, 96 and 711 indicate that Environment and Climate Change Canada (ECCC) is not satisfied with proposed mitigations or the lack of consideration for information provided by provincial caribou biologist D. Seip on Quintette caribou movement. June 7, 2016 4th round response does not address the issue. HEWR and Matrix habitat will be impacted beyond threshold values with no immediate strategy to mitigate for habitat loss pre-development.

Considering the responses to working group IRs, FNITR key issue #6 is only partially addressed as the Caribou Mitigation and Monitoring Plan (CMMP) does not address disturbance thresholds for critical habitats and access, or reducing predators to accommodate for loss of habitat value. The CMMP still does not incorporate mitigation and vegetation management that will successfully replace lost habitat components in a timeframe relative to development that can promote recovery of caribou.

7. Bats Have Not been Assessed

Several bat species were identified during baseline studies, including the red-listed eastern red bat, but they are scoped out of the assessment. The rationale provided in the EAC Application for excluding bats from the assessment is that the growing season habitat for bats can be assessed by proxy or relying on the results for other VECs. Using the results for other species does not apply to hibernacula (over-wintering habitats), which are unique to

karst geologic features that were not considered in the effects assessment for other VECs. In addition, the potential spread of white nose syndrome (WNS) into the RAA is another unique challenge to bats that was not considered in the EAC Application. Other potential effects, including risk of mortality, changes in population dynamics, and toxicology and proposed mitigations are unique to bats and not necessarily captured by assessing other species groups.

Based on the conservation status of the red-listed eastern red bat (provincially red-listed and/or Endangered on Schedule 1 of the *Species at Risk Act* (SARA)) and the points provided above, it is recommended that a separate assessment, using the five effects considered in the effects assessment, be undertaken for bats, with particular attention to species of conservation concern located in the area. Cumulative effects of nearby projects, such as the Meikle Wind Project, should also be considered.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. A direct response to the FNITR issues has not been provided by the proponent to date.*

The response to working group IR 96 (round 1 and 2) suggests that effects to bats have been addressed by other species assessments. (e.g.," fisher, mature forest bird community for foraging and roosting habitat requirements; birds in general for mortality risk"). The response does not address FNITR key issue #7. Notably bats have unique hibernating habitat not used by fisher (e.g. karst caves), and white nosed syndrome (WNS) is a disease only transmitted to bats. Without an assessment specific to bats, these potential impacts are not captured, and the proposed mitigation will not be effective.

The response to working group IR 100 (round 1 and 2) regarding pre-disturbance surveys does not address FNITR key issue #7.

The response to working group IR 314 regarding bat hibernacula does not address FNITR key issue #7 as there was no mapping conducted to identify geology that may support hibernacula (e.g. karst) within the LAA or RAA.

A memo submitted by the proponent to the working group on February 14, 2016 in response to IRs 94, 95, 104 and 770 only partially addresses FNITR key issue #7. While several new mitigation activities are outlined, the memo does not address the potential for geomorphic hibernacula or consider WNS and its potential spread.

Considering the responses to working group IRs, FNITR key issue #7 is not addressed. An assessment specific to the unique issues affecting bats is recommended.

2.2 ARCHAEOLOGY

8. The Archaeological Impact Assessment (AIA) in the EAC Application covers the Project footprint. It is recommended that an AIA be conducted in a LAA that includes a 500 m buffer around the footprint and a RAA that includes a 2 km buffer around the footprint to identify the location and nature of recorded archaeological sites within and adjacent to the proposed Project.

   Analysis of Glencore Responses to Working Group Comments:

   Not Addressed *by information provided to the EAO working group. A direct response to issues identified during the FNITR has not been provided by the proponent to date.*

9. Indirect effects on archaeological and heritage sites were not considered in the EAC Application, and it is recommended that these effects be assessed. An example of these effects includes effects associated with increased human presence.

   Analysis of Glencore Responses to Working Group Comments:

   Not Addressed *by information provided to the EAO working group. A direct response to issues identified during the FNITR has not been provided by the proponent to date.*

10. It is recommended that the archaeological potential model is evaluated. The use of a potential model is typically tested by ground-truthing a sample of low potential areas. Archaeological potential should be assessed in areas where Project components and activities are proposed.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. A direct response to issues identified during the FNITR has not been provided by the proponent to date.*

11. The EAC Application should provide significance ratings for all of the archaeological sites, and information on the size of the sites, their age, and whether diagnostic artifacts were found should be used to support the significance ratings.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. A direct response to issues identified during the FNITR has not been provided by the proponent to date.*

12. References for statements in the EAC Application regarding First Nations' support of Heritage Conservation Act permit applications should be provided as participation in field work does not constitute support of a permit application or the Project.

    Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. A direct response to issues identified during the FNITR has not been provided by the proponent to date.*

2.3 TERRAIN AND SOILS

Soil Quality Effects

13. Soil admixing, compaction, erosion, fertility, and landform changes are not assessed in the EAC Application due to the difficulty of quantifying these effects. Soil acidification due to nitrate/sulfate deposition resulting from increased diesel engine emissions is not discussed as a potential effect. It is recommended that these effects be analyzed and assessed. Where it is not possible to quantify effects on soil quality, it is recommended that a qualitative assessment of effects be conducted based on the geographic extent of potential soil degradation.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. A direct response to issues identified during the FNITR has not been provided by the proponent to date.*

Responses provided by the proponent to the working group do not address the absence of assessment on admixing, compaction, erosion, fertility, and landform changes in the EAC Application. The proponent is encouraged to analyze and assess these effects quantitatively where possible or qualitatively based on geographic extent of potential soil degradation.

14. The EAC Application assumes that residual Project effects to soil quality will not interact cumulatively with the effects of other projects due to a lack of spatial overlap with dust deposition plumes. To confirm this assumption, it is recommended that the potential for a "nibbling effect" related to dustfall deposition on soil resources in the region be discussed and assessed spatially.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. A direct response to issues identified during the FNITR has not been provided by the proponent to date.*

Responses provided by the proponent to the working group do not address the "nibbling effect". A spatial assessment and discussion on the "nibbling effect" as it relates to dustfall deposition on soils is recommended.

Soil Quantity Effects

15. Residual permanent loss of soil (approximately 242 ha) is predicted to occur in flooded or steep terrain within the open pit and under project roads and rail infrastructure remaining after Closure. The EAC Application concludes that there will be no significant effects on soil quantity as the magnitude of the effect on soil cover loss is approximately 12%. Is this conclusion relative to the LAA? What other factors contribute to this conclusion?

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. A direct response to issues identified during the FNITR has not been provided by the proponent to date.*

In its response to working group IR 609 (round 3) the proponent states that soil quantity is dictated by changes to soil cover and changes in soil volume. The assumption for characterizing these effects implies that all mitigation measures are put into place and where standard mitigation measures are used they are successful. Therefore, the characterization of not significant is based upon the assumption that though there is a 12% decrease in soil cover, reclamation effects will not prevent the areas from becoming "self-sustaining ecosystems with an average capability to the present baseline."

Further discussion should describe how these results pertain to the LAA and provide additional information on other factors that contribute to the assessment of soil quantity. Clear commitments to mitigating reductions in soil quantity are required to ensure the 12% reduction in soil cover is not significant.

2.4 TERRESTRIAL VEGETATION

16. The definitions provided in Table 5.4-5 Characterization of Residual Environmental Effects for Plant Species Distribution and Abundance, Community Distribution and Abundance in the EAC Application are based on changes to measurable parameters within the RAA. Further information is requested as follows:

    i. The spatial boundary of the LAA is based on ecology factors. Additional rationale for the spatial boundaries of the LAA based on the location of Project components and activities.

    ii. The assessment focuses on potential effects in the RAA. Provide the rationale for not assessing potential effects in the LAA (with the exception of plant species of conservation concern); and

    iii. Provide the rationale for achieving net positive gains after reclamation.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. A direct response to FNITR key issue #16 has not been provided by the proponent to date.*

None of the IR responses specifically address the rationale for setting the spatial boundaries of the LAA. In its response to IR 383 (round 2) the proponent indicates that the LAA was delineated when the development area was established but does not provide the criteria by which the LAA was defined based on the proposed development and associated activities. Further information is requested to explain the delineation of these boundaries.

None of the IR responses provide a rationale for focusing the assessment of potential effects on the RAA rather than the LAA. This could misrepresent and/or dilute the magnitude of potential effects on all VCs except plant species of conservation concern. Additional rationale should be provided with regard to the choice of the RAA as the spatial boundary for the assessment.

None of the IR responses elaborate on the assertion that positive gains will be achieved after reclamation. The proponent suggests that mitigation measures will result in positive effects (e.g. high and moderate productivity forests for Transmission Line Option 1). As this assertion puts an emphasis on the effectiveness of mitigation and reclamation measures additional rationale should be provided for the confidence in achieving positive gains.

17. Review the characterization of potential residual effects for WHICH VCs and rationale for not undertaking a cumulative effects assessment. Additional clarification and follow up is requested for not conducting cumulative effects assessment for a number of measurable parameters, including riparian ecosystems (Section 5.4.7.2.2.3 of EA) and old forests (Section 5.4.7.2.2.5 of the EA).

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. A direct response to FNITR key issue #17 has not been provided by the proponent to date.*

Responses to IRs submitted by the working group regarding vegetation resources have been reviewed and do not provide additional rationale for not undertaking a cumulative effects assessment for a number of measurable parameters. Further discussion and rationale is requested.

2.5 AIR QUALITY

18. Total Suspended Particulate (TSP) was identified as a primary emission but it was not assessed in the EAC Application. TSP represents the total amount of dust in the air, regardless of particle size. First Nations identified that dust (including coal dust) could reduce First Nations land use and impact the ability of animals to sense and avoid danger.

    It is recommended that TSP be assessed and compared against the BC TSP objectives (Note: The BC government has a daily and annual air quality objective concentration for TSP (120 µg/m^3 daily value, 60 µg/m^3 annual value).

    It is recommended that cumulative effects of dust be considered, including the Meikle Wind Project and other activities that use the Sukunka Forest Service Road.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #18 has not been provided by the proponent.*

2.6 GREENHOUSE GASES

No key issues were identified with the Greenhouse Gases (GHG) Management Study or GHG Technical Data Report in the EAC Application.

19. The Aboriginal Participants recommend that the processing of coal from the Sukunka Project outside of Canada be considered as part of the global GHG emissions budget.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #19 has not been provided by the proponent.*

2.7 NOISE

20. A description of noise baseline monitoring and an explanation of how it was conducted should be provided.

21. The EA states an assessment of noise effects on human health was not carried out as there are no human receptors within the LAA; however, there are human receptors within the rail load out LAA. Please update the assessment.

22. The assessment does not consider First Nations traditional land users as potential receptors. For example, the Saulteau First Nations land use study indicates there are human receptors in the area. Please update the assessment.

23. The LAA is defined as the area beyond which noise effects are negligible; however, exceedances in noise thresholds have been predicted outside of the LAA. Potential effects outside the LAA may not have been assessed. Please update the assessment.

24. The screening criteria for human health receptors were limited to within the LAA; however, there are exceedances to noise thresholds outside of the LAA. Please revise the screening criteria and update the assessment accordingly.

25. Based on the noise assessment and the receptors shown in the human health assessment, the exceedances do not appear to occur at the location of the human health receptors; however, the assessment should include a discussion of these receptors and all areas of exceedance.

26. The EAC Application estimates that there will be 13 one-way haul truck trips per hour from the mine site to the rail load out. However there is no assessment of the potential effects of noise associated with haul truck traffic on human health receptors located along the haul route.

    It is recommended that potential noise effects on human receptors along the proposed haul routes be assessed, or justification provided for not including these receptors in the noise modeling.

27. Cumulative noise effects from the SNRL gas plant and the Brule Mine that utilize the Sukunka FSR should also be considered.

28. The EAC Application identifies Year 7 of Operations as being the worst case scenario for noise based on peak production. However, there is an earlier scenario where mining equipment in the open pit is not shielded by topography and could have higher noise levels. A sensitivity assessment or justification for the "worst case scenario" should be provided.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issues #20 - 28 have not been provided by the proponent.*

Responses to IRs submitted by working group regarding noise have been reviewed and have not addressed the FNITR comments on the EA. A work plan will be proposed that will address the comments provided with the aim to satisfy the requirements of the EA and conformity to the AIR.

2.8 HYDROLOGY

29. The EAC Application does not include surface water hydrology as a VC so potential effects of diversion and impoundment structures during each phase of the Project are not assessed and no mitigation is identified to mitigate potential impacts to surface water. However, Section 4.2.1 (paragraph 1) of the EAC Application concludes there may be potential changes in surface water flows resulting from Project activities. The exclusion of hydrology as a VC in the EA is a gap in the assessment, and it also affects the assessment of other effects to other VCs (e.g., fish and fish habitat) that rely on surface water flows.

    It is recommended that effects to surface water hydrology be assessed and these effects be considered for other VCs, including fish and fish habitat, water quality and aquatic biota.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR key issue #29 has not been provided by the proponent.

30. A baseline surface water hydrology study was completed for the Project area. The manual flow estimates obtained for Chamberlain and Skeeter creeks during the surface water field program are insufficient to estimate high flows (> 1:2 year event). The maximum measured discharges obtained during the field studies were not high, resulting in over extrapolation of rating curves, which increases the uncertainty in discharge flow estimates. In the case of Chamberlain and Skeeter creeks, the rating curves were over-extrapolated (> two times the maximum measured flow) in order to characterize the annual hydrographs.

    Peak flow discharge estimates (especially those with longer return periods) typically exceed the maximum measured extents of Project rating curves. However, it is unusual to require

over-extrapolation of the rating curve for much shorter return periods (1:2). This extrapolation introduces uncertainty, and therefore, peak flow data supporting other VCs (such as fish and fish habitat, and aquatic biota) would be similarly impacted.

Uncertainties in flow data presents limitations for modeling impacts to other VCs for 1) each phase of the mine lifecycle in Chamberlain Creek and Skeeter creeks, and 2) during different return period events (1:10, 1:50, 1:100, 1:200, PMP [Probable Maximum Precipitation], PMF [Probable Maximum Flood]). In addition to the other VCs, uncertainties in flow data also presents limitations for design flows (1:100, 1:200, PMP) that have been identified for Project components, such as diversion and impoundment structures, and sizing these structures for extreme events (1:100 / 1:200 year events).

It is recommended that additional high flow field data be collected to support the development of robust rating curves; and, any models that rely upon high flow estimates provide validation results to demonstrate the level of uncertainty between measured and modelled results. Updated data should be incorporated into the hydrology effects assessment (Item 29) and the results should be considered for other VCs (e.g., fish and fish habitat, water quality and aquatic biota) that rely on surface water flows.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR key issue #30 has not been provided by the proponent.

2.9 HYDROGEOLOGY (GROUNDWATER)

31. The EAC Application does not include groundwater (quantity and quality) as a VC, which is typically included in EAs for proposed mining projects in BC. It is recommended that effects to groundwater be assessed and these effects be considered for other VCs that may rely on groundwater quantity and quality.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #31 has not been provided by the proponent.*

None of the IR responses submitted to the working group addressed the issue that groundwater was not included in the assessment as a valued component. Not including groundwater as a valued component can have negative consequences for an environmental assessment. Project-related effects on groundwater would be measureable and potentially result in subsequent effects on fish, aquatic life and human health in the downstream receiving environment. Groundwater quantity and quality was not included in the list of VCs, despite multiple government agencies (e.g., BC MoE, MEM, NRCan) and First Nations recommending it be included, and raising these concerns during the AIR review and EA screening review.

32. The RAA and LAA used for the hydrogeology baseline study and those referenced in the EAC Application are too small or inappropriate. Please provide additional rationale to support their selection.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issues #32 has not been provided by the proponent.*

Additional information is requested to support the selection of the LSA and RSA boundaries used in the hydrogeology baseline. For example, it is not clear why the RSA was so close to the proposed mine footprints (particularly in the west and southwest) and why the LSA followed the mine tenure outlines rather than the typical watershed boundaries.

Additional information is requested to support the selection of the LAA and RAA boundaries used in the hydrogeology effects assessment. The RAA and LAA used in the effects assessment are not consistent with the RSA and LSA used in the baseline study. Such discrepancies may be justifiable, but further rationale is requested.

33. Most of the wells installed at the Project site were less than 76 m in depth. These wells are not deep enough relative to the depths of the proposed pits (down to 200 m). It is recommended that the Proponent develop a plan to revisit the field sampling program to adequately characterize groundwater resources.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #33 has not been provided by the proponent.*

None of the IR responses submitted to the working group addressed the issue of groundwater quality, which may change with depth below the ground surface. In the region of the proposed project, salinity of groundwater tends to increase with depth. The lack of deeper wells and groundwater samples runs a risk of mischaracterization of deeper groundwater quality and baseline conditions, with subsequent consequences for the environmental assessment of the proposed project on other aquatic VCs.

34. Hydraulic conductivity data was collected from 18 monitoring well response tests, and it is not clear why packer tests were not conducted during or after the borehole drilling. No pumping tests were done and no data is available to calculate anisotropy ratios of permeability (e.g., permeability along the beddings vs. across the beddings), transmissivity, specific storage, etc. Overall, the impression is that permeability data for overburden and bedrock is limited for the Project. It is recommended the Proponent develop a plan to revisit the field sampling program to adequately characterize groundwater resources.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #34 has not been provided by the proponent.*

In the response to working group IR 232, the proponent notes that 21 packer tests were additionally conducted in drill holes advanced in the open pit and waste dump footprints.

The FNITR reviewer could not find documentation of those tests in the available documents. Table 4.2-1 of Addendum 2 to Appendix 27.A-4 mentioned in the response could not be located.

35. A total of 29 wells (13 twinned and 3 single) were installed to monitor continuous long-term water level measurements. Many of the wells were insufficient to characterize seasonal variation in water levels in the groundwater system due to the shallow depths of the wells. It is recommended the Proponent develop a plan to revisit the field sampling program to adequately characterize groundwater resources.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

In the response to working group IR 376 (round 1), the proponent states that the groundwater level monitoring and sampling recommendations provided in the Hydrogeology Technical Data Report have been implemented. Groundwater will continue to be monitored and additional data will be assessed during the permitting process, as required.

The monitoring program outlined in Section 4 of the Preliminary Groundwater Management Plan would benefit from providing a map of the wells that will be included in the program.

36. Groundwater samples to measure groundwater quality were collected using the low flow purging sampling approach, rather than the traditional volume-based purging sampling approach, which requires a minimum of three well volumes of water to be purged prior to sampling. The low flow approach might result in insufficient well purging and the samples collected might be less representative of the true ambient background water in the geological materials and formations. It is recommended the Proponent develop a plan to revisit the field sampling program to adequately characterize groundwater resources.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

In the response to working group IR 492 (round 1 and 3), the proponent committed to groundwater sampling that will follow the BCMOE 2012 Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operators. Following that

guidance document addresses FNITR key issue #36 regarding the use of low-flow sampling technique.

37. Quantitative groundwater modeling was not conducted to predict potential changes in the groundwater system, including dewatering inflow rates into the proposed 6 pits and refill, the seepage rates from the waste rock dumps, groundwater discharge into the streams, and the flow pathways of contact groundwater from various mine components. Effects were qualitatively estimated and assessed in the watershed modeling, which is departure from standard industry practice for EA applications of mining projects in BC and Canada, including other coal projects in Northeast BC. It is recommended the Proponent develop a plan to conduct quantitative models for groundwater dynamics that focus on the above parameters.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #37 has not been provided by the proponent.*

In the response to working group IR #155 (round 3) regarding the seepage from waste rock dumps not being quantitatively estimated, the proponent proposes an adaptive water quality management approach, which is appropriate. Quantitative analyses are provided to estimate the seepage rates, which is a prerequisite to mine contact water capturing and attenuation efficiency analyses, in "Sukunka Coal Mine Project – EA Supplemental Clarification For Water Quality and Water Management Structure, April 29, 2016" which also references a "Technical assessment of mine contact water capture efficiency" report completed by Knight Piesold Ltd., April 21, 2016).

In the response to working group IR 571 (round 1), the proponent states that that groundwater flows cannot be modeled separately from surface water flows due to a lack of data to support a separate groundwater model. The collection of additional data to support this modeling is required. Collecting such data would include drilling some boreholes to depths comparable to the planned depth of mining, and sampling and testing those boreholes

In the response to working group IR 708 (round 1), the proponent uses the results of watershed modelling to infer the reduction in- or increase of baseflow in creeks during winter months. Conceptually, the response is reasonable; however, it is standard practice that changes in stream baseflow as a result of project stresses on groundwater systems are evaluated with numerical groundwater models. These models were not developed for the project.

In the response to working group IR 709 (round 1,2), the proponent states that changes in groundwater levels (as a result of mine dewatering) were evaluated using hydrologic modelling to present the worst case scenario. Glencore states that hydrologic modelling was completed to present the worst case scenario. It appears a watershed model was used It is standard practice for similar projects in BC to use a numerical groundwater model to

evaluate changes in groundwater levels, or baseflows in creeks, as a result of mine dewatering operations. These models were not developed for the project.

In the response to working group IR 722 (round 1), the proponent states that interactions between groundwater systems and creeks were evaluated using a watershed model. It is standard practice for similar projects in BC to use numerical groundwater models to evaluate changes in groundwater discharge to creeks (baseflow) or recharge from creeks to groundwater system. These models were not developed for the project.

38. No effects (residual and cumulative) on groundwater (e.g., changes of groundwater levels, flow directions, hydraulic gradients, groundwater recharge/discharge, groundwater and surface water interactions) were assessed during the Construction, Operation, Closure and Post-closure phases, which introduces uncertainty with respect to potential impacts to groundwater resources and other VCs (e.g., water quality and aquatic biota) that may interact with groundwater. It is recommended the Proponent develop a plan to conduct an effects assessment on groundwater for all phases of mine development.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed by information provided to the EAO working group. To date, a direct response to FNITR key issue #38 has not been provided by the proponent.

In response to working group IR 235, the proponent states that the rates of groundwater recharge and discharge are assumed based on professional judgment. A quantitative groundwater model was not constructed and calibrated to baseline conditions for the project area, which is standard practice for a project of this magnitude. It is recommended that a quantitative model is developed to derive predictions about project effects on groundwater and what impacts such effects could have on surface waters, during and after the completion of the project.

39. No mitigation measures are discussed for minimizing Project effects on groundwater quality and quantity, which introduces uncertainty with respect to potential impacts to groundwater resources and other VCs (e.g., water quality and aquatic biota) that may interact with groundwater. It is recommended the Proponent develop mitigation measures for groundwater based on the final results from items 35 – 37.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed by information provided to the EAO working group. To date, a direct response to FNITR key issue #39 has not been provided by the proponent.

In response to working group IR 448 (round 1) regarding the protection of surface waters against impacts from contact groundwater (seepage from mine workings), the proponent explains that the detailed protection measures (including groundwater pumping) will be determined during permitting process. Additional information is requested.

40. The preliminary groundwater monitoring plan does not include a map showing the locations of the proposed monitoring wells, and no rationale is provided for the well locations and monitoring frequencies. Please update the monitoring plan.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

In response to working group IR 376 (round 1), the proponent states that the groundwater level monitoring and sampling recommendations provided in the Hydrogeology Technical Data Report have been implemented. Groundwater will continue to be monitored and additional data will be assessed during permitting process, if required. The monitoring program provided in Section 4 of the Preliminary Groundwater Management Plan would benefit from providing a map of the wells planned to be included in the program.

In response to working group IR 446 (round 1), the proponent acknowledges that the existing Preliminary Groundwater Monitoring Plan will require revisions to include the closure and post-closure phases of the project and that more wells may be required.

In response to working group IR 449, the proponent acknowledges that a seep monitoring program for the life of mine will need to be discussed and developed.

2.10 WATER QUALITY AND AQUATIC BIOTA (GEOCHEMISTRY)

41. Generally the EAC Application includes an assessment of the relevant effects related to water quality and presents mitigation measures that will result in compliance with the BC water quality guidelines. The water quality model results indicate that the residual Project effects are not significant; however, in terms of the mitigation approaches, the expectations for success are likely overly optimistic. Detailed evidence is lacking for the mitigation efficiencies identified in the EAC Application. Sensitivity analysis to account for complicating factors should be included for the following mitigation approaches:

    i. PAG management; and

    ii. Saturated backfill.

    Additional seepage capture sensitivity analysis was performed in response to government agency comments. The results indicate that a minimum net seepage capture (NSC) of 85% is required to meet water quality objectives. Selenium exceedances are predicted for NSC < 85%.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #41 has not been provided by the proponent.*

The updated water package "Sukunka Environmental Assessment – Supplemental Information Clarification for Water Quality and Water Management Structure" was reviewed in the context of providing a response to previous comments by the working group and FNITR ID #41.

The updated information provides:

- an updated water quality model
- further technical assessment of mine contact water capture efficiency
- updated mine design plans, and
- updated mine development programs and management.

Updated information on PAG management ***partially addresses*** the issue that sufficient blending will be possible.

Updated information on the efficacy of saturated backfill ***partially addresses*** the issue that sufficient attenuation of nitrate and selenium will occur to avoid other water quality mitigation strategies and contingency plans, such as long term active water treatment.

Updated information on seepage capture efficiencies ***partially addresses*** the issue that such optimistic capture is possible.

2.11 WATER QUALITY AND AQUATIC BIOTA (TOXICOLOGY)

The Aboriginal Participants remind the Proponent that members drink water from the Sukunka region.

42. Derivation of a Selenium Site Performance Objective (SPO) and EA for Selenium-related Toxicity (also see specific comments in Section 3.11.3).

    i. Based on the definition provided in the effects assessment of water quality and aquatic biota, SPOs are not protective of the aquatic receiving environment (i.e., they are the concentrations at which high magnitude adverse effects occur).

    ii. The bioaccumulation model and many of the assumptions used in developing the SPO are not conservative and result in a SPO that is likely to have adverse effects in the receiving environment, particularly for lentic environments.

    iii. There should not be an upper bound for the lentic SPO. The SPO should be a single number (i.e., the lower bound), since this is the concentration at which adverse effects could begin to occur in rainbow trout (not taking into consideration the potential for presence of other more sensitive fish species).

    iv. The use of the selenium SPO in the effects assessment, particularly for lentic environments, underestimates the potential for risk to aquatic biota.

v. It is recommended that:

   a. a Science-based Environmental Benchmark (SBEB) be developed that is protective of aquatic biota, or provide rationale for why SBEBs shouldn't be adopted for the Project.

   b. a rationale be provided for why a range of lentic SPOs is required and why more sensitive fish species have not been considered in the development of the lentic SPO.

   c. the effects assessment be revisited to evaluate the potential for adverse effects in aquatic biota due to selenium in lentic environments, taking into consideration the potential for effects in all fish species that could be present in the wetlands.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #42 has not been provided by the proponent.*

Relevant Batch and Comment #/IR Tracking:

- Comment IR-046 (MOE), IR-048 (MOE),IR-050 (MOE), IR-054, IR-263 (FLNRO), IR-266 (FLNRO), IR-267 (FLNRO), IR-268 (MOE), IR-269 (FLNRO)

No new work has been provided by the proponent, other than responses to working group comments in tables. No new information is provided in the updated water package titled "Sukunka Environmental Assessment – Supplemental Information Clarification for Water Quality and Water Management Structure".

The comment responses indicate that the SPO is based on Rainbow Trout toxicity data, which the proponent asserts is the most sensitive species; however, data provided by the proponent indicates that Northern Pike are more sensitive than rainbow trout, and state their sensitivities are 'similar'.

In comment IR-046, the MOE reviewer further indicates that for wetlands, selenium benchmarks should be 0.002 mg/L and 20 mg/kg dw in egg tissue to account for more sensitive species than rainbow trout until uncertainties can be resolved and adequate site-specific supporting data is available.

It is recommended that the proponent:

- Revise the proposed selenium SPO for lentic environments to be based on the most sensitive species (Northern Pike, or back-calculated from the threshold derived in DeForest et al (2010) of 20 mg/kg dw in egg tissue);
- Eliminate the 'range' of SPOs since the methodology used to derive them means that adverse effects are possible at the low end of the range; and

- Derive the selenium benchmark using the approach advocated by BC MOE in their current Technical Guidance 8 document so that the selenium benchmark is protective of the most sensitive species that could be present in the wetland.

43. The effects assessment for parameters that are predicted to exceed guidelines due to background conditions or poor detection limits in source terms would benefit from additional information (also see specific comments in Section 3.11.3).

    i. Parameters are predicted to exceed water quality guidelines, but they are not predicted to contribute to Project residual effects because of high background concentrations or poor detection limits in model source terms.

    ii. The baseline water quality data provided in the chapter does not support this conclusion, and detection limits for the source terms are not provided or referenced.

    iii. It is recommended that additional information be provided and/or collected to ensure that none of these parameters are missed in the effects assessment, particularly the ones with high background concentrations.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #43 has not been provided by the proponent.*

44. Mitigation Measures for Water Quality (also see comments under Section 3.11.5).

    i. The primary proposed mitigation measure to control selenium (and nitrate) is attenuation of contact water in saturated pit backfills (attenuation of 99% for selenium and 95% for nitrate).

    ii. This mitigation measure is unproven and has not been used in BC previously (based on information provided in the EAC Application). There is no evidence provided in the EAC Application to indicate that this will be an effective method of attenuating selenium (or nitrate) in contact water in the short or long term.

    iii. Mitigation is also reliant on capture and pump-back of contact water at the efficiency rate of 85%. This is likely not a realistic estimate of the amount of contact water and seepage that can be captured from the entire site.

    iv. There is no description of retention time for the various backfilled pits or how high seasonal flows will affect retention time and efficiency of attenuation.

    v. If either of these mitigation measures fail or do not achieve the minimum effectiveness assumed in the water quality model then adverse effects in the aquatic environment are much more likely (unmitigated water concentrations are at least an order of magnitude higher). The effects assessment for aquatic biota does not consider these scenarios. The Ministry of Environment (MOE) appears to be currently using the

unmitigated water quality predictions for their assessment based on recommendations from Ministry of Energy and Mines (MEM).

vi. The proposed mitigation measures (assuming 100% effectiveness 100% of the time) still results in the exceedance of the selenium SPO in lentic environments, which, by definition, is the concentration at which adverse toxicological effects could occur.

vii. It is recommended that an effects assessment be provided following the generation of new water quality model results using more reasonable assumptions about the attenuation rates for selenium (and nitrate) and contact/seepage water collection efficiency. Alternatively, please provide an effects assessment for water quality and aquatic biota using the unmitigated water quality model sensitivity scenario, as recommended by MEM and MOE.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #44 has not been provided by the proponent.*

The most recent comments from MOE (letter to EAO dated August 15, 2016) and MEM (letter to EAO dated July 29, 2016) indicate that the supplemental information provided by the proponent is not adequate to address all of their concerns. Many of the concerns expressed by MOE and MEM were similar to the key issues identified in ERM's review.

Substantial uncertainties regarding mitigation and contingency measures still remain outstanding.

The supplemental information and updated water quality model suggest that selenium (and other parameters) concentrations will be higher than originally provided and assessed in the Application/EIS.

The supplemental information provided does not provide a re-assessment of the potential for effects to aquatic biota or water-dependent organisms such as birds or amphibians.

It is recommended that the proponent:

- Provide enough information to address key uncertainties or, alternatively, use a more conservative version of water quality model predictions that use more conservative assumptions as the foundation for assessing potential effects to aquatic biota.
- Provide an updated effects assessment for aquatic biota and other water-dependent organisms, incorporating all new water quality predictions and modifications to the proposed SPO for selenium.

2.12 FISH AND FISH HABITAT

45. The EAC Application does not include an assessment of predicted changes in groundwater quantity and quality on aquatic habitat in downstream reaches of the mine.

    It is recommended that an assessment of potential effects due to changes in groundwater quantity and quality on fish and fish habitat be undertaken.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #45 has not been provided by the proponent.*

    In its response to working group IR 168, the proponent proposes additional studies regarding "groundwater, water quality and hydrological studies" for the creation of overwintering pools in Lower Skeeter Creek. It is recommended that these additional studies are conducted prior to the consideration of serious harm in the assessment of effects related to changes in instream flow.

46. The EAC Application does not properly characterize residual effects on fish habitat.

    It is recommended that the characterization of residual effects on fish habitat be redone (i.e., Table 5.1-10).

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #46 has not been provided by the proponent.*

47. The EAC Application lacks an assessment of potential water withdrawal effects on Sukunka River instream flow.

    It is recommended that an instream flow assessment for the Sukunka River be completed according to standard methods, and a residual effects assessment be conducted for this potential effect.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed by information provided to the EAO working group. To date, a direct response to FNITR key issue #47 has not been provided by the proponent.

    Additional instream flow data have not been supplied.

48. The Skeeter and Chamberlain creeks instream flow assessment does not follow standard methods.

    It is recommended that an instream flow assessment be completed according to standard methods, and potential residual effects be re-assessed to consider the results of the instream flow assessment.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed by information provided to the EAO working group. To date, a direct response to FNITR key issue #48 has not been provided by the proponent.

    Additional instream flow data have not been provided.

    See also comments in Section 3.12 pertaining to 'Conceptual Fish Habitat Offsetting Plan'

49. The analysis of baseline fish relative abundance data may be misleading.

    It is recommended that the baseline fish relative abundance data be re-analyzed as catch-per-unit-effort (rather than biomass) and the results reported.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed by information provided to the EAO working group. To date, a direct response to FNITR key issue #49 has not been provided by the proponent.

    Additional fish relative abundance data have not been provided.

50. Baseline relative abundance assessments were not conducted for the Sukunka River.

    It is recommended that baseline fish relative abundance assessments be conducted for the Sukunka River and the results reported.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed by information provided to the EAO working group. To date, a direct response to FNITR key issue #50 has not been provided by the proponent.

    Additional fish relative abundance data in the Sukunka River have not been provided.

51. Proposed fish habitat offsetting measures are uncertain because there is a lack of supporting baseline data related to potential effects on fish and fish habitat and how that information will be incorporated in the fish offsetting plan.

    It is recommended that baseline fish, fish habitat, hydrology, topographical survey, and preliminary engineering data be collected to support the proposed offsetting measures. A biological offsetting budget should also be provided to determine if Project related fisheries loss equals offsetting fisheries gain. As indicated above, instream flow studies using

standard methods should be conducted to help determine fish habitat loss. Habitat offsetting is proposed as the main measure to mitigate effects to fish and fish habitat and this mitigation is also considered in the assessment of cumulative effects. Due to the uncertainty with the proposed offsetting plan, the conclusions for the residual and cumulative effects assessments for fish and fish habitat are unsupported.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed by information provided to the EAO working group. To date, a direct response to FNITR key issue #51 has not been provided by the proponent.

See comments in Section 3.12 pertaining to 'Conceptual Fish Habitat Offsetting Plan'

In response to working group comment 168n, the proponent provided the requested offsetting habitat budget; however, this budget is not based upon revised instream flow data conducted to BC standards. Therefore, the numbers provided in the offsetting budget remain uncertain.

52. Please clarify commitments surrounding fish and fish habitat follow up monitoring programs.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #52 has not been provided by the proponent.*

Additional information requested.

2.13 HUMAN AND ECOLOGICAL HEALTH

Appendix 27.A-25 (Human Health and Ecological Risk Assessment-Technical Data Report)

53. Page 2 of the Technical Data Report (TDR) indicates it has not been updated fully. A listing is provided of the areas in which inconsistencies may occur since the TDR was not updated. It is understood that the water quality model was updated between the first and second submission of the EAC Application. However, it is not clear whether the water quality model results presented in the second EAC Application were used in this TDR and subsequently in Chapter 9 of the EAC Application.

    Please clarify that the source data used in all calculations is the same as the data generated by the various models (e.g., water quality, air quality, soil quality, etc.) presented as part of the second EAC Application. If incorrect or not current data was used in the TDR to support the second EAC Application, please provide an updated TDR and human health effects assessment for review and comment. It is not possible to evaluate the effects assessment for human health if the underlying data in the TDR is not correct.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #53 has not been provided by the proponent.*

Updates to the TDR and human health effects assessment chapters that consider changes in water quality modelling and changes in mine design could not be located.

54. Contaminant of Potential Concern (COPC) selection criteria used in the TDR do not follow either federal (Health Canada) or provincial (BC MOE) guidance for human health risk assessments.

    i. Standard risk assessment guidance indicates that maximum environmental media concentrations compared against health-based guidelines should be used to screen for COPCs. This should be done for each environmental media (i.e., air, water, and soil).

       Please provide rationale for why using a 95% Upper Confidence Limit of the Mean (UCLM) is appropriate at the COPC selection stage of a risk assessment or redo the screening by comparing maximum environmental media concentrations against relevant guidelines.

       Please provide rationale for why air quality (specifically the concentrations of metals in air) compared against guidelines from other jurisdictions were not considered in the COPC selection process.

    ii. The TDR makes reference to the use of dissolved metal concentrations being used in COPC screening and in calculations involving the water exposure pathway. Use of dissolved concentrations is likely to underestimate the total concentrations for most metals.

       Please provide rationale for why dissolved metal concentrations were used instead of total metal concentrations when guidelines are based on total metal concentrations. Revise the COPC screening process to use total metal concentrations rather than dissolved concentrations in water.

    iii. Step 3 of the screening process described in the TDR excludes COPCs if concentrations in coal dust are less than concentration in soil. However, soil is not the only media to consider in selecting COPCs so this step has the potential to exclude COPCs that should be retained.

       Please provide rationale for why this step should be used to exclude COPCs from all exposure routes based on soil concentrations, which is not a standard practice in risk assessment (as described in BC and federal guidance documents). Alternatively, this step can be dropped from the COPC screening process.

    iv. The COPC selection process did not consider air, soil, or water quality predictions. This could result in some parameters not being included in the human health effects

assessment. It is possible that the Project could cause changes in environmental concentrations that push the baseline concentrations from below the guideline to baseline to concentrations higher than an applicable guideline during the phases of the Project.

Please provide COPC screening based on future predictions of air quality, water quality, and soil quality compared to applicable guidelines to ensure that no relevant COPCs were missed in the selection process.

v. No information regarding hydrocarbons or, more specifically, polycyclic aromatic hydrocarbons (PAHs) could be located in the human health chapter or TDR.

Please provide and effects assessment for human health for PAHs, or provide rationale for why they do not need to be assessed for risk to human health.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #54 has not been provided by the proponent.*

The proponent has provided some additional clarification regarding the COPC screening procedure used in the HHRA in response to comments from CEAA (on behalf of Health Canada). However, citations of applicable federal or provincial (BC) guidance have not been provided to support the approach used in COPC screening. The COPC screening procedure has the potential to miss parameters in other environmental media (e.g., air, total metal concentrations in water), and COPC screening did not consider potential increases in environmental media concentrations as a result of the Project.

It is recommended that the proponent provide an updated TDR and human health effects assessment that incorporates recommendations and changes to the Project design or Project predictive models. Alternatively, provide rationale as to why updates are not required.

55. Standard guidance from Health Canada and BC MOE specifies that Human Health Risk Assessments (HHRAs) should consider multimedia exposures. The TDR indicates that the water exposure pathway is scoped out because no parameters were noted to exceed drinking water guidelines (based on 95% UCLM concentrations, see comment 54i). However, COPCs were selected based on other screening criteria used and the contribution of drinking water to the overall intake of each COPC should still be considered in the HHRA and human health effects assessment, as required in a multimedia HHRA.

The use of a 0.2 hazard quotient (HQ) benchmark in the risk characterization stage is not appropriate given that exposures from each potential exposure route have not been summed and that background exposures have not been taken into consideration (i.e., potential exposures outside of the Project area such as exposures at home or work, ambient air outside of the Project area, or exposure through commercial foods).

To ensure that risk, particularly risk due to the Project, is not underestimated please provide an updated HHRA that takes into consideration the contribution of COPC intake from each potential (operable) exposure pathway (i.e., multimedia HHRA). Exposures to a COPC from each pathway should be summed to provide a total intake, which should be evaluated against the Toxicity Reference Value (TRV) for that COPC. The HQ should be compared against a benchmark of 0.2 (or background exposures must also be added to the overall exposure calculation). Please update the residual effects characterization for human health if warranted based on the results of an updated HHRA.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #55 has not been provided by the proponent.*

Updates to the TDR and human health effects assessment chapters that consider the sum of multimedia human exposure pathways could not be located.

It is recommended that the proponent provide an updated TDR and human health effects assessment that incorporates recommendations and changes to the Project design or Project predictive models. Alternatively, provide rationale as to why updates are not required.

56. There is valuable information in the traditional knowledge (TK)/traditional land use (TLU) report that can be included in the assessment. This is particularly important for nomadic users. Since the TK/TLU report indicates use at the fence line, the Maximum Point of Impingement (MPOIs) should be included as human receptor locations and carried forward into the effects assessment chapter (although it was assessed at least partially in the TDR, the MPOI was not considered in the human health effects assessment). Please provide an update of the HHERA that incorporates TK/TLU information.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #56 has not been provided by the proponent.*

Updates to the TDR and human health effects assessment chapters that consider TK/TLU could not be located.

It is recommended that the proponent provide an updated TDR and human health effects assessment that incorporates recommendations and changes to the Project design or Project predictive models. Alternatively, provide rationale as to why updates are not required.

57. The AIR specifies that potential effects on worker health will not be considered because they are regulated by the Province of BC's *Occupational Health and Safety Act* (OHSA). However, off-duty workers will reside at or near the Project site and are not covered by OHSA during their off-duty hours.

Worker camps should be included as human receptor locations and assessed accordingly as off-duty workers spend a considerable amount of time at the camp in close proximity to the Project. Please provide a human health risk assessment (HHRA) and human health effects assessment for off-duty workers.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #57 has not been provided by the proponent.*

Updates to the TDR and human health effects assessment chapters that consider potential effects to off-duty workers could not be located.

It is recommended that the proponent provides an updated TDR and human health effects assessment that incorporates recommendations and changes to the Project design or Project predictive models. Alternatively, provide rationale as to why updates are not required.

58. A country foods assessment typically includes a large mammal, small mammal, avian species, fish, and vegetation. However, in the TDR, only moose, fish, and vegetation (berries) are included as country/sustenance foods. All the typical food groups should be included in the country foods assessment portion of the chapter so that risk due to country food intake is not underestimated.

    Please revise the HHRA and effects assessment to incorporate a more representative range of country foods, or provide rationale for why it is not required.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #58 has not been provided by the proponent.*

    Updates to the TDR and human health effects assessment chapters that consider representative country foods types could not be located.

    It is recommended that the proponent provide an updated TDR and human health effects assessment that incorporates recommendations and changes to the Project design or Project predictive models. Alternatively, provide rationale as to why updates are not required.

59. No assessment of noise could be located for human health, even though there are potential receptors located within the LAAs of the rail load-out. Noise should be a part of human health risk assessment. Please include an assessment of noise effects on human health. (See also comments in Section 2.7).

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #59 has not been provided by the proponent.*

Updates to the TDR and human health effects assessment chapters that consider potential effects due to noise could not be located.

It is recommended that the proponent provide an updated TDR and human health effects assessment that incorporates recommendations and changes to the Project design or Project predictive models. Alternatively, provide rationale as to why updates are not required.

60. The receptors included in the ecological risk assessment (ERA) of the TDR do not line up with the valued components assessed in other chapters (e.g., wildlife VCs).

    Please provide rationale for why VCs were not considered as receptors in the ERA, particularly those that are listed or sensitive species (e.g., woodland caribou) and those identified at WMFN, SFN, and MLIB community meetings.

    Please provide an ERA that assesses the potential risks to all wildlife VCs that were considered in the EAC Application so that potential effects to these wildlife VCs due to contaminants can be fully assessed.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #60 has not been provided by the proponent.*

    Updates to the TDR and assessment chapters for relevant ecological VCs that consider the results of an updated ERA that includes all VCs could not be located.

    It is recommended that the proponent provide an updated TDR and effects assessments for VCs that incorporates recommendations and changes to the Project design or Project predictive models. Alternatively, provide rationale as to why updates are not required.

Section 9 of the Application (Assessment of Potential Environmental Effect, Human and Ecological Health)

61. Revisit the effects assessment, significance determination, and conclusions made in Section 9 of the EAC Application once the recommended changes are made in Appendix 27.A-25.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR key issue #61 has not been provided by the proponent.*

    Updates to the conclusions of the effects assessment chapters taking into consideration the recommended changes could not be located.

    It is recommended that the proponent provide an updated TDR that incorporates recommendations and changes to the Project design or Project predictive models. Please update the significance determinations of effects assessments or indicate that they are unchanged. Alternatively, provide rationale as to why updates are not required.

3. SECONDARY ISSUES IDENTIFIED DURING THE TECHNICAL REVIEW

The following secondary issues identified during the technical review are related to the key issues, but focus on specific technical aspects of the EAC Application, which may include questions regarding model parameters, assumptions used in modeling approaches, clarification regarding baseline methodologies and results or the application of particular guidelines and standards. Discussion and resolution of the secondary issues will support resolution of the key items and may occur concurrently. It should be noted that the EAC Application has been accepted for review, and therefore, comments regarding the Application Information Requirements are presented for information purposes only and not presented as issues for resolution, unless otherwise requested by the Aboriginal Participants.

3.1 WILDLIFE AND WILDLIFE HABITAT

3.1.1 Reports Reviewed

Sukunka Coal Mine Project Application Information Requirements – Approved by Environmental Assessment Office on October 23, 2013

Wildlife Technical Data Report

Wildlife Habitat Technical Report

3.1.2 Evaluation of Conformity to AIR

The information provided meets the general terms of the AIR; however, the baseline description does not meet the FLNRO (2014) guidelines to attain the baseline data necessary to inform an EA.

While the FLNRO (2014) document may not have been available at the time the EAC Application was submitted for formal review, the guidelines provide a basis to assess impacts from development to wildlife, and are based on information collected from past projects that have successfully received their EACs. The document formalizes a reasonable expectation that already exists with respect to the types of information required for an EA to assess potential impacts to wildlife.

Some gaps in baseline information have been identified in regards to wildlife habitat use within the LAA and data on key indicators for VCs, such as abundance, distribution, mortality and survival rates, particularly for ungulates such as moose, goat, and elk. Baseline information on predators such as wolves is also important in the context of the CMMP and this information is not local or detailed enough to inform monitoring.

3.1.3 Assessment of Technical Studies

Report 1 Wildlife Technical Data Report

1. The Recovery Strategy for the Woodland Caribou, Southern Mountain population (*Rangifer tarandus caribou*) in Canada (herein Recovery Strategy) identifies critical habitat for caribou, including matrix habitat. The extent of critical habitat is still being mapped and refined (e.g., Quintette herd), but alternative sources of information exist. It is unclear how critical habitat, including core low and high elevation summer and winter range, and matrix habitat, were considered in the assessment and subsequently the CMMP.

   Analysis of Glencore Responses to Working Group Comments:

   Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #1 has not been provided by the proponent.*

2. A rationale has not been provided for the selection and delineation of the study areas boundaries relative to each VC. From FLNRO 2014:

   i. *"A key consideration when designing the baseline program is deciding on the study area. The objective is to quantify the impact to habitat at a scale that is relevant to the wildlife VC in question. Most scales used to evaluate the significance of an effect require that the magnitude of the impact be evaluated with respect to a population."*

   Analysis of Glencore Responses to Working Group Comments:

   Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #2 has not been provided by the proponent.*

   This requires caribou to be assessed at the scale of the Local Population Unit (LPU). It is not clear from the comment responses submitted to the working whether the assessment of caribou has been redone considering the LPU scale.

3. While a review of additional data sources has been provided, the results have not been comprehensively evaluated relative to the proposed Project. The information provided is primarily a list of species that "may occur". The EA would benefit from a detailed summary from other sources on the wildlife VCs, including information on current population estimates and trends, distribution in the study area, habitat requirements and sensitivities. For species of conservation concern, a summary of estimated population sizes, likelihood of occurrences, seasonal use and distribution within the study area from existing data sources is required to evaluate potential effects and design appropriate mitigation measures.

   Analysis of Glencore Responses to Working Group Comments:

   Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #3 has not been provided by the proponent.*

4. The Wildlife Guidelines for Industrial Developments (FLNRO 2014) indicate that specific information needs to be attained to inform an impact assessment for wildlife VCs. For example, the guidelines for caribou require:

    i. Identify caribou habitat and historic and current caribou use of those habitats within the proposed project footprint and its area of influence; and,

    ii. Identify caribou indicators within the project area by caribou ecotype.

    The wildlife technical report does not meet the information requirements in the guidelines for caribou and other wildlife VCs, or discusses any information shortfalls and how they have been addressed in the EAC Application.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #4 has not been provided by the proponent.*

5. A substantial area of the LAA was not surveyed for waterfowl during any of the seasonal surveys. This includes the Meikle Creek drainage, which appears to support many wetlands that could be used by breeding waterfowl. There is no rationale for omitting this drainage. This represents a potential gap with respect to wildlife guidelines for industrial developments (FLNRO 2014):

    i. Identify bird habitat and current use of those habitats within the proposed project footprint and area of influence; and,

    ii. Identify bird indicators within the project area.

    Analysis of Glencore Responses to Working Group Comments:

    Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #5 has not been provided by the proponent.*

    A brood survey was conducted on August 1. No staging or pair surveys were conducted. These surveys are recommended to address this comment.

6. Baseline waterfowl observations have not been analyzed to describe habitat use, which limits the assessment of potential effects to waterfowl. It is recommended the Proponent include a discussion on the use of wetland and riparian habitats by waterfowl in the LAA.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #6 has not been provided by the proponent.*

7. Waterfowl surveys were not conducted during spring staging period. During spring staging, waterfowl are concentrated in areas of open water, including areas that may dry in summer and fill with melt water. These areas may be limited in their local availability, increasing the vulnerability of waterfowl to impacts from low elevation development. Fall staging areas may not be representative of spring staging, as suggested in the environmental assessment. It is recommended that the Proponent conduct spring staging surveys prior to construction to document waterfowl use during the migration period.

   Analysis of Glencore Responses to Working Group Comments:

   Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #7 has not been provided by the proponent.*

   Appropriate spring and fall staging surveys are recommended.

8. Bird observations have been related to habitat in very general terms. The environmental assessment would benefit from further analysis on the distribution of important habitats based on field observations of birds and ecosystem maps developed for the Project. This is necessary to make inferences about available habitat in the LAA that have not been surveyed for birds. The analysis should consider habitat parameters (e.g. ecosystem units) used in the TEM mapping, which would further support an accuracy assessment of the habitat maps developed for bird communities.

   Analysis of Glencore Responses to Working Group Comments:

   Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #8 has not been provided by the proponent.*

9. Raptor observations have been related to habitat use in very general terms, and are not applicable to areas of the LAA that were not surveyed. This limits the ability to evaluate potential effects on raptors across the LAA that have not been surveyed. The environmental assessment would benefit from relating raptor observations to the ecosystem maps developed for the Project so that important habitats may be identified in areas that were not surveyed.

   Analysis of Glencore Responses to Working Group Comments:

   Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #9 has not been provided by the proponent.*

10. Survey effort for amphibians is not described in either the methodology or results sections, which is an important piece of information to determine what areas were surveys and what areas might need further investigation. In addition, while the objectives of the baseline surveys include documenting habitat use, no such information has been provided with respect to the type of waterbodies surveyed and their distribution across the LAA and RAA. The absence of this information represents a gap in the assessment of potential effects on

amphibians and the result is a Present/Not Detected survey intensity, which does not meet BC FLNRO (2014) guidelines:

i. Identify western toad habitat and current use of those habitats within the proposed project footprint and area of influence; and,

ii. Identify western toad indicators within the project area.

It is recommended that details regarding survey effort and habitat use by western toad be provided. Additional surveys may be required to adequately document the distribution of western toad in the LAA, and evaluate potential effects consistent with BC FLNRO (2014) guidelines.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #10 has not been provided by the proponent.*

11. The importance of clearings and other open areas to bats is not adequately described. Wetlands and moist areas are more likely to produce insect prey for bats. Sites that were inventoried should be described in sufficient detail that corresponds with ecosystem mapping to enable inferences about available habitat in areas of the LAA that was not surveyed. FLNRO (2014) guidelines require:

    i. Identify bat habitat and current use of those habitats within the proposed project;

    ii. Identify bat indicators within the project area.

    iii. Quantify the availability of karst, limestone, or geothermal activity as potential indicators of bat hibernacula.

    Three species of bats that are of conservation concern, including the provincially red-listed eastern red bat, were recorded during baseline studies, yet bats were not carried forward to the EA as a wildlife KI/VC. Given the unique requirements of bats as a group and the conservation status of several species that occur in the vicinity of the Project, it is recommended that an environmental assessment specific to bats is conducted.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #11 has not been provided by the proponent.

    An assessment that considers the unique characteristics of bats is required; for example, susceptibility to white nose syndrome (WNS) and geomorphology suitable for hibernacula.

12. The fur-harvest database was not utilized to support the environmental assessment on furbearers. This information provides Present/Not Detected information and in some cases

relative abundance estimates for furbearers, particularly for marten. Using the fur-harvest database is a key component of the RISC standards for the inventory of furbearers. The assessment on furbearers would benefit from incorporating the fur-harvest data.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #12 has not been provided by the proponent.*

13. The appropriate methodology for surveying furbearers involves placing a grid over the study area, and adjusting effort relative to habitat availability in each grid (RIC 1999). Considering that fisher is likely the most vulnerable forest dwelling furbearer in the RAA, a 5 km grid is the recommended grid size. Differentiating fisher and marten tracks from the air can be difficult as large male marten can have tracks similar to those of female fisher. Marten tracks were not detected during aerial surveys, which question the effectiveness of aerial techniques for this Project. The ground survey covered 10.7 km, which is an inadequate intensity to detect fisher. FLNRO (2014) guidelines for furbearers include:

    i. Identify fisher habitat and historic and current use of those habitats within the proposed project footprint and area of influence; and,

    ii. Identify indicators within the project area.

    Additional surveys may be required to adequately document the distribution of furbearers in the LAA, and evaluate potential effects consistent with BC FLNRO (2014) guidelines.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #13 has not been provided by the proponent.*

14. Winter track surveys provide the only site specific information for ungulates associated with the Project. This represents a present/not detected level of intensity and is only a portion of the type of information that might typically be collected to support an EA. FLNRO (2014) guidelines require the collection of data on population and habitat use by ungulates across an appropriate study area. Additional surveys may be required to adequately document the distribution of ungulates in the LAA, and evaluate potential effects consistent with BC FLNRO (2014) guidelines.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #4 has not been provided by the proponent.*

Additional surveys have not been conducted.

15. Motion-triggered and infrared cameras are increasingly being used to monitor wildlife activity around industrial developments. The camera monitoring design used by the Proponent missed the critical winter and kidding seasons for mountain goats, and provided presence/not detected information during the growing season, which failed to meet the objectives to establish baseline levels of use during the summer and fall. It is unclear whether cameras captured activity at the mineral lick, an important feature for goats, including the number of animals, timing of use, duration, and demographics of goats using the lick. Modifications to the current camera monitoring program may be required to document mountain goat activity, particularly during the sensitive winter and kidding periods.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #15 has not been provided by the proponent.*

16. Inaccuracies in habitat mapping were attributed to the use of contractors that conducted the modeling (Section 4-12), despite the statement that an experienced biologists generated the habitat suitability ratings. Please provide the "cheat sheets" that were used as the basis for the habitat suitability modeling. These cheat sheets should outline the assumptions that form the basis for the ratings tables.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #16 has not been provided by the proponent.*

17. Typically, TEM plots are circular with a 20 m radius. Why was a 20 x 20 m square plot used?

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #17 has not been provided by the proponent.*

18. There is insufficient ground-truthing of wildlife observations with Terrestrial Ecosystem Mapping (TEM) plot data to support habitat suitability mapping. Relating observations to ecosystem unit, seral stage, canopy closure etc. would enable verifying the habitat modeling algorithms and assumptions. This information is briefly presented in the habitat report, but no detailed analysis of field observations is presented. Wildlife sign was not analyzed relative to habitat. Given the low accuracy of the habitat mapping, revising the models based on additional field verification is warranted and recommended to understand potential effects.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #18 has not been provided by the proponent.*

Field verification is required to assess inaccuracies in habitat mapping.

19. Many important wildlife habitat features such as mineral licks, stick nests, etc. occur at a local scale and can only be detected by ground surveys. These features are protected by the BC Wildlife Act. Please provide details on the plan to locate and mitigate potential effects to these features prior to construction.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #19 has not been provided by the proponent.*

20. The wildlife baseline lacks population estimates for ungulates and predators that may be used as the basis to monitor changes over time. As a result, there is no data to support the commitment to monitor changes in predator-prey dynamics (e.g., Table 4.1-3 in assessment methodology). It is recognized that to effectively address predator-prey dynamics at a regional scale is beyond any single proponent to address. It is recommended that Glencore explore opportunities to facilitate and/or support regional initiatives that address predator-prey dynamics, in partnership with First Nations, other industry proponents, and provincial and federal agencies.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #20 has not been provided by the proponent.*

Wolf, elk and moose surveys are required to establish baseline populations and support caribou planning.

Report 2 Wildlife Habitat Technical Report

21. Please provide a rationale for the 500 m buffer around the LAA.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #21 has not been provided by the proponent.*

Partially addressed assuming it was based on Environment Canada (2014) caribou management recommendations. Clarification is requested.

22. The Recovery Plan for southern mountain caribou identifies critical habitat, which includes both core and matrix habitat. It is unclear how critical habitat, as defined by the Recovery Strategy, was considered in the habitat mapping and environmental assessment for caribou, and how limitations in the federal maps may have influenced the results.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #22 has not been provided by the proponent.*

23. Contrary to the objectives in the habitat report, no information was collected on habitat use, and as a consequence, habitat use was not effectively evaluated, suggesting a potential gap in the baseline. The absence of this data reduces confidence in the habitat report as there is no field verification of habitat value relative to wildlife observations, or evaluation of the Habitat Suitability Ratings, which is RISC standard. While using assumptions on habitat use from the literature is a recognized first step, FLNRO (2014) outlines that delineating habitat and documenting current habitat by VCs are required to inform the EA. The absence of information regarding local habitat use has been carried through the EA for each VC and may be a reason for the low accuracy of the habitat maps (Section 4.12). Potential effects would be better understood by revising the habitat mapping products for each VC using existing wildlife observations and additional field verification.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #23 has not been provided by the proponent.*

Field verification is required to evaluate the habitat suitability maps.

24. The use of a confusion matrix is a valid approach, but the results shown in Table 4.12-1 indicate that the models perform poorly in predicting habitat values in the field, many with less than 42% agreement and most of this accounted for by nil (HSR 4) valued habitat, which is generally the easiest to predict. The confusion matrices for all models developed should be presented. The inaccuracies suggest the EA information on habitat impacts may not be adequate. Given uncertainty, a field review of the final map output is required to determine its actual accuracy on the ground. Without this review of the final product, their remains uncertainty surrounding the effects assessment of impact to habitat availability.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #24 has not been provided by the proponent.*

Field verification is required to address uncertainty in habitat mapping.

25. Elk: HSI model is well developed and appropriate to describe winter habitat use by elk.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

26. Moose: HSI model is appropriate to describe severe winter habitat suitability. Development of an early winter model that is less influenced by snow pack is recommended.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #26 has not been provided by the proponent.*

27. Goat: Shrub and conifer vegetation are underrated in this model given their value as forage. Please revise.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #27 has not been provided by the proponent.*

28. Goat: Escape terrain is not accurately defined. The following will improve the escape terrain model for mountain goats:

    i. The 40° / 80% limit for slope is sufficient; however, escape terrain includes all topography with the appropriate slope. Incorporating aspect as an additional parameter will improve the model.

    ii. Cooler aspects may be used in winter, while warmer slopes will rated at lower suitability during the summer.

    iii. Incorporating vegetation classed such as RO, BA, TA etc. will ensure that steeper forested areas are not identified as escape terrain, resulting in an overestimate.

    iv. Distance values should also be graduated, i.e., forage within 100 m of escape terrain will be rated higher than forage at the end of the 500 m threshold, particularly if predator density is high.

    An HSI approach similar to moose and elk is recommended for mountain goat to improve confidence in the assessment of potential effects on mountain goat habitat.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #28 has not been provided by the proponent.*

It is recommended that mountain goat habitat is appropriately mapped.

Grizzly Bear: Please clarify how structural stage was incorporated in the models. In addition, the models appear to be based on vegetation chronology as opposed to plant phenology. Please clarify how vegetation ratings were defined.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #29 has not been provided by the proponent.*

29. Marten: A winter model may be more appropriate to describe trapline impacts; however, a growing season model is similar in attributes and appropriate for this assessment.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group*

30. Olive sided flycatcher: It is unclear how BEC units were incorporated into the model. This is not illustrated in Table 3.10-1. Please clarify.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #30 has not been provided by the proponent.*

31. Western toad: Algorithms to describe western toad breeding habitat are feasible; however, the model would be strengthened by considering water quality and substrate. In addition, small ditches, ponds etc. not typically picked up by TRIM or TEM may provide suitable breeding habitat. For this reason, the model should be supplemented by field verification to predict breeding habitat. As part of the wildlife mitigation and monitoring plan, it is recommended that Glencore incorporate annual surveys to identify ephemeral ponds where western toad breeding may occur to avoid disturbance to those areas.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #32 has not been provided by the proponent.*

A survey was conducted on August 1, 2015.

32. Western toad: As with ephemeral ponds, small wetlands may not be captured by this model, underscoring the importance of field verification and ongoing monitoring.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #33 has not been provided by the proponent.*

33. Western toad: The over-wintering model may be too broad to inform mitigation. Field verification is recommended.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #34 has not been provided by the proponent.*

There was no evaluation of overwintering during the August 1 survey.

34. Indirect impacts or sensory disturbance associated with development do not appear to be accounted for in the habitat modeling, despite statements in the EA that these effects are likely to occur. Please clarify how indirect effects were considered in the habitat modeling.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #35 has not been provided by the proponent.*

35. Given the heavy reliance on the habitat models to inform the assessment of potential effects on wildlife and wildlife habitat, low model accuracy limits confidence in the assessment and requires further evaluation. Field verification is a necessary first step. With the exception of the mountain goat and western toad models, the assumptions that form the basis for the habitat models for the other species are generally standard; therefore, it is unclear what is causing the low accuracy. Mapping inaccuracies may result from subjectivity of field staff and errors in GIS/Vegetation classification ratings. It is recommended that Glencore evaluate the reasons for the low accuracy of the habitat models and revise them accordingly to improve confidence in the environmental assessments that rely on them.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #36 has not been provided by the proponent.*

In working group IR 406 (round 1 and 2), the working group reviewer expressed concern over the use of more than 10 biologists with varying and unknown levels of local knowledge of species and habitat relationships. The concern was not addressed and limit confidence in model accuracy. To address this comment appropriately, the models require field verification and modified accordingly to accurately represent ground conditions.

3.1.4 EA Conclusions

Caribou

The EA predicted significant residual effects of habitat loss and change in mortality to caribou associated with the Project, and concluded that a decline in the Quintette herd was likely, resulting from reduced cow and calf survival.

36. The CMMP has several limitations that are likely to reduce its effectiveness at managing the Project's contributions to the predicted decline in the Quintette herd:

    i. Incomplete baseline data and delineation of critical habitat.

    ii. None of the measures proposed in the CMMP will result in a net neutral or positive outcome for caribou within 10 years, as directed in the Peace Northern Caribou Plan (PNCP).

    iii. Road density in the region currently exceeds sustainable thresholds. The Project, in combination with other developments, will increase road density further. There is no proposed mitigation in the CMMP and the WPMP to reduce road density.

    iv. The CMMP includes a plan to reclaim caribou habitat, including High Elevation Winter Range (HEWR). Given habitat recovery will span decades, the proposed habitat monitoring over 10 years will not be able to evaluate the success of reclamation activities.

    v. There is no baseline data on alternate prey or predators that may influence caribou population dynamics.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #37 has not been provided by the proponent.*

37. While a Project can limit its impacts at a local scale, the development of an effective CMMP requires a broader context and is larger than a single proponent can address. It is recommended that the Proponent explore opportunities to facilitate and/or support the development of a regional CMMP that addresses habitat reclamation, predator-prey dynamics, road densities, and other issues relevant to the recovery of caribou, in partnership with First Nations, other industry proponents, and provincial and federal agencies.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #38 has not been provided by the proponent.*

Grizzly Bear

The EA concluded that residual effects from change in mortality on grizzly will be not-significant. The cumulative effects assessment concluded there would be a residual effect of mortality risk on grizzly bears as a result of the predicted increase in road density and habitat fragmentation.

38. Road density is a key factor driving the distribution and abundance of grizzly bears at a regional scale. Current road density in the region is 2.2 km/km^{2,} well above the recommended threshold of 0.6 km/km^2. The Project is predicted to increase road density, with no mitigation proposed to counteract the increased fragmentation and associated

mortality risk, suggesting this effect will be long term with unknown consequences to the population.

It is recognized that to effectively address road density at a regional scale is beyond any single proponent to address. It is recommended that the Proponent explore opportunities to facilitate and/or support regional initiatives that address road density, in partnership with First Nations, other industry proponents, and provincial and federal agencies.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #39 has not been provided by the proponent.*

Moose

The EA concluded there would be no residual effects on moose given their resilience and the creation of early seral forage during operation and post-closure, despite impacts to UWR-9-001 SPE-023 and -013:

39. There are inconsistencies with this conclusion and uncertainty surrounding the management of moose:

    i. Low accuracy of the habitat models reduces confidence that habitat effects have been fully accounted for.

    ii. There are contradictions with how the habitat will be managed. The EA suggests moose habitat will be enhanced to mitigate effects, but the CMMP suggests there will be an active effort to reduce moose habitat to reduce chance encounters with predators. What is the end land use objective?

    iii. There has been no population inventory to determine the abundance and density of moose in the RAA. Population estimates are based on regional (Peace 7b) statistics and neighboring watershed populations, which may be substantially different.

    iv. The EA concluded that moose will increase with mitigation, but this prediction cannot be evaluated without a baseline to detect change. Collecting local baseline information on the winter population of moose is recommended.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #40 has not been provided by the proponent.*

Mountain Goat

The EA concluded there would be no residual effects on mountain goat.

40. There is uncertainty with this conclusion associated with the following key points:

i. The mapping of escape terrain needs to be re-evaluated.

ii. A baseline inventory has not been undertaken to document the abundance and distribution of mountain goats in the Project area.

iii. The WPMP suggests that mountain goats may use the coal mine rock faces as potential habitat; however, this will expose mountain goats to coal dust. The potential effect of coal dust on mountain goat health is unclear, creating a potential ecological sink.

Additional information is requested regarding the habitat suitability models, baseline mountain goat distribution, and the potential effects of coal dust on mountain goats.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #41 has not been provided by the proponent.*

Elk

The EA concluded there would be no residual effects on elk, despite potential impacts to UWR U-9-001 SPE-023 and -013.

41. The conclusions for elk are likely correct; however:

i. There are contradictions with how the habitat will be managed. The EA suggests elk winter habitat will be enhanced to mitigate effects, but the CMMP suggests there will be an active effort to reduce elk habitat to reduce chance encounters of caribou with predators. What is the end land use objective?

ii. There has been no population inventory to determine the abundance and density of elk in the RAA. Considering the potential moose / elk / wolf / caribou dynamic in future, baseline inventories are required to inform management planning in support of the CMMP.

It is recognized that to effectively address predator-prey dynamics at a regional scale is beyond any single proponent to address. It is recommended that the Proponent explore opportunities to facilitate and/or support regional initiatives that address predator-prey dynamics, in partnership with First Nations, other industry proponents, and provincial and federal agencies.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #42 has not been provided by the proponent.*

The recommendation to explore opportunities to facilitate/support regional initiatives has been partially addressed.

Marten

The EA concluded there would be no residual effects on American marten.

42. The conclusion relies on habitat mapping that has low accuracy. It is recommended the proponent verify the conclusions based on updated habitat mapping and field verification.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #43 has not been provided by the proponent.*

43. A number of marten mitigation strategies are available to promote sustainable marten populations. These include:

    i. Identifying suitable habitat patches (via updated habitat mapping and ground truthing) and ensuring movement corridors between patches are maintained.

    ii. Creating debris piles to enable crossing of barriers (ie, pipelines, road right of way etc.), installing den boxes in suitable forest habitat, vegetation management to promote vegetation cover etc.

    iii. Considering data from the provincial fur harvest database concurrently with potential effects to habitat may provide a more accurate assessment of effects to marten from development of the Project, and provide indices of harvestable surplus in the absence of absolute abundance data.

    iv. Pending the results of the updated habitat mapping, cumulative effects assessment for marten may be warranted. Forest development is ongoing and removes large areas of marten habitat with substantial delay in documenting these losses.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #44 has not been provided by the proponent.*

Fisher

The EA concluded there would be no residual effects on fisher.

44. The conclusion relies on habitat mapping that has low accuracy. It is recommended the Proponent verify the conclusions based on updated habitat mapping and field verification.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #45 has not been provided by the proponent.*

Waterbirds

The EA concluded there would be no residual effects on waterbirds.

45. The assessment on waterbirds is incomplete. Spring staging were not conducted and limited data was collected about the use of Meikle Creek by waterbirds. There is limited data available to extend inferences about potential effects to those areas that were not surveyed. Assumptions that spring and fall staging are similar are not necessarily true, and this needs verification to support the effects assessment conclusions. It is recommended that Glencore conduct spring staging surveys prior to construction to address this data gap and support the development of additional mitigation measures, as required.

    Analysis of Glencore Responses to Working Group Comments:

    Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #46 has not been provided by the proponent.*

    A brood survey was conducted on August 1. There is no information on spring staging as well as pair and fall staging around Meikle Creek.

Western Toad

The EA concluded there would be no residual effects on western toad.

46. The conclusion is based on 1:20,000 scale maps and some field surveys. Wetlands that support breeding toads are best identified on the ground as features that make them suitable may be missed by the mapping scale, including small ephemeral pools. The conclusion relies on the effectiveness of pre-clearing surveys. Detailed survey methodologies should be developed prior to construction, and incorporated in the final WPMP. This includes surveys for wetlands that may be created during development and assessed for their potential to act as ecological sinks.

    Analysis of Glencore Responses to Working Group Comments:

    Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #47 has not been provided by the proponent.*

    A memo submitted to the EAO working group on February 14, 2016 in response to working group comments 94, 95, 104 and 770 partially addresses this issue. Proposed mitigation activities are outlined that will mediate potential impacts. Details on the proposed western toad protection plan are requested before construction proceeds.

Forest and Grassland Birds

The EA concluded there would be no residual effects on forest and grassland birds, including northern goshawk and olive-sided flycatcher.

47. The conclusion is based on habitat mapping that has low accuracy. It is recommended the proponent verify the conclusions based on updated habitat mapping and field verification.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #48 has not been provided by the proponent.*

48. The conclusion relies heavily on mitigation outlined in the preliminary WPMP. Please confirm that an operational WPMP is forthcoming that details mitigation measures that will be implemented for birds in order to evaluate their potential effectiveness.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #49 has not been provided by the proponent.*

Bats

49. Bats were not directly assessed, despite the potential occurrence of northern myotis and little brown myotis, both federally listed as Endangered under *SARA 2012*, and the provincially red-listed eastern red bat. It is recommended that Glencore evaluate the potential effects of the Project on bats, focusing particularly on species of conservation concern and their requirements for roosting sits and hibernacula.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #50 has not been provided by the proponent.*

Summary

In general, the EA is habitat based, which is a valid approach; however, the low accuracy of the habitat models introduces uncertainty that reduces confidence in the results of the assessment. In addition, many of the conclusions that the Project will not result in residual effects to the respective wildlife VCs rely on potential mitigation measures without clear triggers or commitments to those mitigation measures, further reducing confidence in the assessment. Some of the measures include pre-construction surveys, avoiding timing windows, educating workers, hardening camps, and controlling traffic. Details about implementation are not provided. It is assumed that detailed operational CMMP and WPMP are in development. A final evaluation of the effects assessments will depend on updating and verifying the habitat models, which may be supplemented with additional field surveys, and delivery of the final CMMP and WPMP.

3.1.5 Mitigation

Mitigation for wildlife was reviewed to determine the quality of mitigation measures, and how the proponent structured its commitments to implement these mitigation measures.

50. Conclusions regarding no residual effects on wildlife VCs rely on the effective implementation of proposed mitigation measures. The CMMP and WPMP are preliminary

and described as living documents. It is assumed that detailed operational plans will be developed during the permitting stage. The Proponent is requested to provide the draft detailed CMMP and WPMP to the First Nations for review and comment prior to submission for permitting.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #51 has not been provided by the proponent.*

The CMMP or WPMP has not been provided for review.

51. As preliminary documents, both the CMMP and the WPMP generally reflect industry standards, but miss many potential mitigation and/or improvements, such as:

    i. A strategy for the reclamation and/or decommissioning of roads should be developed to support the long term sustainability of caribou and grizzly bears;

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #52 has not been provided by the proponent.*

The timing for addressing road density has not been discussed.

    ii. Brush piles and debris piles may be maintained to provide denning habitat for marten, cover to cross cleared areas, and a means to cross barriers;

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #52 has not been provided by the proponent.*

The proponent response to working group IR 592 related to furbearer mitigation does not address this issue.

    iii. An assessment of the potential effects of coal dust on mountain goats that may use pit walls after closure should be completed prior to considering it as mitigation;

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #52 has not been provided by the proponent.*

    iv. Clarification of end land-use objectives and apparent contradictions for habitat reclamation outlined in the CMMP versus habitat enhancement activities for moose and elk that may result in incidental predation on caribou;

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #52 has not been provided by the proponent.*

v. Consideration for providing artificial roost boxes for bats, snags and denning boxes for marten and cavity nesting waterfowl to provide habitat features to promote the sustainability of these VCs;

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #52 has not been provided by the proponent.*

vi. The construction and engineering of powerlines to avoid raptor electrocution;

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #52 has not been provided by the proponent.*

vii. Toads may be attracted to ephemeral ponds such as ruts and ditches that dry up before metamorphosis, creating a potential population sink at a local scale. Monitoring these areas and translocation of toads to appropriate breeding habitats should be considered;

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #52 has not been provided by the proponent.*

viii. Pipelines will only buried "if feasible". To avoid pipelines acting as barriers to movement, the location and construction of pipelines need to be evaluated in detail. If burying is not an option, then development of gravel or debris ramps to facilitate crossing may be considered as an alternative;

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #52 has not been provided by the proponent.*

ix. The Proponent needs to make clear commitments surrounding mitigation measures, avoiding words such as "feasible "or "if practical"; and,

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #52 has not been provided by the proponent.*

x. It is recognized that the proposed offset of $92,000 is the result of a formula provided in the PNCP; however, it is an amount that is unlikely to reverse the predicted declines in cow and calf survival, and subsequent herd declines. It is also unclear how these funds will be directed to caribou recovery. Habitat reclamation is also at a scale that will not result in short term benefits to caribou. While a Project can limit its impacts at a local scale, the development of an effective CMMP requires a broader context and is larger than a single proponent can address. It is recommended that the Proponent explore opportunities to facilitate and/or support the development of a regional CMMP that addresses habitat reclamation, predator-prey dynamics, road densities, and other issues relevant to the recovery of caribou, in partnership with First Nations, other industry proponents, and provincial and federal agencies.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #52 has not been provided by the proponent.*

An updated CMMP has not been reviewed.

3.2 ARCHAEOLOGY

3.2.1 Reports Reviewed

Sukunka Coal Mine Project Application Information Requirements – Approved by Environmental Assessment Office on October 23, 2013

Chapter 8.0: Assessment of Potential Heritage Effects

Appendix 27.A-22 Archaeological Impact Assessment Report for the Sukunka Coal Mine Project

3.2.2 Evaluation of Conformity to AIR

The EAC Application states that it will characterize baseline conditions and provide "information on the location and nature of recorded archaeological sites within and adjacent to the Sukunka Project area" (Section 8.1.4). The RAA includes no information on the location and nature of archaeological sites adjacent to the Project. Without this information on the sites adjacent to the Project it is not possible to assess the significance of the impact on the archaeological sites that will be affected due to construction, operation, closure and post closure of the project and related activities. Additionally, not all archaeological sites have been inventoried within the Sukunka Project footprint as the AIA for the Project is not complete and archaeological field work has not been carried out for the entire footprint (Section 8.1.3.4.3 of Chapter 8.0).

3.2.3 Assessment of Technical Studies

Chapter 8.0: Assessment of Potential Heritage Effects

52. The LAA should include a buffer around the project footprint to account for impacts to sites related to increased human presence. The LAA is too small an area to assess potential impacts of the Project. The assessment would be completed by buffering the LAA by a minimum of 500 m, and including an assessment of the risk to sites resulting from increased human presence.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #53 has not been provided by the proponent.*

53. The RAA is too small to provide a baseline setting. Additional information on archaeological sites in the region is required to establish the baseline setting. The assessment would be completed by increasing the RAA to buffer the Project by a minimum of 2 km.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #54 has not been provided by the proponent.*

54. Section 8.1.3.1 states that the HCA Section 14 heritage inspection permit was supported by five Aboriginal groups, including Doig River, Halfway River, McLeod Lake, Saulteau and West Moberly. Please indicate how the First Nations endorsed the permit application.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #55 has not been provided by the proponent.*

55. Section 8.1.3.4.3 states: "An important data gap exists as the AIA carried out for this Project is not yet complete. The full extent and nature of all heritage sites and their interactions with the Project are not presently known". The direct impacts to archaeological resources cannot be adequately assessed at this time without a complete study. Please provide a plan to complete the AIA.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #56 has not been provided by the proponent.*

56. Please provide additional information on sites GhRk-1, GiRj-6 and GiRj-11, including the size of the sites, their age, and whether diagnostic artifacts were found. With this information, please provide a significance rating for these sites.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #57 has not been provided by the proponent.*

57. Please provide additional information on site GhRj-3, including estimated age of the site, types of lithic material found, description of the types of artifacts that were recovered and if any were diagnostic. Please explain the significance rating.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #58 has not been provided by the proponent.*

Appendix 27.A-22 Archaeological Impact Assessment Report Sukunka Coal Mine Project

58. The methodology suggests that it relied on archaeological potential, which is a potential flaw in the study design as the potential model does not cover the entire Project development area. There is no discussion on how archaeological potential was identified in areas that are not covered by the potential model, if at all. While the use of potential models is common, it is standard practice to test the accuracy of the model by surveying a sample of low potential areas. Field verification of the models was not conducted, which introduces a high level of uncertainty in the assessment. Additionally, potential models only take into account the present landscape and do not account for changes in the landscape over time; therefore, it is potentially misleading to rely solely on potential models to assess overall archaeological potential. The Proponent is requested to provide a plan to field verify archaeological potential and update the assessment accordingly.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #59 has not been provided by the proponent.*

59. Indirect effects to archaeological sites resulting from increased human presence are not considered. Please update the assessment.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #60 has not been provided by the proponent.*

3.2.4 EA Conclusions

60. The EA concludes that "A project-specific AIA identified two archaeological sites. The potential for development to conflict with these sites is high. Project effects will be mitigated through SDR and/or archaeological monitoring of construction activities, to standards defined by the Archaeology Branch. Therefore, residual Project effects on

terrestrial archaeological and heritage resources are assessed to be not significant." This statement is not supported by the baseline data presented in the EAC Application as there is no mention of the other three archaeological sites that were previously recorded in the LAA and if they are going to be impacted. Additionally, potential residual effects to heritage sites are not clear as "the full extent and nature of all heritage sites and their interactions with the Project are not presently known". Until the AIA is completed and additional information provided, there is uncertainty in the assessment of effects on heritage resources.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #61 has not been provided by the proponent.*

3.2.5 Mitigation

The mitigation measures identified in the EAC Application is consistent with measures identified in BC guidelines.

3.3 TERRAIN AND SOILS

3.3.1 Reports Reviewed

Sukunka Coal Mine Project Application Information Requirements – Approved by Environmental Assessment Office on October 23, 2013

Baseline Trace Elements in Soil and Vegetation – Technical Data Report

Technical Data Report (Appendix 27A-6)

3.3.2 Evaluation of Conformity to AIR

Gaps:

AIR item 67. The methodology for VCs selection is only briefly mentioned in section 5.5.3.3.

AIR item 72. The effects of coal dust deposition / metal contamination on soil quality are considered for only the LAA (Figures 5.5.-11 and 12 and Sections 5.5.6.2.3 and 5.5.6.2.4), which precludes the assessment of the full geographic extent of this effect on terrestrial ecosystems. It is unclear why the LAA does not include the full extent of the projected coal dust deposition plume.

AIR item 75 (and 78). While a list of potential adverse effects resulting from the Project are identified, only coal dust deposition and changes in hydrological regime are analyzed (Sections 5.5.5 and 5.5.6, EA p. 31-34). Admixing, compaction, erosion, acidification, and contamination effects on soil quality were not scoped in to the assessment due to a lack of reasonable ability to quantify these effects. In the absence of quantifiable parameters, please provide a qualitative assessment for these potential adverse effects.

AIR item 76. Potential adverse effects from other known past present and foreseeable projects or activities in the proposed Project area are discussed in section 5.5.8 (EA p. 55-58). The potential for residual Project effects on soil quality to act cumulatively with the effects of other projects is not discussed because there was no overlap between dust deposition plumes. The potential for a "nibbling effect" associated with many areas of dust deposition on soil resources in the region has not been discussed.

AIR item 78. Additional information and rationale is required to support the conclusion of no significant residual effects on loss of soil cover (Section 5.5.6.2.8).

3.3.3 Assessment of Technical Studies

Terrain and Soils – Technical Data Report (Appendix 27A-6)

61. The *Soil Inventory Methods for BC* (1995) indicates that mapping at 1:5,000 requires a minimum survey intensity level (SIL) of 2, which entails 1 field inspection per 2-20 ha. Soil data was collected at 590 sites within the 11,280 ha of the LAA (Section 5.2, p. 24), equivalent to 1 inspection per 19.1 ha, which meets the standard. Terrain SIL also meets the standard (386 sites, 120 air calls - Section 4.2, p.18).

    Analysis of Glencore Responses to Working Group Comments:

    Fully Addressed *by information provided to the EAO working group*

62. The report is thorough and contains the required data and information on terrain (including stability) and soils (including SMUs, reclamation suitability and erosion potential). A general map of soil orders within the LAA (erroneously called "soil associations") is presented on pages 5.5-11 and 13 of the soil EA.

    Analysis of Glencore Responses to Working Group Comments:

    Fully Addressed *by information provided to the EAO working group*

Baseline Trace Elements in Soil and Vegetation – Technical Data Report

63. The report is thorough and based on 88 soil samples. It is unclear why metal concentrations in organic soils were compared to guidelines for mineral soils. Please clarify.

    Analysis of Glencore Responses to Working Group Comments:

    Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #64 has not been provided by the proponent.*

    Additional rationale is requested regarding the use of guidelines for mineral soils applied to metal concentrations in organic soils.

3.3.4 EA Conclusions

64. The potential effects of coal dust deposition / metal contamination on soil quality are considered within the LAA. There is limited discussion of potential effects with respect to the full geographic extent of the coal dust deposition plume (5.5.-11 and 12 and Sections 5.5.6.2.3 and 5.5.6.2.4). Please update.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #65 has not been provided by the proponent.*

Additional discussion of potential effects of dust is requested to characterize the full geographic extent of the coal deposition plume.

65. The assessment of effects on soil quality focuses on the effects of coal dust deposition and hydrology. Admixing, compaction, erosion, acidification, and contamination effects on soil quality are not included in the assessment due to an inability to quantify these effects. Please provide a qualitative assessment of potential effects on soil quality.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #66 has not been provided by the proponent.*

No responses to working group IRs address the absence of assessment on admixing, compaction, erosion, fertility, and landform changes in the EAC Application. The proponent is encouraged to analyze and assess these effects quantitatively where possible or qualitatively based on geographic extent of potential soil degradation.

66. While different pathways of soil degradation are described (section 5.5.6.2), the magnitude (in ha) of soil degradation is not provided/assessed. Please update.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #67 has not been provided by the proponent.*

Additional assessment on the magnitude of soil degradation in hectares is requested to better characterize soil degradation associated with project infrastructure and activities.

Soil Quantity

67. Soil volume will be lost as soil will not be salvaged in some areas. An additional 20% of soil volume will be available than is required for reclamation (due to loss of reclaimable areas under the open pit, roads, and rail infrastructure remaining after closure). The rationale for the effects assessment is well supported in Section 5.5.6.2.7 of the EAC Application.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

68. Residual permanent loss of soil cover (approx. 242 ha) will occur in flooded or steep terrain within the open pit and under the haul roads and rail infrastructure that remains after Closure. The lack of a significant effect is based on the statement that *"the magnitude of the effect on soil cover loss is approximately 12%"* (of the LAA) (Section 5.5.6.2.8). Please re-evaluate, or provide additional rationale to support the conclusion of no significant residual effect of loss of soil cover.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

In response to working group IR 609 (round 3), the proponent indicates that effects on soil quantity are dictated by changes to soil cover and changes in soil volume. The assumption for characterizing these effects implies that all mitigation measure are put into place and where standard mitigation measures are used they are successful. Therefore the characterization of not significant is based upon the assumption that though there is a 12% decrease in soil cover, reclamation effects will not prevent the areas from becoming "self-sustaining ecosystems with an average capability to the present baseline."

Soil Quality

69. Due to weak hydrologic connection between surface soil moisture (unsaturated zone) and groundwater, surface water diversion is not expected to cause changes in the soil moisture regime. The rationale for the effects assessment is reasonably well supported in Section 5.5.6.2.3 of the EAC Application (reference to Section 4.2.2 Hydrogeology).

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

70. Exceedance of soil concentration guidelines for molybdenum will result from deposition of coal dust. Predicted increases of molybdenum in soil is less than 10% of baseline values. The effects assessment is well supported in Sections 5.5.6.1.1 and 5.5.6.2.3. It is unclear if the effects assessment includes terrestrial ecosystems outside of the LAA (Figures 5.5-11 and 12 and Sections 5.5.6.2.3 and 5.5.6.2.4).

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #71 has not been provided by the proponent.*

Further information is requested to identify whether terrestrial ecosystems outside of the LAA were used in the effects assessment.

71. Soil admixing, compaction, erosion, fertility, and landform changes are not assessed due to inability to quantify these effects. Soil acidification due to acidic deposition is not discussed as a potential effect.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #72 has not been provided by the proponent.*

Responses to working group IRs do not address the absence of assessment on admixing, compaction, erosion, fertility, and landform changes in the EAC Application. It is recommended that the proponent analyze and assess these effects quantitatively where possible or qualitatively based on geographic extent of potential soil degradation.

Terrain Stability

72. An assessment of Project effects on terrain stability has not been conducted.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

Cumulative Effects

73. No cumulative effects are predicted for soil quantity or quality since *"no existing or proposed projects have the potential to overlap with the residual effects due to the Project"*. Consequently, a cumulative effects assessment on soil quantity or quality was not conducted. The approach does not consider the potential for a "nibbling effect" of several projects in the region that do not overlap physically.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #74 has not been provided by the proponent.*

The "nibbling effect" is not acknowledged in the responses to working group comments. A spatial assessment and discussion on the "nibbling effect" as it relates to dustfall deposition on soils is recommended.

74. Cumulative effects on terrain stability have not been assessed.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

3.3.5 Mitigation

75. A narrow spectrum of standard mitigation options is proposed (Sections 5.5.6.2.2 and 5.5.6.2.6). There is no commitment to these mitigation options and there is no discussion of triggers for mitigations to be implemented. Please provide a matrix of effects, relevant mitigation measures , and the conditions that will trigger mitigation, and how success will be monitored/evaluated.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #76 has not been provided by the proponent.*

In response to working group IRs 367 (round 2) and 608 (round 3), the proponent indicates that monitoring will be used to assess effectiveness of mitigation strategies and will develop a detailed Reclamation Plan during the permitting phase. The proponent also states that Best Management Practices (BMPs) will be applied and additional mitigation measures will be applied if conditions necessitating them arise. No commitment to specific mitigation measure or monitoring plans have been provided as Glencore indicates that these will depend upon site specific conditions at that time.

Because project effects rely heavily on the successful implementation of mitigation measures, more specific criteria related to mitigation measures should be provided. A risk matrix is recommended including effects, relevant mitigation measures, and the conditions that will trigger mitigation, and how success will be monitored/evaluated.

76. Training for machine operators on field identification of salvageable soil depths is proposed. It is unclear whether dedicated planning and stripping operations would be supervised by qualified personnel. Please clarify.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #77 has not been provided by the proponent.*

The proponent should provide comment on whether planning and stripping operations will be supervised by a qualified professional.

77. To verify model results for trace element loadings on soils a follow up monitoring program (including soil and vegetation sampling) was proposed to span operation through closure (EA Section 5.5.10). Please provide details of this monitoring program.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #78 has not been provided by the proponent.*

Additional details of the monitoring program for trace element loadings on soils should be provided for operation through closures phases.

78. The proponent proposes to keep an inventory of soil volumes salvaged and going to stockpiles during construction and operation (Section 5.5.10) is proposed. Please provide details of the monitoring program, including the plans for reporting the results.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #79 has not been provided by the proponent.*

Additional details of the monitoring program and reporting for soil salvage and stockpiling volumes is requested.

79. Monitoring changes to soil quality resulting from potential admixing, compaction, loss of fertility, and erosion includes maintaining a log of the mitigation measures that have been implemented. This information is provided in an annual reclamation report (Section 5.5.10 and Surface Erosion and Sediment Control Plan, Appendix 20.0-A.13). In the absence of a baseline assessment of the soil features in the RAA, it is unclear what will be monitored, what types of changes will require mitigation, and how success will be monitored/evaluated. Please provide details of this monitoring program.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #80 has not been provided by the proponent.*

Please provide additional details about the factors that will be monitored to detect changes to soil quality resulting from potential admixing, compaction, loss of fertility, and erosion. Due to the absence of baseline information, provide additional details about what will be monitored, mitigation triggers, and how success will be measured.

80. The invasive plant monitoring program will be conducted in conjunction with the Invasive Plant Management Plan**.** Surveys for invasive species will be conducted in disturbed lands within the Proposed Disturbance Area (PDA) and infestation locations will mapped each year in late spring or early summer (Reclamation Plan Section 12.5, App. 20A-14). Please detail monitoring protocols and follow-up actions if invasive plants are identified.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #81 has not been provided by the proponent.*

In response to working group IRs 374, 375, and 480 (round 2), the proponent indicates that an Invasive Species Management Plan will be updated as part of the permtting phase. In the comment responses, measures that will be implemented to prevent spread of invasive

species include: visual inspection and removal of species from vehicles, washing of the undercarriage and bumpers at appropriate washing stations, and baggage and disposal of all invasive plants if any of that species are discovered flowering.

Additional details are requested for the specific protocols and removal strategies for invasive species control.

3.3.6 Review of Reclamation Plan

Reclamation Plan Assumptions (page 15):

81. The EAC Application includes a conceptual Reclamation and Closure Plan, and a detailed plan will be provided in the Mines Act permit application First Nations would like to review the detailed Reclamation Plan before it is submitted as part of the Mines Act permit application.

    Analysis of Glencore Responses to Working Group Comments:

    Fully Addressed *by information provided to the EAO working group.*

    First Nations to review the Detailed Reclamation Plan.

82. There are uncertainties regarding the long-term performance of vegetation communities and capability to return to original ecosystem functions. How does this impact achieving end land use objectives?

    Analysis of Glencore Responses to Working Group Comments:

    Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #83 has not been provided by the proponent.*

    In response to working group IR 463 (round 2), the proponent indicates that reclamation activities will focus on ecosystems that are cleared and have experienced ground disturbance (excluding exempt sites). Areas where land has been cleared but has not undergone ground disturbance, ecosystem units are expected to recover to baseline conditions.

    Further evidence is requested to support the conclusion that ecosystems will return to baseline conditions. Other biotic and abiotic factors may influence the recovery of the baseline ecosystems despite avoidance of soil disturbance. Additional information and/or resources are recommended to support the prediction of successful recovery of these ecosystems and describe how this will impact end land use objectives.

83. The EAC Application proposes to use native, traditional, and culturally important species for reclamation. Annual agronomic species will be considered for use in erosion control seed mixes (page 17). It is recommended that the Proponent collaborate with First Nations on developing a seed bank from local plants for reclamation use.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

It is recommended that the proponent collaborate with First Nations to develop a seed bank of native plants for reclamation.

Section 4 – Soil Handling Plan

84. The EAC Application includes a preliminary soil handling plan. A detailed soil handling planning will be included in the Mines Act permit application. First Nations would like to review the detailed Reclamation Plan before it is submitted as part of the Mines Act permit application.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

First Nations to review the Detailed Reclamation Plan when it becomes available.

85. Section 4.1. Soil suitability for reclamation for the Project is determined primarily by soil texture and coarse fragment content. Soils are generally non saline, non-sodic, and pH variable.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

86. Table 4.1-2 Criteria for Evaluating Soil Reclamation Suitability in the Project Area (page 23): Confusing colour system used instead of aligning criteria with ratings. Ratings seem appropriate.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #87 has not been provided by the proponent.*

Please update table in future reports to align criteria with ratings instead of color system.

87. Table 4.1-4 Soil Reclamation Suitability Ratings and Salvage Depth for Soils in the Local Assessment Area (page 25). Inconsistencies inlcude soil orders called associations, soils on thin veneers (10-20 cm) given salvage depths of 30-50 cm, fluvial fan is likely terrace, part of legend missing. Please update.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #88 has not been provided by the proponent.*

Please update Table 4.1-4 as needed: soil orders called associations, soils on thin veneers (10-20 cm) given salvage depths of 30-50 cm, terrace labelled as fluvial fan, and incomplete legend.

88. Section 4.2. Soil depths: wrong figure numbers. Soil depths shown on Figures 4.2-4 and 4.2-5 likely reflect *vx* soil depth overestimations from table 4.1-4. Please verify.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #89 has not been provided by the proponent.*

Please update figure numbers in Section 4.2. Please verify whether soil depths shown on Figures 4.2-4 and 4.2-5 reflect over estimations from Table 4.1-4.

89. Agricultural Land Reserve (ALR) soils: a diligent soil stripping and replacement plan. Please provide a rationale for the two-lift approach.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #90 has not been provided by the proponent.*

Please provide rationale for the two-lift approach for ALR soils.

90. Section 4.3 Soil Replacement Strategy (page 36). A general, preliminary plan. A detailed plan will be submitted as part of the Mines Act permit application. First Nations request a copy of the plan for review and comment before the application is submitted.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

First Nations to review the detailed Soil Replacement Strategy prior to application submission.

91. Organic soils will be salvaged and stockpiled separately from mineral soils, and mixed before placement according to specific formulas. The planned thin capping (~20 cm) proposed for the poorer, drier sites developed over unconsolidated material (waste rock) may not provide sufficient moisture holding capacity for target ecosystems. Please verify. What is the implication for reclaiming these sites?

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #92 has not been provided by the proponent.*

Additional rationale for using a thin capping on poorer, drier sites developed over unconsolidated material is requested. Please verify anticipated moisture holding capacity with reference to target ecosystems and provide additional details about the implications for reclaiming these sites.

92. The soil balance appears to provide a surplus of salvaged material (~800,000 m^3). Is this correct? Please verify calculations, particularly given some inconsistencies in the data tables. Update the soil handling plan accordingly.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #93 has not been provided by the proponent.*

It is recommended that all calculations are verified and the soil handling plan is updated accordingly.

Section 5 – Reclamation of Infrastructure Areas

93. Combined coarse coal rejects and tailings will be co-disposed within waste rock stockpiles. This may be a source of potential contamination and needs further review during permitting when the detailed Reclamation and Closure Plan is available.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

First Nations to further review plans for the disposal of coarse coal rejects and tailings when the detailed Reclamation and Closure plan is available.

Section 6 – Surface Erosion and Sediment Control Plan

94. Suggested best practices for soil management are to salvage, stockpile and re-vegetate in a timely manner to reduce surface erosion. Reclaimed mine features will be re-vegetated with grass seed mixes and tree and shrub species to meet end land use objectives. Monitoring results will be used to guide follow-up seed application and planting after the initial treatments. Preliminary site specific plans are provided for plant site, waste rock piles, pits, watercourses, and roads.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

3.4 TERRESTRIAL VEGETATION

3.4.1 Reports Reviewed

Sukunka Coal Mine Project Application Information Requirements – Approved by Environmental Assessment Office on October 23, 2013

Vegetation and Ecosystems Technical Data Report (Appendix 27.A-5_rpt_suk_tdr_veg.pdf)

Section 5.4: Vegetation Resources EA

Appendix 20-A Reclamation – Vegetation Related Sections

Environmental Assessment Certificate Application Round 1 IR Tracking Table–Batch 1 September 30, 2015;

Environmental Assessment Certificate Application Round 1 IR Tracking Table–Batch 2 October 15, 2015

3.4.2 Evaluation of Conformity to AIR

The Vegetation Resources EA addresses all of the items identified in the Sukunka AIR (Version 6 October 23, 2013), with the exception of the information required for Baseline Conditions listed in Section 5.4.4. There are some gaps in the following components:

i. a description of the approach and methods used to collect baseline vegetation information required to support the assessment, and the sources of this information (i.e. the standards used for mapping, the Survey Intensity Level, methods for the field sampling etc.).

ii. descriptions of ecosystem units from TEM for the Sukunka Project;

iii. reporting on rare ecological communities identified during TEM survey and noxious weeds and invasive species found in the Sukunka project area during vegetation surveys;

iv. classification of ecosystem units, old forests, wetlands, and ecological communities of conservation concern;

v. description of species identified by Aboriginal groups as being of cultural, spiritual, traditional use and human health importance, including any vegetation used as country food.

The Vegetation and Ecosystems Technical Data Report (Stantec 2014) is referenced, which summarizes the methods used in creating the Project TEM and PEM and the description of the field surveys completed to inform the ecosystem mapping process.

3.4.3 Assessment of Technical Studies

Vegetation Resources Effects Assessment

95. The Vegetation Resources effects assessment is well written and well researched.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

96. The methodology for the identification, characterization, and evaluation of potential Project effects is described and the rationale for exclusion/inclusion of effects is clearly stated.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

97. Table 5.4-10 Potential Project Environmental Effects on Vegetation – this table does not include the Measurable Parameters (e.g., traditional plants, wetlands riparian areas etc.) and thus it is not possible to verify which measurable parameters have been excluded/included. Please clarify.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #98 has not been provided by the proponent.*

No comments address the exclusion of Measurable parameters in Table 5.4-10. This table provides a summary at the effects level, including changes in species distribution and abundance, community distribution and abundance and community function, but does not differentiate between the measureable parameters (i.e. traditional plants, wetlands). This table should be expanded to include the measurable parameters and thus provide context for parameters that have been included/excluded.

98. The EA is effects based, not VC based. One VC, Vegetation Resources, is assessed using measurable parameters, which collectively includes alpine and parkland, riparian, old forests, wetlands, ecosystems of conservation concern and plants of conservation concern.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #99 has not been provided by the proponent.*

99. It is not a valid approach to consider reclamation activities as a positive gain (see Section 5.4.5.1, Justification of Interaction Rankings). This issue needs to be addressed throughout the EA and/or provide additional rationale to support this assertion.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #100 has not been provided by the proponent.*

No responses to working group comments further defend the positive gains that are anticipated after reclamation. The proponent indicates that mitigation measures will result in positive effects (e.g. high and moderate productivity forests for Transmission Line Option 1). As the effects assessment puts an emphasis on the effectiveness of mitigation and reclamation measures, additional rationale should be provided to support the conclusion of positive gains after reclamation.

100. There is an over- reliance on the effectiveness of mitigation measures to address Project effects. For example, "with the implementation of mitigation measures (Section 5.4.6.2.2) and the Air Quality and Dust Control Plan, these populations are unlikely to be affected by the Project. Therefore, the effect of the mine site on plant species of conservation concern distribution and abundance is characterized as a neutral, effect with negligible magnitude (Table 5.4-16)."

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #101 has not been provided by the proponent.*

In the responses to working group IRs 360 and 463 (round 2), the proponent indicates that a vegetation management plan will be developed during the permitting stage, which will further describe mitigation measures. They also indicate that in areas where land has been cleared but has not undergone ground disturbance, ecosystem units are expected to recover to baseline conditions.

Given the high reliance on mitigation measures to reduce and/or eliminate project effects, further justification is required to support the conclusion that mitigation measures will achieve the predicted level of success. This should be completed prior to the permitting stage as its implications are relevant to the magnitude of effects on vegetation and ecosystems.

101. Provide rationale as to why Project effects were not assessed within the LAA. (See Table 5.4-7 Significance Thresholds for Changes in Community Distribution and Abundance Measurable Parameter).

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #102 has not been provided by the proponent.*

No rationale is provided for focusing the assessment of potential effects on the RAA rather than the LAA. This could misrepresent and/or dilute the magnitude of potential effects at a local scale on all VCs, except plant species of conservation concern. Additional rationale

should be provided to justify why project effects were not assessed within the context of the LAA.

102. The identification and evaluation of the Project related effects on vegetation resources is conducted predominantly within the Regional Assessment Area (RAA), which is not considered adequate to determine potential Project related effects at a local scale. A summary of the measurable parameters and their corresponding areas of assessment are provided below:

- **Plant Species of Conservation Concern** - evaluated within the LAA
- **Traditional Use Plants** - evaluated within the RAA
- **Ecosystems of Conservation Concern**- - evaluated within the RAA
- **Wetlands** - evaluated within the RAA
- **Alpine and Parkland ecosystems** - evaluated within the RAA
- **Riparian ecosystems -** evaluated within the RAA

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #103 has not been provided by the proponent.*

As mentioned above, the proponent should provide additional rationale for focusing the assessment of potential effects on the RAA rather than the LAA. By assessing project effects only within the context of the regional setting, the magnitude of potential effects may be misrepresented and/or diluted for all VCs, except species of conservation concern. Additional rationale should be provided to justify why project effects were not assessed within the context of the LAA.

103. A summary of the predicted loss of wetlands as a result of the Project relative to the availability of wetlands within the LAA (as defined in Section 5.4.3.5.2 of the Application) was provided in response to comment IR Tracking ID 045.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

104. Supporting rationale for the characterization of effects in terms of the definitions provided in Table 5.4-5 should be included in the evaluation of effects on each measurable parameter.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #105 has not been provided by the proponent.*

The residual effects described in sections 5.4.6.3.3, 5.4.6.3.4, and 5.4.6.4 include brief characterizations based upon the criteria defined in table 5.4-5. Further rationale regarding the characterization of effects based on these definitions is requested.

105. Additional information is required to determine how a change in a measurable parameter will be detected over time in relation to plants of conservation concern. For example, medium magnitude is defined as a "measurable loss varying between 2 and 5 percent loss of individuals of a species of concern within a population or 2-10 % loss of all occurrences in the RAA for a blue-listed plant; up to 2 % loss for a red-listed plant in the RAA". How will this be determined and how will this inform the rank status of the species? Additional knowledge of local and regional floral biodiversity is required in order to accurately evaluate effects in terms of total area or % change in the population of a species. It is recommended that the proponent explore and/or facilitate collaborative approaches with First Nations and other proponents to address Project related and cumulative effects to the rare plants and lichens regionally.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #106 has not been provided by the proponent.*

In response to working group IR 367 (round 2), the proponent acknowledges that monitoring will be used to evaluate the success of mitigation measures. Reclamation monitoring measures are provided in Section 11.0 in Appendix 20A 14. The proponent indicates that additional detailed monitoring strategies will be developed during the permitting phase.

Though monitoring efforts are to be outlined during the permitting phase that will enable the detection of changes in populations of plants of conservation concern over time, thorough baseline population data is required at a regional and local level. Further evaluation of local and regional floral biodiversity should be conducted to accurately quantify total area or % change in populations.

106. Additional investigation into the life requisites (e.g. edaphic conditions) and potential sources of disturbance for each ecosystem of conservation concern is required to support the inclusion of all structural stages. This approach can be useful in terms of guiding avoidance and management strategies but may overestimate the presence and extent of ecosystems of conservation concern, ultimately reducing the magnitude of overall effects within the RAA (section 5.4.6.1.2 Assumptions and the Conservative Approach, pages 5.4-34 and 5.4-62). Including all structural stages in the assessment of ecosystems of conservation concern does not provide a mechanism for the identification and conservation of these sites, as a harvested rare ecosystem, for example, might be equivalent to a mature or old forest ecosystem in terms of rarity. Classification and Management of Rare Ecosystems in British Columbia (McLennan and Ronalds, 1999) reports that "the majority of the BC CDC listed ecosystems occur in the plant associations of forested ecosystems (i.e. mature forest and old forest structural stages) with the exception of wetlands, alpine and grasslands. These older

structural stages are rare or threatened across the landscape, and are generally the object of conservation. Younger structural stages that have developed following forest harvesting or other disturbance within these site associations are represented by different plant associations (seral associations) and, generally, are not considered rare or endangered."

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #107 has not been provided by the proponent.*

No responses to working group comments elaborate on the life requisites and sources of disturbance for each ecosystem of conservation concern. Further discussion should focus on these topics to support the inclusion of different structural stages for ecosystems of conservation concern.

107. Please provide references and/or additional information to support the assertion that reclamation activities will restore ecosystems of conservation concern (page 5.4-62).

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #108 has not been provided by the proponent.*

In response to working group IR 463, the proponent indicates that reclamation activities will focus on ecosystems that are cleared and have experienced ground disturbance (excluding exempt sites). They also indicate that in areas where land has been cleared but has not undergone ground disturbance, ecosystem units are expected to recover to baseline conditions.

Further evidence is requested that supports the conclusion that ecosystems of conservation concern will return to baseline conditions. Other biotic and abiotic factors may influence the recovery to baseline ecosystems despite avoidance of soil disturbance. Additional information and/or resources are recommended to support the prediction of successful recovery these ecosystems.

108. Please provide references and/or additional information to support the confidence in the successful reclamation of bogs (Tumbler Ridge Options A and B, pages 5.4-95 and 5.4-99).

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #109 has not been provided by the proponent.*

In response to working group IRs #042 (batch B) and 356 (batch A), the proponent has committed to a Wetland Management Plan to be developed during the permitting stage. The goal will be no net loss of ecosystems. Ground verification of ecosystem mapping and rare

plant surveys will also be conducted during the final design. A species at risk management plan will be developed, if required.

To support the commitment to various management plans to mitigate effects, further references and/or rationale should be provided that support the high level of confidence in the successful reclamation of bogs.

109. Please provide references and/or additional information to support the assertion that changes to abundance and distribution will not result in changes to function (Table 5.4-21 Potential Cumulative Environmental Effects on Vegetation- page 5.4-112.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #110 has not been provided by the proponent.*

Additional information is not provided that that supports the conclusion that a change to community abundance and distribution is not associated with a change in community function for the cumulative effects assessment (CEA). For example, effects to wetland function were defined by changes to wetland distribution. Further rationale is requested to support the conclusion that other project activities in the CEA might affect community abundance and distribution but not affect community function, as presented in Table 5.4-21.

110. Excluding ecosystems of conservation concern because "timber harvesting regulations require licensees to limit harvesting activities in areas where ecosystems of conservation of concern exist" is not considered sufficient evidence for not completing a quantitative cumulative effects assessment (Section 5.4.7.2.2.1 Ecosystems of Conservation Concern). Please conduct a cumulative effects assessment on ecosystems of conservation concern, or provide additional data to support their exclusion.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #111 has not been provided by the proponent.*

Additional information is not provided that supports the exclusion of ecosystems of conservation concern from the quantitative cumulative effects assessment. Additional data to support this exclusion should be provided or a cumulative effects assessment should be conducted.

111. Please provide references and/or additional information to explain why cumulative effects on community function were not assessed (Table 5.4-21 Potential Cumulative Environmental Effects on Vegetation- page 5.4-112).

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #112 has not been provided by the proponent.*

In response to working group IRs 162 and 358 (round 1), the proponent states that the community function assessment focused on wetlands to align with the Federal Policy on Wetland Conservation. Forested ecosystems were also considered for community function in the effects assessment.

Additional rationale or references are requested to support the exclusion of community function from the cumulative effects assessment.

112. Please provide references and/or additional information to support the assertion that "the RAA is relatively undisturbed, and traditional use plants are resilient to stress; so, the ecological and socio-economic context can be characterized as highly resilient." – page 5.4-47.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #113 has not been provided by the proponent.*

No information is provided that supports the conclusion that "the RAA is relatively undisturbed, and traditional use plants are resilient to stress; so, the ecological and socio-economic context can be characterized as highly resilient." Additional references and rationale are requested to support this statement.

3.4.4 EA Conclusions

113. The overall EA conclusions align with the methodology provided. However, the conclusions are based on evaluation of effects within the RAA and as a result may misrepresent and/or dilute Project related effects. Project effects were not identified or characterized within a LAA (with the exception of plants of conservation concern). It is recommended that the proponent conduct an effects assessment on vegetation resources in the LAA, particularly given the reliance on mitigation measures (see below) to reduce potential effects. The assessment should be completed prior to submitting the *Mines Act* permit application and submitted to First Nations for review and comment.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #114 has not been provided by the proponent.*

As mentioned previously, additional rationale is not provided for focusing the assessment of potential effects only on the RAA and not considering the LAA. This could misrepresent and/or dilute the magnitude of potential effects on all VCs, except plants species of

conservation concern. An effects assessment focusing on the LAA is recommended to provide context for potential effects at a local scale.

114. In the absence of an effects assessment for Project related effects in the LAA, it is unclear what mitigations are required and how success will be measured.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #115 has not been provided by the proponent.*

In response to working group IRs 360 and 463, the proponent states that a vegetation management plan will be developed during the permitting stage, which will further describe mitigation measures. They also indicate that in areas where land has been cleared but has not undergone ground disturbance, ecosystem units are expected to recover to baseline conditions.

As mentioned previously, an effects assessment at the LAA level will provide greater context to the anticipated effects. Given the high reliance on mitigation measures to reduce projects effects to a negligible level, additional information regarding mitigation measures and references supporting their predicted effectiveness is requested. This should be completed prior to the permitting stage as its implications are relevant to the magnitude of effects on vegetation and ecosystems.

3.4.5 Mitigation

115. The mitigation measures proposed within the EAC Application are considered reasonable measures to avoid and minimize the predicted environmental effects (5.4.6.2.2 Proposed Mitigation). However, there is an over-reliance/confidence related to the success of reclamation activities as a means of avoiding residual effects completely, particularly in the absence of an effects assessment of Project related effects in the LAA. A tighter linkage between effects and proposed mitigations is required. See recommendation for an additional work plan in item 124 above.

The Proponent has committed to reclaiming areas with traditional use plants as well as extensive follow up surveys and monitoring (Sections 5.4.9, **Follow-Up and Monitoring**). These surveys include ground verification of general mapped ecosystems and ecosystems of conservation concern, and focused rare plant, traditional use plants and invasive and noxious weeds surveys within the PDAs. Additional commitments include engagement with timber licensees and applicable regulators to address OGMAs that fall within the PDA boundaries.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #116 has not been provided by the proponent.*

The effects assessment is highly reliant on mitigation measures to reduce project effects. Further information and references are requested to support confidence in the effectiveness of mitigation measures.

3.5 AIR QUALITY

3.5.1 Reports Reviewed

Sukunka Coal Mine Project Application Information Requirements – Approved by Environmental Assessment Office on October 23, 2013

EA Table of Concordance

EA Executive Summary Section 2.0: Project Overview

EA Executive Summary Section 5.0: Assessment Methods

EA Executive Summary Section 6.4: Air Quality

EA Executive Summary Section 7.0: Summary of Assessment

EA Section 5.6: Air Quality EA

EA Appendix 20-A.15 Air Quality and Dust Control Plan

EA Appendix 27-A.1 Snow and Climate Technical Data Report

EA Appendix 27-A.17 Air Quality and Meteorology Technical Data Report (2012-2013)

EA Appendix 27-A.18 Air Quality and Meteorology Technical Data Report (2013-2014)

EA Appendix 27-A.19 Air Quality Detailed Model Plan

EA Appendix 27-A.20 Air Quality Technical Modeling Report

3.5.2 Evaluation of Conformity to AIR

Interim Air Quality Objectives

116. AIR Item No. 414 and 422. The AIR states the EA will identify the relevant quantitative ambient air quality criteria used for characterizing the effects and determining effect significance, and the EA will compare predicted ambient air concentrations determined through modeling to appropriate federal and provincial guidelines.

i. New interim 1-hour objective for NO_2 and SO_2 were announced by the BC government in October 2014. The 1-hour objective for SO_2 has been reduced from 450 µg/m^3 to 200 µg/m^3 (daily 1-hour maximum, annual 99th percentile value, over one year), and

the 1-hour objective for NO_2 has been reduced from 400 µg/m^3 to 188 µg/m^3 (daily 1-hour maximum, annual 98th percentile value, over one year).

ii. The EAC Application uses the maximum predicted 1-hour concentrations, which are below the stated objectives (maximum SO_2 value is 195 µg/m^3 and the maximum NO_2 value is 79 µg/m^3). It is recommended that the predicted ambient air concentrations be compared with the interim NO_2 and SO_2 objectives issued in October 2014.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #117 has not been provided by the proponent.*

Assessment of Total Suspended Particulate

117. AIR Item No. 409, 410, 414, 422. The AIR states the air quality assessment will focus on the primary emission sources associated with the Project. Identified air quality components are to be brought forward for detailed assessment and compared to federal and provincial guidelines.

i. Total Suspended Particulate (TSP) was identified as a primary emission but it was not assessed.

ii. The BC government has a daily and annual average air quality objective level for TSP (120 µg/m^3 daily value, 60 µg/m^3 annual value).

iii. It is recommended that TSP be included in the assessment and compared against the BC TSP objectives.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #118 has not been provided by the proponent.*

3.5.3 Assessment of Technical Studies

Air Quality Effects Assessment (EA Section 5.6)

118. TSP levels resulting from Project emissions are not assessed and are not compared to the appropriate BC guideline values. TSP typically refers to a particle size with a diameter less than 100 µm. The EA assesses the effects of PM_{10} (aerodynamic diameter less than 10 µm) and $PM_{2.5}$ (aerodynamic diameter less than 2.5 µm), which are subsets of TSP by definition. PM_{10} and $PM_{2.5}$ are important for assessing air quality effects on respiratory health, and TSP is important for assessing the overall dust levels, including nuisance dust that may not be considered a respiratory health risk, depending on the dust emission source.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #119 has not been provided by the proponent.*

119. Table 5.6-1 is missing the $PM_{2.5}$ annual value.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #120 has not been provided by the proponent.*

120. Section: 5.6.4.2.1: There is no mention of weather influences from the north such as Arctic outbreaks, which can have a large influence on the weather.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #121 has not been provided by the proponent.*

121. Throughout the EAC Application, it is stated that the RAA is centered around the Project tenure area; however, mapping shows the RAA is centered approximately 15 km north of the tenure area. Based on the modeling results, it is assumed that the mapped location of the RAA is correct, Please confirm.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #122 has not been provided by the proponent.*

122. Section 5.6.2: The text indicates the modeling "confirms" that winds are influenced by adjacent terrain. The role of modeling is to identify predictions.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #123 has not been provided by the proponent.*

123. Section 5.6.4.1.1: The text states that long term wind data is not available from stations within the RAA. Long term climate normal wind data is available from the Environment Canada Chetwynd meteorological station, which provides data for the 1981-2010 climate normal period. However, it is recognized that this station may not be suitable for modeling due to the absence of nighttime hourly wind data for many years, including 2010 (the modeled meteorological year).

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #124 has not been provided by the proponent.*

124. Section 5.6.4.1.1: The text states that the Bullmoose meteorological station is located east of the Project; however, in Figure 5.6-1 the station is located southeast of the Project. Please confirm.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #125 has not been provided by the proponent.*

125. Section 5.6.5.1: Further information is needed to justify why use of the rail line is not expected to produce air emissions (ranked as 0 in Table 5.6-7). There will be diesel exhaust and possibly fugitive coal dust released during rail line use.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #126 has not been provided by the proponent.*

Air Quality Technical Modeling Report (EA Appendix 27-A.20)

126. For CALMET modeling purposes, historical observational meteorological data may have been available for inclusion in the model rather than using simulated Weather Research and Forecasting (WRF) model data. Stations operated by Environment Canada may not be suitable; however, stations operated by various BC government agencies within the RAA may be suitable. For example: Kwoen Gas Plant station (operated by the BC MOE), Tumbler Ridge station (operated by the BC Ministry of Transportation and Infrastructure), and Tumbler (Denison) and Gwillim station (operated by the BC Wildfire Service).

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #127 has not been provided by the proponent.*

127. The EAC Application should describe how observed data was used to verify the CALMET meteorological model. For example, maps of wind vector fields and wind roses generated from the CALMET model should be compared to data from the on-site Skeeter Creek and Upper Sukunka meteorological stations. Although the CALMET model was run in 2010 when data was unavailable from the meteorological stations on the Project site, the annual wind roses from different years are generally consistent.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #128 has not been provided by the proponent.*

3.5.4 EA Conclusions

128. TSP should be included in the assessment and compared against the BC TSP objectives, and modeling results for SO_2 and NO_2 should be compared to 2014 interim BC objectives.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #129 has not been provided by the proponent.*

129. Conclusions for the air quality VC assessment:

i. Changes in ambient SO_2, NO_2 and CO concentrations are predicted to be below the relevant BC and federal standards and objectives. This was predicted for both transportation scenarios.

ii. Changes in ambient $PM_{2.5}$ concentrations are predicted to be above the relevant BC and federal standards in a small area just north of the LAA. This was predicted for both transportation scenarios. There are also predicted exceedances in limited areas around the unpaved haul road in coal load-out options A and B.

iii. Changes in ambient PM_{10} concentrations are predicted to be above the relevant BC and federal objectives in an area generally within 3 km of the unpaved haul roads. This was predicted for both transportation scenarios.

iv. Changes in ambient dustfall rates are predicted to be above relevant BC objective in an area generally within 1 km of the unpaved haul roads. This was predicted for both transportation scenarios.

v. Even though there were exceedances of some air quality contaminants, all were assessed to be not significant due to their geographic extent, duration and reversibility.

vi. The Air Quality Technical Modeling Report supports the EA conclusions.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #130 has not been provided by the proponent.*

3.5.5 Mitigation

130. Standard mitigation methods for reducing exhaust and fugitive emissions are identified in the EAC Application.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #131 has not been provided by the proponent.*

3.6 GREENHOUSE GASES

3.6.1 Reports Reviewed

Sukunka Coal Mine Project Application Information Requirements – Approved by Environmental Assessment Office on October 23, 2013

EA Table of Concordance

EA Executive Summary Sections 2.0: Project Overview

EA Executive Summary Sections 5.0: Assessment Methods

EA Executive Summary Sections 7.0: Summary of Assessment

EA Executive Summary Sections 9.0: Greenhouse Gas Management

EA Section 17.0: Greenhouse Gas Management Study

EA Appendix 27-A.23 Greenhouse Gas Technical Data Report

3.6.2 Evaluation of Conformity to AIR

The greenhouse gas (GHG) assessment included all of the requirements in the AIR. No information gaps were found.

3.6.3 Assessment of Technical Studies

The EAC Application includes a GHG Management Study and GHG Technical Data Report.

3.6.4 EA Conclusions

GHG project emissions were assessed and compared to provincial, national and international standards? Guidelines?

The EAC Application indicates the proposed Project will emit 343 kt CO2e during peak operation, and will increase global GHG emissions by 0.0008% annually. The GHG assessment methodology adequately supports these statements.

3.6.5 Mitigation

Standard mitigation methods have been proposed relating to fuel use, combustion efficiencies and vegetation loss.

3.7 NOISE

3.7.1 Reports Reviewed

Sukunka Coal Mine Project Application Information Requirements – Approved by Environmental Assessment Office on October 23, 2013EA Table of Concordance

EA Executive Summary Sections 2.0: Project Overview

EA Executive Summary Sections 5.0: Assessment Methods

EA Executive Summary Sections 7.0: Summary of Assessment

EA Section 4.2.5: Acoustic Environment EA

EA Appendix 27-A.8 Acoustic Environment Technical Modeling Report

EA Appendix 27-A.9 Noise Technical Data Report

3.7.2 Evaluation of Conformity to AIR

ID 293, AIR section 5.2.5 – The AIR requires noise effects on human health be assessed. The EAC Application states that an assessment of noise effects on human health was not conducted as there are no human receptors within the LAA; however, there are human receptors within the rail load out LAA. Based on the noise assessment and the receptors shown in the human health assessment, the exceedances would not occur at the human health receptor locations; however, a discussion of these receptors should be included in the assessment.

ID 295, Section 4.2.5.2 – The AIR states the delineation of the study areas will be included. In the EAC Application, the LAA is defined as the area beyond which noise effects are negligible; however, exceedances of noise thresholds have been predicted outside of the LAA; therefore, potential effects outside the LAA may not have been assessed.

ID 292, AIR section 5.2.5 – The AIR states the noise emissions associated with the operation of the Project will be quantified. The EA does not include an assessment of the noise associated with (road traffic) haulage from the mine to the rail load out, therefore the potential effects on the receptors located alongside the road have not been assessed.

ID 296 Section 4.2.5.2 – The AIR states the technical data report should characterize the acoustic environment. The technical data report outlining the baseline study needs to justify the approach as there were not enough measurements undertaken.

3.7.3 Assessment of Technical Studies

Report 1: EA Appendix 27-A.9 Noise Technical Data Report

131. The AIR (S 4.2.5.3) requires the following information to be presented and summarized in a technical data report:

i. Summary of ambient noise level measurements (average (L_{eq}), statistical (L_{90}) and one third octave band data);

ii. Identification of sensitive and other appropriate receptors and their distance from the mine, CHPP and rail load-out

iii. Identification of baseline sound levels at all identified noise receptors

iv. Traditional ecological or community knowledge, where available.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

132. The baseline data does not include L_{90} noise levels and octave band data, focusing primarily on L_{eq} noise levels.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

133. The methods used to calculate average levels are not stated.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

134. The noise levels presented are not clearly identified, for example L_{Aeq}.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

135. Traditional ecological or community knowledge is not described.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

136. The baseline study consisted of 7 operator attended (witnessed) measurements (daytime only) and one 24 hour unattended measurement. Given the variability of noise levels in the area due to atmospherics, this may not provide sufficient data to determine a representative baseline. The operator attended measurements were conducted during the daytime and 24 hours does not seem long enough to gain a representative dataset.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

137. It is recommended that the following be clarified:

i. Long term and short summaries with measured L_{A90} noise levels.

ii. Rationale for providing one long term measurement.

iii. Rationale for selecting a long term measurement duration of 24 hours.

iv. Clarifying the averaging method used to determine average noise levels.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

Report 2: EA Appendix 27-A.8 Acoustic Environment Technical Modeling Report

138. The report indicates that noise from the haul road is included in the assessment (S1.1.1) – it is assumed that this is referring to mining/haul roads. Road transportation (traffic noise) of coal from the open pit to the rail load out is not assessed.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

139. Noise from the operation of rail load out has not been assessed.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

140. The AIR requires the assessment to consider cumulative impacts during representative phases of the Project. The assessment only considers the year of peak production, assuming that noise emissions from non-peak production years would be lower. Provide references to support this assumption.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

141. Section 5.2 states that the majority of processing plant is enclosed and Table 5.1-2 use the term indoor and outdoor. Does 'indoor' mean enclosed?

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

142. Equipment source levels are provided in Table 5.1-1. Some of the source levels (L_W) are questionable:

i. D11/D10 Dozers L_W of 112 dBA is low. This may be representative of the dozer while pushing, but not when reversing, which can be up to 120 dBA.

ii. Milling plant L_W of 126 dBA seems to be high.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

143. It is recommended that the following be clarified:

i. Clarify that the reference to haul roads is for in-pit haulage to processing plant.

ii. Clarify the operational duty of D11/D10 dozers – in particular reversing L_w.

iii. Provide a more detailed description and reasoning for the high L_w used for Milling plant.

iv. Confirm processing plant items/ areas that are enclosed.

v. Assess potential noise effects from road traffic between the mine and the rail load out.

vi. Assess potential noise effects from operation of the rail load out facility.

vii. Provide justification that the peak production year is the potential worst case noise emission scenario. Consider that previous (lower production) years where there may

be less equipment (lower emission) but the mobile equipment is not at depth and could result in higher received noise levels outside the LAA due to lack of shielding from the pit.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

3.7.4 EA Conclusions

144. The EAC Application states the effect of noise from equipment operation, blasting, and road use on wildlife resources (Section 5.3) is captured through sensory disturbance buffers applied to the project development area (PDA). Habitat suitability is reduced within the sensory disturbance buffer (i.e., range from 100 m to 500 m, depending on species sensitivity to human disturbance) to capture indirect noise effects that could result in species avoidance of habitat that is otherwise considered suitable (Section 5.3.6.2, Assessment of Change in Habitat Availability). Please indicate whether noise modeling is consistent with the application of 100 m and 500 m buffers given some exceedances in noise thresholds occur outside the LAA.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

3.7.5 Mitigation

145. Regarding the transmission loss used for the building roof and walls, is there a reference for the source data or method used to calculate loss? Why are the losses for the high frequencies the same?

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #132 has not been provided by the proponent.*

In summary, responses to comments made by the Working Group regarding noise have been reviewed and have not addressed the FNITR comments on the EA. A work plan will be proposed that will address the comments provided with the aim to satisfy the requirements of the EA and conformity to the AIR.

3.8 HYDROLOGY

3.8.1 Reports Reviewed

Sukunka Coal Mine Project Application Information Requirements – Approved by Environmental Assessment Office on October 23, 2013

EAC Application, Hydrology (Section 4.2.1)

Hydrology Technical Data Report (Appendix 27.0 – A.1 and A.2)

Baseline and Mine Site Watershed Model Technical Data Report (Appendix – 27.0 – A.3)

Preliminary Mine Site Water Management Plan

Preliminary Surface Erosion and Sediment Control Plan

'Other VC's' Affected by Surface Water

Instream Flow and Fish Habitat Assessment (Appendix 27.0 – A.12)

Water Quality Model Report (Appendix 27.0 – A.14)

Aquatic Biota Technical Data Report (Appendix 27.0 – A.13)

Accidents and Malfunctions (Section 18.0)

3.8.2 Evaluation of Conformity to AIR

Surface water hydrology was assessed as a VC; therefore, there are no requirements to describe the potential impacts from each phase of the mine lifecycle (construction, operations, closure, post-closure) on surface water flows, and the subsequent mitigation measures proposed to offset these impacts. Surface water hydrology is typically included in mine EAs in BC.

Based on the review of the existing surface water hydrology program (Section 4.2.1), the following issues were noted:

The AIR requires that the hydrology section identify linkages to VCs that may be affected by alterations to surface water discharge. Section 4.2.1.4 of the EAC Application provides references to linkages to VCs?? A summary of the hydrology data used for the assessment of these VCs is also provided; however, the EA does not discuss limitations and subsequent uncertainties in the data that may affect the outcome of the analyses for other VCs. Limitations related to the surface water hydrology dataset should be identified. Further assessment is required to understand how VCs are potentially affected by surface water alterations.

The AIR requires that the hydrology section describe Project components (diversion and impoundment structures, discharge locations, volumes and impacts), including timeframes and

phases of the mine lifecycle (construction, operations, closure, post-closure). The EAC Application does not describe Project components or phases of the mine lifecycle. It is recommended that Project components and phases, including potential impacts to hydrology and mitigation, be completed to fulfill the AIR requirements.

The AIR requires that baseline hydrological conditions be characterized. A baseline surface water hydrology program was completed that met the minimum requirements of the BC Hydrometric Guidelines (2009) as well as the Water and Air Baseline Monitoring Guidance Document for Mine Proponents and Operations (BC MoE 2012). The hydrological dataset contains limitations, which have implications for VCs that have used surface water data as model inputs, specifically Fish and Fish Habitat and Water Quality and Aquatic Biota. The EAC Application suggests that continued monitoring will be conducted to reduce uncertainty in hydrological estimates. It is recommended that the Proponent commit to continuing the monitoring program to establish baseline conditions and strengthen future analyses and modeling.

3.8.3 Assessment of Technical Studies

Report 1 (EA Hydrology – Section 4.2.1)

146. The EAC Application indicates the Project will likely impact surface and groundwater systems. Each are connected systems that sustain fish and fish habitat, water quality, aquatic biota, wildlife, terrestrial ecosystems and numerous other ecological components. Thus, if there is potential for direct impacts to surface water, and it is implicitly considered a VC, then there is a case for hydrology to be included as a VC. During the development of the AIR there was multifaceted support for surface water to be included as a VC, including:

    i. Raised by First Nations at working group meetings during development of the AIR; and

    ii. Ministry of Environment – AIR Tracking Table ID # 344.

    It is recommended that an effects assessment on surface water hydrology be undertaken. Additional field work may be required to undertake this assessment.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #147 has not been provided by the proponent.

147. There is currently no modeling to predict changes in flow throughout each phase of the mine lifecycle (construction, operations, closure, and post-closure).

    It is recommended that surface water flows be modelled for each phase of the mine lifecycle, which will provide data to assess effects on other VCs (fish and fish habitat, water quality, aquatic biota) throughout the various phases of the mine life.

In addition, future hydrometric monitoring an emphasis should include manual field measurements at moderate to high flows to reduce uncertainty in the upper end of site rating curves and improve the accuracy of the synthetic streamflow series and other models that rely upon this dataset.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #148 has not been provided by the proponent.

Report 2 (Hydrology Technical Data Report – Appendix 27.0-A.1 and A.2)

High Flow Estimates / Rating Curve Extrapolation

148. Surface water hydrology field data are insufficient to estimate peak flows, design flows and return period flows (1:50, 1:100, 1:200 events) for the LAA and RAA. Specifically:

i. The maximum discharge measured during the field program for Chamberlain (2.23 m^3/s) and Skeeter (2.03 m^3/s) creeks was obtained during the freshet in June 2012. No freshet sampling was conducted in 2013.

ii. The maximum measured discharge determines the threshold for which flows can be reliably estimated for a particular station within the LAA and RAA. The standard threshold is 1.5 to 2.0 times the maximum measured discharge (Maidment, 1990). Extrapolation of the rating curve is limited to this threshold. Assuming a multiplier of two times the maximum measured discharge, the Chamberlain Creek rating curve can be accurately extrapolated up to 4.46 m^3/s and the Skeeter Creek rating curve can be accurately extrapolated to 4.06 m^3/s.

iii. Return period estimates suggest the 1:2 year event for Chamberlain Creek (5.0 m^3/s) is beyond the threshold discharge (4.46 m^3/s) that can be accurately estimated.

iv. No return period events were calculated for Skeeter Creek. The rationale provided was that Chamberlain Creek was selected as the 'representative' watershed for return period estimates.

v. Daily peak flow for both Chamberlain and Skeeter Creeks exceed the threshold discharge (two times maximum measured flow). This suggests that field data for each creek is insufficient to generate an annual hydrograph.

vi. The implication of the limitations identified above is that these data have been used as modeling inputs to other VCs that could be impacted by changes in surface water. It is recommended that flow measurements are captured during higher magnitude flows to allow the rating curves for Chamberlain Creek and Skeeter Creek to be extrapolated accurately to the required flows (1:10, 1:50, 1:100, 1:200, PMP).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #149 has not been provided by the proponent.

Synthetic Hydrographs / Paired Data

149. Synthetic hydrographs were developed using a statistical method of empirical frequency pairing (EFP) between regional Water Survey of Canada (WSC) and site hydrometric data. The methodology is well-regarded and has been used on numerous projects to increase the reliability of project discharge data. However, this method is dependent on the reliability of rating curves used to establish discharge. The reason for this is that the shape of the regression line is dependent on paired discharge data.

i. Data from the long-term Pine Creek WSC station contains many incidents of high magnitude flows. The Sukunka hydrometric data contains no incidents of high magnitude flows. Therefore, the EFP analysis between these datasets contained reliably paired data at low to moderate flow, but whether the relationship holds for higher flows is not known (beyond site data threshold discharge discussed above), as the stage-discharge relationship often changes at higher flows due to terraces, vegetation influences, increased roughness / bank friction, levees etc.). Consequently, the synthetic hydrographs for the Project sites, which result from applying the EFP relationship to the long-term regional record, assumes that the similar relationship above holds.

ii. Figures B3.1-1 (Skeeter Creek) and B3.2-1 (Chamberlain Creek) shows the synthetic series forecasting high flows (October 2012), presumably in response to a precipitation event when the measured series did not indicate an increase in flow. The significance of this is that the synthetic hydrographs have been used to estimate impacts to other VCs such as fish and fish habitat, water quality and aquatic biota (each is discussed in the next section).

It is recommended that additional field data be collected to extend the Chamberlain and Skeeter creeks rating curve extrapolations. Additionally, modelled data should be compared to measured flows to demonstrate the model can accurately estimate monthly flow conditions. This will allow the model to be refined and, in turn, provide accurate data for assessment of impacts to other VCs such as fish and fish habitat, water quality and aquatic biota.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #150 has not been provided by the proponent.

Report 3 (Baseline and Mine Site Watershed Model Technical Data Report (Appendix – 27.0 – A.3)

Flow Estimates / Changes from Baseline

150. Flow estimates were calculated for the operational mine phase as percent monthly flow changes from baseline. Table 3.3-2 indicates both flow increases and reductions in Chamberlain Creek ranging from an increase of 85-90% to a reduction of 10-20%; and strictly flow reductions in Skeeter Creek to a maximum of a 57% loss. Rearing and spawning conditions for fish are highly specific to depth, velocity and temperature. This level of uncertainty in flow estimates during the critical fish periods precludes the ability to assess flow levels and associated impact for other VCs.

i. Figures 3.3-1 through 3.3-4 present these flow changes along with the uncertainty of the estimate. It is noteworthy that the uncertainty ranges between 75% to >200% during a critical time of the year for Bull Trout spawning.

ii. Additionally, the changes presented in the figures referred to above are monthly flow changes and represent significant changes for fish and fish habitat. For example, a 75% increase in flow during winter may alter mesohabitat assemblages, change temperature profiles and impact energy budgets.

iii. Predictive studies need to be conducted to identify changes in surface water throughout the mine lifecycle. Specifically, changes in flow for Chamberlain and Skeeter creeks should be calculated for each phase of the mine lifecycle.

It is recommended that flow estimates are calculated for each phase of the mine lifecycle. This will strengthen the assessment of other VCs by providing accurate input data to the respective modeling exercises.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #151 has not been provided by the proponent.

Operational Flow Estimate / Predictive Studies

151. Flow estimates were calculated for a single phase of the mine lifecycle. With respect to the other VCs such as fish and fish habitat, water quality and aquatic biota, construction, closure and post-closure phases of the mine lifecycle will also have flow impacts and should be considered. Specifically, changes in flow for Skeeter and Chamberlain creeks should additionally be calculated for the construction, closure and post-closure phases. Restricting the analysis to operational flow estimates precludes the ability for other VCs (fish and fish habitat, water quality and aquatic biota) to assess flow-related impacts throughout the mine life. Presently, flow estimates are presented for 'operations' as a single term. *As a result, an accurate assessment of impacts cannot be conducted for the other VCs during construction, operations (years 0-17), closure (years 18-23), or post-closure (years 24 and beyond) scenarios.* The following studies would strengthen the assessment and increase confidence in the conclusions:

i. Fish and Fish Habitat - Estimate the absolute impacts to monthly discharge throughout Skeeter and Chamberlain creeks for each phase of the mine lifecycle (construction, operations, closure and post-closure). This will allow for a more accurate calculation of habitat loss due to changes in flow. Both increases and decreases in flow can result in habitat loss. With substantial flow reductions fish passage can be impeded.

ii. Water Quality - Estimate the absolute impacts to monthly discharge throughout Skeeter and Chamberlain creeks for each phase of the mine life (construction, operations, closure and post-closure). This will allow for more accurate calculation of water quality impacts.

iii. Aquatic Biota - Estimate the absolute impacts to monthly discharge throughout Skeeter and Chamberlain creeks for each phase of the mine lifecycle (construction, operations, closure and post-closure). This will enable an assessment of impacts to aquatic biota.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #152 has not been provided by the proponent.

Report 4 (Preliminary Mine Site Water Management Plan (Section 20.0 – A.7)

152. The Mine Site Water Management Plan contains insufficient information to inform water management decisions. For example:

i. The plan does not contain water management strategies for each phase of the mine lifecycle. The Plan would be more robust with information on water use, processing needs and emergency contingency plans.

ii. There are insufficient figures and technical detail for water management structures, such as diversion ditches, sediment control ponds and spillways. A discussion of each structure, its design flow assumptions and limitations, maintenance requirements and contingency plans would strengthen the Plan.

iii. Language is generic and not specific to water management on the Sukunka Project. Discussion surrounding water use, operational needs, and management of contact and non-contact water specific to the Sukunka Project would strengthen the Plan.

The assessment and its conclusions would be strengthened by expanding the scope of the water management plan to include a site schematic of water management, details on proposed water management structures, and a discussion of water management during each phase of the mine lifecycle.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #153 has not been provided by the proponent.

Report 5 (Preliminary Surface Erosion and Sediment Control Plan (Appendix 20.0 – A.13)

No substantial gaps were identified.

Report 6 (Instream Flow and Fish Habitat Assessment Report – Appendix 27.0-A-12)

153. The estimated (return periods) and modelled (synthetic hydrographs) data lack the rigor to accurately inform the instream flow modeling. For example

i. Limitations in the calculation of peak flow (provided above) precludes the ability to model fish habitat at flow scenarios beyond the threshold discharge, as determined by the maximum measured flow data.

It is recommended the proponent commit to continued monitoring of the baseline hydrometric network to improve data efficacy. This would reduce uncertainty in hydrological estimates and improve those models that rely on data derived from the hydrometric program.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #154 has not been provided by the proponent.

Report 7 (Water Quality Model Report – Appendix 27.0-A-14)

154. The estimated (return periods) and modelled (synthetic hydrographs) data lack the rigor to accurately inform water quality modeling. Specifically, the omission of high flow data such as 1:10 return period events and greater is problematic. Confidence in the assessment would be improved by continued monitoring of the surface water hydrometric network to obtain sufficient high flow data to develop robust rating curves that will enable reliable extrapolations for extreme events (1:10, 1:100, 1:200, PMP, PMF, etc.).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #155 has not been provided by the proponent.

Report 8 (Water Quality and Aquatic Biota – Appendix 27.0-A-14)

155. The estimated (return periods) and modelled (synthetic hydrographs) data lack the rigor to accurately inform water quality and aquatic biota modeling and analysis.

Specifically, the omission of high flow data such as 1:10 return period events and greater is problematic. Confidence in the assessment would be improved by continued monitoring of the surface water hydrometric network to obtain sufficient high flow data to develop robust rating curves that will enable reliable extrapolations for extreme events (1:10, 1:100, 1:200, PMP, PMF, etc.).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #156 has not been provided by the proponent.

3.8.4 EA Conclusions

Report 1 (EA Hydrology – Section 4.2.1)

N/A - All EA conclusions are made in the hydrology section of the EAC Application.

Report 6 (Instream Flow and Aquatic Biota Technical Data Report – Appendix 27.0-A-12)

156. Using results from the Instream Flow and Aquatic Biota Technical Data Report, the EAC Application concludes that no loss of Bull Trout habitat will occur in either Chamberlain or Skeeter creeks. The hydrology section (4.2.1) of the EAC Application concludes that flow impacts are likely. This represents a potential inconsistency. The Project design shows the North Collection Ditch will intercept several significant tributaries to Skeeter Creek. The Project design also shows that the West Collection Ditch will intercept several significant tributary streams to Chamberlain Creek.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #157 has not been provided by the proponent.

157. **Peak Flow Estimates.** Confidence in the assessment would be improved by continued monitoring of the surface water hydrometric network to obtain sufficient high flow data to develop robust rating curves that will enable reliable extrapolations for extreme events (1:10, 1:100, 1:200, PMP, PMF, etc.).This will further reduce uncertainty in model results for the instream flow section of the EA, which used hydrological data as modeling inputs.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #158 has not been provided by the proponent.

158. **Operational Flows.** Confidence in the assessment would be improved by providing flow estimates for each phase of the mine lifecycle (i.e, construction, operations, closure, and post closure). This will address substantial gaps in the EA by enabling a complete assessment of fish and fish habitat throughout the mine life.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #159 has not been provided by the proponent.

Report 7 (Water Quality Model Report – Appendix 27.0-A-14)

159. Conclusions based on modelled data should be reviewed carefully to understand when, and to what degree, the modelled hydrological data have been extrapolated beyond the threshold discharge (two times the maximum measured discharge).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #160 has not been provided by the proponent.

160. **Peak Flow Estimates.** Confidence in the assessment would be improved by continued monitoring of the surface water hydrometric network to obtain sufficient high flow data to develop robust rating curves that will enable reliable extrapolations for extreme events (1:10, 1:100, 1:200, PMP, PMF, etc.). This will further reduce the uncertainty in model results in the water quality section of the EA, which used hydrological data as modeling inputs.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #161 has not been provided by the proponent.

161. **Operational Flows.** Confidence in the assessment would be improved by providing flow estimates for each phase of the mine lifecycle (i.e, construction, operations, closure, and post closure). This will enable more accurate water quality estimates.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #162 has not been provided by the proponent.

Report 8 (Aquatic Biota Technical Report – Appendix 27.0-A-13)

162. Conclusions based on modelled data should be reviewed carefully to understand when, and to what degree, the modelled hydrological data have been extrapolated beyond the threshold discharge (two times the maximum measured discharge).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #163 has not been provided by the proponent.

163. **Peak Flow Estimates.** Confidence in the assessment would be improved by continued monitoring of the surface water hydrometric network to obtain sufficient high flow data to develop robust rating curves that will enable reliable extrapolations for extreme events (1:10, 1:100, 1:200, PMP, PMF, etc.). This will further reduce the uncertainty in model results in the aquatic biota section of the EA, which used hydrological data as modeling inputs.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #164 has not been provided by the proponent.

164. **Operational Flows.** Confidence in the assessment would be improved by providing flow estimates for each phase of the mine lifecycle (i.e, construction, operations, closure, and post closure). This will address substantial gaps in the EA by enabling a complete assessment for aquatic biota throughout the mine life.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #165 has not been provided by the proponent.

3.8.5 Mitigation

165. Project components such as diversion ditches, culverts, and emergency spillways are designed based on design flows. Design flows are used to engineer water management structures. They are designed to extreme events such as the 1:100 or 1:200 year events.

A discussion of peak flows and design flows is made in the EA (18.3.2, pa 18.10, paragraph 2). A limitation to Project data may be the estimation of peak flows. As peak flow estimates may contain substantial uncertainty, the design flows estimates for low frequency, high magnitude events must also contain substantial uncertainty. Currently it is not clear whether this uncertainty would have appreciable effects on design flows.

A discussion of how limitations and uncertainty in the hydrometric data may affect model results and EA conclusions is recommended.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #166 has not been provided by the proponent.

166. As a result of excluding hydrology as a VC, the EAC Application does not discuss Project impacts on hydrology or mitigation measures, despite the conclusion in section 4.2.1 (par. 1) of the EAC Application that there may be potential changes in surface water flows resulting from Project activities. The exclusion of hydrology as a VC in the EA represents a substantial gap in the EA, and introduces additional uncertainties in the assessment of other VCs that rely on surface water flows.

It is recommended that an effects assessment on hydrology be undertaken as a VC. The result of this assessment will enable updates to the effects assessments of other VCs, the development of an effective mitigation and monitoring program for surface water hydrology (that will additionally benefit other VCs), and provide increased certainty to First Nations that water resources will be protected. Additional field work may be required to undertake this assessment.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #167 has not been provided by the proponent.

3.9 HYDROGEOLOGY/GROUNDWATER

3.9.1 Reports Reviewed

Sukunka Coal Mine Project Application Information Requirements – Approved by Environmental Assessment Office on October 23, 2013

Preface to Environmental Assessment Application

Section 1-3 Part A – Introduction and Background

Section 4 Assessment Approach

Appendix 27.A-4 Sukunka Coal Mine Project Hydrogeology Technical Data Report, prepared by Knight Piesold on April 24, 2014

Appendix 20.A-8 Preliminary Groundwater Management Plan for Sukunka Coal Mine Project, prepared by Knight Piesold on June 22, 2015

Appendix 27.A-3 Sukunka Coal Mine Project Baseline and Mine Site Watershed Model Technical Modeling Report , prepared by Knight Piesold on September 26, 2014

SRK's Memo: Net Seepage Capture

Stantec's Memo: Selection of Valued Components, August 20, 2013

Sukunka Coal Mine Project Issues Summary Report, prepared by Stantec Consulting Ltd. for BC Environmental Assessment Office, November 13, 2013

Draft AIR Comment Tracking Table

Sukunka Coal Mine Project Environmental Assessment Certificate Application Round 1 IR Tracking Table – Batch 1, September 30 2015

Sukunka Coal Mine Project Environmental Assessment Certificate Application Round 1 IR Tracking Table – Batch 2, October 15, 2015

3.9.2 Evaluation of Conformity to AIR

AIR Section 4.1.2 Valued Components

> Groundwater quantity and quality was not included as a VC, despite multiple government agencies (e.g., BC MoE, MEM, Natural Resources Canada) and First Nations recommending its inclusion. This is a departure from standard practice for mining EAs in BC and Canada, particularly in northeastern BC where several other coal mine projects in the region (e.g., Quintette, Roman-Trend, Murray River) have assessed potential impacts to groundwater. The Project, which proposes to mine six open pits during operation and generate multiple waste rock dumps, has the potential to affect groundwater quantity and quality in the mine area, with subsequent effects to fish, aquatic life and even human health in the downstream receiving environment.

AIR Section 4.2.2.2: Delineation of study area(s) and rationale for the delineation of the study areas

> Additional rationale is requested for the selection of the RSA and LSA boundaries for the hydrogeology baseline study. For example, why is the LSA so close to the proposed mine footprint, particularly in the west and southwest, and why does the LSA follow the mine tenure boundary rather than the watershed boundaries.
>
> Additional rationale is requested for the selection of the RAA and LAA delineated for the hydrogeology effects assessment. The RAA and LAA are not consistent with the RSA and LSA used in the baseline study.

AIR Section 4.2.2.2: Timeframes for Project phases

> Section 4.2.2.2.3.1 (Temporal Boundaries) of the EAC Application states that predictions of potential effects on groundwater quantity were completed for a worst case operational

scenario. Potential effects on groundwater quantity and quality were not assessed for the construction, closure and post-closure phases. Effects on groundwater quality (e.g., by contact water seepage from the proposed waste rock dumps) was not assessed. This is likely a consequence of not including hydrogeology as a VC. Given potential interactions with other VCs, it is recommended that the groundwater assessment be revisited, and potential effects to groundwater quantity and quality for all phases of the mine lifecycle be assessed.

AIR Section 4.2.2.3: Data that will be reviewed includes: Aerial photographs

Information related to aerial photos was not found in Appendix 27.A-4 or other sections of the EAC Application.

AIR Section 4.2.2.3: Hydraulic testing (e.g., response testing), groundwater level measurements, and groundwater samples will be collected from each monitoring well.

Hydraulic testing (response testing), groundwater level measurements, and groundwater quality sampling were not conducted in all the wells. Response testing was done in a few wells, and no packer testing or pumping tests were done in any of the wells shown in Appendix 27.A-4. Groundwater level measurements (particularly long-term measurements with transducers) were available for some wells due to dry wells. Groundwater quality samples were collected once or twice in a few wells (e.g., MW13-09, MW13-1, MW14-15D). It is recommended that groundwater quantity and quality samples be collected from wells of appropriate depth to adequately characterize groundwater resources in the Project area.

AIR Section 4.2.2.3: Interpretation of any potential relationships between groundwater quality results and site conditions (e.g., geology).

Discussion of the potential relationships between groundwater quality and site conditions (e.g., different rock types and formations) is not provided in Appendix 27.A-4. Please provide.

AIR Section 5.1.5.2: Provide an assessment of potential project-related effects for each phase of the Project based on fish distribution, predicted changes in surface and groundwater flows and quality, and potential project-related changes to aquatic habitat in downstream reaches of mine-influenced drainages.

Predictions are not provided for potential changes in groundwater flows and quality (e.g., changes of groundwater levels, flow patterns, hydraulic gradients, flow directions and pathways, and groundwater quality, due to dewatering and refill of the pits and seepage of contact groundwater from the waste rock dumps) as it relates to Fish and Fish Habitat. Please provide.

AIR Section 5.2.4: Provide water quality predictions for metals and other constituents of concern (sulphate, nitrate) for relevant onsite and receiving environment locations, key flow conditions and relevant time-steps in the mine life (i.e., temporal boundaries will include construction, operations, decommissioning and closure and post-closure) based on inputs from the geochemistry, hydrogeology and hydrology teams.

Predictions are not provided for the potential changes in groundwater flows and quality for construction, closure/post-closure as it relates to Water Quality and Aquatic Biota. Please provide.

3.9.3 Assessment of Technical Studies

Report 1 (Appendix 27.A-4 Sukunka Coal Mine Project Hydrogeology Technical Data Report)

167. Section 1.0 Introduction, Sub-section 1.1 Scope of Work: It is stated that "Groundwater is not defined as a Valued Component (VC) for the Project. However, groundwater contributes to surface water flows and can therefore indirectly impact VCs such as Fish and Fish Habitat and Water Quality and Aquatic Biota, as a result of potential changes to groundwater quantity and quality." It is a concern that groundwater (along with surface water) was not included as a VC despite the above statement that acknowledges potential indirect impacts to other components. In the low flow season, groundwater discharge is likely the main source of surface water flow in the creeks and the quantity and quality of groundwater discharge will directly affect fish and aquatic life. It is recommended the proponent conduct a complete environmental assessment on groundwater as prescribed for other VCs.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #168 has not been provided by the proponent.

168. Section 2.2.4 Regional Groundwater Uses. The Application states that "There are no current groundwater users within the RSA". This may be a function of how the study areas were delineated. There are three water supply wells near the proposed mine tenure area (as shown in Table 2.2-1). Please re-evaluate.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #169 has not been provided by the proponent.

169. Executive Summary. It is stated that "The many distinct units and material types have resulted in a groundwater regime that has a bulk hydraulic conductivity along the bedding plane that is much higher than across the bedding" and "Bedrock that has been subject to deformation as a result of folding, joints and faults. These structures are expected to enhance the already anisotropic groundwater regime from lithology alone". These statements are not supported by any data from limited the hydraulic tests presented in the report, and no pumping tests were done that would enable calculating anisotropy ratios of overburden and bedrock units to demonstrate higher permeability along the bedding plane than across the bedding. Please provide additional references and/or data to support the conclusions.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #170 has not been provided by the proponent.

170. Executive Summary. It is stated that "The average groundwater recharge is expected to be approximately 10% of precipitation with groundwater recharge up to about 25% of precipitation in the river and creek valley deposits…..Recharge to depth under higher ground is expected to be limited". It is not clear how these recharge rates were estimated. Considering the orographic effects on precipitation, shouldn't there be more recharge into groundwater system at higher elevations and less recharge at lower elevations? The common understanding is that groundwater recharge zones (with recharge dominantly) are generally located at higher elevations and discharge zones (with discharge dominantly) are generally located at lower elevations. If differences in lithology are considered more important than orographic effect, please provide additional rationale.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #171 has not been provided by the proponent.

171. Executive Summary (also Section 4.3.5 Groundwater Flow Directions and Rates). The average groundwater flow velocity was calculated in sand/gravel, upper alluvial fans, and bedrock, respectively, based on assumptions about horizontal hydraulic gradient, bulk hydraulic conductivity, and average effective porosity rather than measuring these parameters. How valid are these assumptions given that the parameters likely vary from location to location? Why were the measured hydraulic conductivities (e.g. from the well response tests) on site not used in the flow velocity calculations? Why were hydraulic gradients not calculated using measured water levels from the monitoring wells?

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #172 has not been provided by the proponent.

172. Section 3.1.2 Historical Programs: The proposed mine footprints including the open pits and waste rock dumps, together with the LSA/RSA should be shown together with the monitoring well locations in Figure 3.1-1 to allow assessing the sufficiency of the monitoring wells for hydrogeology and groundwater baseline characterization.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #173 has not been provided by the proponent.

173. Section 3.2 Data Collection. Detailed descriptions of drilling, well installation and development, and response testing were expected in this Methodology Section 3.0, in addition to references of the relevant guidelines. Please provide.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #174 has not been provided by the proponent.

174. Section 3.2 Data Collection. Table 3.2-1 (Summary of Monitoring Wells) provide dates for well response tests, but not for installation of the wells. A couple of wells were noted "Dry", but it is not clear how the response tests were carried out in those dry wells and how those hydraulic conductivities were calculated. Most of the wells were installed with screens at depths of less than 50 m, a few around 50 m, and even fewer less than 76 m. The wells are not deep enough to characterize the hydrogeological conditions in the area and to monitor and sample groundwater quality in deeper bedrock formations. The proposed mine pits can be as deep as 200 m. As a result, the contact groundwater in the pits and from the waste rock dumps could migrate down to much greater depths. It is recommended that the proponent revisit the well monitoring program and install deeper wells to adequately characterize hydrogeological conditions and groundwater quality.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #175 has not been provided by the proponent.

175. Section 4.1.1 Local Bedrock Geology. A local bedrock map is provided and shown in Figure 4.1-1. The LSA for hydrogeology and the proposed mine footprints should be added to this map.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #176 has not been provided by the proponent.

176. Section 4.2 Local Surficial Geology. Although the types and distributions of surficial overburden materials were characterized, no specific information was provided for thickness of overburden in the drillholes and well locations. The LSA and mine footprints should be

shown in Figure 4.2-1. Wells are shown but no other drillholes. Please provide a table that summarizes overburden types, composition and thickness from wells and drillholes. It is not clear if any geophysical surveys were conducted to map the overburden, or if the map was based on remote sensing data and aerial photo interpretation.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #177 has not been provided by the proponent.

177. Section 4.3.1 Hydraulic Conductivity. The tested K values (Table 3.2-1) are limited because of dry wells or insufficient water depths in some wells. Tested K values for many hydrostratigraphic units in the conceptual model in Addendum 2 are not available.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #178 has not been provided by the proponent.

178. Section 4.3.1 Hydraulic Conductivity. The statement that "the limited recent testing suggests that hydraulic conductivity cannot be correlated to rock type" suggests that hydraulic testing was insufficient to characterize the permeabilities of the geological materials in the area. Only 5 response tests were done in overburden as shown in Table 3.2-1, which is not sufficient to estimate a K value for each overburden type. It is recommended that the proponent conduct additional hydraulic testing to remove the uncertainties in predicted permeabilities.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #179 has not been provided by the proponent.

179. Section 4.3.2 Groundwater Storage. Hydraulic tests (e.g., pumping tests) or soil grain size analyses were not conducted to calculate specific storage, specific yield, porosity and effective porosity for the geological materials because it is difficult and expensive to obtain these data. Literature values can be used, but the data sources should be provided.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #180 has not been provided by the proponent.

180. Section 4.3.3 Groundwater Levels. The figures provided in Appendix E of the 2014 baseline report and in Appendix A.1 of Addendum 1 indicate there were problems with data collection (e.g., flat curves indicating no seasonal variation) associated with dry wells or insufficient water depths, suggesting the monitoring wells were not deep enough for groundwater monitoring and sampling.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #181 has not been provided by the proponent.

181. Section 4.3.3 Groundwater Levels. Provide additional rationale for the assumption that "Horizontal groundwater flow gradients in the LSA along the lower valley slopes are assumed to range between 0.01 and 0.03 m/m along the Sukunka River valley bottom based on the study area topography". It is not clear why the horizontal gradients were not calculated using measured water levels in the wells and why an assumption was required that introduces uncertainty.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #182 has not been provided by the proponent.

182. Section 4.4 Groundwater Quality. All groundwater samples collected for this Project used the low flow purging sampling approach rather than the volume-based purging sampling approach, which is industry standard and requires a minimum of 3 well volumes of water to be purged prior to sampling. According to the relevant guidelines, low flow purging sampling is recommended when turbidity is high (e.g., > 50 NTU) in wells (e.g., installed in geological units with high contents of fine materials), or when wells have very slow recharge. The response test results in the wells (Table 3.2-1) suggest the permeabilities of overburden and bedrock were not too low (from e-4 to e-7 m/s, some e-8 m/s) and the Project site is located in an area with moderate precipitation. The disadvantage of the low flow approach, in contrast to the volume-based approach, is that wells might not be sufficiently purged and the samples might be less representative (as stated in Appendix C, Section C.1.3). Please provide additional rationale for use of the low flow approach and what methods were used for well development?

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #183 has not been provided by the proponent.

183. Section 4.4.2 Data Analysis stated that there are no registered drinking water wells in the PDA. This is because the water supply wells were excluded due to the size of the LSA and RSA. No monitoring and sampling data was collected from the supply wells.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #184 has not been provided by the proponent.

184. Section 4.4.3.5 Benzene, Toluene, Ethylbenzene, and Xylene (BTEX). Table 4.4.2 shows these organic compounds were detected in those wells and even exceeded the guidelines. Were those wells contaminated?

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #185 has not been provided by the proponent.

185. Addendum 1 Groundwater Supplementary Technical Data Report, 2.4 Hydraulic Conductivity Testing. Response test data for the monitoring wells were analyzed using the Cooper et al. (1976) method. Should be Cooper et al (1967). Please provide additional rationale for using this approach over the more common methods such as Hvorslev (1951) and Bouwer and Rice (1976).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #186 has not been provided by the proponent.

186. Addendum 1 Groundwater Supplementary Technical Data Report, 2.6 Groundwater Sampling Methods, 2.6.1 Sample Collection. Monitoring wells MW14-13S/D, MW14-14S and MW14-16D contained insufficient water to sample since their installation in January 2014. The previous 2014 baseline report also showed that some wells were dry and not sampled. The transducer data in some of the wells monitored in 2013 showed flat curves (no fluctuations). Table 2.2-1 (of Addendum 1) and Table 3.3-1 (in 2014 hydrogeology baseline report) showed that the deepest well was only 76 m. Collectively, hydrogeology has not been adequately characterized as a consequence of not being included as a VC. It is recommended that data be collected to address data gaps and uncertainties associated with groundwater quantity and quality.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #187 has not been provided by the proponent.

187. Addendum 2 Memorandum, 2.3.1 Summary of Groundwater Conditions at the Test Mines: Groundwater inflow into the test mine was estimated. Groundwater inflow was not estimated or calculated for all of the open pits. Contact groundwater flow from waste rock dumps was not estimated.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #188 has not been provided by the proponent.

Report 2 (Section 4 Assessment Approach)

188. Additional rationale is requested to support the selection of the LAA and RAA boundaries. The RAA and LAA for the hydrogeology in the EAC Application (Section 4.2.2) are inconsistent with those used during baseline studies (Appendix 27.A-4). It is unclear what data was collected for groundwater in the Sukunka River valley to support the effects assessment on other VCs such as fish and aquatic life in that area. The LAA is too close to the proposed mine components (especially in the west and southwest), which does not provide sufficient buffer for the assessment of downstream effects on groundwater. The RAA is not large enough to assess regional residual and cumulative effects, and it doesn't follow the watershed boundaries along the Sukunka River.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #189 has not been provided by the proponent.

189. Please include labels for surface topography elevation contours on Figure 4.2-5.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #190 has not been provided by the proponent.

190. Section 4.2.2.2.3.1 Temporal Boundaries: "Predictions of potential effects on groundwater quantity were completed for a worst case operational scenario (e.g., maximum extent) footprint….. Available information for closure and post-closure are limited". As a consequence of not being included as a VC, potential effects of the Project on groundwater quantity and quality were not assessed for closure/post-closure phases, and only the effect

on groundwater quantity was assessed during operation, not quality (e.g., the potential for contact water leaching from the waste rock dumps).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #191 has not been provided by the proponent.

191. Section 4.2.2.3.2 Overview of Baseline Conditions: "The average groundwater recharge is expected to be approximately 10 percent of precipitation with groundwater recharge up to about 25 percent of precipitation in the river and creek valley deposits…..Recharge to depth under higher ground is expected to be limited". It is unclear how these recharge rates were estimated. Due to the orographic effects of precipitation, should there be more recharge into groundwater system at higher elevations and less recharge at lower elevations? The common understanding is that groundwater recharge zones are generally located at higher elevations and discharge zones are generally located at lower elevations.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #192 has not been provided by the proponent.

192. Section 4.2.2.3.2 Overview of Baseline Conditions. The average groundwater flow velocity was calculated in sand/gravel, upper alluvial fans, and bedrock, respectively, based on assumptions about horizontal hydraulic gradient, bulk hydraulic conductivity, and average effective porosity rather than measuring these parameters. How valid are these assumptions given that the parameters likely vary from location to location? Why were the measured hydraulic conductivities (e.g. from the well response tests) on site not used in the flow velocity calculations? Why were hydraulic gradients not calculated using measured water levels from the monitoring wells?

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #193 has not been provided by the proponent.

193. Section 4.2.2.4.2 Groundwater Flow Paths: "Groundwater flow in the water quality model was modelled as discharging within the upper Skeeter and Chamberlain creeks, and groundwater flow within the lower portions of Skeeter and Chamberlain Creeks was modelled to report to the Sukunka River. All groundwater flow paths in the water quality model discharge to surface and contribute to water quality in either the Sukunka, Skeeter or Chamberlain Creeks within the limits of the model". Groundwater flow pathways were interpreted based solely on topographical constraints. Will the complex sedimentary

geological structures (the sedimentary beddings, folds and northwest-striking faults) affect or even control the groundwater flow pathways? Will the mine components and activities, such as dewatering the pits during operation, affect groundwater flow pathways? Should groundwater flow pathways be modelled with a numerical groundwater model calibrated to represent pre-mining baseline hydrogeological conditions? It is not clear how those groundwater flow discharge rates presented in Table 2 were calculated for the wetland water balance in Appendix 4.2.1-A Conceptual Wetland Water Budget Memo.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #194 has not been provided by the proponent.

194. Section 4.1.7.1 Project Interactions. Dewatering of the pits was not listed as a Project activity in Table 4.1-7. The Sukunka Coal Mine is a proposed open pit mine. The depth of the mine will generally be above 120 m, but in some cases may reach 200 m, which means that some sections of the pits would be below the groundwater table and would need to be dewatered. Should recovery of groundwater at closure/post-closure also be included in the list of Project activities?

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #195 has not been provided by the proponent.

195. Section 4.2.1 Hydrology described 1) Interception of groundwater by the open pit area and introduction of this intercepted water into the surface water system, 2) Enhanced groundwater recharge or potential groundwater seepage down-gradient from waste rock piles and contact water collection ditches, and 3) Alteration of the groundwater flow regime by open pit development, and subsequent alteration of natural groundwater discharge patterns to the surface water system.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #196 has not been provided by the proponent.

196. Section 4.2.2. Hydrogeology discussed that changes in groundwater quality or quantity may result from the following main mine activities: 1) Decrease in groundwater levels from mine dewatering during open pit mine development, 2) Enhanced groundwater recharge or potential groundwater seepage down-gradient from waste rock piles, and 3) Potential groundwater seepage down-gradient from sediment control ponds or losses from collection ditches.

The above statements in the EAC Application provide additional support that groundwater should be included as a VC and open pit dewatering should be included in the list of Project activities.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #197 has not been provided by the proponent.

197. Section 4.2.2.3 Baseline Conditions. Please include the monitoring well locations relative to the Project components, including the open pits and waste rock dumps, in Figure 4.2-7 to assess the adequacy of the monitoring wells for hydrogeology and groundwater characterization.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #198 has not been provided by the proponent.

Report 3 (Preliminary Groundwater Management Plan)

198. Section 4.1 Monitoring. Please provide additional details about the proposed monitoring program. Currently, there is no map of the proposed monitoring well locations, and sampling frequency will be quarterly rather than the standard monthly or bi-monthly. There is no clear statement about monitoring frequency during closure and post-closure. There was no rationale provided for monitoring well locations and monitoring frequency. There is no indication about who will conduct the groundwater monitoring (e.g., qualified hydrogeologists or by trained environmental technicians).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #199 has not been provided by the proponent.

Report 4 (Appendix 27.A-3 Baseline and Mine Site Watershed Model Technical Modeling Report)

199. This report included estimation of pit inflow, seepage from waste rock dumps, and changes of stream flows (Table 2.6-1) relative to baseline conditions. However, all were based on water balance and assumed values, without considering the complex subsurface geology and hydrogeology conditions. Predictions were not provided for the potential variance in these estimates for groundwater flows due to uncertainties of various factors.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #200 has not been provided by the proponent.

200. Section 3.2 Open Pit Inflows. Groundwater mine inflows were quantitatively assessed only for the open pits for the watershed modeling work, but it is unclear how pit inflow was estimated without a groundwater model, which would incorporate recharge, discharge, hydraulic properties such as permeability of overburden/bedrock, and hydraulic gradients. In addition, the potential contact water migration pathways were assumed, rather than modelled. The BC Guidelines for Groundwater Modeling to Assess Impacts of Proposed Natural Resource Development Activities indicate that proponents should use quantitative groundwater models to support EAC applications. Groundwater models can be used to characterize the pre-mining hydrogeological baseline conditions, describe the groundwater flow system and the main processes that influence system behavior, assess impacts (i.e., type, degree, extent) related to various Project components (e.g., dewatering of a proposed open pit; potential reduction in baseflow from well pumping), assess potential effects and mitigation options related to groundwater pathways, guide development of mitigation and contingency measures, and communicate information to regulators and other stakeholders.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #201 has not been provided by the proponent.

201. It is unclear how groundwater quality data for the pre-mining baseline conditions and potential changes during Operation, Closure and Post-closure were incorporated into the water quality modeling for the fish, aquatic and wildlife effects assessments.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #202 has not been provided by the proponent.

202. The following two technical reports were not found and therefore not reviewed:

Knight Piésold Ltd. (KP) 2013. *2012-2013 Hydrogeological Site Investigation Data Report*. Ref. No. VA101-511/3-1. Prepared for Glencore. Vancouver, BC.

Knight Piésold Ltd. (KP) 2014. *2013-2014 Hydrogeological Site Investigation Data Report*. No. VA101-511/3-4. Prepared for Glencore. Vancouver, BC.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #203 has not been provided by the proponent.

3.9.4 EA Conclusions

The EA conclusions were made for the VCs including fish and aquatics and wildlife, using groundwater as one of the inputs. No conclusions were found for effects on groundwater quantity and quality because groundwater was not selected as a VC.

3.9.5 Mitigation

203. As a result of excluding hydrogeology as a VC, the hydrogeology section of the EAC Application does not discuss the potential effects of the Project on hydrogeology or mitigation, despite statements in the EA that there may be potential changes in groundwater dynamics resulting from Project activities. The exclusion of hydrogeology as a VC in the EA represents a substantial gap in the EA, and introduces additional uncertainties in the assessment of other VCs that may interact with groundwater flows.

It is recommended that the effects of the Project on hydrogeology be undertaken, including the updates recommended in sections 6.2.3 – 6.2.6. The result of this assessment will enable updates to the assessments of other VCs, the development of an effective mitigation and monitoring program for groundwater (that will additionally benefit other VCs), and provide increased certainty to First Nations that water resources will be protected.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #204 has not been provided by the proponent.

3.10 WATER QUALITY AND AQUATIC BIOTA (GEOCHEMISTRY)

3.10.1 Reports Reviewed

Sukunka Coal Mine Project Application Information Requirements – Approved by Environmental Assessment Office on October 23, 2013

Section_5.2 Water Quality and Aquatic Biota, Section 5: Assessment of Potential Environmental Effects.

Appendix_27.A-13 Water Quality and Aquatic Biota Technical Data Report. Sukunka Coal Mine Project. Prepared for Glencore by Stantec Consulting Ltd., June 19, 2015.

Appendix_27.A-14 Sukunka Coal Mine Project Water Quality Model Report. Prepared for Stantec Consulting Ltd. by SRK Consulting (Canada) Inc., June 2015.

Appendix_27.A-26 Wetland Baseline Water Quality and Aquatic Biota Technical Data Report. Sukunka Coal Mine Project. Prepared for Glencore by Stantec Consulting Ltd., January 5, 2015.

Appendix_27.A-7 Geochemistry Technical Data Report 2015. Sukunka Coal Mine Project. Prepared for Glencore by Stantec Consulting Ltd.

Appendix_20.A-7 Preliminary Mine Site Water Management Plan. Sukunka Coal Mine Project. Prepared for Glencore by Knight Piesold Ltd., June 28, 2015.

Appendix_20.A-8 Preliminary Groundwater Management Plan. Sukunka Coal Mine Project. Prepared for Glencore by Knight Piesold Ltd., June 22, 2015.

Appendix_20.A-9 Preliminary Metal Leaching and Acid Rock Drainage Management Plan, Sukunka Project. Prepared for Stantec Consulting Ltd by SRK Consulting (Canada) Inc.

Appendix_20.A-13 Preliminary Surface Erosion and Sediment Control Plan. Sukunka Coal Mine Project. Prepared for Glencore by Stantec Consulting Ltd., June 23, 2015.

Front Matter

Section_1-3 Introduction and Background

Section_4 Assessment Approach

Section_21 Summary of Management Plans

Section_21 Compliance Reporting.

Net Seepage Capture. Sukunka Coal Mine Project. Prepared for Glencore by SRK Consulting (Canada) Inc., September 30, 2015.

Water Quality Predictions at Additional Nodes Information Request #90 and #91. Sukunka Coal Mine Project. Prepared for BC Environmental Assessment Office by Stantec Consulting Ltd., September 30, 2015.

3.10.2 Evaluation of Conformity to AIR

While sediment quality is described in Section 5.2.4.2.1.3 of the application, no reference is made to a table that presents the data for all samples or as a set of summary statistics. The data is in fact presented in Appendix_27.A-13 (Water Quality and Aquatic Biota Technical Data Report) but isn't linked in section 5.2.4.

Section 5.2.6 (Assessment of Residual Environmental Effects on Water Quality and Aquatic Biota): Quantitative water quality predictions for the construction phase were not modelled, but effects are

considered in the cumulative effects assessment. While the effects may be deemed minor, it is better to provide quantitative water quality predictions for all phases of the project.

3.10.3 Assessment of Technical Studies

Water Quality and Aquatic Biota Technical Data Report. Sukunka Coal Mine Project. Prepared for Glencore by Stantec Consulting Ltd., June 19, 2015

The baseline provides 2 years of information for water quality (May 2012 to May 2014), sediment quality, periphyton, benthic invertebrates, and tissue metal residues (summer of 2012 and 2013) from up to 16 stream sites and 2 wetlands in the Project area. Sampling was conducted in the Sukunka, Pine, Wolverine, and Murray rivers and Skeeter, Chamberlain, and Bullmoose creeks.

Comments:

204. No baseline sediment, periphyton, or benthic samples collected for SKNK07 (near Skeeter Creek headwaters, upstream of mine operations).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #205 has not been provided by the proponent.

205. No baseline fish tissue samples collected for SKNK06 (Skeeter Creek upstream of confluence with Sunkunka River, downstream of mine operations), SKNK10 (Chamberlain Creek, middle section).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #206 has not been provided by the proponent.

206. Only one baseline fish tissue sample collected for SKNK07 (near Skeeter Creek headwaters, upstream of mine operations).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #207 has not been provided by the proponent.

207. Missing baseline data (sediment, periphyton, benthic invertebrates, or fish tissue) prevents comparisons to be drawn with predicted/measured results for the active mining phases (construction and operations) and closure, post-closure phases. The missing data is less critical for nodes located upstream of mine operations provided that these nodes are not subject to any cumulative effects. However, nodes located downstream of mine operations

are critical for the environmental assessment and must have baseline data to compare to predicted/measured results.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #208 has not been provided by the proponent.

208. While additional samples were collected during the spring freshet as part of the WQ program, it appears collecting 5 samples at core sampling sites within 30 days during maximum changes in the hydrograph was not attained as per BC MOE (2012) guidance (Section 6.5.2 of BC MOE document). Required to properly calculate 30 day mean, as per long-term water quality guidelines.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #209 has not been provided by the proponent.

209. Phosphorus was presented as only the total fraction (Section 3.2.2.2). Given that the effects of eutrophication were assessed in the EA (Section 5.2.6.4) with respect to nitrogen and phosphorus constituents, expanding this section to include ortho-phosphate, total dissolved phosphorus, and total phosphorus would provide additional insight on the spatiotemporal dynamics of phosphorus in the region. A link can likely be made between elevated concentrations during high flow periods when TSS is greatest.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #210 has not been provided by the proponent.

210. The sediment quality program included triplicate samples at each site, with a QA/QC field split collected at only one site per year. The QA/QC program does not meet BC MOE (2012) guidelines (Section 7.5 of BC MOE document), which calls for field splits to be collected at every other site (as per Spatial Variance Program; Section 7.5.1.).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #211 has not been provided by the proponent.

211. PAH results are to be reported on a dry weight basis (Section 7.4; BC MOE 2012). It is unclear in results section and Table 4.2-1 if PAH results are dry or wet weight.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #212 has not been provided by the proponent.

212. The periphyton program would benefit from increased replication for chlorophyll *a* and tissue metals. The current data does not provide an accurate account of the baseline chlorophyll *a* and metal levels given the inherent spatial variability of periphyton in streams. Currently, the data does not contribute to future monitoring programs given the lack of replication. Replication consisted only of duplicates at a few sites, which does not meet BC MOE guidelines (BC MOE 2012). The report acknowledges that RPDs for the few duplicate samples that were collected were high, likely because of the inherent high spatiotemporal variability of periphyton communities in lotic environments. Enhanced replication at several sites (Basic Non-statistical Program, Section 7.5.3 of BC MOE (2012)), and ideally all sites (Spatial Variance Program, Section 7.5.3 of BC MOE (2012)), would increase confidence in the results. Given the high RPDs, these data are not entirely reliable. Laboratory QA/QC procedures mentioned that an external review of taxonomic identification was conducted but no data were included to support this.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #213 has not been provided by the proponent.

213. It is stated in Section 5.1.3 that total richness was calculated as total species per sample. It is assumed this means that some genera or higher classifications were included when identification to species level was not possible. This should be clarified in the methods.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #214 has not been provided by the proponent.

214. Section 6.1 – should reference Environment Canada field (2011) and laboratory (2009) manuals for CABIN sampling.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #215 has not been provided by the proponent.

215. Two years of data collection adheres to general BC MOE requirements, although 5-in-30 WQ sampling during freshet was not accomplished or was incomplete.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #216 has not been provided by the proponent.

Section_5.2 Water Quality and Aquatic Biota, Section 5: Assessment of Potential Environmental Effects

216. The proponent did not provide quantitative water quality predictions for the construction phase of the Project. Based on experience with other projects, the residual cumulative effects of the construction phase activities can have a negative interaction on water quality. Quantitative water quality predictions for the construction phase would indicate which specific metals or nutrients might have an effect. Please update.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #217 has not been provided by the proponent.

217. Section 5.2.4.2.1.1. – There is a broad description of water phosphorus constituents (total P, total dissolved P, and ortho-P) but these data are not presented in Tables 5.2-4 through 5.2-6. Please confirm whether these were modelled. As these constituents are quantified in the effects assessment related to potential eutrophication (Section 5.2.6.4), monthly mean data should be presented in these tables as was done for nitrogen.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #218 has not been provided by the proponent.

218. Section 5.2.4.2.1.7 – There is no mention of exceedances of BC guidelines for selenium tissue concentration, despite reference to the USEPA and BC mercury guidelines. Selenium exceedances are also presented in the baseline. It would be helpful to have this info included in the existing environment section.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #219 has not been provided by the proponent.

219. Section 5.2.6.4 – Jarvie et al. (1999) reference should be (1998). Should clarify that the 7N:1P ratio is not an atomic ratio (as Redfield ratio) but a mass ratio. Also, the ratio does not imply nutrient limitation as periphyton growth would not be nutrient limited at these ratios if sufficient concentrations of nutrients were available for each of N and P (nutrient

limitation is best determined by 'grow-out' experiments). If nutrients were in short supply, then the ratio points towards the potential limiting nutrient or nutrient that controls the levels of primary productivity in the system. This point should be noted in the introduction. Baseline phosphorus levels are within half saturation uptake levels for periphyton in BC waters (Bothwell 1985).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #220 has not been provided by the proponent.

220. Section 5.2.6.4.3.2 - Low N:P ratios are common in lower order streams (particularly headwater steams), and the >95% proportion of cyanophytes present in the stream during the summers of 2012 and 2013 indicate the presence of a nitrogen-fixing community adapted to the lower levels of nitrate and ammonia. Since there would be no increase in P, the likely effect of increasing N in the creek during operations, if any, would be a change in community composition from cyanophytes to possibly diatoms or some other algal group. Notably, cyanophytes were dominant later in the summer even though N:P was 9:1, which would be considered P-limited. The potential to alter community composition should be considered in this section and mentioned in Section 5.2.6.4.3 as well.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #221 has not been provided by the proponent.

221. Section 5.2.6.4.3.3, 1st paragraph - *"15 to 37 strongly suggests phosphorous limitation during the growing season"*. Too much emphasis is placed on ratio and not on actual in situ concentrations. Baseline P concentrations in the Sukunka River have P concentrations within published half saturation uptake levels for BC periphyton (Bothwell 1985) and therefore may not necessarily be limiting for the community present during the summers of 2012 and 2013. A consideration of concentrations should be integrated into the text for proper context and a more thorough understanding of the actual nutrient dynamics in the system. It may be a better approach to discuss the potential for phosphorus to control the primary productivity in the system.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #222 has not been provided by the proponent.

Appendix_27.A-14 Sukunka Coal Mine Project Water Quality Model Report. Prepared for Stantec Consulting Ltd. by SRK Consulting (Canada) Inc., June 2015

222. Water quality predictions were not developed during the construction phase. The proponent justifies this gap with an assumption that water quality is primarily affected by total suspended solids (TSS) during construction, a parameter that cannot be modelled with any accuracy. TSS is not necessarily the only parameter that affects water quality during construction. Ultimately, water quality depends on disturbance of rock material and migration of contact water, and synchronized management practices or lack thereof. There may be loads coming off construction material, which need to be predicted for effective management. The Proponent plans to implement sediment and erosion control measures to mitigate the effects of TSS during construction. Regardless, pending changes to water quality need to be accounted for.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #223 has not been provided by the proponent.*

223. Source terms appear to be missing for all pit backfill locations. Only two of four reported in Table 2.2-1.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #224 has not been provided by the proponent.*

224. PAG management includes blending PAG rock with non-PAG rock in stockpiles. The Proponent states that PAG waste in the piles will not exceed 50% of the total waste rock and the ratio of neutralization potential (NP) to acid potential (AP) will exceed 3. While the PAG waste will not exceed 50% of the total waste in the pile, the schedule from ML/ARD Management Plan, Appendix 20.A-9, indicates that it will come close in some years. It is not clear how the ratio of NP to AP (NP/AP) will exceed 3 for the years in the schedule that report nearly 50% PAG waste rock in the pile. The monitoring plan will need to include an appropriate number of ML/ARD test samples relative to the mass of waste reporting to the stockpile as recommended by MEND. A contingency plan must be in place if the NP/AP ends up being less than 3.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #225 has not been provided by the proponent.*

Updated information on PAG management ***partially addresses*** the issue that sufficient blending will be possible. While the end-dumping method does serve to control the frequency of disposal and blend the PAG and non-PAG material, this method is not expected to achieve an intimately mixed composite of PAG and non-PAG rock. Without an

intimate mixture of PAG and non-PAG material, there is potential for "hot spots" of acidity. There is also a chance that blinding of NP by secondary mineralization in response to acid generation will occur, making the blended mixture ineffective with respect to generating a discharge of acceptable quality.

The proponent advocates a minimum 50:50 ratio of PAG to non-PAG rock, and identified that sufficient non-PAG rock is available to accomplish this target ratio. However, a 50:50 ratio of PAG to non-PAG rock may not necessarily achieve a net non-PAG composite if the NPR of the PAG rock is particularly low and NPR of the non-PAG rock is at the minimum rating of 2.

225. Section 3.5.2: Source Terms - Unsaturated Waste Rock and Co-Disposed Tailings and Coarse Rejects - In some cases the source term derivation relied upon analog data instead of humidity cell, field barrel, or shake flask tests. For example, seeps were calculated for two Gething Formation analog mine sites (Brule and Willow Creek). The ratio of analog concentrations to Sukunka concentrations indicates that the analog source terms underestimate fluoride, sulphate, aluminum, antimony, lithium, mercury, molybdenum, selenium and silver (Figure 3.5-1). Sulphate and selenium concentrations were corrected to account for thermodynamic solubility constraints. Final constraints used the highest concentrations, whether from site max or analog (Table B-2, Appendix B).

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

226. Pit wall source terms were derived from humidity cell leach rates; however, please specify which humidity cells were used for each source term.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

227. The mass balance pit water chemistry presented in Table B-6, Appendix B, provides median and 95th percentile concentrations for each pit. It is not clear whether the Proponent has considered that the concentrations in the water column would likely vary with depth (top, middle, and bottom) due to varying physical factors, including mixing/stratification, changes in temperature, density, and salinity.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

228. From a mass balance perspective it would be more useful to present the waste production schedule (Appendix A) in tonnage rather than bank cubic meters. Tonnages would also allow for a more accurate estimate of the recommended number of ML/ARD tests required for a representative population.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

229. The Proponent acknowledges that the relationship between saturated backfill and selenium attenuation is not well understood. No selenium attenuation was assumed if the mean annual hydraulic residence time in a saturated backfill zone was less than one year. Selenium attenuation of 99% was assumed for the four saturated backfill zones in the pits with residence time > 1 year. However, these represent arbitrary assumptions. Without direct evidence, 99% attenuation might be overly optimistic. It is advised that alternate cases in the model be examined with lower selenium attenuation (e.g., 75%, 50%, 25%, etc.). The same kind of sensitivity analysis could also be performed for nitrate.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #230 has not been provided by the proponent.*

Updated information on the efficacy of saturated backfill ***partially addresses*** the issue that sufficient attenuation of nitrate and selenium will occur to avoid the necessity of other water quality mitigation strategies and contingency plans, such as long term active water treatment. The provided information does not support the optimistic attenuation factor applied.

230. The proponent assumes that blending PAG rock with non-PAG rock in the stockpiles will not result in any acid rock drainage because the NP/AP ratio of the stockpile is going to be maintained above 3. In theory this approach can be successful if ideal blending occurs; however, there is a chance that mineral NP is armored by sulphide oxidation weathering products, thus preventing the mineral NP from further delivering any neutralization potential. In such circumstances, ARD "hot spots" may be generated, resulting in a higher rate of metal leaching. The prediction model does not account for this occurrence as a sensitivity or worst case scenario. The same concern exists for the exposed pit walls. While the placement of waste rock with excess neutralization potential along the bottom of the PAG highwall sections is a pro-active measure to mitigate potential ARD, there needs to be additional consideration for varying degree of success, as influenced by armoring of mineral NP by sulphide oxidation weathering products.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #231 has not been provided by the proponent.*

Updated information on PAG management ***partially addresses*** the issue that sufficient blending will be possible.

Appendix_20.A-7 Preliminary Mine Site Water Management Plan. Sukunka Coal Mine Project. Prepared for Glencore by Knight Piesold Ltd., June 28, 2015

231. The water management plan doesn't discuss saturated backfill for selenium attenuation, nor is it included in the water management plan figure (figure 3.3-1). The water quality model report, however, shows the location of the model nodes in Figure 1.2-1, which includes 3 locations for pit saturation overflow (e.g., Pit02-Sat01 Overflow, Pit04-Sat01 Overflow, and Pit01-Sat05 Overflow).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #232 has not been provided by the proponent.

232. Report does not indicate how long it will take for the pits to fill once dewatering ceases for Closure.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #233 has not been provided by the proponent.

3.10.4 EA Conclusions

233. Generally the methods for the EA conclusions are rational, e.g., the residual Project effects with respect to the water quality of Skeeter and Chamberlain creeks and the Sukunka River are characterized as not significant. However, this conclusion hinges on the success of a series of planned mitigations, which are perhaps overly optimistic in some cases. For example, there does not appear to be sufficient evidence to conclude that the saturated backfill approach to mitigating selenium and nitrate will result in 99% and 95% removal, respectively. Seepage capture in the ditching networks has also likely been overestimated at 85% efficiency. The blending approach to mitigating PAG rock does not account for complicating factors such as armoring of mineral neutralization potential by sulphide oxidation weathering products. More sensitivity analyses are required to present a range of possible outcomes that might include negative water quality effects.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #234 has not been provided by the proponent.*

Additional sensitivity runs ***partially address*** the issue; however, selenium attenuation factors seem to be overly optimistic.

3.10.5 Mitigation

234. The mitigation measures that the proponent has proposed represent industry standards that have had varying degrees of success at other project sites, including:

i. PAG management

ii. Saturated backfill

iii. Seepage capture

iv. Pumping.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #235 has not been provided by the proponent.*

235. The approaches to mitigate against acid rock drainage (ARD) and metal leaching (ML) are expected to lower the discharging metal concentrations, although the approaches are not necessarily guaranteed to yield the predicted results. Additional sensitivity analyses are justified to account for all potential outcomes due to complicating factors.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #236 has not been provided by the proponent.*

236. The proponent is no longer considering segregating PAG from non-PAG waste, with subaqueous disposal of PAG waste. Instead, PAG and non-PAG waste will be blended in stockpiles or non-PAG waste rock will be placed in the pit to offset potentially acid generating drainage from exposed Moosebar Formation hanging wall.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #237 has not been provided by the proponent.*

237. Saturated backfill of waste material in pits is expected to improve water quality drainage with respect to selenium and nitrate provided sufficient residence time (>1 year). Further benchtop and field scale pilot test work is required to confirm the degree of success that can be expected from saturated backfill as 99% and 95% attenuation of selenium and nitrate, respectively, is overly optimistic. Evidence from Elk Valley indicates that a minimum 5 year residence period is required to achieve minimum success.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #238 has not been provided by the proponent.*

3.11 WATER QUALITY AND AQUATIC BIOTA (TOXICOLOGY)

3.11.1 Reports Reviewed

Sukunka Coal Mine Project Application Information Requirements – Approved by Environmental Assessment Office on October 23, 2013

Section 5.2: Water Quality and Aquatic Biota.

Appendix 5.2-A. Development of a Site Performance Objective for Selenium for the Sukunka Mine Area.

Chapter 21.0: Follow-Up Monitoring and Compliance Reporting

Appendix 20.9-A. Preliminary Metal Leaching and Acid Rock Drainage Management Plan

3.11.2 Evaluation of Conformity to AIR

Section 20 of the AIR indicates a Selenium Management Plan will be provided. There is no selenium management plan provided in the Application/EIS. In addition to being required by the AIR, selenium management plans are standard components of EAs for coal mines (and metal mines where selenium is an issue) in BC. A selenium management plan, including a framework describing mitigation measures, contingency plans, and monitoring commitments should be provided.

3.11.3 Assessment of Technical Studies

238. Section 5.2.3.7—The definition for Site Performance Objectives (SPOs) is that they are "scientifically defensible benchmarks for high magnitude adverse effects". However, later sections suggest that exceedance of SPOs are not likely to result in adverse effects in the aquatic environment, which is inconsistent with the definition provided for the SPO and inconsistent with the underlying data the SPO is derived from (i.e., toxicity thresholds for selenium which are the concentrations at which adverse effects begin to occur).

i. Are the proposed SPOs intended to be used in the long-term as the acceptable benchmarks for the aquatic receiving environment? Or are the SPOs intended to be used for the determination of significance for the EA and new, protective SBEBs will be proposed at a later date?

ii. The description provided does not suggest that the proposed SPOs will protect aquatic organisms and this is not standard practice in BC. The current MOE guidance regarding effluent permitting is that receiving environment guidelines should be met

or that Science-based Environmental Benchmarks (SBEB) that are protective of aquatic organisms should be proposed.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #239 has not been provided by the proponent.

239. Section 5.2.4.2.1.3 – the text indicates that several PAHs are elevated in sediments measured under baseline conditions. However, there is no subsequent discussion about whether the Project will affect the PAH concentrations or bioavailability in the aquatic environment (i.e., residual effects due to PAHs from the Project) or if the PAHs measured in sediment pose a risk to aquatic organisms under either baseline or future conditions.

i. Please provide additional information regarding risk to aquatic organisms under baseline conditions and an assessment of Project-related risk to aquatic organisms as a result of Project influence on sediment (or water) PAH concentrations.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #240 has not been provided by the proponent.

240. Section 5.2.4.2.1.6: Text provides a summary of fish tissue residues of mercury and selenium.

i. In the second paragraph, the tissue residues measured in rainbow trout were compared to the US EPA guideline for tissue residues rather than BC MOE guidelines. Why was this done? The baseline selenium tissue residues in at least some rainbow trout exceeded the BC MOE guideline of 4 ug/g dw.

ii. Please provide a rationale for why the US EPA (and not the BC MOE) guideline is appropriate for a Project located in BC that does not have the potential for cross-boundary effects in the USA.

iii. Please provide a description of whether or not risk of toxicity to rainbow trout would be expected to occur under baseline conditions. The risk to fish and other water-dependent egg-laying vertebrates (i.e., fish and amphibians) is not described under baseline conditions.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #241 has not been provided by the proponent.

241. Mercury tissue residues in fish were only compared to the BC MOE tissue residue guidelines for protection of human consumers of fish.

i. Please provide a comparison of baseline mercury fish tissue residues to the BC MOE tissue residue guideline for the protection of wildlife consumers of fish (0.033 mg/kg ww). At least some of the mercury tissue residues in fish are at concentrations that could pose a risk to wildlife consumers (based on exceedance of the guideline).

ii. Please provide a description of the level of risk to wildlife consumers of fish under baseline conditions to enable subsequent assessment of the risk due to Project-related changes in fish tissue mercury concentrations.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #242 has not been provided by the proponent.

242. Section 5.2.4.1, Table 5.2-3— summary of baseline data collection.

i. Are there no fish at Skeeter Creek, downstream of mine operations (SKNK06) or in the middle section of Chamberlain Creek (SKNK10)? Why were these areas not sampled for fish?

ii. Was 5-in-30 water sampling done for any of the sites during high or low flow to characterize variability? The text indicates that extra samples were collected in May and June to capture variability, but does not define how many samples. Please provide clarification.

iii. There do not appear to be upstream reference sites on Skeeter or Chamberlain Creeks based on Table 5.2-3 (all site types indicate 'exposure' or 'cumulative'). Sampling/monitoring at a reference site is standard practice to allow for BACI (before-after-control-impact) design of monitoring programs. Please confirm that Table 5.2-3 is correct and that there were no upstream reference sites sampled in the baseline program.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #243 has not been provided by the proponent.

243. Section 5.2.4.2.1. – summary of baseline water quality conditions.

i. In the absence of BC guidelines, why were CCME guidelines not used for those parameters (e.g., total aluminum, which exceeds the CCME guidelines, or selenium,

which has a lower CCME guideline than BC guideline)? Please provide a rationale for why the CCME guidelines are not relevant for this Project.

ii. Please provide a rationale as to why the selenium BC WQG for protection of aquatic life alert level (1 ug/L) is not considered in this assessment. This is a relevant screening level and is equivalent to the CCME WQG for protection of aquatic life.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #244 has not been provided by the proponent.

244. Section 5.2.6.1.1 – Analytical Assessment Techniques for Water Quality and Aquatic Biota

i. The first paragraph indicates that "*…predicted values were then compared to WQGs, SPOs, and other screening tools…*". Please describe what 'other screening tools' were used and how they were used in the effects assessment.

ii. The third paragraph indicates that "a mass balance model was used to predict changes in water chemistry in the watercourses at the end of operation, closure, and post-closure". This statement implies that the model only accounted for water quality predictions at the end of each phase. Is this correct? If this is the case, why weren't changes to water quality predicted over the entire phase (e.g., a monthly timestep), which is standard practice for EAs in BC? Please clarify what data was used in the effects assessment for water quality and aquatic biota.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #245 has not been provided by the proponent.

245. Section 5.2.6.1.1.2. Proposed Site Performance Objectives

i. The text indicates that "*the WQGs contain ten-fold safety factors*". Please reference this statement. There are a number of BC water quality guidelines that have no safety factor or have a safety factor of 2 (or less). This rationale is used to support the characterization of residual effects and is incorrect.

ii. Please provide rationale for why predicted exceedances of the WQGs do not warrant development of SBEBs, which is protective of the aquatic receiving environment.

iii. Please define what frequency is considered "*occasionally higher than WQG*".

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #246 has not been provided by the proponent.

Section 5.2.6.1.1.2 and Appendix 5.2-A: Derivation of the SPO for Selenium

246. The SPO for selenium appears to be based on a model developed by Orr et al (2012) for Western Cutthroat Trout in the Elk Valley (southeast BC). Orr et al (2012) developed models for lotic and lentic receiving environments, and these models have been applied to the Project (which is in the northeast coal block). Provide additional rationale for why application of the Orr et al. (2012) is appropriate for the Sukunka Project.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #247 has not been provided by the proponent.

247. Page 2 of 11: last bullet on the page. Text indicates that "baseline studies performed in the vicinity of the Project indicate that whole body fish tissue concentrations generally exceed the British Columbia guideline in baseline. This suggests the threshold value may be too conservative to evaluate industrial contributions to selenium and effects to aquatic biota."

i. This statement implies that a receiving environment where fish already have elevated tissue concentrations of selenium that are approaching or are already at levels of concern (up to double the BC WQG for tissue residues) should be subject to a standard that is less protective in order to enable industrial development.

ii. Any new or additional inputs of selenium into the aquatic receiving environment, particularly the lentic receiving environments of the Sukunka wetlands, has the potential to increase tissue residues further from baseline levels.

iii. Please provide additional rationale as to why it would be acceptable to elevate baseline concentrations of selenium when there is already evidence of naturally-elevated tissue residues under current conditions in the downstream environment to levels that could be of concern for aquatic biota.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #248 has not been provided by the proponent.

248. Page 3 of 11: first bullet point discussing US EPA proposed selenium criteria

i. The text indicates that the new (2014/15) US EPA proposed criteria for selenium in the whole body is higher than what was proposed previously by the EPA in 2004.

ii. While this is correct, the text does not mention the US EPA proposed selenium criteria for egg/ovary tissue, which takes precedence over whole body concentrations. The proposed criteria is 15.8 mg/kg dw in the egg, which is higher than the proposed criteria of 11 mg/kg dw in the egg/ovary of the BC MOE guideline. The text also does not mention the US EPA proposed selenium criteria for water, which is 3.1 µg/L in lotic environments and 1.2 µg/L in lentic environments. Table 4.1 of the draft US EPA proposed selenium criteria indicates that the water quality guideline supercedes the fish tissue residue guideline in areas where 'new' inputs of selenium from a specific source (such as the Project) are anticipated.

iii. Please provide rationale for why the US EPA 2014 proposed selenium criteria for water quality were not considered, and only the tissue residue criteria for whole body (but not the egg/ovary tissue) were considered, when the effects assessment for selenium is based on predicted water concentrations and egg tissue predictions.

iv. Based on the predicted concentrations of selenium from the Orr et al (2012) model, the predicted concentrations of selenium in fish ovary from lentic or semi-lentic environments (up to 29.4 mg/kg dw at Skeet and Chamb) exceeds all regulatory thresholds, and will exceed the threshold for toxicity in Rainbow Trout (22.9 mg/kg dw) and other fish species (20 mg/kg dw).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #249 has not been provided by the proponent.

249. Page 3 of 11: second bullet point describing how the BC MOE 2014 selenium guideline was derived

i. The text identifies that the BC MOE 2014 guideline is based on the application of a safety factor of 5. However, the BC MOE guideline from 2014 only references a safety factor for the WQG when describing the former 2001 WQG for selenium. The current BC WQG was derived using multiple lines of evidence to derive the water quality guideline of 0.002 mg/L, including studies that suggest toxicity could occur in sensitive environments at concentrations below this level.

ii. Please provide the page number in the BC MOE 2014 technical guidance document or companion manual to indicate where the use of a safety factor of 5 was used in deriving the current BC MOE WQG for selenium.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #250 has not been provided by the proponent.

Section 4 and Table 1 – Summary of Toxicity Benchmarks for Selenium

250. Regarding Section 4.1, discussion about toxicity thresholds for fish:

i. The last paragraph notes that Janz et al. (2010) suggests that 10 mg/kg dw of selenium in the diet is an acceptable threshold for juvenile fish. However, Janz et al. (2010) also highlights that there is limited data available upon which to base a conclusion.

ii. The toxicity threshold for salmonid juveniles (such as Rainbow Trout) is in the range of 10 mg/kg dw whole body, based on limited available data (as described in Janz et al. (2010), as well as the literature review provided in the 2014 BC MOE selenium WQG technical guidance document).

iii. Please provide evidence that the proposed SPOs in water will result in tissue concentrations in fish dietary items that are below the proposed threshold, and that the proposed threshold will maintain body burdens of selenium in juvenile fish of <10 mg/kg dw.

iv. The discussion in both Appendix 5.2-A and in Chapter 5.2 focuses on ovary tissue concentrations, but it seems likely that juvenile fish will likely be present in the potentially exposed areas. Please provide an effects assessment for the potential effects to juvenile fish and birds from exposure to selenium via the aquatic food chain (based on the concentrations of selenium predicted in the benthic invertebrate level of the food chain using the Orr et al 2012 models).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #251 has not been provided by the proponent.

251. Please provide additional rationale for why the concentration at which toxicity occurs (in up to 15% of the exposed population, or resulting in a 15% change from unexposed conditions, i.e., an EC15) was defined as an acceptable level of toxicity in the environment. This is not protective of aquatic resources since effects will occur at this level. This is not standard practice in BC (e.g., please see guidance document from BC MOE on SBEB development in the effluent permitting process: http://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/effluent_permitting_guidance_doc_mining_proponents_apr2013.pdf).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #251 has not been provided by the proponent.

252. For fish species, the toxicity benchmark is identified as 20 mg/kg dw in the eggs, based on an EC10 for a wide range of Canadian fish species. A range in EC15 concentrations for Rainbow Trout was provided as the toxicity benchmark for this fish species specifically.

i. Please provide rationale for why the more conservative benchmark of 20 mg/kg dw wasn't used as the toxicity threshold for back-calculating the acceptable selenium SPOs in the aquatic receiving environment. This value is at least representative of the toxicity threshold for all potential fish species.

ii. When DeForest et al (2012) incorporated the data from the Holm et al studies into their proposed benchmark, they used the value of 23 mg/kg dw to represent Rainbow Trout toxicity. Please provide additional rationale to support the use of the higher value of 29 mg/kg dw.

iii. Please explain the benefit of defining a range of toxicity benchmarks or SPOs for selenium when the values at the lower end of the range already have the potential to cause toxicity (i.e., 23 mg/kg dw in Rainbow Trout ovary can cause larval deformities in 15% of developing embryos).

iv. Please provide additional rationale for why the lower toxicity benchmark and lower SPO shouldn't be the only values considered in the discussion of potential effects and determination of magnitude of effects since toxicity could occur at these levels.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #253 has not been provided by the proponent.

253. For birds, the EC10 in eggs is defined as 12.5 mg/kg dw based on a study from Adams in 2003. Additional data has become available since that study, indicating that there are other bird species that may be more sensitive (e.g., papers by Lee Harding on spotted sandpiper; also see the literature review provided in the 2014 BC MOE selenium WQG technical guidance document).

i. Please explain why the more recent data was not considered in deriving a toxicity benchmark for birds or, alternatively, please update the toxicity benchmark for bird species to take into account the more recently published studies for selenium toxicity in birds.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #254 has not been provided by the proponent.

Section 5.0 (pages 5 to 7 of 11). The Tissue Residue Model Used was for Westslope Cutthroat Trout, Developed Based on Studies Done in the Elk Valley

254. Please explain why Project-specific or region-specific (ie, northeast BC) water quality and fish tissue residue data was not used to derive a more site-specific bioaccumulation model for evaluation of risk to aquatic biota.

i. This is a standard practice for all mining projects in BC where selenium is likely to be or is predicted to be a contaminant of potential concern (not just coal mines, but all types of mines).

ii. This was not provided in the Application and no commitment to collect the required information could be located in the Application.

iii. Please indicate what type of monitoring Glencore is currently undertaking in order to address this gap.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #255 has not been provided by the proponent.

255. Please provide rationale as to why a model developed for southeastern BC can be directly applied to a Project located in the northeast coal block.

i. Selenium uptake via the aquatic food chain is influenced by a number of site-specific factors.

ii. How were these factors taken into account in the application of a model developed for a different region of the province? Please provide evidence that the aquatic food chain, flow conditions, receiving environments, etc., are similar between the data used to develop the Orr et al (2012) model for the Elk Valley and the Project location in the northeast.

iii. Please provide rationale for why a safety or uncertainty factor was not included in the calculation of an acceptable SPO for the aquatic receiving environment to account for the uncertainty associated with the use of a model developed for a different region of the province.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #256 has not been provided by the proponent.

256. The model developed by Orr et al (2012) is based on Western Cutthroat Trout, but is applied to predict potential effects for Rainbow Trout. There is data available in the literature that indicates that there can be significant inter-species differences in the uptake and tissue distribution (i.e., relationship between body burden and ovary concentration) of selenium between fish species.

i. Please provide rationale to support the application of a model developed in one species of fish (Western Cutthroat Trout, which is not found in the Project area) for another species of fish (Rainbow Trout).

ii. Please provide evidence from published literature to indicate that the toxico-kinetics and toxico-dynamics of selenium are similar between Western Cutthroat Trout and Rainbow Trout. Specifically, please provide evidence that the diets of the two fish species are similar, habitat use is similar, rate of uptake of selenium from dietary items is similar and that the distribution (partitioning) of selenium between the muscle and egg tissue is similar between these two fish species.

iii. Please explain why a safety or uncertainty factor was not included in the calculation of an acceptable SPO for the aquatic receiving environment to account for the uncertainty associated with the extrapolation of a model developed for one fish species and used in a second fish species.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #257 has not been provided by the proponent.

257. The baseline tissue concentrations of selenium measured in whole body of Rainbow Trout sampled from lotic areas downstream of the Project area (i.e., Sukunka River) were approximately 2.8 to 7.0 mg/kg dw (indicated in Section 5.2.4.2.1.6). Typically, concentrations of selenium are around 3 fold higher in egg/ovary tissue than measured in whole body, suggesting that baseline fish ovary concentrations could be in the range of 9 to 21 mg/kg dw. However, based on Figure 1 in Appendix 5.2-A it appears that the predicted fish ovary concentrations are lower than this range (i.e., <10 mg/kg dw based on the model for lotic environments).

i. Please use the Orr et al (2012) models and other available literature (e.g., relationship between whole body or muscle concentrations and ovary concentrations of selenium) to demonstrate whether or not fish tissue residues measured in Rainbow Trout whole

body in baseline studies are consistent with the values predicted by the lotic model by using baseline water concentrations as the input into the model.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #258 has not been provided by the proponent.

258. Page 7 of 11: the text states in regards to the proposed SPOs that "These values are above the BC MOE and CCME WQG…but are expected to be protective of RBT".

i. Please provide additional rationale to support this statement given that the SPO concentration in water is associated with the toxicity threshold in fish. By definition, the SPO is not 'protective' of fish; it is the concentration at which adverse effects could occur. The SPO would only be protective if it was derived in a conservative manner, including the application of safety or uncertainty factors.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #259 has not been provided by the proponent.

259. Page 7 of 11: text states that "the more conservative toxicity threshold for sensitive fish species should be applied (20 mg/kg dw), for which predicted water concentrations match the BC MOE WQG of 0.002 mg/L."

i. There are other fish present in the receiving environment other than Rainbow Trout (including Bull Trout, a listed species, for which toxicity data is not available); however, the recommended SPO that is equivalent to the BC MOE WQG was not applied in the effects assessment.

ii. Please explain why the more conservative SPO was not used.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #260 has not been provided by the proponent.

260. Section 6.0, Page 7 of 11: discussion around implications of intermittent selenium exposures. The text indicates that selenium exposures higher than the upper limit of the SPO would be acceptable as long as concentrations decrease to below the upper limit of the SPO within 60 days.

i. Please provide evidence based on available literature to support this statement, taking into consideration that the timing of exposure is important to determining the level of

risk (e.g., exposures during vitellogenesis, exposures of sensitive juvenile states of fish via the diet, etc.).

ii. Please describe the potential risk associated with selenium accumulation in sediments, particularly in lentic environments, and explain why intermittent water exposures will not result in loading of aquatic sediments (i.e., sediments acting as a selenium sink), which could subsequently act as a selenium source for the aquatic food chain when water concentrations are lower.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #261 has not been provided by the proponent.

Section 7.0, Bullet List of Uncertainties

261. The text correctly identifies most of the uncertainties associated with the development of the SPO, which is a positive inclusion in the memo. However, there is no information provided on how these uncertainties were taken into account when developing the SPO, or how the uncertainties will be resolved in order to increase the confidence in the proposed SPO.

i. Please clarify what steps are being taken and what the Proponent is committed to implementing to decrease the uncertainty associated with deriving the SPO.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #262 has not been provided by the proponent.

Section 5.2.6.2.3 – Characterization of Residual Environmental Effects to Changes in Baseline Surface Water Chemistry

262. The summary tables provided in the text do not provide any information regarding the duration of predicted guideline exceedances, and only present the last year of each phase. The end of operation may not be the worst-case predictions (e.g., see Figure 5.2-7, where predicted concentrations of selenium are highest in the earlier years of Operation).

i. Please provide tables that show the minimum, mean, median, and maximum concentrations predicted for each month of each phase for each modeling node, or indicate where this information is available.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #263 has not been provided by the proponent.

Some Parameters are Predicted to Exceed WQG at the Various Modeling nodes. However, They are Not Fully Assessed for Potential Effects

263. Based on the text provided in Section 5.2.4.2.1.2 regarding guideline exceedances of dissolved and total metals, it appears that baseline concentrations of most parameters rarely exceeded guidelines. However, subsequent sections of the Project effects assessment indicate that predicted exceedances are the result of baseline exceedances. For example, only a single sample during baseline had a concentration of mercury higher than the water quality guidelines (in Skeeter Creek), so it is not likely that Project-related predictions for mercury guideline exceedances are due to baseline conditions.

The text indicates that some parameters, such as beryllium, copper, iron, and silver, are not a concern since the predicted concentrations are similar to baseline concentrations. The baseline data provided in Section 5.2.4.2.1.1 does not appear to support the conclusion that the exceedances are driven solely by background conditions (i.e., based on comparison of summary tables from Section 5.2.4.2.1.1 to those in Section 5.2.6.2.3, in some months where exceedances are predicted, baseline concentrations appear to be below the guideline, and the change in predicted concentrations relative to baseline appears to be 2 or more fold higher).

i. Since the mean and median baseline concentrations are below the water quality guidelines, please provide rationale and evidence regarding how predicted water quality guideline exceedances could be a result of baseline exceedances.

ii. Please provide figures for all parameters predicted to exceed guidelines. Please show baseline concentrations, predicted concentrations, and guidelines on each figure for all phases of the project for all parameters that are predicted to exceed water quality guidelines for each modeling node. Please provide these figures for both base and upper case. To make the figures clear, please use lighter weight lines on the figures than what was provided in the Application (i.e., thinner lines than what is provided on the Figures from the Application). If these figures are already available, please forward or indicate where it can be found.

iii. Please provide an effects assessment that assesses the incremental change in risk to aquatic biota due to the Project compared to baseline conditions. This is particularly important for parameters where exceedances of the WQGs were noted in baseline conditions (i.e., how much more does the Project increase the concentration relative to baseline and how much more risk is there to aquatic biota as a result).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #264 has not been provided by the proponent.

264. Mercury in Skeeter Creek (Skeet2, Skeet) is predicted to be almost 4 times above the guideline. The predicted concentrations are much higher than baseline but no assessment of risk of bioaccumulation and subsequent toxicity of mercury is provided for aquatic life or wildlife. The text implies this could be caused by high detection limits in source terms.

i. Please provide data (i.e., detection limits of source terms) or references to support this conclusion regarding source terms.

ii. The rationale provided on page 5.2-107 in the fourth bullet point under mercury is not valid in explaining why the increased concentrations of mercury in the receiving environment will not lead to increased concentrations of mercury in the food chain. If it is assumed that the proportion of inorganic mercury remains the same, the overall concentration of mercury is predicted to increase by up to 8 fold at some nodes (thus the concentration of methylmercury would also be expected increase). Presumably, the "*processes that promote the methylation of mercury*" will remain the same as they were under baseline conditions. The change in risk is then associated with the predicted change in mercury concentration in water, unless there is a reason to believe that the proportion of inorganic mercury will increase. If an assumption about a change in mercury speciation was made, please provide the relevant literature or site-specific monitoring data to support this assumption.

iii. Based on the results of the baseline program (water and tissue) and predictive water quality modeling, a more detailed effects assessment for mercury is required that looks at the potential for effects in wildlife consumers of fish or other aquatic dietary items (i.e., consideration of the potential for biomagnification of mercury is required). Baseline concentrations of mercury in fish tissue exceed the BC guideline for the protection of wildlife consumers of fish and the Project-related predicted increases in mercury concentrations should also be evaluated in this context.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #265 has not been provided by the proponent.

265. Zinc in Chamberlain Creek (Chamb, Chamb3) is predicted to be almost 4 times above the guideline. The Application states that elevated zinc concentrations are due to baseline exceedances; however, baseline concentrations appear to be near the guideline (not significantly exceeding the guideline). These concentrations could result in toxicity to aquatic

biota and do not appear to be due solely to baseline conditions (i.e., Project adds a significant loading of zinc to the aquatic environment). However, no assessment of risk is provided.

i. Please provide an effects assessment for zinc that includes a comparison of predicted zinc concentrations to baseline zinc concentrations on a month-by-month basis over the life of the project to determine the **incremental increase in risk** to aquatic biota due to Project-related increases in zinc concentrations in the aquatic environment.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #266 has not been provided by the proponent.

266. Dissolved aluminum concentrations at Skeet2, Skeet, Chamb, and Chamb3 are predicted to exceed the WQGs. The concentrations do not exceed guideline in baseline for Skeeter Creek. The text suggests that this is because water quality modeling does not account for "*common complexing processes*" that could decrease dissolved aluminum concentrations (pg 5.4-109).

i. Please provide data to support this statement. Please provide data to indicate what the concentration of dissolved aluminum might be if "common complexing processes" were taken into account. Are the predicted concentrations still an issue under that scenario?

ii. Please provide an effects assessment for dissolved aluminum that includes a quantitative comparison of predicted dissolved aluminum concentrations to baseline dissolved aluminum concentrations on a month-by-month basis over the life of the project to determine the incremental increase in risk to aquatic biota due to Project-related increases in dissolved aluminum concentrations in the aquatic environment.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #267 has not been provided by the proponent.

267. The sulphate concentrations at Skeet are predicted to be elevated compared to guidelines (also in end of pipe predictions). Based on text provided on page 5.2-90, acute toxicity to invertebrates could occur at concentrations of 374 to 462 mg/L. Predicted concentration at Skeet in both base and upper case are higher than the toxicity thresholds for invertebrates.

i. While acute lethality of fish is unlikely, toxicity to secondary producers could have an effect on fish by decreasing availability of their food supply or could result in alteration of the community structure of primary and secondary producers. Please provide an effects assessment for potential effects due to sulphate, taking into

consideration the potential for toxicity to aquatic biota other than fish and potential for change in aquatic community structure.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #268 has not been provided by the proponent.

268. Conclusions regarding the WQG exceedances of beryllium and silver are based on the assumption that poor source term detection limits are driving the predictions (i.e., detection limits higher than WQGs).

i. Please provide evidence to support this conclusion, or indicate where this data can be found.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #269 has not been provided by the proponent.

Section 5.2.6.2.3.10 – Summary of Residual Environmental Effects to Changes in Baseline Surface Water Chemistry

269. This section focuses only on selenium and nitrate, and doesn't take into account the other parameters that are predicted to exceed guidelines (and be higher than baseline conditions).

i. Please provide an effects assessment that takes into account the other parameters that are predicted to be exceed water quality guidelines and that could have effects on fish or aquatic resources (e.g., sulphate; see comments 282 to 287)

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #270 has not been provided by the proponent.

270. Predicted concentrations of selenium in lentic areas are higher than BC WQG for aquatic life, sporadically higher than the upper limit of the proposed lentic SPO and frequently higher than the lower limit of the proposed lentic SPO. This indicates that the predicted concentrations are within the range in which toxicity could occur in fish (since the lower bound of the SPO is exceeded and this is a concentration at which effects could occur in Rainbow Trout), yet the effects assessment does not recognize this as "high" magnitude. The effects assessment cannot rely solely on the 'upper bound' of the lentic SPO (which is also sporadically exceeded and is not considered in the effects assessment).

i. Please explain why the determination of magnitude for potential effects does not acknowledge the regular exceedances of the lower bound of the proposed selenium SPO and result in a definition of 'high' magnitude for the potential effects.

ii. The rationale that there is a *'low risk of adverse toxicological effects'* is not true when exceedances of the SPO are predicted, given that the SPO is defined as the level at which adverse effects could occur.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #271 has not been provided by the proponent.

Page 5.2-124, Bullet List near the top of the Page:

271. The bullet list recommends follow up studies, but these do not appear under follow up studies later in the document. Please confirm the commitment to addressing the uncertainties described in the bullet list as part of the follow up monitoring program.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #272 has not been provided by the proponent.

Section 5.2.8 – Cumulative Effects

272. This section was not reviewed in detail due to the uncertainties and questions regarding the description of the Project residual effects. This section will be re-visited once the comments/questions on the Project residual effects assessment are resolved.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #273 has not been provided by the proponent.

Section 5.2.10 – Follow Up and Monitoring

273. The proposed follow up and monitoring program is preliminary and lacks the detail that would be expected for an EA-level document. Standard practice is to provide at least basic details of the proposed monitoring programs, including what is to be monitored, the frequency, the (general) locations, etc. It is not clear from the descriptions whether tissue monitoring of primary and secondary producers is included, or if metals (and PAHs?) will be monitored in sediments or other media.

The text indicates that a *'tiered approach for the aquatic monitoring program for selenium effects"* will be implemented. This contradicts previous bullets that indicate that benthic community and sediment monitoring will occur annually.

i. Standard practice in BC is to provide a monitoring framework at the EA level. Please provide a monitoring framework that includes commitments regarding what will be monitored, frequency of monitoring and parameters or types of sampling (e.g., taxonomy, tissue metals, etc.) included in the monitoring plan. This should also include description of triggers for implemented progressive tiers of the monitoring program.

ii. Please provide a tiered framework consistent with the level of detail that has been provided by other proponents in the northeast coal block at the EA level. Alternatively, provide a commitment to adhering (at minimum) to the tiered monitoring framework recommended by the BC MOE in their Companion Document to the Ambient Water Quality Guidelines for Selenium (http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/waterqualityguidesobjs/approved-wat-qual-guides/selenium/companiondocument2014.pdf).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #274 has not been provided by the proponent.

274. The follow up monitoring described in Section 5.2.10 does not address the uncertainties described in the derivation of the selenium SPO in Appendix 5.2-A. Please indicate how the uncertainties identified in Section 7 of Appendix 5.2-A will be addressed to allow refinement of the selenium SPO.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #275 has not been provided by the proponent.

Section 5.2.10.1 – Adaptive Management Strategy

275. The text indicates that *"there are also contingency measures available to address Upper Case…predictions".* However, the text does not describe what those contingency measures are. The bullet list refers to a "*contingency plan for a selenium treatment plant",* but provides no other information to enable evaluation of this option as a contingency measure.

i. Please describe the contingency measures available to address Upper Case predictions in sufficient detail to enable evaluation of their viability as contingency measures.

ii. Please provide a description of what kind of treatment plant, treatment capacity, and effluent targets that could be achieved by the selenium treatment plan (assuming this is what is being proposed).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #276 has not been provided by the proponent.

276. The text indicates the "use of a tiered monitoring approach for selenium to identify whether a change in bioaccumulation trends in the wetland areas is occurring".

i. Please explain why the monitoring program would be limited to the wetland.

ii. Please affirm that the results of the monitoring program will be used to adjust mitigation and management strategies and that triggers will be built into the monitoring and adaptive management programs to enable enough lead time so that mitigation can be implemented before toxicity occurs.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #277 has not been provided by the proponent.

Section 21.2 – Follow Up Programs and Compliance Reporting

277. Table 21.2-1 lists follow up programs that the Proponent is committed to. This table should detail follow up studies required to address uncertainties where the predictive confidence is low (such as with the derivation of the selenium SPO).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #278 has not been provided by the proponent.

278. Although Table 21.2-1 lists the same follow up programs as is described in Section 5.2.10, a number of identified uncertainties were not included in the follow-up programs. Please explain why it is not necessary to address significant uncertainties with follow up studies (e.g., uncertainties described in Section 7 of Appendix 5.2-A, or the bullet list on page 5.2-124).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #279 has not been provided by the proponent.

3.11.4 EA Conclusions

Section 5.2.7: Summary of Project Residual Effects

279. The residual effects descriptor definitions provided in Table 5.2-33 are different than those provided in Table 5.2-2 at the beginning of the chapter.

i. Which set of definitions is correct? Please explain the apparent discrepancy and why one set of definitions should be used over the other.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #280 has not been provided by the proponent.

280. The descriptors for likelihood of significant effect do not appear to take into consideration that the predicted concentrations of selenium in lentic environments are higher than the SPO, which is defined as the concentration at which adverse effects occur. The residual effects descriptors for change in water quality or tissue residues for magnitude do not appropriately account for the regular exceedances of the lower bound of the selenium SPOs for lentic environments and occasional exceedances of the upper bound of the selenium SPO, and a 'high' magnitude is appropriate based on the definitions provided in Section 5.2.3.6 in Table 5.2-2.

The SPO was also not derived taking into account sensitivity of all fish species, which Appendix 5.2-A recommends to be 0.002 mg/L (i.e., equivalent to the WQG) when the SPO is calculated based on the toxicity benchmark of 20 mg/kg dw.

i. Please explain why the definitions for the significance descriptors from Table 5.2-2 were not applied in the determination of residual effects for changes in water quality or tissue residues.

ii. Please explain why an effect with what appears to be a high magnitude is not considered to be 'significant' rather than 'not significant', particularly when the data provided in the chapter and in Appendix 5.2-A suggest that "high magnitude adverse effects" (i.e., as described in the definition of the SPO) are likely.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #281 has not been provided by the proponent.

281. It is not clear how it was determined that the effects due to change in water quality are long term, rather than permanent. The water quality model does not provide any evidence to support the assertion that concentrations will decrease over time or that concentrations of selenium (and other parameters) will ever return to baseline levels. The criteria to determine if the effect is 'permanent' does not appear to be defined in the chapter (i.e., how long does the effect have to last before it becomes permanent?).

i. Please explain how the determination of 'long term' rather than 'permanent' effects was made.

ii. Please indicate where to find evidence to support the assertion that the effects are not permanent.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #282 has not been provided by the proponent.

282. The descriptors for prediction confidence (moderate) seem optimistic given the uncertainties associated with the selenium SPO, the reliance on an unproven mitigation measure (saturated backfill providing 99% attenuation for selenium in contact water) and optimistic seepage capture efficiencies (75 to 85% overall), and the lack of clearly defined contingency measures in the event that mitigation fails. The recommendation that saturated backfill requires 'pilot testing' further confirms that this mitigation measure is not proven and should not be relied upon in determining the potential for effects.

i. Please provide additional rationale supporting the conclusion of 'moderate' confidence in the predictions.

ii. If 'low' confidence is found to be a more appropriate description, please explain how this affects the overall significance determination and whether the significance determination should also be changed.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #283 has not been provided by the proponent.

3.11.5 Mitigation

Section 5.2.6.2.1.: Proposed Mitigation for Water Quality

Saturated Backfills (Also with Reference to the ML/ARD Management Plan)

283. In Section 5.2.6.1.1.3, Project Components Modelled, the text states that *"in total, water from 85 percent of the developed areas will be routed through a saturated backfill zone…"*.

This appears to be the only mitigation measure described for attenuation of selenium concentrations in contact water. Is this correct?

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #284 has not been provided by the proponent.

284. Based on information provided in the Preliminary ML/ARD Management Plan (ML/ARD MP), saturated backfill 'treatment' of selenium is an unproven mitigation measure. The Plan states that "*…selenium removal from contact waters has not been demonstrated directly…*" (from page 15 of the ML/ARD MP). The assumption in the water quality model is that 'treatment' of contact water by saturated backfills will result in 99% attenuation of selenium in contact waters. There does not appear to be any contingency measure described or provided in the event that 99% attenuation of selenium is not achieved 100% of the time. The limited evidence provided for the effectiveness of saturated backfill does not support an assumption of 99% attenuation of selenium.

i. Please provide evidence to support the selection of an unproven mitigation measure as the primary method for removal of selenium from contact water.

ii. Please provide evidence to support the assertion that saturated backfill is an effective treatment method for contact water to remove 99% of selenium and will continue to be an effective treatment method in perpetuity.

iii. Please indicate if there is a lag time between the initiation of mining (when selenium concentrations would begin to rise) and the time when selenium attenuation is expected to reach the 99% level. Was this incorporated into the model?

iv. Since the effects assessment seems to be based on predicted concentrations at the end of a given phase, it is possible that the predicted concentrations do not represent the highest concentrations that might occur during the phase? Would predicted concentrations of parameters like selenium and nitrate be highest in the time before the establishment of saturated backfill for treatment of contact water? During which years of mine construction and operation would saturated backfill 'treatment' of contact water be available?

v. Please provide more detailed information regarding contingency measures that would be implemented in the event that saturated backfill does not remove 99% of selenium.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #285 has not been provided by the proponent.

285. The information provided by SRK in the ML/ARD MP suggests that a residence time of up to 5 years is required for effective attenuation of selenium.

i. The ML/ARD MP indicates that a residence time of 1 year for contact water is 'targeted' for the Sukunka Project, but doesn't provide any information on predicted residence time.

ii. Please provide data to indicate what the retention time will be for contact water at each of the saturated backfills, taking into account seasonal variability in contact water flow rates and/or volumes. Are there any factors that could influence the retention time and thus affect the efficiency of selenium removal that were not considered in the water quality model (e.g., channeling)?

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #286 has not been provided by the proponent.

286. Based on the information provided, in order to not exceed water quality guidelines or the SPO for selenium (although exceedances are already regularly predicted for the lower bound selenium SPO in lentic environments), mitigation effectiveness has to be 99% attenuation of selenium and 95% nitrate in the saturated backfills and at least an 85% overall seepage capture efficiency across the entire Project area.

i. Please confirm these assumptions are the ones included in the water quality model.

ii. Please comment on how realistic these assumptions are considering that saturated backfill is an unproven mitigation measure and that it may be difficult to achieve 85% overall seepage capture efficiency and pump-back.

iii. Please indicate where sensitivity analyses for the water quality model can be located that take into account different scenarios regarding saturated backfill attenuation and seepage capture both together and separately. If sensitivity analyses have not been completed, please provide sensitivity analyses based on assumptions of lower attenuation rates.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #287 has not been provided by the proponent.

287. The last paragraph of Section 5.2.6.2.2 indicates there is "confidence in the ability of the design elements, mitigation measures, and other plans to be effective in maintaining surface water quality at acceptable levels".

i. Please provide additional evidence to support high confidence in maintaining surface water quality at acceptable levels given the uncertainty associated with the proposed mitigation measures, the uncertainties associated with the proposed SPO (which is not protective of aquatic biota, particularly in lentic environments), and the lack of detail provided for contingency measures in the event that proposed mitigation fails.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #288 has not been provided by the proponent.

288. Based on comments provided by MEM and MOE, the MOE (Bruce Carmichael, October 28, 2015) and MEM (Brenda Bailey, October 30, 2015) are recommending the unmitigated base and upper case water quality modeling scenarios as more reasonable estimates of predicted water quality given the uncertainties associated with the proposed mitigation measures. This is a reasonable approach when considering a mitigation measure for contact water that has never been used before and has not been field- or lab-tested.

i. Please prepare an effects assessment based on the unmitigated base and upper case water quality modeling scenarios, or provide rationale for why this is not necessary (i.e. provide evidence for mitigation effectiveness).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #289 has not been provided by the proponent.

3.12 FISH AND FISH HABITAT

3.12.1 Reports Reviewed

Sukunka Coal Mine Project Application Information Requirements – Approved by Environmental Assessment Office on October 23, 2013

Section 1-3 Introduction and Background

Section 4 Assessment Approach

Section 5.1 Fish and Fish Habitat

Appendix 20.A-10 Preliminary Fish Habitat Offsetting Plan

Appendix 27.A-10 Fish and Fish Habitat Technical Data Report

Appendix 27.A-11 Transportation Route Crossings Fish and Fish Habitat Technical Data Report

Appendix 27.A-12 Instream Flow and Fish Habitat Assessment Technical Data Report

Appendix 27.A-13 Water Quality and Aquatic Biota Technical Data Report, Section 7 Fish Tissue

3.12.2 Evaluation of Conformity to AIR

Overall, the fish and fish habitat assessment adhered to the Table of Concordance.

The assessment did not include specific fish species as VCs. Therefore, the effects assessment does not characterize effects to changes in fish habitat productive capacity or fish mortality risk for specific fish species (e.g., Bull Trout).

The AIR and First Nations identified that effects on fish and fish habitat must be assessed. This is not complete.

At a screening level the assessment includes the required criteria; however, at a technical review level there are substantial gaps in the assessment that preclude the ability to make the EA conclusions contained in the assessment.

ID#75: Section 5.1.5.2 Effects Assessment and Proposed Mitigation.

> The AIR stated that potential project-related effects will be assessed for each phase of the Sukunka Project based upon predicted changes in groundwater flows and quality on aquatic habitat in downstream reaches of the mine. However, the fish and fish habitat section does not contain an assessment of groundwater flows and quality on aquatic habitat (i.e., fish and fish habitat) in downstream reaches of the mine. Without this assessment, the conclusions of the EA chapter are not supported and do not conform to the AIR requirements. Please 1) verify if this assessment has been conducted; 2) explain how the conclusions of the EA are supported if this assessment has not been conducted; 3) if an assessment has not been conducted, provide a clear commitment to assess predicted changes in groundwater flows and quality on aquatic habitat in downstream reaches of the mine data; and 4) provide an assessment of residual effects and mitigation measures for this potential effect.

ID#78: Section 5.1.5.3 Residual Effects and Significance.

> The AIR stated that any identified Project residual effects will be characterized based upon direction, magnitude, geographic extent, etc. However, the EA chapter is largely incomplete with respect to fish habitat residual effects characterization. The residual effects assessment lumps multiple fish habitat residual effects into one category named “change in fish habitat productive capacity” (Table 5.1-10). However, the body of the EA document recognizes different residual effects, such as flow alteration, food and nutrient alteration, behavioral cue alteration, habitat loss due to infrastructure, wetland connectivity and habitat loss, etc. Each of these residual effects varies in duration, frequency, magnitude, etc. Therefore, each of these residual effects should be characterized in Table 5.1-10 and rationalized in the body of the fish and fish habitat chapter. Rationalization of the residual effect descriptors (e.g., reversibility) is lacking in the body of EA document. Without this assessment, the

conclusions of the EA chapter are not supported and do not conform to the AIR requirements. Please 1) re-evaluate, characterize, and rationalize all identified fish habitat residual effects in Table 5.1-10 and body of fish and fish habitat chapter; 2) reassess the cumulative effects assessment based upon these updates, and 3) based upon the reassessment, confirm whether the conclusions of fish and fish habitat assessment are valid.

3.12.3 Assessment of Technical Studies

Section 5.1 Fish and Fish Habitat Effects Assessment

A fish and fish habitat effects assessment was completed for the LAA and RAA and conforms to AIR requirements, except those previously identified above. In addition, there are gaps and errors associated with the assessment methods and analysis, which are detailed below.

289. Section 5.1.5.2.2: Mitigation measures other than fish habitat offsetting should be considered for the potential effects related to water quantity in Skeeter and Chamberlain creeks. The construction of rock weirs and/or flow augmentation has been successfully implemented for other projects in NE BC where minor (i.e., 10-15%) flow reduction is predicted.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #290 has not been provided by the proponent.*

This comment/suggestion has not been addressed as habitat offsetting remains the primary mitigation measure for effects to fish and fish habitat.

290. Section 5.1.5.2.3.1: There are errors associated with the instream flow assessment methods and analysis for Skeeter and Chamberlain Creeks (See specific comments regarding these errors below pertaining to Appendix 27.A-12). As a result, the flow alteration residual effect(s) assessment is unsupported and requires a re-assessment.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #291 has not been provided by the proponent.*

Additional instream flow data and re-assessment according to BC standards have been provided.

See comments in Section 2.12 pertaining to 'Conceptual Fish Habitat Offsetting Plan'

291. The following residual effects assessments are incomplete, and the significance of these potential residual effects were not characterized in Table 5.1-10. This omission could lead to an underestimate of true project related effects on fish and fish habitat.

i. Section 5.1.5.2.3.2: The residual effects assessment stated that the reduction in mean annual discharge might cause a reduction in food and nutrients for fish in Skeeter Creek. In addition, this assessment only considered operations, not closure.

ii. Section 5.1.5.2.3.3: The residual effects assessment stated that changes in flushing flows may cause changes in the channel forming process, thus fish habitat, and that further assessment is required. In addition, this assessment only considered operations, not closure.

iii. Section 5.1.5.2.3.4: The residual effects assessment stated that flows may cause changes in the water temperature of Skeeter Creek, thus fish behavioral cues, and that a follow-up monitoring program may be required.

iv. Section 5.1.5.2.3.6: The residual effects assessment stated that flow changes may affect water quantity in the Sukunka River Wetland, thus fish habitat and productive capacity, and therefore further studies and assessments are required.

v. Section 5.1.9: The proposed fish and fish habitat follow up monitoring programs are not all-inclusive. Other follow up monitoring and assessment programs have been suggested within the technical studies and the EA. Confirmation is required to clarify the monitoring and assessment program commitments.

vi. Cumulative effects assessments are incomplete.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #292 has not been provided by the proponent.*

Additional assessments of the potential residual effects shown above have not been provided.

Follow-up, Monitoring and Compliance Reporting

292. From the perspective of fish and fish habitat, this section of the EA (Section 21.0) conforms to AIR requirements. However, the proposed fish and fish habitat follow-up monitoring programs are not all-inclusive. Additional follow up monitoring and assessment programs have been suggested in the technical studies and the EA. Confirmation is required to clarify the monitoring commitments, and justify the duration of specific monitoring commitments.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #293 has not been provided by the proponent.*

Preliminary Dangerous Goods and Hazardous Materials Management Plan

293. From the perspective of fish and fish habitat, the management plan conforms to the AIR, and meets industry standards and best management practices.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

Preliminary Explosives Management Plan

294. From the perspective of fish and fish habitat, the management plan does not address environmental effects on fish. Therefore, does not meet industry standards and best management practices, such as DFO's Guidelines for the use of explosives in or near Canadian Fisheries Waters (as recommended in the Section 5.1.5.3.2 of the Fish and Fish Habitat EA), to mitigate potential Project related effects.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

Preliminary Emergency Response Management Plan

295. From the perspective of fish and fish habitat, the management plan conforms to the AIR, and meets industry standards and best management practices.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

Preliminary Surface Erosion and Sediment Control Plan

296. From the perspective of fish and fish habitat, the management plan conforms to the AIR, and meets industry standards and best management practices.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

Preliminary Air Quality and Dust Control Plan

297. From the perspective of fish and fish habitat, the management plan conforms to the AIR, and meets industry standards and best management practices.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

Preliminary Access Management Plan

298. From the perspective of fish and fish habitat, the management plan conforms to the AIR, and meets industry standards and best management practices.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

Appendix 20.A-10 Preliminary Fish Habitat Offsetting Plan

299. A Fish Habitat Offsetting Plan (or "Fisheries Offsetting Plan") was completed and therefore conforms to AIR requirements. Because the plan is preliminary and conceptual, there are numerous data gaps and large uncertainties in the proposed offsetting options. This plan should be further developed to a technically feasible level in order to determine effects to fish and fish habitat as a result of the Project.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #300 has not been provided by the proponent.*

Additional instream flow data have not been provided.

This comment was partially addressed in response to working group IR 168 (primarily sections h and n). The response provided the requested offsetting habitat budget; however, this budget is not based upon revised instream flow data conducted to BC standards. Therefore, the numbers within the offsetting budget remain uncertain and possibly irrelevant. The offsetting plan remains conceptual and not 'technically feasible'.

300. The EA residual effects assessment concluded that there will be no effect on Bull Trout in Skeeter and Chamberlain Creeks due to instream flow alterations, prey and nutrient alterations, etc. However, this residual effects assessment was based upon erroneous instream flow study design and modeling (see below Appendix 27.A-12 comments). This could lead to an underestimate of true Project related effects on fish and fish habitat, which could lead to an underestimate of fisheries offsetting measures.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #301 has not been provided by the proponent.*

Additional instream flow data collected to BC standards have not been provided. Thus the effects assessment and conceptual offsetting plan remain uncertain.

301. The Preliminary Fish Habitat Offsetting Plan assumed that 40 m^2 of instream habitat will be lost at each fish-bearing watercourse crossing. The assumed area of riparian habitat loss per each fish bearing watercourse crossing was not provided. While it was recognized

that the preferred transportation option(s) have not been selected yet, it is uncertain if the proposed fish habitat offsetting measures are sufficient to offset the instream and riparian habitat loss. This could lead to an underestimate of true Project related effects on fish and fish habitat, which could lead to an underestimate of fisheries offsetting measures.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #302 has not been provided by the proponent.*

Partially addressed in the response to working group IR 168 f.

302. The fish habitat enhancement and creation efforts in West Bullmoose Creek watershed are largely conceptual and lack field data to demonstrate the benefits of the proposed offsetting measures. The culvert evaluation method does not appear to meet provincial standards for culvert fish passage assessment procedures. Field data pertaining to historical and current spawning abundance in reaches above the culvert was not provided. These uncertainties could lead to inadequate fish habitat offsetting measures.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #303 has not been provided by the proponent.*

Comment remains un-addressed until additional field data regarding the proposed offsetting sites are provided to demonstrate the benefits of the proposed offsetting measures.

303. Validation of the Bull Trout HSI curves was proposed as a research offsetting measure. H.S.I. curve validation is a step in the instream flow modeling methodology. Therefore, validation should be completed as part of the modeling effects assessment, and is not an acceptable fish habitat offsetting measure.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

Fully addressed in IR comment response 168 r and s. Complementary measures (e.g., validation of H.S.I. curves for Bull Trout) have bene removed from the conceptual offsetting options and plan.

304. The Preliminary Fish Habitat Offsetting Plan places an emphasis on "fish habitat productivity". However, the amended Fisheries Act pertains to "fisheries productivity". Fish habitat productivity and fisheries productivity are not equal, and budgeting values to offset the fisheries loss are not provided. Therefore, the plan does not address the requirements of the Fisheries Act. The habitat budget with an analysis that includes how gains are equal or greater than the losses in equivalent units is required. Without this evaluation these uncertainties could lead to inadequate fish habitat offsetting measures.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #305 has not been provided by the proponent.*

See comments in Section 2.12 pertaining to 'Conceptual Fish Habitat Offsetting Plan'

Comments 51 and 305 was partially addressed in response to working group IR 168n. The response did provided the requested offsetting habitat budget; however, this budget is not based upon revised instream flow data conducted to BC standards. Therefore, the numbers within the offsetting budget provided remain uncertain and possibly irrelevant.

Appendix 27.A-10 Fish and Fish Habitat Technical Data Report

305. A fish and fish habitat assessment was completed for local and regional study area and conforms to AIR requirements. However, there are gaps and errors associated with the fisheries assessment methods and analysis.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #306 has not been provided by the proponent.*

306. The AIR specifically mentions characterizing fish relative abundance. However, the baseline report incorrectly analyzed relative abundance data. The authors analyzed relative abundance as g/100 sec, which is a measure of biomass, not a measure of fish relative abundance. This leads to an inaccurate estimate of abundance, which may influence the EA residual effects assessment conclusions. For example, stream site 1 had a single 1,000 g adult Rainbow Trout captured in 100 sec, while stream site 2 had 100 10 g juvenile Rainbow Trout captured in 100 sec. The biomass of fish captured at each site is the same, but the relative abundance differs by 100. Therefore, the correct method of presentation of relative abundance data is number of fish per 100 electrofishing seconds. The authors may wish to present the relative abundance data for each fish life history stage for each species to more accurately represent fish relative abundance in streams. Correct characterization of relative abundance is important for in the development of an aquatic effects monitoring program (AEMP).

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #307 has not been provided by the proponent.*

Additional data pertaining to fish relative abundance have not been provided.

307. The AIR specifically mentions characterizing fish relative abundance. However, relative abundance assessments were not conducted for the Sukunka River. This leads to a data gap in abundance estimates within the local study area. Correct characterization of

relative abundance in the Sukunka River is important for an aquatic effects monitoring program (AEMP) to monitor potential Project related effects, such as water extraction from the Sukunka River and mine effluent discharge to the Sukunka River floodplain.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #308 has not been provided by the proponent.*

Additional data pertaining to fish relative abundance have not been provided.

Appendix 27.A-11 Transportation Route Crossings Fish and Fish Habitat Technical Data Report

308. A fish and fish habitat assessment was completed for watercourse crossings along the transportation route options and conforms to AIR requirements. The methods appear to meet provincial standards for watercourse crossing inventory and assessment procedures.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

Appendix 27.A-12 Instream Flow and Fish Habitat Assessment Technical Data Report

309. Water is proposed to be withdrawn from the Sukunka River; however, the assessment did not assess the effects of water withdrawal on instream flow. As a result, the flow alteration residual effect(s) assessment is incomplete, and requires assessment.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #310 has not been provided by the proponent.*

Additional data pertaining to instream flow have not been provided.

310. An instream flow assessment was completed for Skeeter and Chamberlain Creeks and conforms to AIR requirements. However, the instream flow assessment did not conform to Provincial standards and best practices. As a result, the flow alteration residual effect(s) assessment is unsupported and requires a re-assessment.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #311 has not been provided by the proponent.*

Additional data pertaining to instream flow or an explanation of how the presented data conform to BC standards have not been provided.

311. The instream flow assessment for Skeeter and Chamberlain Creeks does not conform to the BC instream flow methods (BCIFM) standard. Since the one-dimensional hydraulic-habitat analysis model (i.e., PHABSIM) relies upon following the standard practices, the results of the assessment are erroneous. The assessment results are erroneous due to the following:

i. Transect Selection: Fish use different mesohabitats (e.g., pool, riffle, glide, etc.) during their life history stages. To characterize instream flow effects on a particular fish life history stage, transects must be placed in mesohabitats that the life stage utilizes to adequately characterize the habitat flow relationship. This is a standard methodology of the BCIFM (Lewis et al. 2004). The assessment identified three critical Bull Trout life history stages – spawning, rearing, and overwintering. However, there is no indication that these transects were selected based upon mesohabitat type (e.g., pool, riffle, etc.) for each of the identified life history stages. For example, to evaluate Bull Trout spawning habitat, transects must be placed in potential spawning habitat (e.g., pool tail outs). A review of transect data (i.e., substrate and photos) and report indicates these transects likely do not represent Bull Trout spawning habitat.

ii. Transect Sample Size: It is necessary to install a sufficient amount of transects to represent the range of natural variability observed for each mesohabitat type. Based upon the BCIFM (Lewis et al. 2004), a minimum of five transects are required to represent the range of natural physiographic variation for each mesohabitat type within a single hydrogeomorphic unit (or "macro-reach" as termed in the assessment). The minimum requirement of five transects for each mesohabitat type were not achieved in this assessment. The significance to the EA is that without an adequate characterization of the habitat flow relationship for each life stage, within each mesohabitat, it is difficult to draw meaningful conclusions on loss of habitat or changes in fish habitat productivity in Chamberlain and Skeeter creeks.

iii. HSI Curves: The use of peer reviewed HSI curves is an acceptable approach for the PHABSIM model to evaluate incremental changes in flow on fish life history stages. This is classified as a Category II criteria curve in the Development and Evaluation of Habitat Suitability Criteria for use in the Instream Flow Incremental Methodology (Bovee 1986). However, it is not standard or acceptable practice to adjust HSI curves with no empirical data to justify the HSI curve modification. In this assessment, the Bull Trout rearing HSI curve was adjusted based upon "professional knowledge" but without empirical validation data. Furthermore, the authors proposed a new overwintering HSI curve that is not based upon supporting data. The validity of this overwintering HSI curve and assessment results is suspect without this validation procedure.

iv. Transferability: It not standard or acceptable practice to take reach specific instream flow transect data from one stream and apply it to a different stream. It is also erroneous to determine effects with this transferred data. Therefore, transferring data

from Upper Chamberlain Creek to Upper Skeeter Creek is not standard or acceptable practice, and the effect assessment results are likely erroneous.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #312 has not been provided by the proponent.*

Additional data pertaining to instream flow or an explanation of how the presented data conform to BC standards have not been provided.

Appendix 27.A-13 Water Quality and Aquatic Biota Technical Data Report, Section 7 Fish Tissue

312. The methods appear to meet provincial standards for fish tissue sampling and assessment procedures, although this section should cite the most recent BC selenium guidelines (Beatty and Russo 2014).

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #313 has not been provided by the proponent.*

313. Fish tissue data for 2012 and 2013 appear to be combined into a single data set. Where sufficient sample sizes are available (i.e., n = > 8 individual fish per site), data should be presented and analyzed for each individual year, such that trends through time can be described.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #314 has not been provided by the proponent.*

3.12.4 EA Conclusions

314. The methods for making conclusions on fish mortality risk were primarily qualitative and rational. The conclusions generated are consistent with the effects assessment predictions and baseline data.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

315. The methods for making conclusions on fish habitat productive capacity were quantitative and qualitative.

Analysis of Glencore Responses to Working Group Comments:

Fully Addressed *by information provided to the EAO working group.*

316. Conclusions drawn from the results of the instream flow assessment contain substantial uncertainty. This is premised on the fact that: (1) the field design did not follow Provincial standards, and (2) the habitat suitability curves were not developed following standard practices. Collectively, it is difficult to defend the findings of the study when the study design contains large gaps. These gaps preclude the ability to make definitive statements and conclusions in the EA and result in uncertainty regarding how much offsetting is required to account for Project residual effects.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #317 has not been provided by the proponent.*

Additional data pertaining to instream flow or an explanation of how the presented data conform to BC standards have not been provided.

317. The residual effects assessment is largely incomplete with respect to effects characterization and rationalization. Residual effects characterization varies depending upon the type of effect; however, the residual effects assessment does not distinguish between different effects on fish habitat productive capacity. Therefore, the residual effects conclusion is not supported.

Analysis of Glencore Responses to Working Group Comments:

Not Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #318 has not been provided by the proponent.*

318. The Preliminary Fish Habitat Offsetting Plan possesses data gaps, large uncertainties in the proposed offsetting options, and does not present a budget indicating the predicted losses and gains in equivalent units. Therefore, the residual effects and cumulative effects conclusions, and confidence in mitigation measures such as offsetting, are highly uncertain.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #319 has not been provided by the proponent.*

3.12.5 Mitigation

319. Overall, the proposed mitigation measures meet industry standards and best management practices. However, DFO's standard mitigation guidelines Measures to Avoid Causing Harm to Fish and Fish Habitat (DFO 2013) were not cited within the EA chapter. Additionally, the instream flow mitigation measures will require further attention, as the methods employed in the assessment did not meet Provincial standards and are insufficient to support the current EA conclusions.

Analysis of Glencore Responses to Working Group Comments:

Partially Addressed *by information provided to the EAO working group. To date, a direct response to FNITR secondary issue #320 has not been provided by the proponent.*

3.13 HUMAN AND ECOLOGICAL HEALTH

3.13.1 Reports Reviewed

Sukunka Coal Mine Project Application Information Requirements – Approved by Environmental Assessment Office on October 23, 2013

Chapter 9.0: Assessment of Potential Human and Ecological Health Effects.

Appendix 27.A-25: Human Health and Ecological Risk Assessment-Technical Data Report.

3.13.2 Evaluation of Conformity to AIR

Noise should be assessed as part of the HHERA, as described in Section 4.2.5 and Section 4.2.5.2. However, noise was assessed for potential effects to human health because the noise predictive study concluded that there were not human receptors located within the noise study area (see also Section 3.7 and 4.7).

i. There is potential for temporary human receptors and off-duty workers to be located in the vicinity of the Project. Elevated noise levels could occur in these areas which could affect human health or land use patterns. Please provide an effects assessment of the potential for effects to human health due to noise for temporary human receptors who may be present at or near the Project fenceline and off-duty workers who reside in close proximity to the Project.

ii. There could be human receptors present at or near the rail-load out areas, which were not considered in the Application. Please provide an assessment of the risk to human health due to noise at the rail-load out areas which were modelled in the noise predictive study.

Sections 9.1.4 and 9.1.5.2 of the AIR specifies that hydrocarbons (or more specifically PAHs) could pose a potential risk to the health of humans and ecological receptors and will be assessed in soil, water sediment, vegetation, and country foods. However, no assessment of the potential risks associated with PAHs could be located in the Application (see also Section 3.13 of this document).

i. Please provide a reference to where this information can be found in the Application, or provide an effects assessment of the potential risks posed to human and ecological receptors under both baseline and future conditions for PAHs.

3.13.3 Assessment of Technical Studies

Appendix 27.A-25 (Human Health and Ecological Risk Assessment Technical Data Report; HHERA TDR)

Note that many of the comments on the TDR also would apply to the human health effects assessment chapter since the TDR forms the basis for the human health effects assessment chapter.

320. Executive summary, 9th paragraph: Canadian standards and guidelines for arsenic, lead and mercury are not applicable to country foods. These guidelines are for commercial (retail) foods and are essentially import/export standards established by the Canadian Food Inspection Agency (CFIA). These are not necessarily health-based standards, and they don't take into account receptor-specific factors that could influence risk (e.g., consumption rates and frequencies).

i. Please provide rationale for why the BC aquatic life guidelines for fish/shellfish when human diet is based primarily on fish (which ranges from 0.1 to 0.5 mg/kg ww, depending on consumption rate) was not used in the assessment for either screening or for providing context in terms of risk to human consumers. Please provide an assessment that takes into account this guideline.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #321 has not been provided by the proponent.

321. Section 1.3: this section indicates that "Mine contact water will be discharged from a final polishing sediment pond through a pipe to the Sukunka River. An environmental water treatment facility may be required to treat effluent water if it does not meet guidelines established for the Project." There appears to be a discrepancy between the TDR and the water quality and aquatic biota effects assessment chapter (Section 5.2). There is no mention elsewhere in the Application of a water treatment facility.

i. Please confirm that an 'environmental water treatment facility' is included as a contingency measure in the event that water quality does not meet guidelines. Please provide a description of the type of water treatment facility that is being proposed, including a description of parameters treated, treatment technology proposed, treatment capacity, and expected end-of-pipe effluent quality.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #322 has not been provided by the proponent.

322. Sections 3.2 and 3.4.6.2: The TK/TLU provides a location of camps within the LAA and RAA. The TK/TLU report indicates there are camps at the tenure area and, therefore, hunting, trapping, fishing, and other cultural activities are expected to occur near the tenure area and people may spend a significant amount of time near the Project area. This information is not incorporated in the chapter.

i. Throughout the report, the proponent indicates that humans are not expected to spend a substantial amount of time near the Project tenure area. Please provide a reference for this statement.

ii. Please provide a risk assessment and effects characterization taking into account temporary receptors that could be present in the LAA or RAA, as described in the TK/TLU report. In the absence of quantitative information in the TK/TLU report, please provide a list of assumptions and rationale for the assumption made regarding frequency of use by temporary receptors, receptor characteristics, and consumption rates and frequencies for country foods.

iii. CACs, especially $PM_{2.5}$, PM_{10}, and SO_2, around the MPOI are above guideline limits. Since these areas may be utilized by hunters, trappers, or other land users, these exceedances should be taken into account regardless of whether the frequency is less than the three receptors identified in the LAA. Please provide an assessment of potential effects to human health from CACs in areas where temporary receptors may be present for a period of an hour or more. CACs at workers accommodations for off-duty workers should be also assessed.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #323 has not been provided by the proponent.

323. Section 3.2, 4th paragraph: Waterways (e.g., Sukunka River) within the LAA and RAA are used for recreational purposes. Please provide a rationale as to why water quality (baseline and predicted) is not compared to recreational water quality guidelines?

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #324 has not been provided by the proponent.

324. vSection 3.3: Drinking water sources such as wells, water licenses, source of drinking water for the workers and camp, and wells associated with dwellings within the LAA and RAA should be identified and included in the receptor identification and characterization (i.e., these represent potential receptor locations). Please provide a map that shows known or suspected drinking water sources throughout the LAA and RAA, including locations identified as drinking water sources in the TK/TLU report.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #325 has not been provided by the proponent.

325. Section 3.4: method of screening of COPCs used in the assessment (see also Section 3.13).

i. Please provide scientific rationale for use of relative toxic potential for a suite of metals that may or may not have the same mode of action.

ii. Please provide scientific rationale for elimination of metals with relative toxic potential less than 1%, considering that only the baseline soil concentrations are being evaluated in this screening step (i.e., does not consider other potential exposure routes).

iii. The BC Contaminated Sites Regulation Matrix Numerical Soil Standards and Generic Numerical Soil Standards are often more permissive than the CCME soil guidelines. Selection of COPCs based on comparison of 95th UCLM soil concentrations to these standards is not conservative. The most conservative soil quality guideline should be used for screening COPCs in soil. Also, CCME soil quality guideline for arsenic should be 12 mg/kg instead of 17 mg/kg as indicated in Appendix C, which is referred to in Section 3.4.1. Please provide rationale for why the screening step for soils does not use the most conservative approach possible in order to ensure that all relevant COPCs are identified (as described in Health Canada and BC MOE guidance documents).

iv. The water quality screening does not include the predicted water quality or humidity cells or geochemistry source terms for water quality modeling that would be analogous to using raw coal samples in the selection of COPCs from soil. Please provide rationale for why source terms for the water quality model were not considered in the selection of COPCs (similar to what was done for soil).

v. Please provide rationale for why predicted water and soil quality were not considered in the selection of COPCs, since this resulted in some COPCs not being carried forward into the HHERA. Both aluminum and thallium should have been carried forward in the HHERA. Aluminum is predicted to have increased concentrations based on water quality model; however, aluminum is not among the COPCs selected in the HHERA. Beryllium is predicted to exceed soil quality guidelines due to deposition of coal dust at the Project, which is also not included as a COPC in the HHERA.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #326 has not been provided by the proponent.

326. Section 3.4.4 — the assessment states that *"iron was not evaluated in the ecological risk assessment because it is inherently non-toxic to aquatic life"*. Please provide references to support this assertion, particularly for dissolved iron.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #327 has not been provided by the proponent.

327. Section 3.4.6.2 — based on EPA 2005 guidance, usually a depth of 2 cm is used for untilled soil to predict soil concentrations due to dust deposition. A depth of 10 cm will underestimate predicted soil quality (US EPA 2005. *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities. EPA520-R-05-006. United States Environmental Protection Agency, Office of Solid Waste and Emergency Response: Washington, DC.).*

i. Please provide rationale to support the selection of a depth of 10 cm for assuming mixing of dust deposited on soil, or please re-calculate predicted soil quality and comment on the implications of the underestimation in surface soil concentrations to the overall risk calculation.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #328 has not been provided by the proponent.

328. Section 3.4.6.3: node SUK3 is not the most conservative node for water quality predictions since it is located in the Sukunka River downstream of the IDZ (assuming full mixing at this node). A location in Skeeter Creek or Chamberlain Creek is more appropriate to ensure that risks to human health are not underestimated. Concentrations are predicted to be lower in the Sukunka River due to its large dilution capacity.

i. Please re-evaluate the risk to human health if predicted water quality at other nodes are considered in the effects assessment or provide comment as to the implications for the outcome of the risk assessment as a consequence of using a non-conservative water quality predictions from the Sukunka River (as opposed to Skeeter or Chamberlain creeks).

ii. It is possible that transient land users could drink surface water from throughout the LSA. Please incorporate this into the HHERA when considering the potential for exposure and uptake of COPCs from drinking water in a multimedia HHRA.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #329 has not been provided by the proponent.

329. Section 3.4.6.3, Table 3.4-9: should be using total concentration rather than dissolved. Values in this table are not consistent with water quality predictions provided in other parts of the Application. Please ensure that all calculations and data analysis provided in the TDR is using the water quality model provided in the second submission of the Application.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #330 has not been provided by the proponent.

330. Section 3.4.6.5: please provide calculations in a tabulated format, along with the equations and input parameters (including the biota transfer factors) to demonstrate how future predicted vegetation metal COPC concentrations were calculated (including a sample calculation). Alternatively, please indicate with section(s) and page references where this information can be found in the Application.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #331 has not been provided by the proponent.

331. Section 3.4.6.5 — vegetation can uptake metals through both soil concentration uptake from the roots as well as dust deposition on the vegetation's surface. Based on the second paragraph under section 3.4.6.5, it is implied that only soil root uptake is considered.

i. Please clarify if vegetation predicted concentrations only considered root uptake.

ii. If dust deposition onto surfaces of plants was not considered, this could underestimate the potential concentrations of COPCs to human consumers (who may not wash berries or vegetation prior to eating it). Please provide rationale for why this is an acceptable approach, or recalculate the vegetation concentrations and risk calculations taking into account the potential for deposition of dust onto plant surfaces.

iii. Please provide the equations used in the prediction of vegetation concentrations, with references.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #332 has not been provided by the proponent.

332. Section 3.4.6.6: please provide the calculations in a tabulated format, along with the equations and parameters used (along with references and sample calculations) to estimate the baseline and predicted future concentrations of COPCs in soil invertebrates. Please provide which uptake factors (along with references) were used.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #333 has not been provided by the proponent.

333. Section 3.4.6.7: predicted concentration of metals in small mammals is dependent on animal specific parameters, such as ingestion rate, time an animal spends at the site, body weight, type of food it ingests, trophic level, etc. Please provide the calculations in a tabulated format, along with the equations, parameters, and data sources used to estimate the baseline and predicted future concentrations of COPCs in small mammals. Please indicate what animal was used to represent small mammals and why.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #334 has not been provided by the proponent.

334. Section 3.4.6.7: predicted COPCs in small mammals appears to only consider COPCs in soil. Water and food concentrations should also be considered since these may contribute to the overall body burden in small mammals. Please recalculate the risk taking into consideration the potential for COPC uptake from all exposure routes for small mammals.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #335 has not been provided by the proponent.

335. Section 3.4.6.8: please provide a reference for the moose vegetation ingestion rate. The moose vegetation ingestion rate may be underestimated, which could underestimate the risk to moose.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #336 has not been provided by the proponent.

336. Section 3.4.6.8: adjustment of uptake factors for organic contaminants is a reasonable and common practice and these contaminants tend to bioaccumulate in fat tissues. However this practice is not a standard practice for metals because they do not typically partition into lipid stores of the organism. Please provide a scientific rationale (including references for each COPC, if necessary) for why predicted concentrations of metal COPCs in tissue should be lipid-normalized.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #337 has not been provided by the proponent.

337. Section 3.4.6.9: predicted fish tissue metal concentrations seems to rely on literature BAF and BCF relationship. However, as described in Appendix 5.2-A of the EA, fish bioaccumulation models were used to predict fish tissue selenium concentrations using Orr et al (2012) approach. The proposed SPO for selenium is based on the linear regressions analysis that was applied to the above environmental and biological compartments.

i. Please explain why different methodologies were used to predict fish tissue selenium concentrations in the TDR and in the Water Quality and Aquatic Biota chapter. Please comment on which methodology is the most reasonable for parameters such as selenium or mercury that are known to bioaccumulate of biomagnify.

ii. Section 3.2.6.9, Table 3.4-16 — some of the predicted fish tissue concentrations are lower than the measured baseline tissue concentrations (e.g. selenium). The results are inconsistent with the Water Quality and Aquatic Biota chapter. Please provide rationale for why this would occur and provide validation of the methodology used in predicting fish tissue concentrations taking into consideration measured tissue metal concentrations from baseline studies.

iii. Please provide the specific methodology used to predict fish tissue concentrations for each metal as the Application indicated that several data sources were used. Please list the specific BCFs that were used and the associated source for each metal included in the assessment. Please provide the calculations in a tabulated format, along with the equations and parameters used to estimate the predicted future concentrations of COPCs in fish.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #338 has not been provided by the proponent.

338. Section 3.4.7, Table 3.4-20: Please clarify what is meant by "predicted PM_{10} concentrations (coal dust portion only)". All PM_{10} (whether it's derived from coal dust or not) should be associated with metals. Does this mean that the total metal concentration in PM_{10} might be underestimated if metals in PM_{10} from other sources (e.g., road dust) was not considered?

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #339 has not been provided by the proponent.

339. Section 4.1-1, Table 4.1-1 — Please provide additional rationale and justification for using 2 days a week as the time human receptors may spend within the HHERA RSA. The TDR indicated that 2 days a week residency time is conservative as "*typical occupancy rates are considered to be closer to 30 days per year*". Please provide a reference for this statement. Given that land use from several First Nations at the time of this study was unavailable, use of 2 days a week to estimate residency time may not be a conservative assumption.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #340 has not been provided by the proponent.

340. Section 4.1.1: it is agreed that the health risk estimate for toddlers is higher than adults; however, the risk to adults should not be overlooked in this assessment particularly given that elevated risk was identified for toddlers. Please provide an assessment of the risk to adults, including at temporary receptor locations identified in the TK/TLU report.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #341 has not been provided by the proponent.

341. Section 4.2.2, Table 4.2-1: the WHO (2000) provides a more conservative, health-based guideline for CO (30ppm or 28625 $\mu g/m^3$ for 1-hour and 10 ppm or 11450 $\mu g/m^3$ for 8 hours). These values are more conservative than what is represented in Table 4.2-1, Appendix 27.0-A.25. Since WHO guidelines for CO are based on human health, these guidelines are more appropriate to use in this case. (See WHO, 2000. Air Quality Guidelines

for Europe, Second Ed. World Health Organization Regional Office for Europe, Copenhagen, Denmark. Section 5.5.)

i. Please provide rationale for why WHO standards should not be considered in the effects assessment. Would the assessment be changed if these standards were used?

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #342 has not been provided by the proponent.

342. Section 4.2.2: methylmercury TRVs of 0.00047 and 0.00023 mg/kg BW/day for adults and toddlers should be added to Table 4.2-2 and be used in the assessment for assessing risk from consumption of fish at least (since methylmercury concentrations in fish tissue are typically very close to 100% of total mercury).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #343 has not been provided by the proponent.

343. Section 4.4.3.4 – the proponent states that the "risk assessment used in this assessment overstates potential adverse health risks rather than understates them". The reviewer disagrees with this statement because:

i. the Proponent has not included the water exposure route in the calculation of total exposure and estimate of risk;

ii. inhalation of metals does not appear to have been considered in this assessment in the context of overall multimedia exposure to COPCs;

iii. receptor locations of camp residents (i.e., off-duty workers) and potential transient users that may be in the tenure area or at the fence line, where there is a higher potential for exposure, have been excluded from the assessment;

iv. summing of all exposure routes and consideration all potential receptors is expected to result in exposure to higher level of contaminants and therefore a higher level of risk than what is predicted in this assessment; and

v. the benchmark used in the effects assessment (a HQ of 0.2 for each exposure pathway) does not take into account the risk from concurrent multimedia exposures nor the exposures from background (i.e., outside of the Project area). This results in underestimate of potential risk to human health.

vi. Therefore, please provide rationale to support the assertion that the risk assessment overstates the potential adverse health risks given that a number of non-conservative assumptions were made.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #344 has not been provided by the proponent.

344. Section 5.1.1: Selection of ecological receptors should either follow the methodology provided by Environment Canada (2012) or based on wildlife indicators (species) identified in the AIR. The methodology for the selection of ecological receptors is not well described.

i. Please explain how were the selection criteria chosen? Was any published guidance used in the selection of ROCs? If not, please explain why an alternative method was chosen. Please provide rationale for why all the wildlife species assessed in the wildlife effects assessment chapter were not included as ecological receptors, particularly when there is elevated interest in these species (e.g., caribou).

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #345 has not been provided by the proponent.

345. Section 5.1.2: Please provide references for parameters such as diet items, ingestion rates of food, soil, and water for each of the receptors selected.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #346 has not been provided by the proponent.

Section 9 of the Application (Assessment of Potential Environmental Effect, Human and Ecological Health)

346. Section 9.1.3: is the Baseline HHRA the same as Current HHRA? Is it possible to characterize the effects from the Brule Mine Kwoen Gas Plant and the Bullmoose Mine in the area? Considering that the Project is located in the Peace River Coalfield of northern BC, there are likely current effects that are different from baseline conditions.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #347 has not been provided by the proponent.

347. Section 9.1.3.5.2: why are there no temporary receptor locations identified in the TDR or the effects assessment chapter? The TK/TLU report provides a map that shows camp locations. Transient users should be accounted for by inclusion of the MPOIs. Please also include these receptors on Figure 9.1-1 and update the effects assessment accordingly.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #348 has not been provided by the proponent.

348. Section 9.1.3.6, Table 9.1-2: under magnitude characterization, Low magnitude was defined as 0.2 <HQ ≤ 2.0, which significantly exceeds the standard benchmarks (i.e., HQ of 0.2 for a multimedia HHRA that does not consider background exposures outside of the Project area). Please provide a justification for the definitions of magnitude. Please comment on the appropriateness of using HQs to define magnitude since this is contradictory to current understanding and practices regarding the use and interpretation of HQs when they are calculated as a simple ratio of exposure to toxicity thresholds.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #349 has not been provided by the proponent.

349. Table 9.1-3, 1st bullet under "For Carcinogenic Chemicals": Should "CR" be used for the assessment of carcinogenic chemicals? Based on Table 9.1-1 and the definition of CR, ILCR should be used to estimate the risk of exposure to carcinogenic chemicals from inhalation, dermal and ingestion pathways.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #350 has not been provided by the proponent.

350. Section 9.1.6.1.2, bullet # 5: please provide a rationale as to why the fish from Chamberlain Creek and Skeeter Creek are not used in the assessment. Changes in water quality are higher in these creeks when compared to Sukunka River. Since the Proponent has assumed that 100% of the fish consumed by people are from portions of Sukunka River, the predicted risk could be underestimated. Please provide rationale to support the assumption that 100% of the fish collected from within the LAA come from the Sukunka River.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #351 has not been provided by the proponent.

351. Section 9.1.6.1.2: the assessment assumes that fish spend an entire lifetime in the mixing zone area of the river (SUK-IDZ); however, this is not consistent with the TDR which indicates that the SUK3 modeling node was used in the assessment. This is not the area with the highest concentrations of contaminants. Therefore, the assessment potentially underestimates fish tissue concentrations. Please provide a reassessment using more conservative assumptions of potential risk.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #352 has not been provided by the proponent.

352. Section 9.1.6.2.1: this section should also include dermal and accidental ingestion of soil exposure pathways. If these pathways are scoped out, please provide a rationale for excluding them from a multimedia HHRA.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #353 has not been provided by the proponent.

353. Section 9.1.6.2.3.2, 1st paragraph: "the estimation of metal accumulation in soil was based on coal dustfall predictions associated with the mine operations and as a result was independent of the haul road." It is not clear what the authors mean by this statement. Is dust associated with the haul road not included in the air quality model? How did the air quality model evaluate the road use? How was dust deposition on to soil and/or vegetation along the haul roads assessed or incorporated into the estimates of risk to human health?

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #354 has not been provided by the proponent.

354. Section 9.1.6.2.3, 1st paragraph: What about short-term exposure to concentrations of PAHs and metals through drinking water or consumption of country foods? Some short exposures may result in long-term irreversible effects. PAHs, mercury, lead, and arsenic are an example of these types of chemicals.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #355 has not been provided by the proponent.

355. Section 9.1.6.2.3.3: in reference to Section 4.1.2 HHERA TDR — Table 4.1-2 refers to Appendix H. Based on this table, the maximum COPC concentration in surface water meets drinking water guidelines so the drinking water pathway is not expected to result in health effects. However, Appendix H is not provided in the Application.

i. It is unclear what modeling case is used for comparison to WQ guidelines; please specify which modeling scenario was used.

ii. Which WQ guidelines are used in this assessment? Did the evaluation consider both Health Canada and BC MOE drinking water guidelines? Was the most conservative drinking water guideline used?

iii. In addition to metals, are PAHs in drinking water included in the assessment?

iv. Section 9.1.6.2.3.3: *"Predicted COPC concentrations in surface were compared to guidelines for Canadian drinking water quality"*. Was this done for all locations or just Sukunka IDZ?

v. Section 9.1.6.2.3.3: *"Exposure to metals in surfaces within the RAA that are used as sources of drinking water will not represent a potential human health risk"*. While this may be true, water quality predictions should be incorporated into the total uptake in mg/kg/day for a multimedia HHRA. Did this statement take into consideration that any and all surface waters could be used by temporary land users as a drinking water source while engaged in camping, hunting or fishing within the LAA or RAA?

vi. Section 9.1.6.2.3.4, 2nd paragraph: Why were changes in the water quality model not incorporated into the uptake model? This has the potential to result in significant miscalculations of risk to human and ecological receptors.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #356 has not been provided by the proponent.

356. Section 9.1.6.3.3, 1st paragraph: *"the future case is based on maximum average of the predicted maximum monthly average concentrations …"* please define the maximum average. It is not clear what this statistic represents.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #357 has not been provided by the proponent.

357. Section 9.1.6.3.3.2: "the chemical quality of modelled fish is representative of fish that have lived their entire lifespan in the affected area of Skeeter Creek. Freshwater fish will naturally migrate to tributaries and other rivers that are not affected by water discharges from the Project." Based on information provided in the Application, there appears to be barriers to migration of fish. There is low or no connectivity to Sukunka via the wetlands. Please verify that the assertion related to exposure potential is correct.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #358 has not been provided by the proponent.

358. Section 9.1.6.3.4: the report indicates that fish quality was modelled using unmitigated discharge water. However, based on the water quality and aquatic life chapter, the fish quality predictions used mitigated discharge water and even with treated discharge water, fish tissue quality exceeds guidelines.

i. Please confirm which results from the water quality model are being referred to in the prediction of fish tissue residues.

ii. Please explain or provide rationale for the discrepancy in water quality model predictions and fish tissue residue predictions between the human health effects assessment chapters and the water quality and aquatic biota chapter.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #359 has not been provided by the proponent.

359. Section 9.1.8.2: "The assessment of cumulative effects for water quality and aquatic biota concluded that due to the limited overlap between the Project activity effects on water quality and the effects of other projects on water quality, and the requirement for the Project and other projects to meet regulatory standards for discharge to waterbodies, potential cumulative effects on water quality are not significant. Specifically, predicted changes in chemical concentrations of environmental media associated with the Project will not overlap with potential changes associated with other projects." This is not what is indicated in the water quality chapter. Brule Mine was linked to the Project effects in the water quality chapter. Table 9.1-21 does not reflect the linkage of Brule mine to the project for cumulative effects as it is described in the water quality chapter.

i. Please provide rationale for why the potential linkages for cumulative effects with other projects are different between the human health chapter and the water quality and aquatic biota chapter.

ii. Section 9.1.8.2: there is potential for wildlife (i.e., country foods) to move between habitats at the Project and other nearby projects. This is especially relevant to large mammals or birds. Just because effect to abiotic media is limited, it does not imply that country foods quality will remain the same when taking into consideration the activities occurring in the larger home ranges for large mammals or birds. Please provide rationale for whether or not wildlife with a larger home range (i.e., that extends across multiple project areas) could be affected by cumulative effects from these projects.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #360 has not been provided by the proponent.

360. Section 9.1.8.3: water quality cumulative effects were modelled for Brule Mine. Therefore, the statement that "*water quality between the Project and other projects and activities will not overlap and therefore are not significant*" may not be accurate. Please provide an assessment of cumulative effects that includes consideration of the quantitative cumulative water quality effects from the two projects.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #361 has not been provided by the proponent.

361. Section 9.1.8.3: "In the absence of a significant effect, the second condition for determining the need for an assessment for potential cumulative effects has not been met." This is incorrect. The requirement for assessing cumulative effects is the presence of any residual effects, regardless of the significance of the residual effect. Please provide a cumulative effects assessment for any Project-related residual effect to human health, regardless of whether or not it was found to be significant.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #362 has not been provided by the proponent.

362. Section 9.1.10: the authors indicate that the monitoring program will reduce potential changes in trace metal concentrations in fish tissue. Please clarify how a monitoring program will result in reductions of water or fish tissue concentrations.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #363 has not been provided by the proponent.

363. Section 9.1.10: "increasing trends in mercury or selenium that approach the water quality predictions will result in review of the fish tissue concentrations. Details of the water quality monitoring program are provided in Section 5.2". This information is not available in the water quality chapter (Section 5.2). Please provide details of the water quality monitoring program.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #364 has not been provided by the proponent.

3.13.4 EA Conclusions

364. The current conclusions presented in chapter 9 of the EA appear to have the potential to underestimate risk and may be based on erroneous (wrong version) of the water quality model. It is recommended the Proponent update the TDR (Appendix 27.A-25), conduct a multi-media HHRA consistent with current standards of practice recommended by both federal and BC regulators, re-consider the significance and magnitude assessment, and revisit the conclusions made in Section 9 of the Application.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #365 has not been provided by the proponent.

3.13.5 Mitigation

365. Proposed mitigations are based on what is suggested in the air quality, water quality and aquatic biota assessments. It is recommended the Proponent consider additional mitigation and monitoring given that elevated hazard quotients, risk quotients and cancer risks have been identified. This is especially important given the identified risks may be underestimated. Please provide a list of additional mitigation that could be used to decrease the potential for Project-related effects to human health, or indicate why additional mitigation to protect human health is not required.

Analysis of Glencore Responses to Working Group Comments:

Review Pending

To date, a direct response to FNITR secondary issue #366 has not been provided by the proponent.