October 16, 2009

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MVEIRB File#: EA 0809-004

Chuck Hubert
Environmental Assessment Officer
Mackenzie Valley Environmental Impact Review Board
200 Scotia Centre, Box 938, 5102-50th Ave
Yellowknife, NT X1A 2N7

Sent via email: *chubert@reviewboard.ca*

Re: Review of the Draft Terms of Reference for the Environmental Assessment of Fortune Minerals Ltd.'s NICO Cobalt-Gold-Copper-Bismuth Project (NICO Project)

This letter is in response to the Mackenzie Valley Environmental Impact Review Board's (MVEIRB) September 15 request to review the *Draft Terms of Reference (ToR)* document for the Fortune Minerals Ltd.'s NICO Project, NT.

Natural Resources Canada is providing comments from departmental experts in the following areas: terrain stability and hazards, geotechnical engineering/stability, permafrost, groundwater quality and quantity, effects of climate change, surficial geology and acid rock drainage / metal leaching. Our comments, included in the attachment to this letter, are arranged in this order and keyed to sections of the draft ToR. The intent of these suggestions is to add additional clarity and ensure that the information provided in the EIS is adequate for technical review and therefore avoid an unnecessary lengthening of the review process due to the need to acquire more detailed information. The intent of the comments and suggestions provided is not prescriptive but rather to ensure that the information provided is adequate to enable MVEIRB to determine whether the conclusions reached by the proponent regarding environmental impacts are supported by the information provided in the EIS.

Should you have any questions regarding this request please contact the undersigned at (613) 943-0773 or at John.Clarke@nrcan.gc.ca.

Sincerely,

Original signed by

John Clarke
Regional Team Leader
Natural Resources Canada

cc: R Johnstone, MMS

NICO Project, NT.
Review of the *Draft Terms of Reference document* for the NICO Project, NT.

Reviewer #1

Reviewer: Geological Survey of Canada

Expertise: Permafrost

Documents Reviewed:

Project Description Summary, NICO Project, NT by Fortune Minerals Limited, April 2009 (and related presentations)

MVEIRB's Draft Terms of Reference, Sept. 15 2009.

Recommendations

General

Issues have been prioritized and two particular issues require special consideration and have been identified as key lines of inquiry. These are (i) impacts of the NICO Project on water quality and (ii) long-term impacts following mine closure. Adequate mine waste (tailings and waste rock) containment will be essential to ensuring that the impacts described in the key lines of inquiry are minimized. Other mining projects have utilized frozen conditions in the design of waste containment facilities. For example, frozen core dams on frozen foundations have been utilized in the design of tailings ponds and permafrost encapsulation has been utilized for land based containment (waste rock piles and mine tailings).

It is unclear from the project description whether design of waste containment facilities will utilize frozen conditions. If the proponent is to rely on frozen conditions, then the EIS will need to consider the permafrost conditions at containment sites (thermal and ground ice conditions), how these conditions will change during operation of the waste containment facilities and any impacts that will result in terms of performance of the containment facility and impacts on water quality. If frozen conditions are to be relied on for long-term containment of contaminants following closure, the impacts of climate change will also need to be considered in the design to ensure that frozen conditions will be maintained over the long-term and impacts will be minimized. NRCan suggests that the TOR reflect the need for consideration of the maintenance of frozen conditions if it is the Proponent's intention to utilize frozen conditions for contaminant containment.

Section 3.2.4 Description of the Existing Environment (and Appendix A)

It is suggested that the TOR include a specific request for the EIS to provide a description of the methods used to acquire the information used to describe the baseline conditions. Some parameters may be directly measured in the field while others are derived through utilization of models. It is essential that reviewers know the techniques that were utilized in order to assess whether the information is credible. This is especially important for aspects of the biophysical environment for which very little on-site data (e.g. climate data) may be available and various techniques may be used to determine on-site conditions from information available for surrounding regions.

Comments regarding specific components of the Biophysical Environment outlined in Appendix A

#3 Climate conditions
The description of baseline climate conditions should include a description of the variability in climatic conditions in order to determine the range in conditions under which the project must operate. This would also include consideration of extreme events. This will be particularly important for assessing impacts related to the hydrological regime, water quality and quantity and also for design of project components such as water retention structures. In addition trends, in climate conditions over time should also be addressed as this may be important for design of closure plans to ensure long-term impacts are minimized.

Since limited on-site climate data may be available it may be necessary for the Proponent to utilize data from climate stations located some distance from the site in order to describe baseline conditions, variability and long-term trends. It is therefore suggested that the TOR require that the EIS include a description of the methodology utilized to determine climate conditions at the Project site including an assessment of uncertainty in the description of baseline conditions.

#4 Hydrology and hydrogeology
The permafrost distribution and configuration of taliks are important in determining groundwater flow paths as well as permeability of subsurface materials. It is suggested that the EIS also consider the relationship between the groundwater regime and permafrost conditions.

As mentioned above in the discussion of climate conditions, limited on-site data may be available. Characterization of variability in precipitation and the probability of extreme events for example, may therefore rely on analysis of data from surrounding climate stations. There may also be uncertainty in the description of trends over time in climate variables which would also lead to uncertainty in water balance components such as precipitation inputs and evaporation. It is therefore suggested that the TOR include the need for a description of the methodology used to derive the components of the water balance and characterization of flow regimes including a discussion of how uncertainty is dealt with.

#10 Terrain
The TOR includes a description of permafrost locations. It is suggested that this be expanded to require information such as the ground thermal condition, ground ice/moisture contents of the underlying material. This information is required to for assessments of terrain stability. It is also suggested that the description of granular materials also include information on ground ice as this will be important for assessment of impacts associated with extraction of granular resources.

3.2.5 Development Description (and Appendix B)
A description of the mine rock management area should also be included in the description of project components.

#15 Management of tailings
It is suggested that this include a description of all dams and dykes including techniques utilized to ensure their stability and containment over the period of operation. As mentioned in General Comments, if frozen conditions are to be relied on, techniques to be utilized to ensure the maintenance of these conditions will also need to be provided.

#21 Access Road
It is suggested that in addition to including a description of designs for water crossing, this also include a description of techniques to be utilized to ensure that erosion, bank instability etc. is minimized.

3.3 Impacts on the Biophysical Environment
3.3.1 Impact Assessment Steps
It is suggested that the TOR also require the EIS to include a description of the techniques, models etc. utilized for impact prediction. It is also suggested that the EIS describe any uncertainty in the impact prediction including techniques to deal with this in project design, contingency plans, environmental management programs etc.

3.3.3 Closure and Reclamation (and Appendix D)
MVEIRB should also consider a requirement that the EIS consider the role of climate change in development of closure and reclamation plans in order to ensure that the site does not pose an ongoing hazard to the surrounding environment. This may include for example, consideration of climate change in the design of permanent features in order to ensure long-term physical integrity.

3.3.5 Fish and Aquatic Habitat (and Appendix E)
Item 2a in App. E and item 6 require descriptions of changes to flow near water crossings and details on sediment and erosion control measures. It is suggested that this will also require consideration of variability of flow (related to climate variability) and extreme events (e.g. high flows).

3.3.7 Terrain (and Appendix G)

A description of soil conditions (item 1a, App. G) should also include the ground thermal conditions and ground ice conditions as these will be important factors determining terrain and slope stability. If permafrost conditions exist in the mine rock management and tailings management areas (and may also be a component of containment), there will also need to be a discussion of how changes in ground thermal conditions may effect the stability of these facilities and their associated components such as dams and dykes.

Item 2 addresses the need to describe impacts of Project operations on terrain stability and vice versa. Vegetation removal through project activities or through natural causes such as fire (as discussed in section 3.3.9 and App. I) can also result in changes to the ground thermal regime and result in thawing of permafrost, terrain instability, drainage changes etc. It is suggested that vegetation removal be considered in the assessment of permafrost related impacts in the project area.

Item 4 provides requirements for monitoring geotechnical stability of mine rock management area, tailings management area and dams (item 4c) and contingency plans that will be adopted if terrain stability is compromised (item 4e). It is suggested that the EIS also include how the monitoring data will be utilized to determine if action is required. This could include definition of critical values, decision trees etc.

Reviewer #2

Reviewer: Geological Survey of Canada

Expertise: Hydrogeology

Documents Reviewed:

Draft Terms of Reference for the Environmental Assessment of Fortune Minerals Ltd.'s NICO Cobalt-Gold-Copper-Bismuth Project, EA 0809-004, prepared by the Mackenzie Valley Review Board, September 15, 2009.

NICO Project, NT, Fortune Minerals Limited, Project Description Summary, April 2009.

NICO Cobalt-Gold-Bismuth-Copper Project Presentation, Technical Scoping Session, April 20, 2009, Fortune Minerals Limited, 32 p.

NICO Cobalt-Gold-Bismuth-Copper Project Presentation, Technical Scoping Session, Environmental Overview, Fortune Minerals Limited, 22p.

Recommendations:
Note: Sections referred to here are from the Draft Terms of Reference document. When more than one Section is given in the heading, it is recommended that the Board consider including the reviewer's points in at least one of the sections identified.

Section 3.2.4- Description of the Existing Environment AND Appendix A- Existing Environment, Section (3) Climatic Conditions AND Appendix H- Air Quality:

- Provide all climate data used, at least in an appendix.
- Provide the rationale for selection of meteorological data (on-site, Environment Canada and other) used in modeling and water balance calculations.
- Provide a map indicating the location of all meteorological stations utilized or considered.
- It is recommended that on-site climate data be collected throughout project planning, construction, operations, closure, and post-closure.
- It is recommended that on-site evaporation pan data be collected throughout project planning, construction, operations, closure, and post-closure.

Section 3.2.4- Description of the Existing Environment AND Appendix A- Existing Environment, Section (4) Hydrology and Hydrogeology:

- In Section 3.2.4, the point "water quality" could be expanded into three points: surface water, groundwater quality, and groundwater quantity.
- Provide all data used, at least in an appendix.
- Provide a map indicating the location of all existing and planned wells, and of seeps within the study area. Any other monitoring points should also be indicated.

- Provide the location of seepage meters and evaporation pans installed in the study area.
- Sufficient data should be obtained to capture spatial and temporal variations in water quality.
- Provide the rationale for selection of monitoring well sites and any other water collection/monitoring sites.
- Ensure the conceptual hydrogeological model identifies all recharge and discharge areas, describes aquifer characteristics including aquifer extent, thickness, depth and hydraulic properties, describes groundwater-surface water interactions and the connectivity of groundwater aquifers in the Study Area with those in surrounding areas, and includes a map indicating the direction of groundwater flow, velocity, and hydraulic gradients.
- Baseline water table elevations should be characterized using measurements taken from on-site water table monitoring wells.
- Install multi-level bundle samplers to obtain points for hydraulic head measurements at depth, determine vertical hydraulic gradients and construct a water table elevation map.

Section 3.2.5- Development Description AND Appendix B- Development Description:

- Indicate the locations of First Nations communities on the maps provided with locations of traditional fishing grounds and sites where country foods are obtained.

Section 3.3.2- Key Line of Inquiry: Water Quality AND Appendix C- Water Quality:

- Provide all data used, at least in an appendix.
- Provide the rationale for selection of a numerical model for determining potential effects to groundwater quality. Model input parameters should be clearly defined, be based on a sufficiently large data set, and be conservative in nature. Model calibration and validation should be discussed. A sensitivity analysis that includes extreme climatic variations is also recommended.
- Present the criteria to be used for the release of contaminated and treated water to the environment.
- Discuss how potential changes to permafrost resulting from Project activities may affect groundwater quality.
- To Section 2c of Appendix C, add “temperature”.
- Present details on frequency, timing, locations and parameters for water quality and water quantity monitoring in the post-closure period.
- Provide justification for the length of groundwater monitoring in the post-closure period.

Section 3.3.4- Water Quantity:

- Provide all data used, at least in an appendix.
- Provide the rationale for selection of a numerical model for determining potential effects to groundwater quantity. Model input parameters should be clearly defined, be based on a sufficiently large data set, and be conservative in nature. Model calibration

and validation should be discussed. A sensitivity analysis that includes extreme climatic variations is also recommended.

- Discuss potential effect of pit de-watering on groundwater levels and water table drawdown.
- Include a discussion of the potential changes to groundwater-surface water interactions resulting from Project activities.
- Discuss how potential changes to permafrost resulting from Project activities may affect groundwater quantity.

Section 3.5- Accidents and Malfunctions:

- Describe on-site containment features, such as concrete pads and dykes, and detection systems used for early warning of spills.
- List the storage location of mill reagents including maximum volumes and concentrations of reagents to be stored on site.

Appendix A- Existing Environment, Section (10) Terrain, surficial geology, structural geology, mineralogy, bedrock geology (type, depth, composition, permeability), seismic activity records and risk factors, permafrost locations and types within the environmental assessment study area:

- Provide all data used, at least in an appendix.
- Provide complete references for historical data and indicate when historical data is used to provide geological descriptions.
- Indicate when field data is used to provide geological descriptions. Provide relevant information on sampling/testing timing, frequency and duration.
- Include analyses of a sufficient amount of samples for determination of such properties as porosity in order to obtain a measure that is representative of site conditions and to delineate heterogeneities.
- Include maps, cross-sections and figures to illustrate geological features, where appropriate.
- Discuss how permafrost influences on-site hydrogeology.

Reviewer #3

Reviewer: Geological Survey of Canada

Expertise: Surficial Geology

Documents Reviewed:

Draft Terms of Reference for the Environmental Assessment of Fortune Minerals Ltd.'s NICO Cobalt-Gold-Copper-Bismuth Project, EA 0809-004, prepared by the Mackenzie Valley Review Board, September 15, 2009.sections 1.0 - 3.6, and Appendices A, C, D, G.

Recommendations:

3.2.4 Description of the Existing Environment and Appendix A: Existing Environment

Comments
This section provides sufficient guidance to the proponent while preparing the EIS on the issues regarding description of the biophysical environment, notably terrain. There are however no published surficial geology maps, or information on materials, to be used as reference for this area of the Northwest Territories (Appendix A, Point 10).

As described in the ToR, knowledge of the current state of the baseline conditions, and the natural range of background condition is essential. This includes not only surface water and groundwater quality (Appendix A, Point 5) but also soils (Appendix A, Point 11) because of the range of natural variability of background concentrations of certain elements such as arsenic. For example, past studies in the Yellowknife area have demonstrated the anomalously high naturally-occurring baseline concentrations of arsenic in soil sediments and vegetation. Data collection and analyses of soil/till geochemistry should provide sufficient information to demonstrate whether soils may affect water quality.

Appendix G: Terrain

Comments
Regarding surficial geology/materials/processes, this section provides sufficient guidance to the proponent while preparing the EIS on the issues required to address impact assessment steps listed in the draft ToR, and no deficiencies have been identified (notably Appendix G, Points 1a, 4).

This documentation should be sufficient to ensure that the proponent adequately addresses issues such as effects resulting from relationships between project and the environment, and a thorough understanding of existing baseline conditions for a rigorous environmental impact analyses and mitigation measures.

Reviewer #4

Reviewer: Geological Survey of Canada

Expertise: Geotechnical Engineering/slope Stability

Documents Reviewed:

Draft Terms of Reference for the Environmental Assessment of Fortune Minerals Ltd.'s NICO Cobalt-Gold-Copper-Bismuth Project, EA 0809-004, prepared by the Mackenzie Valley Review Board, September 15, 2009

Recommendations:

Section 3.3.2:

- Suggest adding the following bullet item at the end: "Describe potential impacts to water quality if breach occurs to containment facilities of hazardous water/materials due to abnormal conditions. Identify measures to be taken to mitigate such impacts."

Section 3.5:

- Suggest adding a bullet item after the second bullet: "Provide a rationale for criteria used for decisions on the various risks related to malfunctions/accidents during construction, operation and post closure phases".

Appendix C, Item 11:

- Suggest adding the following sentence to the end of the first paragraph: "Provide a rationale for criteria used (with reference to relevant code if available) for the decisions on the mitigative measures to be taken."

Appendix C, Item 11.b:

- Suggest changing "landslides" to "slope failures".

Appendix G:

- Suggest adding "5. Describe criteria with reference to relevant code used for geotechnical stability design of all engineered components."

Reviewer #5

Reviewer: Mining and Minerals Sciences Laboratories

Expertise: Acid Rock Drainage / Metal Leaching

Documents Reviewed: Draft Terms of Reference NICO Project

Recommendations:

Suggested additional text is included in red.

Page 4: Other On-Site Facilities and Activities

- Power generation and heat recovery facilities;
- Use of the Effluent Treatment Facility that will treat effluent from the tailings pond and waste rock;

Page 10: Description of the Existing Environment

Describe the biophysical environment, including:..

- the location
- air quality
- climate
- hydrology
- water quality
- aquatic organisms
- wildlife
- vegetation
- terrain
- soil characteristics

Page 13: Key Line of Inquiry: Closure and Reclamation

- Describe to what standard Fortune plans to reclaim the site, and how that standard was selected.
- Describe how and when the mine site will be reclaimed, including how plans will…
- Alternate methods of waste management to be considered

Page 20: Appendix B: Development Description

Specific Items

16a. Amount of effluent treatment sludge production and management of effluent treatment sludge.