Information Request 45

Responses to Information Request 45

IR 45 – Soil Metal Concentrations Modelling

References:

EIS Guidelines, Section 2.7.3.3;
EIS, Section 2.7.3.3
2009 EIS, Section 6.3.1.6;

Related Comments:

CEAR # 265 (Health Canada)
CEAR # 290 (Tsilhqot'in National Government)

Rationale:

In Section 2.7.3.3, the EIS Guidelines require the Proponent to conduct a human health risk assessment and include consideration of the potential effects of all project phases (*i.e.* construction, operation, closure and post-closure).

In the 2009 EIS (Section 6.3.1.6, p. 6-29), the Proponent predicted that soil chemistry would not be altered from baseline conditions through construction. However, it stated that large increases in soil metals concentration were predicted through use of the "2.5 micron model" due to dust deposition, in particular copper concentrations would exceed the agricultural guidelines prior to the end of operation. Table 6-10 on page 6-30 noted that copper would increase from 43 mg/kg in the baseline to 287 mg/kg after 19 years of operation and references the Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines to determine exceedances in this scenario. The 2012 EIS used the "TSP model" and does not predict the same increase. Taseko re-evaluates copper at a maximum increase of 0.65% above baseline for the New Prosperity Project (Table 2.7.3.3-6, page 1198).Taseko notes that the difference between the two assessments was due to the model chosen.

Health Canada noted that considering the sizable difference in predictions of the models, a discussion of the limitations of the models would be useful. Because these modeled results were used in the risk assessment for assessing the risk from consumption of country foods, Health Canada states that it is important to support confidence in the modeled results and to ensure that the predicted soil concentration model used is conservative and appropriate. The Panel would like to understand these differences better.

The Tsilhqot'in National Government stated that recent scientific investigations undertaking with Xeni Gwet'in have stated that the CCME Guidelines for soil ingestion do not accurately estimate intake levels of soil by those who consume traditional foods and in this regard is not precautionary.

Information Requested:

With regards to the atmospheric modelling in the 2009 EIS and the EIS, the Panel requests that Taseko:

a. Provide a discussion on the applicability of the “2.5 micron model” in the current assessment versus the “TSP model” in the previous assessment.

b. Provide a discussion of the limitations of the models in this context

c. Provide a rationale as to why the CCME Guidelines are appropriate for modeling contaminant intake by the sensitive receptors as well as any uncertainties with the use of those Guidelines.

Information Request #45 - Clarification of Stated Rationale

The Panel should note corrections to the rationale for this IR.

The following paragraphs were included in the rationale to IR 45. Taseko believes that there are typographical errors in these paragraphs and submits the following changes indicated in bold italics with the original wording crossed out.

In the 2009 EIS (Section 6.3.1.6, p. 6-29), the Proponent predicted that soil chemistry would not be altered from baseline conditions through construction. However, it stated that large increases in soil metals concentration were predicted through use of the **"*TSP model* ~~2.5 micron model~~"** due to dust deposition, in particular copper concentrations would exceed the agricultural guidelines prior to the end of operation. Table 6-10 on page 6-30 noted that copper would increase from 43 mg/kg in the baseline to 287 mg/kg after 19 years of operation and references the Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines to determine exceedances in this scenario. The 2012 EIS used the **"*2.5 micron model* ~~TSP model~~"** and does not predict the same increase. Taseko re-evaluates copper at a maximum increase of 0.65% above baseline for the New Prosperity Project (Table 2.7.3.3-6, page 1198). Taseko notes that the difference between the two assessments was due to the model chosen.

Information Request #45a

With regards to the atmospheric modeling in the 2009 EIS and the 2012 EIS, the Panel requests that Taseko:

Provide a discussion on the applicability of the “2.5 micron model” in the current assessment versus the “TSP model” in the previous assessment.

Response Summary

The “2.5 micron model” was applied in the 2012 assessment in place of the “TSP model” to offset the inherent conservatism in the 2009 dispersion modeling and arrive at a more realistic prediction of metal deposition to soil.

With the retention in 2012 of Fish Lake as a new receiving water body relative to 2009 and its perceived sensitivity, a more conservative approach was taken with respect to the potential effects of dustfall on water and sediment quality and a TSP model was applied to the area of the lake.

Discussion

The 2009 dispersion modeling for the Prosperity mine included conservative assumptions that had the net effect of over-estimating the deposition of dust fall and metals content in the dust. For example, in the 2009 model it was assumed that:

- Roads were built from a relatively friable material that included 8.3% silt content, and
- No dust suppression from rain or snow occurred, and
- All dust was assumed to be generated at surface and all dust generated in the pit escaped from the open pit, and
- All dust was characterized as ore.

Given the distance to sensitive receptors in the 2009 assessment, offsite effects were within the acceptable range. In the 2012 assessment, with the exclusion of Fish Lake from the mine footprint the “TSP model” dustfall estimates were unrealistically high. It was decided that the “2.5 micron model” would be more appropriate in that setting. Subsequent dust emission modeling carried out in 2012 indicates that the 2009 TSP dust emissions were overstated by more than 400%. Given that the 2009 EIS concluded that there would be no significant effect to soils (and subsequently country foods and human health) on the basis of conservative TSP modeling it is considered that the same conclusion would be applicable to the 2012 assessment especially in light of the original overestimation.

Taseko acknowledges that a fundamental difference between the 2009 and 2012 assessments is the retention in 2012 of Fish Lake. Due to its perceived sensitivity, a more conservative approach was taken with respect to the potential effects of dustfall on water and sediment quality and a TSP model was applied to the area of the lake.

Information Request #45b

With regards to the atmospheric modeling in the 2009 EIS and the EIS, the Panel requests that Taseko:

Provide a discussion of the limitations of the models in this context.

Response Summary

Use of the "TSP-model", with the cumulative conservativeness, can grossly over-predict the deposition of metals in proximity to sources. This can, in turn, result in the over-prediction of exposures and leads to the over-estimation of potential human health risks where none may exist.

Use of the "2.5 micron model" results in lower predicted deposition of metals in proximity to sources by reducing the multiplying effect of the conservative assumptions in the dispersion modeling**.**

Discussion

The deposition of dustfall was calculated for all three size ranges of particulate matter leaving the mine site in the 2009 dispersion modeling exercise. This included: Total Suspended Particulate Matter (TSP), Inhalable Particulate Matter (PM_{10}), and Respirable Particulate Matter ($PM_{2.5}$).

The TSP-based dustfall has the highest deposition rates as these particles are large, and fall out quickly and close to the source by gravitational settling. The $PM_{2.5}$-based dustfall has the lowest deposition rates as these particles are small, and can travel larger distances before settling out.

In the 2009 EIS, TSP-based dustfall estimates were employed in calculating metals deposition. This involved multiplying the dustfall deposition rate by the fraction of each metal in a representative ore profile developed by Taseko, to calculate the deposition rate for each metal. This method is considered extremely conservative, as most of the TSP emissions are from road surfaces, and not the ore body. Additionally, dust emission modeling carried out in 2009 overstates total dust emissions by more than 400%.

Information Request #45c

With regards to the atmospheric modeling in the 2009 EIS and the EIS, the Panel requests that Taseko:

Provide a rationale as to why the CCME Guidelines are appropriate for modeling contaminant intake by the sensitive receptors as well as any uncertainties with the use of those Guidelines.

Response Summary

The CCME Guidelines are appropriate for modeling contaminant intake because they use conservative assumptions in their derivation and in their exposure timelines.

Discussion

The soil quality guidelines developed by CCME and the BC Ministry of the Environment (BCMOE) are designed to be protective of human health and ecological receptors. The soil quality guidelines are developed using the same risk assessment process as that used to assess potential human and ecological exposures for the New Prosperity Project. Both CCME and BCMOE use conservative assumptions designed to over-predict exposure to ensure that the generic soil quality guidelines are protective of human health or ecological receptors. In selecting the final generic guideline value, both agencies compare the soil quality guidelines derived for human health with those derived for ecological receptors and select the lower of the two values as the final generic guideline. This approach provides protection for both human and ecological receptors.

The generic soil quality guidelines for residential land use were used to screen the metal concentrations in surface soil for the New Prosperity Project. For the majority of the metals (antimony, barium, cadmium, chromium, cobalt, copper, molybdenum, nickel, selenium, silver, zinc), the soil quality guidelines are based on protecting ecological receptors and are more stringent than the soil quality guidelines for human health. Thus, applying the CCME residential soil quality guidelines for these metals provides adequate protection for human health, including sensitive members of the population. The CCME residential land-use soil quality guidelines for arsenic, lead and mercury, are based on the protection of human health for situations where people are expected to live on the site 365 days per year over an entire lifetime. In addition, the CCME human-health based guidelines are derived using human-health based toxicological reference values (TRVs) established by Health Canada. The derivation of these TRVs include consideration of sensitive members of the population and thus, the soil quality guidelines derived using the Health Canada TRVs are protective of sensitive members of the population.