TECHNICAL MEMORANDUM

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TO Allison Denning
Health Canada

CC Rob Hajdú, Canadian Environmental Assessment Agency
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RE-EVALUATION OF IDENTIFICATION OF CONTAMINANTS OF POTENTIAL CONCERN (COPCS) FOR THE HUMAN HEALTH RISK ASSESSMENT, BURNCO AGGREGATE PROJECT

Golder conducted a human health risk assessment (HHRA) in support of the Environmental Assessment Certificate Application/Environmental Impact Statement (EAC Application/EIS) for the BURNCO Aggregate Project (the Project). The HHRA focused on evaluating the potential health effects of the Project on human receptors within the project area and consisted of an air quality assessment as well as a multimedia assessment. Following regulatory review of the EAC Application/EIS, Health Canada and the Canadian Environmental Assessment Agency (CEAA) provided comments to the Proponent (BURNCO Rock Product Ltd) related to the HHRA. Several of the regulators' comments[1] related to the use of a 10% increase in concentration from baseline as a criterion for selecting contaminants of concern in the HHRA. The reviewers requested an evaluation of risks for under baseline conditions regardless of the whether an increase in concentrations is predicted as a result of the project[2]. In response to these comments, Golder has conducted a sensitivity analysis to re-examine the identification of COPCs.

1.0 SCREENING APPROACH

The focus of an EAC Application/EIS is to evaluate the potential effects of the Project. Provincial guidance documents indicate that when assessing potential effects of a project, incremental effects of the project should first be considered. If an incremental effect is predicted, then effects from the project should be assessed cumulatively, taking into account the influence of other existing or planned activities in the region. For example, in the *Guidance on Applications for Permits under the Environmental Management Act - Technical Assessments* (BC MOE 2010), it states on Page 6 that assessments should include "…*predicted incremental increases in relevant ambient parameters; and cumulative impacts when the incremental increase is added to the existing receiving environment levels…*"[emphasis added].

[1] Refer to HC-IR-1, HC-IR-2, HC-IR-3, HC-IR-4, HC-IR-16, CEAA-IR-40.

[2] Refer to HC-IR-12, HC-IR-4, CEAA-IR-40, HC-IR-11, HC-IR-16, HC-IR-19

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Similar guidance is provided by federal regulatory agencies in Canada. The *Cumulative Effects Assessment Practitioners Guide* prepared by the Canadian Environmental Assessment Agency (1999) states that "*A cumulative effects assessment (CEA) for a single project should fundamentally do the following:*

1) Determine if the project will have an effect on a valued ecosystem component (VEC)[3].

2) If such an effect can be demonstrated, determine if the incremental effect acts cumulatively with the effects of other actions, either past, existing or future" [emphasis added].

The screening approach used in the HHRA was consistent with this guidance, because it focused on effects related to the Project and to which the Project contributes. As stated in the approved Application Information Requirements/Environmental Impact Statement Guidelines issued to BURNCO Rock Products Ltd on 16 December 2014, the scope of the public health assessment was to *'identify and evaluate potential human health effects related to predicted project-related [emphasis added] effects to water quality, air quality, contamination of country foods*…". As such, the HHRA focused on the substances that are attributed to emissions from the project. Project-related COPCs were selected by comparing predicted concentrations for the Project to environmental quality guidelines as well as to the Base Case conditions to evaluate whether there is an incremental increase (e.g., >10% from Base Case) that could be attributed to the Project. Where both of these conditions occurred (i.e., incremental change due to the Project occurs and results in exceedance of guideline) the substance was identified as a COPC.

As discussed in Section 9.0 of the EAC Application/EIS, comparison to an increase of 10% above existing concentrations was considered to represent a conservative evaluation of whether a measurable Proposed Project-related impact to soil, surface water and air was likely to occur. Given spatial and temporal variability in these media concentrations, variability in field sampling and laboratory analysis and the conservatism applied in the predictive modelling, any predicted increase of less than 10% above existing concentrations was considered unlikely to reflect a change in environmental quality as a result of the Proposed Project.

2.0 SENSITIVITY ANALYSIS

Health Canada reviewers have expressed concern with the use of an incremental increase of 10% or more from Base Case in selecting COPCs. To address the regulators' concerns, the predicted soil, surface water and air concentrations for the Proposed Project were re-evaluated based on identifying all substances that exceeded the selected screening criteria to evaluate whether additional COPCs should be retained. A qualitative comparison to Base Case was also made for any substance that exceeded the screening criteria. The updated screening results are presented by media, below.

[3] A VEC in this case is defined as any part of the environment that is considered important by the proponent, public, scientists and government involved in the assessment process (CEAA 1999).

2.1 Soil

With the exception of arsenic, the predicted maximum soil concentrations were below the selected screening values (Appendix 9.1-C, Table 9.2-C-2). The predicted maximum concentration of arsenic in soil (15.8 mg/kg) exceeded the selected screening value (12 mg/kg), but was the same as the baseline concentration and below the regional background concentration (20 mg/kg)[4] determined by the British Columbia Ministry of Environment. Because there was no change in arsenic concentration between the Base Case and Application Case and the predicted maximum concentration was below regional background, arsenic was not retained as a COPC in soil. The use of local background chemistry to identify of COPCs is consistent with Health Canada's[5] detailed quantitative risk assessment guidance.

A screening value was not available for bismuth (Appendix 9.1-C, Table 9.2-C-2); however, the predicted maximum concentration of bismuth in soil (0.31 mg/kg) was the same as the baseline concentration. Bismuth concentrations did not change between the Base Case and Application Case, and was not retained as a COPC in soil.

2.2 Surface Water

Predicted maximum concentrations of metals and inorganic parameters in surface water at Pit Lake, MCF-6, MCF-12 and MCF-7 were below the selected screening values (Appendix 9.1-C, Table 9.2-C-1). The predicted maximum concentration of phosphorus in surface water at MCF-7 (0.011 mg/L) exceeded the selected screening value of 0.01 mg/L, but was the same as the baseline concentration (Appendix 9.1-C, Table 9.2-C-1). Phosphorus concentrations did not change between the Base Case and Application Case, and phosphorus was not retained as a COPC in surface water.

Screening values were not available for alkalinity, hardness, calcium, potassium, ammonia, total Kjeldhal nitrogen and titanium (Appendix 9.1-C, Table 9.2-C-1). A discussion for alkalinity, hardness and ammonia was included in the HHRA (Section 9.1.5.6.2). Calcium and potassium were considered innocuous and not retained as COPCs (Appendix 9.1-C, Section 2.2), consistent with Health Canada's *Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals* (Health Canada 2010), which allows for the exclusion of naturally occurring innocuous substances. Ammonia, nitrate and nitrite were used as surrogates for total Kjeldhal nitrogen. Although a screening guideline was not available for titanium, the predicted surface water concentration at the Pit Lake during year 1 of operations was 11% greater than the Base Case concentration. Therefore, titanium was retained as a surface water COPC for the Pit Lake only and evaluated in the multi-media risk assessment (Section 9.1.5.6).

[4] BC MoE. 2010. Protocol 4 for Contaminated Sites: Determining Background Soil Quality. October 2010.

[5] Health Canada. 2010. Federal Contaminated Sites Risk Assessment in Canada. Part V: Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals ($DQRA_{Chem}$). September 2010. Contaminated Sites Division, Safe Environments Directorate.

2.3 Air

Air quality was assessed for 1-hour, 24-hour and annual averaging times. The results for each averaging time scenario are presented below.

1-Hour: The predicted maximum concentrations of aluminum (35 µg/m^3) and iron (41 µg/m^3) in air at the maximum point of impingement (MPOI) exceeded the selected screening values of 20 µg/m^3 and 10 µg/m^3, respectively (Appendix 9.1-B, Table 9.2-B-3). These metals were evaluated in the HHRA (Section 9.1.6.1.1). Screening values (1-hour) were not available for $PM_{2.5}$, PM_{10}, total suspended particulates (TSP) or lead. $PM_{2.5}$, PM_{10} and lead were evaluated under the 24-hour scenario. $PM_{2.5}$ and PM_{10} were used as a surrogate for the assessment of TSP.

24-Hour: The predicted maximum concentrations of $PM_{2.5}$ (75 µg/m^3), PM_{10} (171 µg/m^3), TSP (650 µg/m^3), iron (11 µg/m^3) and manganese (0.16 µg/m^3) in air at the MPOI exceeded the selected screening values of 25 µg/m^3, 50 µg/m^3, 120 µg/m^3, 4 µg/m^3 and 0.1 µg/m^3, respectively (Appendix 9.1-B, Table 9.2-B-4). $PM_{2.5}$, PM_{10}, iron and manganese were evaluated in the HHRA (Sections 9.1.6.1.1 and 9.1.6.1.2.1 and Appendix 9.1-E). $PM_{2.5}$ and PM_{10} were used as a surrogate for the assessment of TSP.

The predicted concentrations of beryllium in air at all receptor locations evaluated exceeded the selected screening value of 0.01 µg/m^3 (Appendix 9.1-B, Table 9.2-B-4). The predicted maximum concentration of beryllium (0.014 µg/m^3) was the same as the Base Case concentration. As there was no change in beryllium concentration between the Base Case and Application Case, beryllium was not retained as a COPC in air for the 24-hour averaging time.

Screening values were not available for bismuth or thallium (Appendix 9.1-B, Table 9.2-B-4). The predicted maximum concentrations of bismuth (0.042 µg/m^3) and thallium (0.0070 µg/m^3) were the same as the Base Case concentrations. There was no change in bismuth and thallium concentrations between the Base Case and Application Case, so bismuth and thallium were not retained as a COPCs in air for the 24-hour averaging time.

Annual: The predicted concentrations of $PM_{2.5}$, chromium, cobalt and nickel in air at all receptor locations evaluated exceeded the selected screening values of 6 µg/m^3, 0.00012 µg/m^3, 0.0031 µg/m^3 and 0.015 µg/m^3, respectively (Appendix 9.1-B, Table 9.2-B-6). $PM_{2.5}$ was evaluated in the HHRA (Section 9.1.6.1.2.2 and Appendix 9.1-E). The predicted maximum concentrations of chromium (0.053 µg/m^3), cobalt (0.0053 µg/m^3) and nickel (0.016 µg/m^3) were the same as the Base Case concentrations. There was no change in chromium, cobalt, and nickel concentrations between the Base Case and Application Case, so chromium, cobalt and nickel were not retained as a COPCs in air for the annual averaging time.

2.4 Conclusion

The selection of COPCs for the HHRA was re-evaluated by identifying those parameters that exceeded guidelines but did not exceed the Base Case by greater than 10%. Only a few of the parameters evaluated exceeded environmental quality guidelines. Among those that did exceed an environmental quality guideline, predicted Application Case concentrations were the same as the Base Case concentration (i.e., no project related change). Therefore, as the objective of the EAC Application/EIS is to assess project-related changes, no additional COPCs were identified based on the results of the re-evaluation and the conclusions of the HHRA remain unchanged.

3.0 CLOSURE

We trust that the information above addresses your needs. If you have any questions, please do not hesitate to contact the undersigned at 604-296-4200.

Yours truly,

GOLDER ASSOCIATES LTD.

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