# FORTUNE MINERALS LIMITED

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Alan Ehrlich
Senior Environmental Assessment Officer
Mackenzie Valley Environmental Impact Review Board
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Dear Mr. Ehrlich

**Re: Update on Processing Changes at the NICO Site for the Fortune Minerals Limited Cobalt-Gold-Bismuth-Copper Project**

On June 17, 2009, Fortune Minerals Limited ("Fortune") advised the Mackenzie Valley Environmental Impact Review Board (MVEIRB) that the hydrometallurgical facility for the NICO Cobalt-Gold-Bismuth-Copper Project (NICO site) would be located in southern Canada.

In the *Mine Industry Questionnaire* (Section 4.0) submitted as part of the *Type A Water License* application on January 30, 2009, Fortune outlined the steps required to process ore mined at the NICO site to a final product. With the relocation of the hydrometallurgical facility, most of the process steps outlined in the *Mine Industry Questionnaire* will no longer occur at the NICO site. This letter is an update on the process activities that will remain at the NICO site and should be considered in the terms of reference for the environmental assessment.

In Section 4.1 of the *Mine Industry Questionnaire*, Fortune outlined the process that would be employed in the primary and secondary crushing and grinding circuits (*Comminution* sub-heading). These initial steps in the processing of the ore will remain unchanged.

The initial steps in the flotation process for the production of a bulk cleaner concentrate will also remain unchanged from the description presented in Section 4.1. Bulk flotation of the ground slurry will still require the addition of potassium amyl xanthate (PAX) and methylisobutyl carbinol (MIBC) to produce a combined cobalt/bismuth concentrate called the bulk rougher concentrate in the first stage. The tailings produced at this stage represent approximately 88% of the plant input into the tailings management area.

The bulk rougher concentrate is subsequently upgraded in a second flotation circuit called the bulk cleaner stage that also uses PAX, producing a bulk cleaner concentrate. In the flow sheet previously presented in January, the bulk cleaner concentrate contains all of the economic cobalt and bismuth, and a substantial

amount of the gold. The tailings from the bulk cleaner flotation stages represent approximately 8.4% of the plant feed, and contain a small amount of the overall gold (6-12%); therefore, Fortune is presently undertaking further metallurgical test work that will result in one of two process outcomes that are detailed in Appendix I of this letter. The two process outcomes being studied are:

- Case 1: Bulk cleaner tailings regrind-flotation-scavenger circuit; and,
- Case 2: Bulk cleaner tailings Carbon-In-Leach (CIL) circuit.

In either situation, water usage will decrease as water will no longer be consumed by the hydrometallurgical processes. Due to the elimination of cyanide in case 1, or the lower cyanide concentrations utilized in case 2, the recycle rate of decant from the tailings storage facility can also be increased. Annual discharges of treated effluent from the mine will be substantially reduced as more freshet runoff will be re-circulated to the plant as process water.

**Cyanide Destruction**

If case 2 is pursued, the CIL tailings slurry, barren of gold, will be filtered to recycle cyanide solution within the CIL circuit in order to minimize reagent consumption and fresh water use. The filter cake would be re-slurried with reclaimed water from the tailings pond and the residual cyanide treated in a cyanide destruction circuit (Appendix I).

**Filtration and Packaging**

The bulk cleaner concentrate will be thickened, and presented to a pressure filter for dewatering to 8% moisture. The resulting solids will be packaged into large bags commonly called “bulk bags” for transport to southern Canada. The technical name for this sort of container is *flexible intermediate bulk container* (“FIBC”), and this type of container is suitable for shipping of material containing arsenical dust, designate UN 1562: Packing Group II, Hazard Class 6.1.

As a result, the separated cobalt and bismuth concentrates and refined metal will be produced off-site at the hydrometallurgical facility, as well as either all of the gold (case 1), or most of the gold (case 2).

No other ore processing will occur at the NICO site.

All of the other processes after flotation listed in Section 4.1 of the *Mine Industry Questionnaire* will now occur at the hydrometallurgical facility. These include:

- High pressure acid leach oxidation;
- Copper precipitation;
- Cobalt precipitation;
- Ionic Exchange and nickel carbonate precipitation;
- Cobalt electro-winning;
- Gold recovery from POX residues, bismuth concentrate, and (in case 2) shipped carbon;
- Bismuth recovery by Chloride Leach Electro-Recovery; and,
- Copper solvent extraction and electro-winning.

Table 4.4-1 in the *Mine Industry Questionnaire* listed all of the chemicals and their consumption rates on an annual basis that were to be used at the NICO site for processing of the ore. With the removal of the hydrometallurgical facility, the amount of chemicals that need to be shipped to and used at the NICO site decreases significantly. The quantities of steel grinding rods and balls, PAX collector, MIBC frother, and flocculant will remain the same.

If Case 1 is shown to be technically and economically viable, sodium cyanide, lime, and activated carbon will be eliminated from the process requirements, along with cyanide destruction reagents such as sodium metabisulphite, sulphuric acid, and copper sulphate (or the Combinox™ equivalents – sulphuric acid and hydrogen peroxide).

If Case 2 is chosen, sodium cyanide and lime requirements will be significantly reduced from that outlined in the January application. Activated carbon will be utilized, shipped south for stripping, and returned to NICO for re-use. Cyanide destruction reagents will also be required, but to a lesser extent, due to the reduced cyanide concentrations and consumption. .

Due to increased water recycling in process, and recycling of decant from the tailings storage facility, reagents required for water treatment will also be reduced on an annual basis.

Fortune has revised Table 4.4-1 from the *Mine Industry Questionnaire* to show only the chemicals that will or might be shipped to the NICO site, depending on the process option is chosen and installed for recovery of gold from the cleaner tails.

**Table 4.4-1 Updated Reagents and Quantities expected to be Utilized by NICO Mine**

| Reagent (Chemicals) | Consumption Rate | |
|---|---|---|
| | (kg/t) | (t/yr) |
| **Base Consumption** | | |
| Steel grinding rods | 0.537 | 910 |
| Steel grinding balls | 1.327 | 2,250 |
| Potassium Amyl Xanthate (PAX) | 0.290 | 492 |
| Methylisobutyl Carbinol (MIBC) | 0.050 | 85 |
| Flocculant | 0.115 | 63 |
| **Case 1** | | |
| Potassium Amyl Xanthate (PAX) | +0.030 | +51 |
| Methylisobutyl Carbinol (MIBC) | +0.050 | +85 |
| **Case 2** | | |
| Sodium Cyanide (NaCN) | 0.036 | 62 |
| Lime (CaO) | 0.125 | 213 |
| Sodium Hydroxide (NaOH) - cyanide mixing | 0.004 | 7 |
| Activated Carbon - CIL, Recycled from Southern Refinery | 0.430 | 730 |
| Sulphuric Acid ($H_2SO_4$) – cyanide destruction | 0.034 | 57 |
| Copper Sulphate ($CuSO_4$) – cyanide destruction | 0.004 | 6 |
| Sodium Metabisulphite ($Na_2S_2O_5$) - cyanide destruction | 0.121 | 205 |
| | | |
| **Seasonal Storage** – based on ETF treating 1,000,000 $m^3$/ year | | |
| Ferric Sulphate ($Fe_2(SO_4)_3$) treatment | 0.137 | 233 |
| Lime, Hydrated ($Ca(OH)_2$) | 0.088 | 150 |
| Flocculant | 0.001 | 2 |

Notes: kg/t ore = kilograms per dry tonne of ore fed to the plant; t/yr = dry tonnes per year;

Dry chemicals used as refinery flux will no longer be stored at NICO, although smaller quantities will be required for assay laboratory operation.

It should be noted that the chemicals no longer required at site represent a significant percentage of the tonnage that would have been shipped along the Government of the Northwest Territories Department of Transport road and the NICO site access road.

We hope this letter clarifies the changes in the ore processing procedures at the NICO site in light of the relocation of the hydrometallurgical facility. Fortune will update the MVEIRB on the results of the process options study once the final results are known. Any questions concerning this letter should be addressed to the undersigned.

Sincerely,

**Fortune Minerals Limited**

Rick Schryer, Ph.D.
Director of Regulatory and Environmental Affairs