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# PHYTOTOXICOLOGY TECHNICAL MEMORANDUM

Interim Report  
2003 Soil Assessment Program  
Cobalt National Historic Site  
Cobalt, Ontario

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## Executive Summary

In 2003, the Ontario Ministry of Environment (MOE) North Bay District Office requested that the Phytotoxicology Investigations Unit of the Environmental Monitoring and Reporting Branch, MOE, initiate a soil assessment program of the Cobalt historical tour sites included in the three walking trails and the Heritage Silver Trail. The scope of this program was to conduct a screening level assessment of soil metals, arsenic, mercury, and cyanide concentrations in the surface soil at the tour sites.

The MOE's 2003 sampling program showed that historical silver mining and milling activities have resulted in excessive concentrations of arsenic, antimony, cobalt, copper, lead, mercury, and nickel in soil and soil-like material at former mill sites in the Cobalt area. These concentrations far exceeded the MOE's background and generic effects-based Soil, Ground Water and Sediment Standards and were located throughout the four mill sites sampled in 2003. Concentrations of these elements varied dependent on historical land use, soil texture and physical location and were not always correlated. Specific areas of mill sites were found to be contaminated with individual elements while other areas contained high concentrations of multiple elements. This has implications for the management or remediation of the sites, if remediation is considered to be warranted, as one element may not be suitable to be used as a marker contaminant to represent all contaminants of concern. With a few minor exceptions, element concentrations were similar, within analytical error, between the 2mm (regular) and 250 $\mu$  (readily ingested) soil fractions. Initial bioaccessibility and metal speciation/mobility studies showed that these elements in certain locations were both bio-accessible and/or semi-mobile. The greater the bio-accessibility the greater the potential for both ecological and human health risks, as an increasing proportion of these elements can be dissolved in soil water and subsequently taken up by plants, and metals can be leached out of incidentally ingested soil in the human gastrointestinal tract. Further laboratory confirmation should be conducted to confirm both the bio-accessibility and the metals speciation/mobility.

This interim report presents the results of the 2003 sampling program; the remainder of the sampling program was conducted in 2004. A final report, combining the 2003 and 2004 results, will be reported at a later date.