# APPLICATION OF FERRIC SLUDGE TO IMMOBILIZE LEACHABLE MERCURY IN SOILS AND CONCRETE

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## ABSTRACT

A Hg-contaminated site in B.C. Province, Canada was caused by the previous operation of Hg-cell in chlor-alkali process for over 25 years. The soils and groundwater at the site are highly contaminated with mercury. An analysis of groundwater at the site has shown that most of the mercury is bonded with humic and fulvic acids (HFA) in colloidal form. The Hg-HFA colloids can be completely removed from the groundwater with ferric chloride treatment under optimized process conditions to form ferric sludge (FS), which is rendered non-leachable by standard TCLP (Toxicity Characteristic Leaching Procedure) test. The effluent discharged from a clarifier has achieved mercury levels of $<0.5\ \mu g\ l^{-1}$. The studies of mercury adsorption characteristics of FS show it has low mercury leachability by TCLP, and great mercury adsorption capability. This feature is the basis for the application of FS to immobilization of leachable Hg-contaminants in solid wastes. Full-scale stabilization tests of Hg-contaminated soil have been carried out, and the time-based stability of the treated soil has been monitored by TSP over a period of 60 days. All the results have shown a small variation in TCLP mercury levels within a range of 10–40 $\mu g\ l^{-1}$. Based on these results and with the approval of the B.C. Ministry of the Environment, 1850 tons of Hg-contaminated soils and 260 tons of Hg-contaminated concrete fines have been treated, stabilized with FS, and disposed in a non-hazardous waste disposal site.

**Keywords:** Ferric sludge, immobilization, remediation, leachable mercury, humic and fulvic acids, contaminated soil

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