Evaluation of MetaFix® Reagent Performance by Two Test Methods on Soils Heavily Contaminated with Arsenic

Overview

In 1996, twenty six arsenic (As) factories in a city located in the Guangxi Province of China were closed. A total of 200,000 tons of arsenic waste residue remains at several highly contaminated sites. Long term stockpiling of arsenic slag has resulted in severe soil contamination and damage to the ecological environment in the region. The arsenic content in the slag is up to 2-5%, with the leaching concentrations as high as tens to hundreds of mg/L.

Soil samples were collected from a demolished arsenic plant located in this mountainous region for treatment with MetaFix® Reagent via TCLP and water leaching testing. (Figures 1 and 2)

Figure 1: Location of a former Arsenic manufacturing site in China

Figure 2: Collection of soil samples

Treatability Study

A lab treatability study was conducted to determine the optimal MetaFix reagent formulation and dosing rate to treat the highly contaminated soil samples with a total arsenic concentration of 21,700 mg/kg.

TCLP (Toxicity Characteristic Leaching Procedure) tests were conducted at two different MetaFix reagent dosing rates, 2% and 5% (wt/wt), for a treatment time of one and four weeks. Both 2% and 5% MetaFix dosage rate resulted in >99% stabilization of arsenic over the control. (Figure 3)

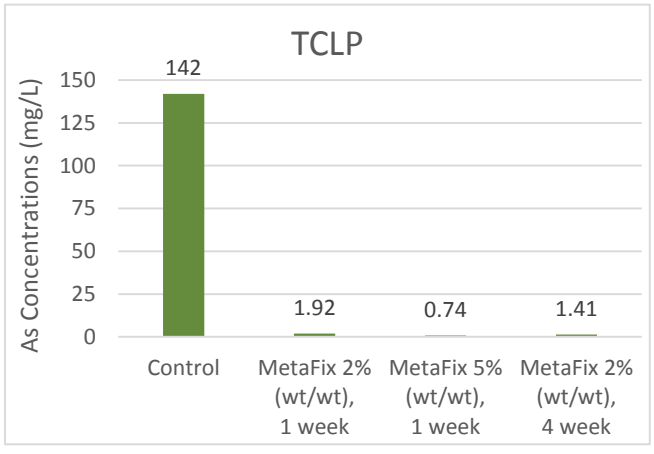

Figure 3: TCLP results for arsenic

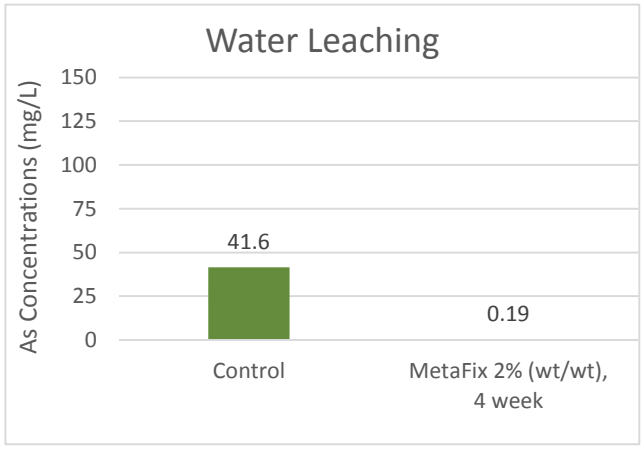

Figure 4: Water leaching results for arsenic

Water leaching analysis were also conducted to determine if ≤ 0.5 mg/L leachable As could be achieved in order to meet the Class One industrial sold waste landfill standard. (Figure 4)

Summary

The TCLP and water leaching studies demonstrated significant stabilization effect of the leachable arsenic. MetaFix reagent dosing as low as 2% achieved a 99% stabilization effect, even by the stringent TCLP testing protocol. Water leaching concentrations dropped from 41.6 mg/L to 0.19 mg/L with MetaFix applied at a 2% dosing rate. This meets the entry standard of Class One industrial sold waste landfill, thus, significantly reducing its disposal cost and environmental risk.

Information courtesy of Beijing Enviro-Chem, a PeroxyChem joint venture in China.