Environmental Solutions

MetaFix® Reagent
Case Study

Mercury Treatment to Non-Detect Levels at a Former Industrial Site with MetaFix® Reagent

Overview

A former chemical plant, located in east China, utilized acetylene to manufacture vinyl chloride. Mercuric chloride, which was used as a catalyst in the manufacturing process, was the source of the contamination. Soil concentrations of mercury (Hg) in the contaminated area ranged from 300 - 420 mg/kg. The remedial goal was to stabilize the soil and to then dispose of the treated soil at an offsite landfill so that the land could be developed for residential use.

Figure 1: MetaFix soil blending treatment of Hg impacted soils

Treatability Study

Treatability studies provide critical information for the success of the field implementation. The optimum MetaFix® Reagent formulation and the appropriate application dosage are evaluated on site soils, taking into consideration the site geochemistry.

	Control	MetaFix 0.5% (wt/wt)	MetaFix 1.0% (wt/wt)
Moisture (%)	18.3	18.5	20.0
pH	8.58	8.04	7.91
Hg (mg/kg)	315	293	314
SPLP (mg/L)	0.035	<0.001	<0.001

Table 1: Treatability Study Data showing the reductions of leachable mercury to non-detect levels with two different low dosages of MetaFix reagent.

The collective results from the treatability study concluded the optimum MetaFix formation could be applied at a 0.5% (wt/wt) dosage rate to achieve non-detect levels (<0.001 mg/L) of mercury in the soil. (Table 1)

Field Application

A pilot study was conducted with MetaFix applied at various dosages (0.5%, 1.0%, and 2.0% w/w) to compare performance of mercury stabilization via SPLP testing. The soil was treated in batches approximately 50 - 100 m^3 at a time. The MetaFix reagent was spread on the soil as a dry powder and was mixed with an excavator. Further mixing was then completed with a screening bucket. Water was added to adjust the moisture content close to the saturation level while the soil was mixed with an excavator bucket. The final mixing was completed

with the screening bucket to assure homogeneity and the soil was then covered and undisturbed to react anaerobically for 7 days.

Four treatment cells were evaluated for mercury stabilization against the baseline data via SPLP analysis. In all four treatment cells, with MetaFix dosage rates ranging from 0.5% to 2.0%, the mercury was stabilized to non-detect levels of < 0.0001 mg/L. (Figure 2)

Summary

The treatability study provided insight on the optimal MetaFix reagent formation and dosing recommendations, which were validated by the site pilot study. The MetaFix reagent dosing of 0.5% was selected for the full scale treatment.

The full scale implementation utilizes an integrated soil treatment mixing system where soil crushing/screening and reagent dosing/mixing can be completed in one process per batch (Figure 3). The treated soils are covered and allowed to react for 7 days.

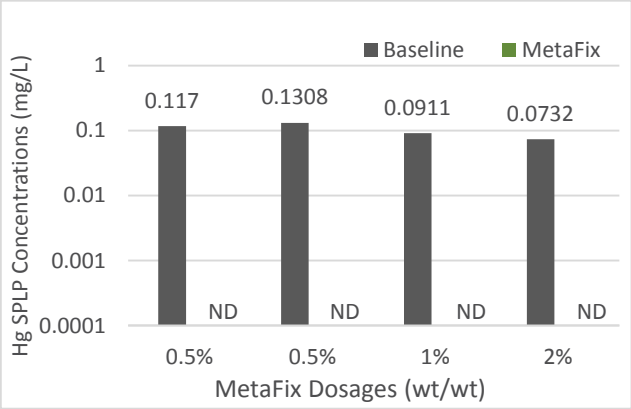

Figure 2: SPLP Evaluation of Hg stabilization of four treatment batches at various MetaFix dosing rates resulting in non-detect levels (<0.0001) in all treatment batches

Figure 3: Full scale treatment process

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