In-situ Stabilization of Metal-Contaminated Surface Soil: Theory for the Idealistic. (S09-essington085208-Oral)

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Abstract:

On a gross scale there are essentially two mechanisms available for the in-situ stabilization of metals-contaminated soil. The first, but often overlooked mechanism is to do nothing. Solids that are stable under the conditions in which a waste is produced, are generally unstable in a soil environment; thus, a phase change occurs resulting in minerals that are stable under the prevailing soil conditions. The second in-situ treatment option is to enhance the natural process by increasing the rate at which the final, stable state of the metal is achieved. The most commonly proposed mechanism of in-situ stabilization of metal cations (Pb, Cd, Cu, Ni, Zn) is metal phosphate precipitation. Metal phosphates are generally perceived to be orders of magnitude more stable than metal sulfides, sulfates, carbonates, ferrites, and (hydr-)oxides over a range of environmental conditions. However, thermodynamic evaluations indicate that metal phosphates may only be meta-stable phases in an environment. In this presentation, the results of a thermodynamic evaluation will be compared to the x-ray diffraction and electron microscopy results obtained through the analysis of a soil contaminated by Pb metal.

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Presentation Information:

Presentation Date: Wednesday, November 13, 2002
Presentation Time: 9:00 am

Keywords:

trace elements, mineral solubility, metal lability