In Situ Stabilization of Heavy Metals in Soil by Microbial Systems

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IN SITU STABILIZATION OF HEAVY METALS IN SOIL BY MICROBIAL SYSTEMS

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ABSTRACT

The Environmental Protection Agency has approved the concept that heavy metal immobilization in soil, sediment, and sludge is an acceptable form of remediation for hazardous waste sites. Many metal sulfides are highly insoluble in aqueous solution and thus would oe relatively immobile in soil and/or sludge. The feasibility of exploiting the activity of naturally—occurring sulfate—reducing bacteria in immobilizing toxic heavy metals as sulfides in soil was examined using the mercury-contaminated East Fork Poplar Creek flood plain as a model system. Laboratory studies indicated that mercury added to sul"fate-amended flood plain soils was immobilized rapidly due to enhanced sulfate reduction activity. However, long-term field studies showed that mercury mobility in the soil was extremely low. Further study of the chemical forms of mercury present in these soils using differential extraction procedures strongly suggested that much of the immobilized mercury was already present in the sulfide form. This implies that sulfate reduction activity has been instrumental in the immobilization of mercury in these flood plain soils. The enhancement of sulfate reduction activity in soils and sediments contaminated with mercury and other toxic heavy metals that form insoluble sulfides may be an effective treatment for the remediation of contaminated hazardous waste sites.