



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL RISK MANAGEMENT RESEARCH LABORATORY  
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OFFICE OF  
RESEARCH AND DEVELOPMENT

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Dear SITE Program Technology Profiles Document Recipient:

This summary is an addendum to the Superfund Innovative Technology Evaluation Program: Technology Profiles Tenth Edition, Volume 1 Demonstration Program document. The EPA document number and publication date are EPA/540/R-99/500a, February 1999, respectively. This information should be added to the document as pages 152a and 152b.

Sincerely yours,

A handwritten signature in black ink, reading "Annette M. Gatchett".

Annette M. Gatchett  
Associate Director for Technology  
Land Remediation Pollution Control Division

## SOLUCORP INDUSTRIES (Molecular Bonding System)

### TECHNOLOGY DESCRIPTION:

The Molecular Bonding System (MBS) is a process developed for the stabilization of a variety of media, such as soil, sludge, slag, and ash, that is contaminated with heavy metals. The process employs a proprietary mixture of nonhazardous chemicals to convert the heavy metal contaminants from their existing reactive and leachable forms (usually oxides) into insoluble, stable, nonhazardous, metallic-sulfide compounds that will achieve toxicity characteristic leaching procedure (TCLP) levels far below regulatory limits. The MBS process maintains the pH levels in the media within the range where the insolubility of the heavy metal sulfides is assured. The system also provides buffer capacity to ensure that the pH is not significantly altered by the addition of acids or caustics to the media.

As depicted in the diagram below, the MBS treatment process is completely mobile and easily transportable (to allow for on-site treatment). Waste material is screened and crushed as required to reduce particle sizes to an average 1-inch diameter (particle size reduction increases surface area, which maximizes contact with the reagents). The waste media is then mixed with powdered reagents in a closed-hopper pug mill (the reagent mixture is established through treat ability studies for the site-specific

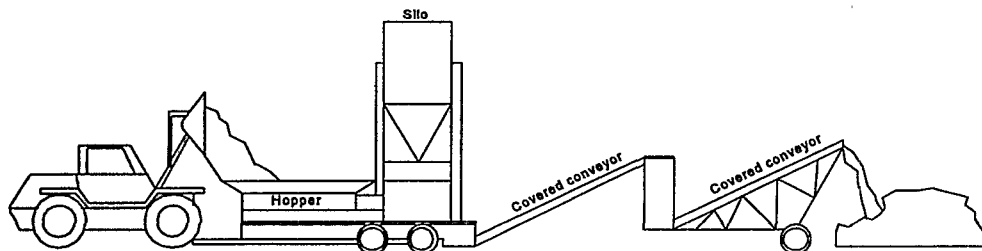
conditions). Water is then added to catalyze the reaction and to ensure homogeneous mixing. There is no curing time and the resulting increase in volume is between 2 to 3 percent. The treated media is then conveyed to a stockpile where it can be either returned to the original site or disposed in a landfill as cover, fill, or contour material.

MBS can also be applied with traditional in situ mixing techniques such as tillers, eliminating the need for excavating and preparing the soil.

The MBS process can also be used to stabilize waste "in line" during the manufacturing process, preventing the waste from being classified as hazardous. Commercial applications on slag from a secondary smelter are underway.

### WASTE APPLICABILITY:

The MBS process stabilizes heavy metals in soil, sludges, baghouse dust, ash, slag, and sediment. Heavy metals rendered inert by the process include arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc. The process can simultaneously stabilize multiple heavy metal contaminants. The presence of organics does not affect treatment by MBS.



Process Flow Diagram of the Molecular Bonding System

**STATUS:**

This technology was accepted into the SITE Demonstration Program in early 1995. A SITE demonstration was conducted at the Midvale Slag Superfund Site in Midvale, Utah in 1997. Three waste streams contaminated with As, Cd, and Pb were treated. Approximately 500 tons of each waste stream was treated. The treated wastes and soils passed EPA's Multiple Extraction Procedure. The MBS process has undergone extensive bench-scale and pilot-scale testing prior to its successful full-scale commercialization. The same reductions in the TCLP levels of hazardous contaminants achieved in the laboratory were achieved at five manufacturing site in five different states.

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