Hazardous Waste Clean-Up Information (CLU-IN) On-line Characterization and Remediation Databases Fact Sheet

United States Environmental Protection Agency

September 2011

This fact sheet provides an overview of the 10 on-line characterization and remediation databases available on the Hazardous Waste Clean-Up Information (CLU-IN) website (www.cluin.org/databases) sponsored by the U.S. Environmental Protection Agency's (EPA) Office of Superfund Remediation and Technology Innovation (OSRTI), Technology Innovation and Field Services Division (TIFSD). These databases provide information about pilot- and full-scale applications of innovative site characterization and treatment technologies for EPA remedial project managers, other federal and state personnel, consulting engineers, technology developers and vendors, remediation contractors, researchers, community groups, and individual citizens. They facilitate and encourage the hazardous waste remediation community to share knowledge about, and experiences with, innovative technologies.

Each database includes project profiles that provide background information on the site (name, location, and type), project information (scale, status, project dates, technology description, contaminants, and media treated), performance and cost data, points of contact, and references. These data are obtained from site managers, regulatory officials, and technology providers, as well as from published reports, conference proceedings, and other available reference materials.

The databases can be individually searched using a list of identified parameters for each database or using key words. In addition, a simultaneous search can be performed across most of the databases based on common search criteria (such as contaminant). The form to search across multiple databases can be found at: www.cluin.org/databases/search.

Number of Project Profiles In Each Database*

- Alternative Landfill Covers – 223
- In Situ Thermal – 152
- Chemical Oxidation – 135
- In Situ Flushing – 40
- Phytotechnology – 180
- MTBE Treatment – 426
- Fractured Bedrock – 237
- Remediation Technology Demonstrations – 438
- Nanotechnology – 31
- Ecological Revitalization – 130

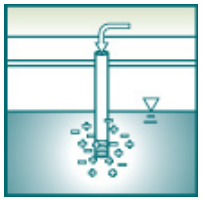
*As of September 2011.

ALTERNATIVE LANDFILL COVERS (WWW.CLUIN.ORG/PRODUCTS/ALTCOVERS)

Alternative landfill cover (ALC) systems are increasingly considered for use at waste disposal sites when equivalent performance to conventional final cover systems can be demonstrated or where some moisture is required to sustain biological processes. They have been implemented at sites such as municipal solid waste landfills, hazardous waste landfills, and radioactive waste sites. Unlike conventional covers that use materials with low hydraulic permeability, ALCs are designed to manage hydrological processes at an area, including precipitation, soil water storage, surface runoff, evapotranspiration, and infiltration to minimize percolation.

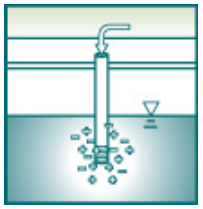
IN SITU THERMAL TREATMENT (WWW.CLUIN.ORG/PRODUCTS/THERMAL)

In situ thermal (IST) treatment includes technologies that involve steam injection, electrical resistance heating (ERH), conductive heating, radio-frequency (RF) heating, and hot air injection. These technologies treat chlorinated solvents, non-chlorinated volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), oils and petroleum products, polychlorinated biphenyls (PCBs), and wood preserving compounds in ground water and soil. IST technologies heat the subsurface to destroy contaminants or enhance their removal, including any present as nonaqueous phase liquids (NAPLs).



CHEMICAL OXIDATION (WWW.CLUIN.ORG/PRODUCTS/CHEMOX)

In situ chemical oxidation (ISCO) is the process of injecting oxidants and coamendments into the subsurface to chemically convert hazardous contaminants to nonhazardous or less toxic compounds that are more stable, less mobile, or inert. ISCO is useful in treating NAPLs and can be applied to contaminants that include chlorinated solvents, non-chlorinated VOCs, SVOCs, petroleum products, PAHs, PCBs, explosives and propellants, and pesticides. Commonly used oxidizing agents include permanganate (either sodium or potassium), Fenton's reagent (hydrogen peroxide and iron catalyst), hydrogen peroxide, and ozone.



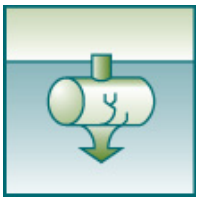
IN SITU FLUSHING (WWW.CLUIN.ORG/PRODUCTS/ISF)

In situ flushing (ISF) involves injecting or infiltrating an aqueous solution into a zone of contaminated soil or ground water, followed by extraction and aboveground treatment of the elutriate (the flushing solution mixed with contaminants). In rare cases, the flushing solution and treated contaminants may be left in place. The solutions used for ISF may consist of surfactants, cosolvents, acids, bases, oxidants, chelants, solvents, or water. Recent applications have also documented the use of cyclodextrin, a non-toxic, modified sugar, as a flushing agent. These flushing solutions typically increase the mobility or solubility (or both) of the contaminants. ISF can treat many organic and inorganic contaminants, including NAPLs, VOCs, SVOCs, PCBs, pesticides, non-volatile metals, and radioactive contaminants.

PHYTOTECHNOLOGY (WWW.CLUIN.ORG/PRODUCTS/PHYTO)

Phytotechnology is an emerging technology that uses various types of plants to degrade, extract, contain, or immobilize contaminants in soil, ground water, surface water, and sediments. Phytotechnology has been used to treat various contaminants, such as chlorinated solvents, metals, explosives and propellants, pesticides, PAHs, radionuclides, and petroleum hydrocarbon compounds.

MTBE TREATMENT (WWW.CLUIN.ORG/PRODUCTS/MTBE)



Fuel oxygenates such as methyl tert-butyl ether (MtBE) have been widely used for the past several decades in the U.S. as gasoline additives to boost octane ratings and to reduce air emissions associated with combustion of fuel. Aboveground or underground storage tank leaks or accidents that involve transport vehicles have contaminated soil and ground water with MtBE in many locations. In some cases, concentrations of MtBE have reached sources of drinking water. This database provides information on in situ and ex situ technologies that have been used to treat MtBE in ground water, soil, and drinking water.

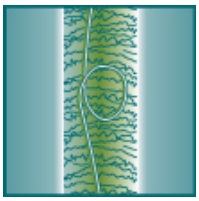
FRACTURED BEDROCK (WWW.CLUIN.ORG/PRODUCTS/FRACROCK)

Characterization and remediation of contaminated ground water at fractured bedrock sites are hampered by the complex geology, the heterogeneous distribution and orientation of the fractures, and the movement of contaminants and fluids in fracture networks and rock matrices. Several characterization and remediation technologies are currently being used both at the pilot- and full-scale levels to improve the understanding of these sites. This on-line database provides information on characterization and remediation technologies used at fractured bedrock sites.

REMEDIATION TECHNOLOGY DEMONSTRATIONS (WWW.CLUIN.ORG/PRODUCTS/DEMOS)

Before they are used in full-scale cleanup applications, new technologies or new applications of existing technologies are often tested in pilot-scale demonstrations. EPA has developed this on-line database to summarize information about selected pilot-scale demonstration projects. This database includes completed and ongoing soil and ground water remediation technology demonstrations that have been performed in North America. Characterization technologies and modeling are not addressed in these profiles, however.

NANOTECHNOLOGY (WWW.CLUIN.ORG/PRODUCTS/NANO)



Nanotechnology is an emerging technology that is generally defined as the ability to create and use materials, devices, or systems with a size of approximately 1 to 100 nanometers (nm). Applications of nanotechnology in environmental protection draw on the unique properties of nanomaterials and include (1) sensors for improved monitoring and detection capabilities, and (2) treatment and remediation techniques for cost-effective and rapid site cleanup.

ECOLOGICAL REVITALIZATION (WWW.CLUIN.ORG/PRODUCTS/ECOREV)

Ecological revitalization refers to the process of returning land from a contaminated state to one that supports a functioning and sustainable habitat. The ecological revitalization database contains information about completed and on-going projects where ecological revitalization was included as part of solutions to various environmental concerns. Project profiles provide information on site history, contaminants of concern, and the ecological revitalization approach taken at each site. EPA actively supports and encourages ecological revitalization, when appropriate, during and after the assessment and cleanup of contaminated properties under its cleanup programs.

How to Submit New Profiles or Update Existing Profiles

EPA encourages project managers, site owners, and technology vendors to add new profiles to the databases or to update existing profiles, especially for sites where work is undertaken with participation of federal or state project managers. All data submitted must be based on published literature. The approach for new profile submittal depends on the database. EPA will review submitted information before it is made available to the public.

Contact Us

If you have any questions or comments about the information provided in this fact sheet, or for more information about any of the databases identified in this fact sheet, please contact:

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Hazardous Waste Clean-Up Information (CLU-IN) Website: www.cluin.org