BIOREMEDIATION

SPECIALY LICENSED FACILITIES

Bioresmediation is conducted in specially licensed facilities situated at Waste Management landfills throughout North America. All are specifically designed, licensed and operated to provide waste generation and remediation companies with a responsive program for the expeditious removal, treatment and disposal of hazardous and non-hazardous industrial waste. (Not all facilities are licensed to accept KRC waste.)

TOSSSM TWO-STEP STATIC SYSTEM®

TOSS® is a two-stage solid phase bioremediation technology that involves both anaerobic and aerobic treatment stages. In the first stage, explosives-contaminated soil is combined with a compost source, an inoculum, vitamins and water to achieve anaerobic conditions. The resulting mixture is formed into a static pile or placed in a berm construction or box to facilitate the chemical reduction of nitramine and nitrate explosives.

In the second stage, the anaerobically treated soil is combined with yard waste compost and built into an aerated biopile. The biopile may be aerated by forced air conveyed through perforated piping buried within the pile or by turning the pile with a compost turner. Previous testing of TOSS® has demonstrated TNT removal efficiencies of >99%.*

* U.S. PATENT #6,066,722

BIIO-IN-A-BOXSM®

Bio-In-A-Box® is a Waste Management process for remediating petrochemical-contaminated soils in quantities of 1,000 cubic yards or less. In this process, the contaminated soil is blended with nutrients and custom-grown microorganisms and then placed in enclosed containers called “solid phase bio-reactors” for incubation. These containers may or may not be linked to aeration and vacuum systems. Once treated, the material may be landfilled, treated for metals, reused or returned to the customer in accordance with regulatory requirements.

THE BIOSITESM SYSTEM

The BioSiteSM System is Waste Management’s proprietary system for the large-scale bioremediation of soils contaminated with petrochemicals including, but not limited to:

• Acetone
• Benzene
• Toluene
• Methyl Ethyl Ketone (MEK)
• Petroleum hydrocarbons

The BioSiteSM System can also handle other contaminants, including:

• Aliphatic chlorinated hydrocarbons (e.g., Trichloroethylene)
• Spent molecular sieve from packing towers
• Chemical manufacturing wastes
• Pesticides

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Regulated compounds including Underlying Hazardous Constituents (UHC) are screened prior to acceptance. Soils co-contaminated with metals may be accepted depending on their concentration.

Using the Daramend® bioremediation process licensed from Adventus Remediation Technologies, Inc., BioSiteSM works by forming the contaminated soil into aerated biopiles around perforated pipes that circulate air through the mixture. Specially cultivated hydrocarbon degrading microorganisms and a blend of inorganic nutrients are then introduced to the pile. A synthetic cover is placed over the biopile and, within a few months, the contaminants are safely and naturally broken down into less-toxic compounds. Once treated, the material may be landfilled, treated for metals, reused or returned to the customer in accordance with regulatory requirements.

DDT contaminated soils may be treated using the Xenorem® bioremediation process licensed from AstraZeneca.

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THE BENEFITS OF OFF-SITE BIOREMEDIATION

Regardles of the technique used, off-site bioremediation by Waste Management offers numerous advantages over on-site treatment, window composting or incineration. These include:

• Lower costs compared to treating the soil at the original site or at an intermediate location
• An environmentally friendly process
• Controlled access to fully equipped, insured and permitted waste sites
• Stabilization of heavy metals (if any) prior to landfilling
• Waste Management’s comprehensive indemnification package
• Remediation backed by the knowledge, experience and financial resources of North America’s leading solid waste services company
• Off-site bioremediation services may be accessed from most North American locations via Waste Management’s WasteByRail program. For more information on WasteByRail services, visit www.wastebyrail.com.

In addition, Waste Management employs two patented processes for the rapid remediation of contaminated soils:

• Daramend®: Designed to accelerate the bioremediation of soils or sediments containing high concentrations of creosote, PCPs, PAHs, heavy oils and petroleum hydrocarbons. This product, licensed from Adventus Remediation Technologies, Inc., utilizes matrix-specific solid-phase organic amendments to create aquatic microsites where native microorganisms can grow, convert contaminants and degrade them. Daramend® products are matrix-specific solid-phase organic particles that are manufactured from natural botanical materials.

• Xenorem®: Developed by the biotech firm AstraZeneca, Xenorem® combines organic compounds derived from wood pulp, straw and animal manure to rapidly and naturally break down chlorinated pesticides, such as DDT, from contaminated soils. By carefully controlling the temperature and oxygen level of the combined waste, Waste Management technicians can degrade pesticides in contaminated soils while producing less harmful byproducts.

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The NEW Waste Management.

www.wm.com
Soil is unloaded at a staging area adjacent to the pile. Materials are fingerprinted and inspected for any foreign matter collected during the excavation process.

Loader places soil onto pile.

A blend of special chemicals and organisms is added.

A synthetic cover is applied to control emissions and humidity.

A blend of special chemicals and organisms is added.

Perforated pressure piping adds air to the pile.

Perforated vacuum piping removes air from the pile.

Recirculated air is periodically monitored to determine the rate of treatment.

Instruments monitor the pressure and temperature of the pile core.

The blower assembly circulates air through the perforated pipe aeration system.

The demister (knock out drum) collects the condensate.

BioSite™ System is a safe, cost-effective method for remediating the contaminated soils in quantities of 1000 yards or more. After being placed in a ventilated biopile, soil is treated with a blend of selected chemicals and microorganisms that naturally break the toxins down into less harmful compounds. After treatment, treated soils can be safely landfilled or taken off-site for other uses.

Bioremediation