U.S. Environmental Protection Agency | Office of Solid Waste and Emergency Response | Office of Research and Development

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BIOREMEDIATION IN THE FIELD

An information update on applying bioremediation to site clean-up.

Welcome

The Bioremediation Field Initiative is designed to provide EPA and State project managers, consulting engineers, and industry with timely information regarding new developments in the application of bioremediation. These applications include the cleanup of abandoned waste sites, industrial facilities, leaking underground storage tanks and ground water impacted from these sources. The Technology Innovation Office (TIO), an office within the Office of Solid Waste and Emergency Response (OSWER), in conjunction with the Office of Research and Development's (ORD) Office of Technology Transfer and Regulatory Support, will produce this bulletin on a regular basis to serve as the principal information transfer mechanism for the Bioremediation Field Initiative. Future issues of Bioremediation will feature articles highlighting field and laboratory tests of bioremediation techniques conducted by EPA's Regional Offices, ORD, States, various Federal agencies, and others. Future issues will also keep readers updated on conferences and seminars, new publications, noteworthy journal articles, and other newsworthy events in the field of bioremediation.

EPA Launches the Bioremediation Field Initiative

In February 1990, EPA Administrator William Reilly hosted a meeting for over 70 representatives of biotreatment companies, site cleanup contractors, environmental organizations, academia, and other Federal agencies. The purpose of the meeting was to develop an agenda for the 1990's outlining strategies for increasing the use of bioremediation for the cleanup of hazardous waste sites and petroleum products. One of the major themes highlighted at the meeting was the need to expand the nation's field experience regarding bioremediation techniques and to collect and disseminate performance data from those field experiences. The meeting participants recommended that EPA serve as the focal point in conducting bioremediation field tests and evaluations, and in documenting and distributing the results.

Based on recommendations from the February meeting, EPA's new Bioremediation Field Initiative has been instituted jointly by OSWER and ORD. The initiative is designed as a three-pronged effort over the next two years. The first aspect of the Initiative is to more fully document the performance of full-scale bioremediation field applications. Performance evaluations will be carried out on in situ and ex situ bioremediation projects and will assess treatment effectiveness, operational reliability, and cost. OSWER and ORD intend to focus on sites utilizing in situ biological treatment for surface and subsurface contamination, but sites utilizing other bioremediation techniques are also being considered.

The second aspect of the Initiative is to provide technical assistance to EPA and State site managers overseeing or

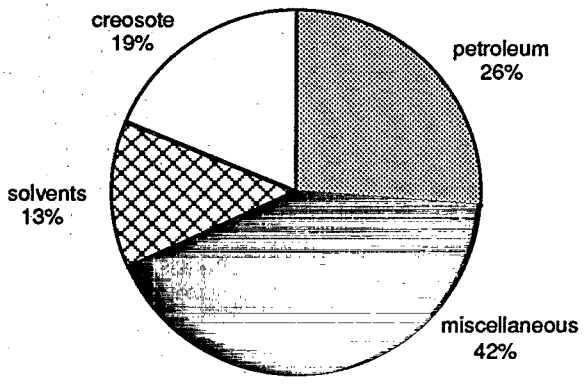


Figure 1: Major Waste Types Being Remediated

considering the use of bioremediation. Technical assistance can be provided to assist with site characterization, treatability study design, or the interpretation of results. This assistance is being provided through the ORD Technical Support Centers in Ada and Cincinnati.

The third aspect of the Initiative is the development of a treatability data base. Data is being compiled on lab, pilot, and full-scale operations being undertaken at CERCLA, RCRA, and UST sites. Treatability data is being obtained from the Regions, States, other Federal agencies, and the private sector. The data base will be a central repository of current data on progress in the field in determining the treatability of various contaminants and matrices. This information will be initially available through EPA's Alternative Treatment Technology Information Center (ATTIC) (see page 16). This information will also be available as part of a bioremediation expert system which is being developed by ORD. This system will be available in FY 92. As this information becomes available, notification will be provided in this bulletin.

Bioremediation Projects Identified at CERCLA, RCRA and UST Sites

To date, 133 sites have been identified across the country where bioremediation projects are being considered, planned, or have fully operational units. These sites and ancillary information about the sites are provided in Table 1. This Table will be updated and new sites added quarterly. When significant advancements are achieved at these sites, articles on the sites will be featured in this bulletin.

Data compiled on these sites show that bioremediation is being undertaken for three major waste categories: petroleum, creosote (with and without pentachlorophenol) and solvents (Figure 1). These three waste types comprise about two-thirds of the waste types being biologically remediated. CERCLA, RCRA and UST sites are included in this assessment. Figure 2 depicts the legislative authority under which these sites are categorized. As indicated, most of the information available is from Superfund sites. The information received to date is largely from the EPA Regional offices.

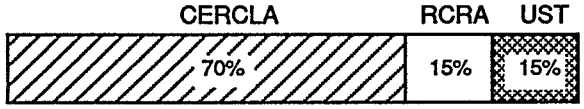


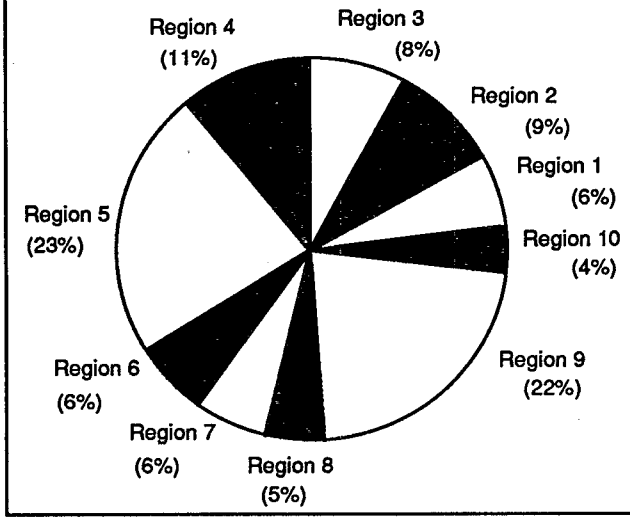
Figure 2: EPA Program Distribution of the Sites Using Bioremediation

Some states (e.g. California, Michigan and New York) have provided data on their sites; however, information is still being received from a number of other states. Consequently, the number of sites contained in this list will continue to expand, especially where the States have the lead on the sites, e.g. UST sites.

Figure 3 shows the distribution, by Region, of the sites identified in Table 1. Federal- and State-lead projects are included in this analysis.

Figure 4 depicts the various stages of implementation of the bioremediation projects identified in Table 1. Roughly, one-third are in the planning stage, one-third are undergoing or have completed treatability studies, and one-third are between commencement of design and project completion.

Figure 3: Distribution of Bioremediation Projects by Region



Field Evaluation Sites

Based on nominations received from the Regions and the States, four sites are being considered for field evaluations under the Initiative. The types of sites include 1) a creosote site, 2) a site contaminated with trichloroethylene, dichloroethylene and vinyl chloride, 3) an ethylene glycol site, and 4) an underground storage tank site. As work proceeds on these sites and evaluations are performed, information will be made available immediately in this bulletin and through other EPA publications. For sites with full-scale bioremediation projects, Regional and State site

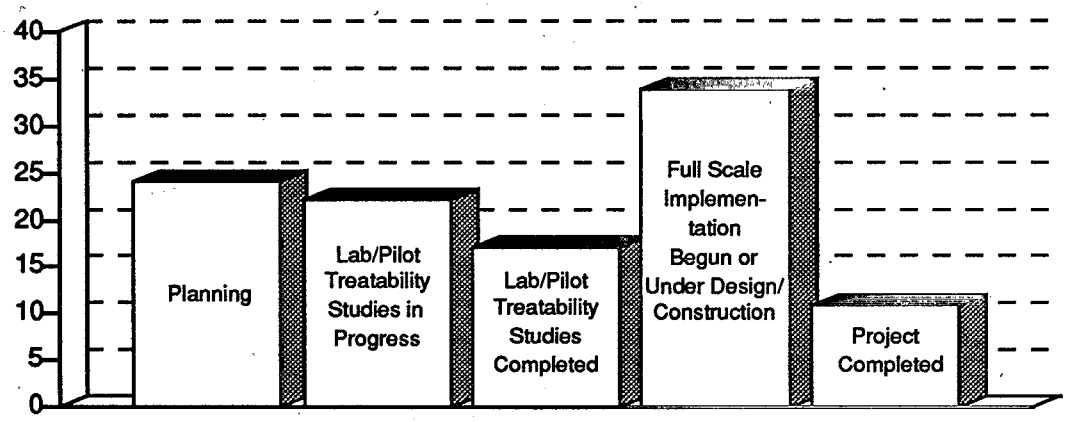


Figure 4: Number of Bioremediation Projects at Various Stages of Implementation

managers interested in nominating their site for the evaluation program should contact Fran Kremer (see below).

Request for Site Information from Regions, States, and the Private Sector

If you have information on a site using bioremediation that is not identified in Table 1, please submit this informaiton in writing to the Coordinator of the Initiative. Additionally, if you have laboratory-, pilot- or full-scale treatability data on a site, please have a copy sent to the Coordinator, if it has not already been sent.

Bioremediation Field Initiative Contacts

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This initiative is a cooperative effort among the Technology Innovation Office (TIO), Office of Solid Waste and Emergency Response (OSWER) and the Office of Technology Transfer and Regulatory Support (OTTRS) and the Office of Environmental Engineering and Technology Demonstration (OEETD), Office of Research and Development (ORD). Major contributors to this initiative include the waste programs in the EPA Regional Offices and the following laboratories in ORD: Ada, OK; Athens, GA; Cincinnati, OH; Gulf Breeze, FL; and Research Triangle Park, NC.

TABLE 1

CERCLA/RCRA/UST SITES CONSIDERING, PLANNING, OR OPERATING FULL-SCALE BIOREMEDIATION SYSTEMS

Region	Site/Location/Lead	Contact/Phone Number	Contaminants/Media	Status	Clean-up Levels	Treatment
I	Iron Horse Park Billerica, MA PRP lead	Don McElroy 617-223-5518 FTS 833-1518	Petroleum hydrocarbons/ soil	Treatability studies completed 1989; ROD signed 9/15/88; currently in design stage	60-80% removal or less than 1 ppm PAH; 50-60% removal of PHCs; nC_{17}/pristane ratio < or =0.2	Excavate to treatment cell - surface treatment
I	Charles George Landfill Tinsboro, MA Fund lead	Dave Dickerson 617-573-5735 FTS 833-1735	Arsenic, DOC, benzene, ethyl benzene/soil, groundwater, sediment	Design stage; ROD signed 9/88	MCLs for soils; risk-based levels for sediment, groundwater and landfill gas	
I	Baird & McGuire Holbrook, MA Fund lead	Paula Fitzsimmons 617-573-5738 FTS 833-1738	Pesticides (chlordane), dioxin, arsenic/groundwater	Under construction; ROD signed 9/30/86	State of MA drinking water standards	Bioreactor
I	Sylvester Nashua, NH State lead enforcement	Chet Janowski 617-573-9623 FTS 833-1623	Phenols, MEK, acetone/groundwater	Treatability study complete; conducting remediation since July 1986	State of NH drinking water standards	Bioreactor (activated sludge with extended air)
I	Charlestown Navy Yard Boston NHP National Park Service Boston, MA State-lead enforcement	Stephen Carlson 617-242-5680	PAHs from creosote/sediments	Planning pilot project for FY 91	Not yet established	In situ
I	General Electric Pittsfield, MA TSCA lead	Joan Blake FTS 382-6236 202-382-6236	PCBs/pond, river sediment	Undergoing pilot treatability studies	2 ppm per peak	In situ
I	Pine Street Canal Burlington, VT Fund lead	Ross Gilleland 617-573-5766 FTS 833-1766	Coal tar, PAHs/soils, sediments	Conducting bench-scale tests, Fall 1990; supplemental RI/FS in progress	Not yet established	In situ
I	Hamilton Standard Windsor Locks, CT RCRA lead	Gina Snyder 617-573-9674 FTS 833-1674	Carbon tetrachloride, PCBs, TCE, PCE, TCA/soil, groundwater	Planning to conduct treatability studies in FY 91	Not yet established	In situ
II	Renora, Inc. NJ	Joyce Harney 212-264-6313 FTS 264-6313	PAHs/soil	Treatability study complete		In situ
II	FAA Technical Center Atlantic City, NJ PRP lead	Carla Struble 212-264-4595 FTS 264-4595	JP-4 jet fuel/soil, groundwater, floating product	ROD signed 9/89; RD stage	NJ soil action levels; NJ MCLs	Groundwater extraction and addition of nutrients for subsequent re-injection, in situ biodegredation
II	Kin-Buc Landfill, NJ PRP lead	Kim O'Connell 212-264-8127 FTS 264-8127	PCBs/soil,sediment; MeCl, benzene/groundwater	Beginning groundwater treatability studies; ROD signed 9/88	Not yet established	Undetermined
II	GEMS Landfill Camden County, NJ PRP lead	Matt Westgate 212-264-3406 FTS 264-3406	Various organic and inorganic compounds/groundwater, leachate	Treatability studies in next 6 months	Not yet established	Undetermined
II	Nascolite Millville, NJ Federal lead	Keith Kollar 212-264-1576 FTS 264-1576	Methylmethacrylate, volatiles and semi-volatiles/soil, groundwater	Soil treatability studies conducted 9/90; ROD scheduled for 1991	NJ interim soil action levels for methylmethacrylate: 50 ppm (surface soil); 5 ppm (subsurface soil); and 350 ppb (groundwater)	Undetermined

Shading indicates non-CERCLA sites.

CERCLA/RCRA/UST SITES CONSIDERING, PLANNING, OR OPERATING FULL-SCALE BIOREMEDIATION SYSTEMS

Region	Site/Location/Lead	Contact/Phone Number	Contaminants/Media	Status	Clean-up Levels	Treatment
II	Osmose Buffalo, NY State lead	Jaspal Singh Wallia NYSDEC 716-847-4585	Creosote, fuel oil	Land treatment ongoing	Not yet established	Land treatment
II	General Motors Massena, NY Enforcement lead	Lisa Carson 212-264-6857 FTS 264-6857	PCBs, PAHs, volatiles/soil, groundwater	Conducting bench-scale studies	Proposed 10 ppm PCBs	Undetermined
II	Alcoa/Reynolds Metals St. Lawrence/Grasse St. Lawrence County, NY	Lisa Carson 212-264-6857 FTS 264-6857	PCBs/river sediments	Currently in RI stage	Not yet established	Undetermined
II	General Electric State lead	Charles Goddard NYSDEC	PCBs			
II	Kaispel Construction Site Horseheads, NY State lead	Frank Padudo NYSDEC 518-457-2462	Gasoline, benzene/soil, groundwater	Remediation completed 10/89	Drinking water standards	In situ (subsurface)
II	Syracuse UST lead	Chris O'Neill NYSDEC				
II	American Linen Stillwater, NY Enforcement lead	Morey Anderson Biotrol, Inc. 612-448-2515	BTX, PAHs, VOCs, VTX/soil	Began land treatment operations 9/90		Land treatment
III	Ordinance Works Disposal Areas, WV Enforcement lead	Bonnie Gross 215-597-9023 FTS 597-9023	PAHs/soil	ROD signed 9/29/89; currently conducting treatability studies	45 ppm carcinogenic PAHs	Land treatment
III	L.A. Clarke & Son VA Enforcement lead	Gene Wingert 215-597-0517 FTS 597-0517	Creosote/soil	Treatability study and RI/FS ongoing; ROD signed 3/91	10 ppm carcinogenic PAHs	In situ (surface and subsurface)
III	Leetown Pesticides Leetown, WV Federal lead	Andy Palestini 215-597-1286 FTS 597-1286	DDT, lindane/soil	Treatability study conducted Spring 1990; now reevaluating remedial action	300 ppb DDT; not yet established for lindane	Undetermined
III	Atlantic Wood Portsmouth, VA PRP lead	Drew Lausch 215-597-1727 FTS 597-1727	PAHs from wood preserving/soil, groundwater	RI/FS ongoing; ROD 3/91	Not yet established	Undetermined
III	Avtex Fibers Front Royal, VA Unit #1 PRP lead	Bonnie Gross 215-597-9023 FTS 597-9023	Arsenic, zinc, lead, carbon disulfide, hydrosulfide, phenol, cadmium/ groundwater	Treatability study planned	.05 mg/l arsenic; 5 mg/l zinc; .05 mg/l lead; .7 mg/l carbon disulfide; .3 mg/l phenol; .01 mg/l cadmium (not yet established for hydrosulfide)	Biological waste water treatment
III	Avtex Fibers Front Royal, VA Unit #2 Fund lead	Bonnie Gross 215-597-9023 FTS 597-9023	PCBs/soil	ROD signed September 1990; no treatability study needed	10 ppb PCBs	Biological waste water treatment

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CERCLA/RCRA/UST SITES CONSIDERING, PLANNING, OR OPERATING FULL-SCALE BIOREMEDIATION SYSTEMS

Region	Site/Location/Lead	Contact/Phone Number	Contaminants/Media	Status	Clean-up Levels	Treatment
III	Drake Chemical Lock Haven, PA Fund lead	Roy Schrock 215-597-0913 FTS 597-0913	Pesticides, DCE/soil, groundwater	Planning treatability study	MCLs	BACT
III	Heleva Landfill Ormrod, PA Fund lead	Richard Watman 215-597-3155 FTS 597-3155	Solid organics, acetone, TCE, DCE/soil, groundwater	Treatability study done as part of remedial study 7/90; pilot study planned	Being revised	
III	ARC Gainesville, VA RCRA lead	Robert Stroud 215-597-8214 FTS 597-8214	Chlorobenzene/soil	Treatability study conducted 6/90; planning pilot study	Unknown	Bioremediation unit on-line since 10/89
III	Whitmore Labs Myerstown, PA Fund lead	Tony Dappalone 215-597-3153 FTS 597-3153	Arsenic, aniline, still bottom wastes/soil and groundwater	Limited treatability study completed 6/90	Arsenic above background levels; Saturated soils: benzene .002 mg/kg; trichloroethene .004 mg/kg; tetrochloroethene .012 mg/kg; aniline .002 mg/kg; Unsaturated soils: benzene .009 mg/kg; trichloroethene .017 mg/kg; tetrochloroethene .051 mg/kg; aniline .009 mg/kg	Biological treatment; clay and soil capping
IV	Brown Wood Preserving Live Oaks, FL Enforcement lead	Martha Berry 404-347-2643 FTS 257-2643	PAHs, creosote/soil	Last load of contaminated soil in surface treatment area (about finished); will monitor 3 years; treatability study conducted	100 ppm PAHs total	Land treatment; surface treatment lined with clay berms 5-6'
IV	American Creosote Works Pensacola, FL Fund lead	Natalie Ellington 404-347-2643 FTS 257-2643	Creosote, PAHs, PCP, dioxins/soil	ROD 9/89 - unit 1; bench-scale treatability study completed 9/89 by Gulf Breeze Labs; pilot tests 1/91; full scale unit planned for FY 92; ROD 6/91 - unit 2	30 ppm PCP; 50 ppm carcinogenic PAHs; 2.5 ppb dioxins	Soil washing, bioreactor
IV	American Creosote Works Jackson, TN Unit #1 Fund lead	Tony DeAngelo 404-347-7791 FTS 257-7791	Creosote/soil	Treatability study completed	100 ppm for 6-8 indicators	Land treatment
IV	American Creosote Works Jackson, TN Unit #2 Fund lead	Tony DeAngelo 404-347-7791 FTS 257-7791	Creosote/soil	Remedial study underway	100 ppm for 6-8 indicators	Land treatment
IV	White House Waste White House, FL Fund lead	Tony Best 404-347-2643 FTS 257-2643	Acids, PCB, waste oil, creosote/groundwater	Bench treatability study completed; planning risk assessment	Not yet established	Possible bioremediation
IV	Coleman-Evans White House, FL Fund lead	Tony Best 404-347-2643 FTS 257-2643	PCP/soil, groundwater	Remedial design underway; pilot study planned	25 ppm sediments, soil; 1 ppm groundwater	Bioreactor
IV	Dubose Oil Containment FL Enforcement lead	Martha Berry 404-347-2643 FTS 257-2643	Oil, minimal PCP/soil	Currently in technology selection phase; treatability study within a year	Unknown	Land treatment

Shading indicates non-CERCLA sites.

CERCLA/RCRA/UST SITES CONSIDERING, PLANNING, OR OPERATING FULL-SCALE BIOREMEDIATION SYSTEMS

Region	Site/Location/Lead	Contact/Phone Number	Contaminants/Media	Status	Clean-up Levels	Treatment
IV	Carolawn Carolawn, SC Enforcement lead	Steve Sandler	VOCs/groundwater	Planning bench-scale studies	Acetone 710 ug/l; cis-DCE 70 ug/l; trans-DCE 120 ug/l; TCA 200 ug/l; TCE 5 ug/l; Pb 5 ug/l	
IV	Koppers Florence, SC RCRA lead	Bob Pultrey 404-347-7603 FTS 257-7603	Creosote, PCP, arsenic (CCA)/soil, groundwater	Treatability study to be conducted early 1991	Unknown	Land treatment
IV	Cape Fear Wood Preserving Fayetteville, NC Fund lead	Jon Bornholm 404-347-7791 FTS 257-7791	PAHs, arsenic, creosote/ soil, groundwater	Planning treatability studies	Soil: 94 mg/kg arsenic, 2.5 mg/kg carcinogenic PAHs, 100 mg/kg total PAHs; Groundwater: 10 ug/l carcinogenic PAHs, 14,350 ug/l noncarcinogenic PAHs; Surface water: 12 ug/l arsenic Sediments: 94 mg/kg arsenic, 3 mg/kg total PAHs	Soil washing followed by treatment in bioreactor of soil finds
IV	Celanese Fibers Operations Shelby, NC PRP lead	Ken Mallary 404-347-7791 FTS 257-7791	Ethylene glycol, benzene, acetone chromium/groundwater; bis(2-ethylhexyl)phthalate/ sediments; chromium, antimony, acetone/soil	Bioreactor on-line since 8/2/89; treatability studies complete	State of North Carolina MCLs	Bioreactor
IV	Langdale Facility Sweetwater, TN RCRA lead	Charles Burroughs 615-741-3424	Creosote (K001 waste)/soils, sludges	Contaminated soil and sludge excavated; site capped after biotreatment	Not yet established	Land treatment using bacteria, nutrients, and cometabolite
IV	Shavers Farm Shelby County, GA Removal lead	Chuck Eger 404-347-3931 FTS 257-3931	2-methoxy-3, 6-dichlorobenzoic acid, benzonitrile/soil	Planning treatability studies; will be recieving workplans in the next 60 days	25 ppm benzonitrile	Undetermined
IV	City Industries Winter Park, FL Fund (for studies) and Enforcement leads	Diane Scott 404-347-2643 FTS 257-2643	Acetone, MEK, TCE, TCA/groundwater	Treatability study to be initiated 1st quarter FY 91	Varied, based on Reference Dose Limits and Federal drinking water standards: 700 ug/l acetone; 200 ug/l MEK; 3.0 ug/l TCE.	Pump and treat, carbon adsorbtion, and biological oxidation
IV	Stallworth Timber Beatrice, AL	Jason Darvey 404-347-3931 FTS 257-3433	PCP, creosote/ground water, soil			
IV	Alabama State Docks Mobile, AL	Jason Darvey 404-347-3931 FTS 257-3433	PCP, creosote			
V	Galesburg/Koppers, IL State lead	Brad Bradley 312-886-4742	Phenols, chlorophenol, PCP, PAHs/soil	Conducting pilot study; ROD signed 7/89; starting design phase in 3 months	Not yet established	Land treatment; in situ with amendments. Amendments and applications not yet determined
V	Cliff/Dow Dump, MI PRP lead	Lida Tan 312-886-1842	Wood tar, acetic acid, phenol, benzene, PAHs	Conducted treatability studies; currently in pre-design stage	Not yet established	Forced aeration
V	Burlington Northern, MN State/Federal lead (split lead)	Amy Blumberg 312-353-9306	Creosote/soil	Currently conducting bioremediation; ROD signed 6/4/86	Groundwater: 28 mg/l carcinogens; 300 mg/l non-carcinogens Soil: detoxification levels	In situ

Shading indicates non-CERCLA sites.

CERCLA/RCRA/UST SITES CONSIDERING, PLANNING, OR OPERATING FULL-SCALE BIOREMEDIATION SYSTEMS

Region	Site/Location/Lead	Contact/Phone Number	Contaminants/Media	Status	Clean-up Levels	Treatment
V	Seymour Recycling, IN Unit #1 PRP lead	Jeff Gore 312-886-6552	VC, TCE, DCE/groundwater	Preliminary stages; no ROD signed	Drinking water standards	Proposed bioremediation of tetrahydrofurans in groundwater
V	Seymour Recycling, IN Unit #2 PRP lead	Jeff Gore 312-886-6552	VC, TCE, DCE/soil	ROD signed 9/87; bioremediation of soil completed; no treatability studies conducted	None established	Biodegredation of heavy hydrocarbons and non-volatiles
V	Allied Signal/Bendix St. Joseph, MI PRP lead	John Kuhns FTS 353-6556	TCE, DCE, VC/groundwater	Pilot scale field demonstration scheduled for 3rd quarter 1991; pilot bench-scale tests have been completed off-site	Not yet established	In situ treatment using indigenous methanotrophs
V	New Lyme, OH Fund lead	Darryl Owens 312-886-7089	Ethyl benzene; methylene chloride; phthalates/groundwater	Conducted pilot study 1/88; final process to begin operation by 11/90	68 ug/l ethyl benzene; 473 ug/l methylene chloride; 9.2 ug/l phthalate	Rotating biological reactors
V	Reilly Tar & Chemical St. Louis Park, MN Enforcement lead	Darryl Owens 312-886-7089 MPCA contacts: Doug Beckwith 612-296-7301 Mike Scott 612-296-7297	Creosote, PAHs/soil, groundwater	Planning treatability study; in situ under design	Not yet established	In situ (surface and subsurface) using additional nutrients (N, P)
V	Reilly Tar, IN Fund lead	Dion Novak 312-886-4737	Creosote/soil; benzene, ammonia, pyridine/groundwater	Treatability studies completed	Not yet established	Undetermined
V	Sleeping Bear Dunes National Lakeshore UST lead	Phil Durgin 702-798-2100 John Wilson 405-332-8800	Gasoline/groundwater	Site investigation completed	Not yet established	Natural biodegredation - no amendments
V	Joslyn MFG, MN State enforcement lead	Cliff Tovaroski 612-296-7827	PAHs, PCP, dioxin, furans/soil	MN declaration 1988 - no concurrence by EPA; design completed	Unknown	Land treatment using irrigation and addition of nutrients
V	Union Carbide, OH Enforcement lead	Kathleen Warren 312-353-6756	VOCs, dioxin, mono- dichlorinated biphenyls/soil, groundwater	Remedial investigation and treatability studies completed	Not yet established	Bioreactor
V	St. Louis River, MN State lead	Debra Siebers 312-353-9299	PAHs/soils, sediments	Planning treatability study	Not yet established	Undetermined
V	McGillis Gibb, MN Fund lead	Darryl Owens 312-886-7089	PAHs, PCP/groundwater	Treatability and pilot studies completed12/89; report due 12/90	Not yet established	Fixed film aerobic reactor
V	Organic Chemical, MI Fund lead	Tom Williams 312-886-6157	Oil, TCE, toluene/groundwater	Waiting for feasibility study to do remediation on TCE and toluene; working on additional workplan for oil	Not yet established	Undetermined
V	Sheboygan Harbor Sheboygan, WI PRP lead	Bonnie Eledir 312-886-4885	PCBs/sediment	Treatability studies to be completed Fall 1990; in situ studies underway; facility under construction	Not yet established	Treatment ongoing without enhancement in enclosed facility

Shading indicates non-CERCLA sites.

CERCLA/RCRA/UST SITES CONSIDERING, PLANNING, OR OPERATING FULL-SCALE BIOREMEDIATION SYSTEMS

Region	Site/Location/Lead	Contact/Phone Number	Contaminants/Media	Status	Clean-up Levels	Treatment
V	Allied Chemical Ironton, OH Enforcement lead	Jim Van der Kloot 312-353-9309 FTS 353-9309	PNAs, benzene/soil	Conducting pilot studies	Not yet established	In situ land treatment
V	Duell and Gardner Muskegan, MI Fund lead	Carla Johnson 312-886-5993	Volatiles, semi-volatiles/soil, groundwater	Conducting treatability studies	Not yet established	Undetermined
V	Moss American Milwaukee, WI Fund lead	Betty Lavis 312-886-5993	PAHs/soil, sediments	Pilot study completed; ROD signed 9/27/90; design stage Summer 1991	6.1 ppm PAHs	Slurry bioreactor using indigenous bacteria
V	Fisher-Calo LaPorte, IN Lead pending (probably PRP)	Brad Bradley 312-886-4742	TCE, DCE, DCA, PCBs/soil, groundwater	ROD signed 8-7-90; design stage	5 ppb TCE; 70 ppb DCE; 200 ppb DCE; drinking water standards used where possible	Undetermined
V	Parke-Davis Holland, MI RCRA lead	Dave Petrovski 312-886-0997	Benzene, methanol, isopropenol, fuel/soil, groundwater	Approaching design phase	Not yet established	Undetermined
V	BP Oil Company Toledo, OH UST lead	Stephen Bouchard 312-886-7569	Petroleum/soil	Discussing bioremediation as an option; no studies underway	Not yet established	Land treatment
V	BP Oil Company Lima, OH	Stephen Bouchard 312-886-7569	Petroleum/soil	Discussing bioremediation as an option; no studies underway	Not yet established	Land treatment
V	Aristech Chemicals Haverhill, OH RCRA lead	Jim Saric 312-886-0992	Cumene, phenols/soil, groundwater	Conducting treatability studies	4.1 mg/kg phenol 4.67 mg/kg cumene	Undetermined
V	Hentchels Travers City, MI UST lead	Bob Kettner 616-775-9728	Gasoline/soil, groundwater	Remediation completed; some contamination remains	Non-detection levels	In situ
V	Mayville Fire Department Mayville, MI UST lead	Sue Kaelber-Matlock 517-771-1731	BTEX/soil, groundwater	Conducting bioremediation	Groundwater: 1 ppb BETX Soil: 10 ppb BETX	Bioremediation using oxygen with no addition of nutrients
V	Meyers Store #12 Grand Rapids, MI UST lead	Bonnie White 616-456-5071	gasoline/soil, groundwater	Pilot studies conducted 1988; bioremediation will no be used at this site	Undetermined	In situ
V	Marathon Station Kentwood, MI UST lead	Bonnie White 616-456-5071	gasoline/groundwater	Conducting bioremediation	Background non-detection levels or risk-based levels	Fixed film bioreactor with submerged plate
V	B & F Trucking Company Rochester, MN UST lead	Becky Lofgren MPCA 612-296-7391	BTEX, gasoline/soil, groundwater	Currently conducting bioremediation	Unknown	In-situ pump treatment; reinfiltration gallery
VI	Sheridan Disposal Services Houston, TX Enforcement lead	Ruth Israeli 214-655-6735 FTS 255-6735	Benzene, phenols, PCBs/soil, surface water	Beginning pilot study; ROD signed 12/88; Currently in design stage	PCBs as an indicator of other organics (25 ppm PCBs)	Bioreactor

Shading indicates non-CERCLA sites.

CERCLA/RCRA/UST SITES CONSIDERING, PLANNING, OR OPERATING FULL-SCALE BIOREMEDIATION SYSTEMS

Region	Site/Location/Lead	Contact/Phone Number	Contaminants/Media	Status	Clean-up Levels	Treatment
VI	French Limited Crosby, TX	Judy Black 214-655-6735 FTS 255-6735	Benzene, vinyl chloride, DCE, PCBs/ sludges, soil and groundwater	ROD signed 3/88; project under design	Soils and sludges: BAP 9 ppm; PCB 23 ppm; VOCs 43 ppm; arsenic 7 ppm; benzene 14 ppm; groundwater MCLs	Treatment in a logoon for sludges and soils, pump and treat and/or in situ for groundwater
VI	Atchinson Santa Fe, NM Enforcement lead	Susan Webster 214-655-6730 FTS 255-6730	Hydrocarbons, diesel/soil	Some treatability studies completed; ROD signed 9/23/88; planning pilot project	Not yet established	In situ (surface and subsurface)
VI	Brio Refining Houston, TX PRP lead	Lou Barinka 214-655-6735 FTS 255-6735	DCA, TCA, VC, methylene chloride, DCE, TCE/groundwater; methylene chloride, Cr, Pb in soil	Land treatment pilot studies conducted in 1987; pilot bioreactor; ROD signed 1988; bioremediation will not be used at this site	Land ban performance standards	Incineration likely
VI	North Cavalcade Houston, TX State lead	Deborah Griswold 214-655-6715 FTS 255-6715	Carcinogenic PAHs, benzene/soil	Design stage; planning pilot project for FY91	.04 ppm benzene; 1 ppm carcinogenic PAHs	Slurry reactor or modified land treatment
VI	Old Inger Darrow, LA Fund lead	Paul Sieminski 214-655-6710 FTS 255-6710	Benzene, ethyl benzene, PAHs, metals/soil, groundwater	Pilot studies completed; ROD signed 9/84; design completed 1986; finalizing construction with remediation to begin 4/91; supplemental groundwater RI being conducted		Land treatment
VI	Hudson Refining Co. Cushing, OK RCRA lead	Keith Phillips 214-655-6480 FTS 255-6480	Oil, grease, PAHs/soil, groundwater	Operational since 4/88	Varied	Land application with varied applications of nutrients
VII	Vogel Paint & Wax, IA State lead	Pat McDonald 913-276-7746 FTS 276-7749	Benzene, ethylbenzene, MEC/soil	Bench-scale studies complete; ROD signed 9/89; currently in design stage	TCLP test for leachwater organics; 100 mg/kg organic hydrocarbons; EPA toxicity test	Land treatment
VII	Conservation Chemical Kansas City, MO Enforcement lead	Steve Octerloni 913-551-7778 FTS 276-7778	Phenols/groundwater	Treatability study conducted; ROD signed 9/30/87; operational since 4/90	MO drinking water standards	Fixed film bioreactor (2 in series)
VII	Amoco Refinery Sugar Creek, MO RCRA lead	Frank Dolan 314-751-3176	Oil, PAHs, refinery sludges, metals/sludges, soil	Treatability studies completed 1988-89; treatment facility under construction	Less than 300 mg/kg total PAHs; less than 160 mg/kg potentially carcinogenic PAHs	Land treatment and liquid solids reactor
VII	International Paper Joplin, MO Unit #1 RCRA lead	Frank Dolan 314-751-3176	24 organic constituents from creosote, including PAHs, PCP/soil, groundwater	Under construction; pilot studies to be conducted concurrently with treatment operations	Sum of the concentrations of 24 aromatic compound is less than 500 ppm	Land treatment (covered facility)
VII	International Paper Joplin, MO Unit #2 RCRA lead	Frank Dolan 314-751-3176	24 organic constituents from creosote, including PAHs, PCP/soil, groundwater	Under construction; pilot studies to be conducted concurrently with treatment operations	Not yet determined	Land treatment (covered facility)
VII	International Paper Joplin, MO Unit #3 RCRA lead	Frank Dolan 314-751-3176	24 organic constituents from creosote, including PAHs, PCP/soil, groundwater	Under construction; pilot studies to be conducted concurrently with treatment operations	Not yet determined	Land treatment (covered facility)

Shading indicates non-CERCLA sites.

CERCLA/RCRA/UST SITES CONSIDERING, PLANNING, OR OPERATING FULL-SCALE BIOREMEDIATION SYSTEMS

Region	Site/Location/Lead	Contact/Phone Number	Contaminants/Media	Status	Clean-up Levels	Treatment
VII	International Paper Joplin, MO Unit #4 RCRA lead	Frank Dolan 314-751-3176	24 organic constituents from creosote, including PAHs, PCP/soil, groundwater	Under construction; pilot studies to be conducted concurrently with treatment operations	Not yet determined	Land treatment (covered facility)
VII	Scott Lumber Alton, MO Removal lead	Bruce Morrison 913-236-3881 FTS 757-3881	Creosote compounds(PAHs, benzo-a-pyrene)/soil (no PCP)	Conducted treatability study 1988; operational since 6/89	500 ppm total PAHs; 14 ppm benzo-a-pyrene	Land treatment using irrigation, no nutrient addition
VIII	Burlington Northern Somers, MT Enforcement lead	Jim Harris 406-449-5414 FTS 585-5414	PAHs, zinc, phenol, creosote//soil, sediments, groundwater	Land treatment demonstration 11/90; pilot studies planned for groundwater in 11/90; ROD signed 9/27/89; full scale 1992	Soil: 36 mg/kg carcinogenic PAHs; Groundwater: .030 ug/l carcinogenic PAHs	Soils: land treatment Groundwater and sediments: in situ
VIII	Libby Groundwater Site Libby, MT Enforcement lead	Julie Dalsoglio 406-449-5414 FTS 585-5414	PAHs, PCPs/soil, groundwater	ROD signed 12/88; consent decree 10/89; bench-scale demonstration project for land treatment unit, bioreactor and in situ treatment completed; full-scale remedial action to begin Summer 1991	Soil: 88 mg/kg total carcinogenic PAHs; 8 ppm non-carcinogenic PAHs; 7.3 ppm pyrene; 37 mg/kg PCP; 1 ppb dioxin; 8 mg/kg napthalene; 8 mg/kg phenanthrene; 7.3 mg/kg pyrene Groundwater: 400 ug/l carcinogenic PAHs; 40 ug/l non-carcinogenic PAHs; 1.05 mg/l PCP; 5 mg/lbenzene; 50 mg/l arsenic; other compounds not greater than 10-5	Soil: Land treatment Groundwater: in situ treatment of groundwater and treatment in fixed film bioreactor
VIII	Public Service Denver, CO UST lead	Suzanne Roll 303-293-1511	Benzene, xylene, toleune/soil, groundwater	Operating unit for one year	Not yet established	
VIII	Chemical Distribution Site Billings, MT State lead	Jim Morrison ECOVA 206-883-1900	Herbicides (chlorinated phenol)/groundwater	Operational since 4/88	Unknown	In situ (subsurface, using nutrients and oxygen)
VIII	Pesticide Distribution Facility Minot, ND RCRA lead	Jim Morrison ECOVA 206-883-1900	Pesticides (2,4-D)/soil	Full-scale bioremediation completed 1988	5 ppm 2,4-D	Above ground and slurry phase biotreatment
VIII	Union Pacific Laramie, WY CERCLA/RCRA enforcement lead	Felix Flechas (303) 330-1524 FTS 330-1524	Creosote, PCP/soil, groundwater	Treatability and pilot studies completed 9/90	Based on human health or agricultural standards, whichever is more stringent (to be decided in next 6 months)	Undetermined
VIII	Chemical Sales	David Duster	TCE, TCA, DCA, DCE	Treatability studies to be conducted Summer 1991		
IX	Fort Ord Army Base Monterey, CA Fund lead	Vance Fong 915-744-2392	MEK, hydrocarbons/soil, groundwater	Bioremediation currently being used as an interim measure; pilot testing planned	Not yet established for soil; MCLs for groundwater	Land treatment
IX	Montrose Chemical Corp. of California Torrance, CA Enforcement lead	Johanna Miller 415-744-2404	DDT, monochlorobenzene/soil, groundwater	Bench-scale treatability study on soil and groundwater completed 8/90; currently planning follow-up bench-scale study	Not yet established	In situ enhanced by injection of nutrients

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CERCLA/RCRA/UST SITES CONSIDERING, PLANNING, OR OPERATING FULL-SCALE BIOREMEDIATION SYSTEMS

Region	Site/Location/Lead	Contact/Phone Number	Contaminants/Media	Status	Clean-up Levels	Treatment
IX	Selma Pressure Treating	Dave Roberts 415-744-2227	Arsenic, chromium, polychlorinated phenol, PCP/soil	Currently in design phase; no treatment studies conducted; ROD signed 1988	Unknown	Undetermined
IX	Koppers Oroville Plant, CA Enforcement lead	Fred Schauffler 415-744-2365 FTS 485-2365	Arsenic, chromium, PCDD/PCDF, PAHs, PCP, creosote/soil; arsenic, chromium, PAHs, PCP, PCDD/PCDF/groundwater	ROD signed 9/89; currently in the last stage of the consent decree for RD/RA; treatability studies to be done late 1991	Background levels for arsenic and Cr in soil and groundwater; .007 ug/l PAHs in groundwater, .19 mg/kg in soil; PCP 17 mg/kg in soil, 2.2 ug/l in groundwater	In situ bioremediation of soil with PCP
IX	J.H. Baxter Weed, CA Enforcement lead	Mary Masters 415-744-1178 FTS 484-2370	Arsenic, chromium, PCP, PAHs, dioxins, furans/soil, sediments, groundwater; benzene/groundwater; zinc, TCP/sediments	Treatability studies conducted; ROD signed 9/27/90	Groundwater: arsenic 5 ppb; chromium 8 ppb; benzene 1 ppb; PCP 2.2 ppb; PAHs 5 ppb; dioxin .000025 ppb. Surface soils: arsenic 8 ppm; chromium 500 ppm; PCP 17 ppm; carcinogenic PAHs .51 ppm; dioxin .001 ppm; furans .001 ppm. Subsurface soils: arsenic 5 ppm; chromium 5 ppm; PCP 1.7 ppm; carcinogenic PAHs .005 ppm; non-carcinogenic PAHs .15 ppm; dioxin .001 ppm. Sediments: arsenic 8 ppm; chromium 18 ppm; zinc 26 ppm; carcinogenic PAHs .5 ppm; PCP 1 ppm; TCP 1 ppm.	Land treatment using improted microbes for soils and sediments; bioreactor for groundwater
IX	Romic Chemicals E. Palo Alto, CA RCRA lead	Jesse Baskir 415-744-2036 FTS 484-2036	MEK, VC/soil, groundwater; DCE/surface water	Treatability studies planned for end of FY91; now in investigation stage	Not yet determined	In situ; possibly pump and treat
IX	SEGS Solar Project Kramer Junction, CA Unit #1 State lead	Bruce La Belle CA Dept. of Health Svcs. 916-324-2958	Heat transfer fluid (biphenyl, diphenyl ether)/soil	Completed full-scale demonstration 10/89; field work began 7/90; periodic site visits will be used to oversee/monitor progress	100 ppm hazardous waste (CA standards)	Land treatment using nutrients, bacteria and water in tilled soil
IX	SEGS Solar Project Kramer Junction, CA Unit #2 State lead	Bruce La Belle CA Dept. of Health Svcs. 916-324-2958	Heat transfer fluid (biphenyl, diphenyl ether)/soil	Phase 1, 2 and 3 field work completed; new variance issued for full scale pilot project under separate demo list number; phase 1 and 2 base report in draft	100 ppm hazardous waste (CA standards)	Land treatment using nutrients and water in tilled soil without added bacteria
IX	BKK Landfill West Covina, CA Enforcement Lead	Carmen Santos 415-744-2144	Arsenic, cadmium, chromium, lead, mercury, dichloromethane, chloroform, 1-2 dichloropropane, carbon tetrachloride, TCE, benzene, phenol, toluene, cyanide, heavy metals/groundwater	Remedial study completed; full-scale bioremediation in operation since 1987	.1 ppm cadmium; .05 ppm chromium, lead, arsenic; .002 ppm mercury; heavy metals 1.5 ppm; 150 ppb dichloromethane, chloroform, TCE; 700 ppb 1-2 dichloropropane; 5 ppb carbon tetrachloride; 550 ppb benzene; not established for phenols, toluene and cyanide (total VOCs 2 ppm)	Bioreactor - leachate treatment plant with metal removal system using complexation with EDTA
IX	Southern California Edison Visalia, CA State lead	Dave Roberts 415-744-2227	PCP, VOCs/soil, groundwater	Feasibility study completed; no treatability studies planned yet	Not yet established	Ground-water pump and carbon treatment/extraction

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CERCLA/RCRA/UST SITES CONSIDERING, PLANNING, OR OPERATING FULL-SCALE BIOREMEDIATION SYSTEMS

Region	Site/Location/Lead	Contact/Phone Number	Contaminants/Media	Status	Clean-up Levels	Treatment
IX	Liquid Gold Richmond, CA State lead	Rose Marie Carroway 415-744-2235	Waste oils, metals (lead, zinc, phenol)/soil, groundwater	Feasibility study completed	Not yet established	Undetermined
IX	JASCO Mt. View, CA Fund lead	Rose Marie Carroway 415-744-2235	VOCs/soil, groundwater	Planning treatability study	Not yet established	Land treatment - composting
IX	Former Tank Farm Torrance, CA State lead	Jim Morrison ECOVA 206-883-1900	Petroleum hydrocarbons/soil	Full-scale treatment ongoing; to be completed 1/91	1,000 ppm total petroleum hydrocarbons	In situ (surface)
IX	Food Processor Ripon, CA State lead	Jim Morrison ECOVA 206-883-1900	TCE/soil, groundwater	Pilot studies completed; currently in design stage	0.5 ppb TCE in groundwater	In situ biological treatment with above-ground bioreactor
IX	Equipment Manufacturer San Francisco, CA RCRA lead	Jim Morrison ECOVA 206-883-1900	Diesel fuel/soil	Remediation complete	200 ppm TPH in soil	Above-ground biological treatment; solid phase biological treatment
IX	Refinery Los Angeles, CA State lead	Jim Morrison ECOVA 206-883-1900	Petroleum, hydrocarbons/soil	Conducting full-scale bioremediation	10,000 ppm TPH in soil	In situ
IX	Oil Co. Visalia, CA State lead	Jim Morrison ECOVA 206-883-1900	Petroleum, hydrocarbons/soil	Conducting full-scale bioremediation	5 ppm TPH in groundwater	In situ
IX	Studio Hollywood, CA State lead	Jim Morrison ECOVA 206-883-1900	Petroleum, hydrocarbons/soil, groundwater	Conducting full-scale bioremediation	Drinking water standards	In situ
IX	Protek Carson City, CA UST lead	Ken Smarkel CA Dept. of Health Svcs 916-322-3910	Diesel fuel/soil	Bioremediation completed	Approximately 100 ppm total petroleum hydrocarbons	Land treatment
IX	Coltrans Lakeport & Garberville, CA UST lead	Ken Smarkel CA Dept. of Health Svcs 916-322-3910	Oil/soil	Field work began 11/8/88; bioremediation completed	Approximately 100 ppm total petroleum hydrocarbons	Land treatment
IX	Citrus Heights Irrigation Citrus Heights, CA UST lead	Ken Smarkel CA Dept. of Health Svcs 916-322-3910	Diesel fuel/soil	Bioremediation completed	Approximately 100 ppm total petroleum hydrocarbons	Bioreactor
IX	Naval Civil Engineering Laboratory Port Hueneme, CA	Tej Pahua CA Dept. of Health Svcs. 916-322-9224	Jet fuel, gasoline, diesel fuel, transmission fluid, aviation fluid/soil, groundwater	Bench scale tests completed in 10/89; final consultant report submitted to Navy for approval; pilot tests are being planned; working on pilot design	Not yet determined	Hydrocarbon aeration

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CERCLA/RCRA/UST SITES CONSIDERING, PLANNING, OR OPERATING FULL-SCALE BIOREMEDIATION SYSTEMS

Region	Site/Location/Lead	Contact/Phone Number	Contaminants/Media	Status	Clean-up Levels	Treatment
IX	California Agricultural Research Ketleman Hills, CA State lead	Robert Ludwig CA Dept. of Health Svcs. 916-322-5308	Pesticides (simazine, carbofurans)/soil	Remediation completed 10/10/88; final report available; inconclusive results obtained and no further funding planned	8 ppm simazine; non-detection levels for carbofurans	Application of pesticide rinsate to organic compost
IX	Southern Pacific Transportation Co. SPTC Maintenance Yard Roseville, CA State Superfund lead	David Wright CA Dept. of Health Svcs. 916-445-9556	Hydrocarbons, diesel fuel/soil	Treatment completed 9/10/90	1000 ppm hydrocarbons	Land treatment - nutrients added to contaminated soil to enhance biological degradation
IX	Seaside High School Seaside, CA UST Lead	Dick Erickson CA Dept. of Health Svcs. 916-322-7046 Alan Ingham 916-322-5629	Diesel fuel/soil	Bioremediation completed 1988	500 ppm hydrocarbons in soil	In situ
IX	Hercules Incorporated Hercules, CA State Superfund lead	Tony Luan CA Dept. of Health Svcs. 916-322-6872	TNT, trinitrobenzene, DNT, nitrobenzene/soil	Pilot scale field study completed; currently conducting bioremediation	30 ppm TNT; 5 ppm DNT; 5 ppm nitrobenzene	Land treatment
IX	Harmon Field Tulare County, CA State Superfund lead	Tony Luan CA Dept. of Health Svcs. 916-322-6872	10 organic pesticides/soil	Pilot project completed; currently conducting bioremediation	Not yet determined	Land treatment
IX	Converse Montebello Corp. Yard Montebello, CA UST Lead	John Wesnousky CA Dept. of Health Svcs. 916-322-2543	Gasoline/soil	Conceptual workplan submitted for review	Not yet determined	In situ bioremediation of contaminated soil; moisture/nutrient addition controlled and monitored in the subsurface; oxygen supplied via vacuum wells.
IX	Growers Air Service UC Davis Medlock Field Woodland, CA State lead	Ken Smarkel CA Dept. of Health Svcs. 916-322-3910	Pesticides: atrazine, BRAVO-chlorothalonil, dacthal, thiadine 1 and 2, DDT, thiadine sulfate, trifluralin,methyl parathion, malathion, parathion, methyl trithion, thion, thithion, paraxon/soil	Bioremediation completed	Not yet determined	In situ with addition of nutrients
IX	San Diego Gas and Electric Main Street Facility San Diego, CA UST lead	John Wesnousky CA Dept. of Health Srvcs 916-322-2543	Petroleum fuels/soil, groundwater	Project is underway; monitoring is ongoing	Not yet established	In situ
X	Former Oil Storage Terminal Seattle, WA UST lead	Jim Morrison ECOVA 206-883-1900	Petroleum hydrocarbons/soil, groundwater	Full-scale bioremediation ongoing	Soil: 200 ppm petroleum hydroxide Groundwater: 5 ppb benzene	In situ (surface)
X	Former PCP Blending Facility Portland, OR RCRA lead	Jim Morrison ECOVA 206-883-1900	PCP/soil	Full-scale bioremediation ongoing since 1989	Not yet established	Slurry phase bioreactor
X	American Crossarm Fund lead	Lee Marshall 206-442-2723	PCP/soil	Currently conducting remedial investigation	Not yet established	Undetermined

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CERCLA/RCRA/UST SITES CONSIDERING, PLANNING, OR OPERATING FULL-SCALE BIOREMEDIATION SYSTEMS

Region	Site/Location/Lead	Contact/Phone Number	Contaminants/Media	Status	Clean-up Levels	Treatment
X	Utah Power and Light Idaho Falls, ID State lead	Randy Steger 208-334-5879	Creosote/soil phenols/groundwater	Final plan for bioremediation not yet submitted	50 ppb creosote in soil; EPA Region 10 groundwater protection standards for groundwater	Part of upgradient portion not capped - bioremediation being used (white rot fungus)
X	Wycoff Eagle Harbor, Puget Sound, WA PRP lead	Rene Fuentes 206-442-1599 FTS 399-1599	Creosote, PCP/soil, groundwater, surface water	RI/FS not conducted yet	Not yet established	Bioreactor - activated sludge
X	Union Pacific Seattle, WA State lead	Bill Glasser	Creosote; soil	Treatability study complete		

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ATTIC: A Multimedia Remedial Action Resource

The Alternative Treatment Technology Information Center (ATTIC) is a comprehensive, automated information retrieval system that integrates hazardous waste data into a centralized, searchable resource. ATTIC became operational in May 1989, under the direction of EPA's Office of Environmental Engineering and Technology Demonstration (OEETD). ATTIC provides data and technical information on alternative methods of hazardous waste treatment and is accessible to all members of the Federal, State, and private sector involved in site remediation. ATTIC can be easily accessed through an online system or a system operator.

The central component of ATTIC is the ATTIC Database, which contains abstracts and executive summaries of over 1,400 technical documents and reports collected into a keyword searchable format. ATTIC documentation includes all RODs from 1985-1989 (459)); SITE project summaries (43); USATHAMA reports (270); State agency reports (63); and industry studies (136). The ATTIC Database provides the most up-to-date information available on alternative and innovative technologies for hazardous waste treatment. These technologies are grouped into five major categories for easy reference and include thermal, biological, solidification/ stabilization, chemical, and physical.

ATTIC is designed to provide site remediation managers in the Federal, State, and private sector with the information they need to make effective decisions on clean-up alternatives.

ATTIC is available through both the ATTIC System Operator and an easy-to-use online computer system and will provide technical assistance, conduct searches, and assist in document retrieval at no charge to the user. For additional information regarding ATTIC, or to obtain a free password and user's guide, please call the ATTIC System Operator at 301/816-9153.

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