EPA United States Environmental Protection Agency

EPA/540/8-91/005
Spring Update
1991

Superfund Innovative Technology Evaluation (SITE) Program

SUPERFUND INNOVATIVE TECHNOLOGY EVALUATION

The U.S. Environmental Protection Agency's Superfund Innovative Technology Evaluation (SITE) Program, now in its fifth year, serves several purposes, including (1) the development and implementation of innovative treatment technologies for hazardous waste remediation and (2) the development and implementation of monitoring and measurement technologies for evaluating the nature and extent of hazardous waste site contamination. The SITE Program was established in response to the 1986 Superfund Amendments and Reauthorization Act (SARA), which recognized a need for an "Alternative or Innovative Treatment Technology Research and Demonstration Program." The SITE Program is administered by EPA's Office of Research and Development and consists of four interrelated programs:

- Demonstration Program
- Emerging Technologies Program
- Monitoring and Measurement Technologies Program
- Technology Transfer Program

This update bulletin, developed as a part of the Technology Transfer Program, highlights progress over the past year under the Demonstration, Emerging Technologies, and Monitoring and Measurement Technologies Programs. It also focuses on new technologies and significant events since the November 1990 SITE Technology Profiles (EPA/540/5-90/006) document was published. Further opportunities for technology transfer are provided at the back of this bulletin.

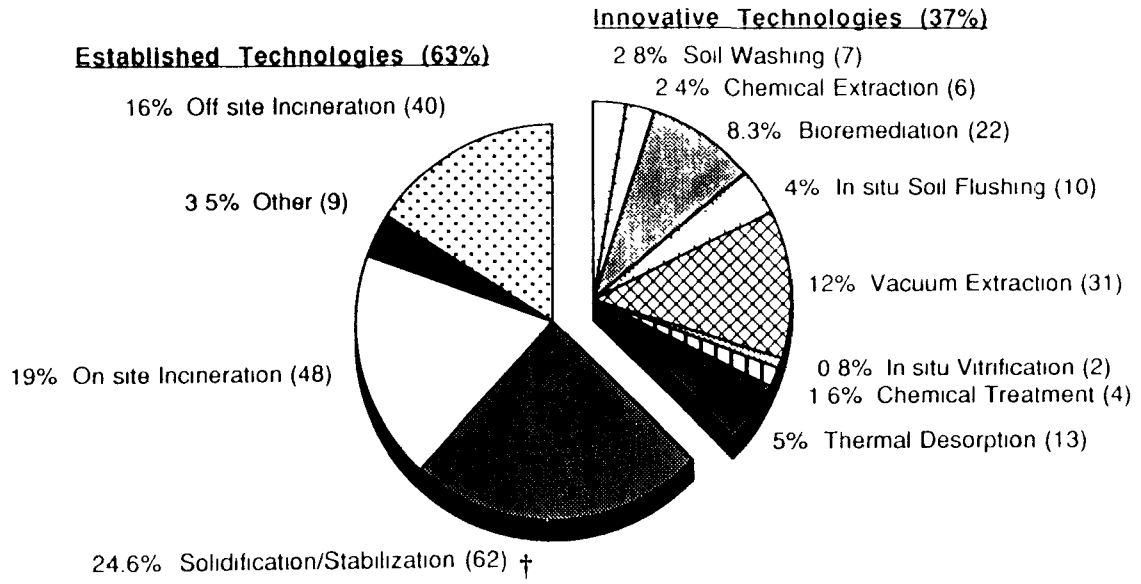
IN THIS UPDATE:

INNOVATIVE TECHNOLOGIES

In April 1990, EPA established the Technology Innovation Office (TIO) under its Office of Solid Waste and Emergency Response to further promote the use of innovative treatment technologies. TIO has several activities aimed at assisting technology vendors in understanding the market for their hazardous waste cleanup technologies. TIO's "Innovative Treatment Technologies: Semi-Annual Report" (EPA/540/2-91/001) describes specific National Priorities List (NPL) sites for which innovative technologies have been selected or used. The following figure shows that innovative technologies are being specified in the Records of Decision (RODs) for many NPL sites. Most of the 95 innovative projects reported are in the design stage, and thus offer market opportunities for technology vendors.

The development of SITE Program technologies will help meet the needs of EPA's remedial project managers (RPMs) and on-scene coordinators (OSCs), as well as other federal agencies, states, and private parties responsible for hazardous waste site activities. Currently, 43 technologies are involved in SITE's Emerging Technologies Program and 58 in the Demonstration Program. Five technologies have successfully graduated from the Emerging Technologies Program into the Demonstration Program; EPA is currently seeking sites for demonstrating these technologies. The Demonstration Program completed four demonstrations in 1990 and one thus far in 1991 (see pages 3-6 for details). Additionally, three demonstrations were conducted in 1990 as a part of the Monitoring and Measurement Technologies Program (see pages 14-15).

Summary of Innovative vs. Established Treatment Technologies For Source Control at Superfund Sites*



* *Data are derived from 1982 - 1989 Records of Decision (RODs) and anticipated design and construction activities. The 254 technologies are associated with approximately 211 site; the difference reflects the use of more than one technology per site.*

( ) *Number of times this technology was selected or used.*

† *Solidification/Stabilization is considered an established technology for metals only.*

DEMONSTRATION PROGRAM

Technologies are selected for the program primarily through annual Requests for Proposals (RFP). The process is non-competitive; proposals are reviewed by EPA to determine which fit into the Demonstration Program and show promise for use at hazardous waste sites. In addition, several technologies have entered the program on an unsolicited basis. These technologies are primarily ongoing Superfund projects or private sector activities in which innovative techniques of interest were identified for evaluation by EPA RPM's and OSC's or technology developers.

Cooperative agreements between EPA and the developers set forth responsibilities for conducting the demonstration and evaluating the technology. Developers are generally responsible for operating their innovative systems at a selected site, and are expected to pay the costs to transport equipment to the site, operate the equipment on-site during the demonstration, and remove the equipment from the site. EPA is usually responsible for project planning, site preparation, sampling and analysis, quality assurance and quality control, reporting, and technology transfer.

The SITE Demonstration Program develops reliable engineering performance and cost data on innovative treatment technologies so that potential users can evaluate each technology's applicability for a specific waste site. Data collected during a field demonstration are used to assess the performance of the technology, the potential need for pre- and post-processing of the waste, applicable types of wastes and media, potential operating problems, and the approximate capital and operating costs. Demonstration data can also provide insight into long-term operating and maintenance costs and long-term risks.

At the conclusion of each SITE Program demonstration, EPA prepares an Applications Analysis Report (AAR) to evaluate all available information on the specific technology and analyze its overall applicability to other site characteristics, waste types, and waste matrices. A second report, called the Technology Evaluation Report (TER), presents demonstration data such as testing procedures, performance and cost data collected, and quality assurance and quality control standards. Videos, bulletins, and project summaries are also prepared to further present demonstration data.

DEMONSTRATIONS CONDUCTED IN 1990

Technologies recently demonstrated under the SITE Demonstration Program are summarized below, including preliminary results from the demonstrations. Applications Analysis reports and other technology transfer materials are being prepared.

E.I. DuPont de Nemours and Company and Oberlin Filtration Company

Membrane Microfiltration

The DuPont/Oberlin microfiltration technology uses a physical separation process to remove contaminants that are one micron or larger in diameter from liquid waste streams. The technology combines a spun-bonded olefin filter material (Tyvek® T-980) developed by DuPont and an automatic pressure filter developed by Oberlin. Pretreatment by chemical addition may be required if dissolved contaminants are to be treated. The end products are filtered solids, called filter cake, and filtered liquids, called filtrate.

The microfiltration system was demonstrated at the Palmerton Zinc Superfund site in Palmerton, Pennsylvania, over a 4-week period in April and May 1990. About 3,000 gallons of groundwater contaminated primarily with zinc were treated. Demonstration results are summarized below:

- Zinc and total suspended solids (TSS) removal efficiencies ranged from 99.75 to 99.99 percent.

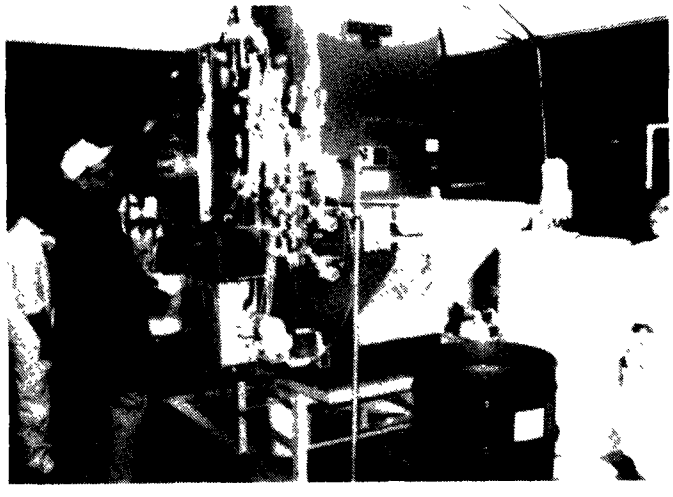
- Solids in the filter cake ranged from 30.5 to 47.1 percent.

- Dry filter cake passed the RCRA paint filter test in all runs.

- Filtrate met the applicable National Pollution Discharge Elimination System (NPDES) standard for zinc.

- A composite filter cake sample passed the Extraction Procedure (EP) Toxicity and Toxicity Characteristics Leaching Procedure (TCLP) tests for leachable metals.

(Contact: John Martin at FTS 684-7758 or 513-569-7758)



DuPont/Oberlin Membrane Microfiltration

U.S. Environmental Protection Agency

Excavation Techniques and Foam Suppression Methods

In June and July 1990, a trial excavation was conducted at the McColl Superfund site in Fullerton, California, to evaluate techniques for controlling fugitive air emissions during excavation operations. The project was a joint effort involving EPA's Risk Reduction Engineering Laboratory in Cincinnati, Ohio; EPA's Air and Energy Engineering Research Laboratory in Research Triangle Park, North Carolina; and EPA Region 9.

The excavation area was one of several large waste pits at the site containing three distinct layers of segregated waste: 3 feet of oily mud, 4 feet of tar, and a hard coal-like char layer. Contaminants of concern were volatile organic compounds (VOCs) and sulfur dioxide (SO_2). The selected test area (Pit L-4) was surrounded by a temporary tent-like enclosure measuring 60 feet wide, 160 feet long, and 26 feet high. Air from the enclosure was vented through an emission control system that included a wet scrubber and vapor-phase carbon adsorption unit. In addition, vapor-suppressing foams were used to reduce emissions coming from the extracted waste.

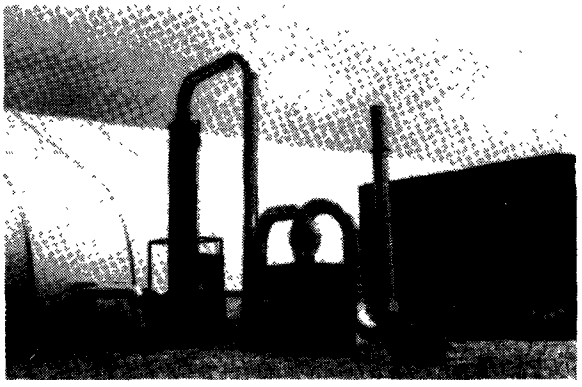
A total of 101 cubic yards of overburden and 137 cubic yards of contaminated waste were excavated during the demonstration. The tar waste was solidified and stabilized by mixing it with fly ash, cement, and water in a pug mill to facilitate processing through a thermal destruction unit. The char wastes did not require further processing. Air contaminant concentrations within the enclosed area were measured and averaged over 5-minute periods. Significant findings are as follows:

- The average concentrations within the enclosure were up to 1000 ppm for SO_2 and up to 492 ppm for total hydrocarbons (THC).

- The air pollution control system removed up to 99 percent of the SO_2 and up to 50 percent of the THC.

- Contaminant concentrations inside the enclosure were higher than expected because the vapor-suppressant foam did not form an impermeable barrier over the exposed wastes. Instead, the foam reacted with the highly acidic waste and degraded. Foam applications also made surfaces slippery for workers and equipment.

(Contact: Jack Hubbard at FTS 684-7507 or 513-569-7507)



EPA Excavation Techniques and Foam Suppression

AWD Technologies, Inc.

Integrated Aquadetox Vapor Extraction and Steam Vacuum Stripping

The AWD Technologies SITE demonstration was conducted at the Lockheed Aeronautical Systems Company (Lockheed) site in Burbank, California. A full-scale Aquadetox system was installed at the site in 1988 to treat groundwater and soil contaminated with volatile organic compounds (VOCs) including trichloroethylene (TCE) and tetrachloroethylene (PCE). The AWD technology integrates two basic processes: (1) a high-efficiency, moderate vacuum stripping tower (AquaDetox) that uses low pressure to treat contaminated groundwater, and (2) a soil vapor extraction (SVE) system that removes contaminated soil gas for subsequent treatment with granular activated carbon (GAC). Integrating the two technologies creates a closed-loop system, providing simultaneous remediation of contaminated groundwater and soil-gas with virtually no air emissions.

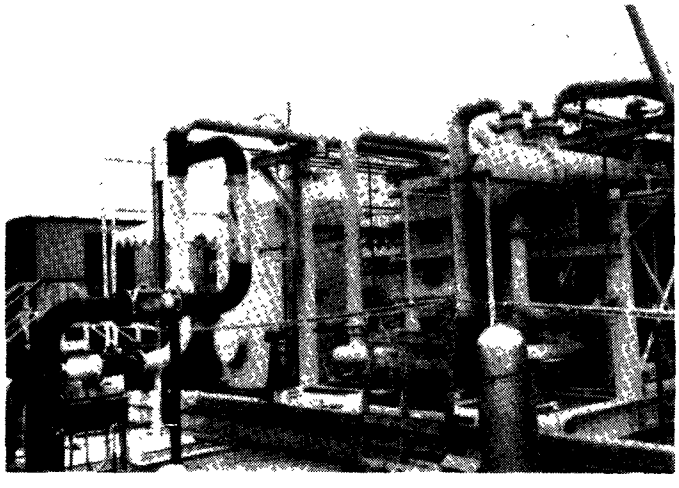
The demonstration was conducted over a 2-week period in September 1990. During this time, 19 test runs were conducted at varying operating conditions for groundwater flow, steam flow, and steam stripping tower pressure. Influent and effluent groundwater and soil-gas samples were collected and analyzed for each test run. Influent TCE concentrations ranged up to 2,000 ppb in the groundwater and 8,000 ppb in the soil gas; PCE ranged up to 11,000 ppb and 420,000 ppb, respectively.

Preliminary results indicate that:

- The system operated well during all test runs, with removal efficiencies as high as 99.99 percent for VOCs in groundwater, and 99.9 percent for VOCs in soil-gas.

- The effluent groundwater complied with regulatory requirements for both TCE and PCE.

(Contact: Gordon Evans at FTS 684-7684 or 513-569-7684)



AWD Technologies Integrated Aquadetox Extraction and Steam Vacuum Stripping

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Silicate Technology Corporation (STC)

Solidification/Stabilization with Silicate Compounds

In November 1990, Silicate Technology Corporation (STC) demonstrated its solidification/stabilization technology, designed to immobilize inorganic and organic constituents into monolithic, concrete blocks. The test was conducted at the Selma Pressure Treating site in

Selma, California, where approximately 16,000 cubic yards of soil are contaminated with chromium, copper, arsenic, and pentachlorophenol. Contaminated soil was excavated and homogenized in a mixer; the untreated soil was sampled for chemical and physical characterization. Three 2.5-cubic-yard batches of contaminated soil were then mixed with water, cement, and STC's proprietary reagents in the mixer. Representative samples from the treated batches were also subjected to chemical and physical testing. EPA also collected samples that will be analyzed at 6 months, 18 months, and 36 months to determine the long-term effectiveness of the treatment. Test results will be available in June 1991.

(Contact: Ed Bates at FTS 684-7774 or 513-569-7774)

STC Solidification/Stabilization with Silicate Compounds

Horsehead Resource Development Company, Inc. (HRD)

Flame Reactor

In March 1991, the Horsehead Resource Development Company, Inc. hosted a demonstration of their Flame Reactor at their facility in Monaca, Pennsylvania. During the demonstration and shakedown runs, approximately 50 tons of secondary lead smelter blast furnace slag were treated. The slag was shipped to Monaca from the National Smelting and Refining site, a planned removal site, in Atlanta, Georgia. The high lead content metal oxide product from the Flame Reactor as well as the resulting slag from the Flame Reactor will be recycled or properly disposed based on analyses performed for the demonstration.

(Contacts: Donald Oberacker at FTS 684-7510 or 513-569-7510 and Marta Richards at FTS 684-7783 or 513-569-7783)

PROFILES OF NEW TECHNOLOGIES

Seventeen new technologies entered the SITE Demonstration Program in 1990. Six of these technologies were selected from responses to the annual solicitation (SITE 005), and are included in the SITE Technology Profiles document (EPA 540/5-90/006). Developers of four projects were invited to participate based on successful results from the Emerging Technologies Program. The following seven new technologies are the most recent additions to the program. The SITE program was requested to provide technology evaluation support for each of the projects. These technologies are currently scheduled to be tested or implemented at hazardous waste sites.

AccuTech Remedial Systems, Inc., Keyport, New Jersey

Pneumatic Fracturing Extraction

Pneumatic Fracturing Extraction, an in-situ process developed at the New Jersey Institute of Technology, is designed to develop and make uniform subsurface airflow and to effectively remove contaminants from low-permeability soils such as clay and fractured bedrock. This process, part of an integrated system of conventional and innovative technologies, will be demonstrated at a New Jersey Department of Environmental Protection *Environmental Cleanup Responsibility Act* (ECRA) site in South Plainfield, New Jersey, where trichloroethylene (TCE), a dense nonaqueous phase liquid (DNAPL), will be removed from a fractured shale aquifer. A groundwater pumping system

will suppress the water table to expose the zone of contaminated fractured rock. The Pneumatic Fracturing Extraction process, combined with a heated-air injection/extraction process, will effectively remove TCE trapped within the rock matrix. The concentrated vapors stripped from the groundwater and extracted from the rock matrix will be treated in an innovative catalytic oxidation unit designed for chlorinated compounds. During the demonstration, the contaminated vapors will be alternately treated by the catalytic oxidation unit and a carbon adsorption system to develop engineering cost data on the two processes.

(Contact: Patricia Lafornara at FTS 340-6988 or 908-906-6988)

Canonie Environmental Services Corporation, Porter, Indiana

Low-Temperature Thermal Aeration (LTTA℠)

Canonie's LTTA℠ system uses heat at low temperatures (500 - 700° F) to vaporize and remove volatile and semivolatile contaminants from soil. Contaminated materials are conveyed to a materials dryer, where the soil flows countercurrent to the air flow. A propane or natural gas burner on the soil exit end of the dryer heats the air, which subsequently heats the soil, and causes the volatile and semivolatile contaminants to be desorbed into the air stream. The dryer gases, containing organics, dust, and small amounts of acid vapor, are vented through a cyclone and baghouse system, followed by a venturi scrubber and a vapor phase carbon adsorption unit. The scrubber water is treated in an activated carbon system. The dry, hot soils are discharged into a pug mixer, quenched with treated scrubber water, and discharged into a stockpile.

The LTTA℠ technology is planned for demonstration at the Anderson Development Company (ADC) site in Adrian, Michigan. The LTTA℠ will treat soil and lagoon sludge contaminated with 4,4'-methylenebis(2-chloroaniline), or MBOCA.

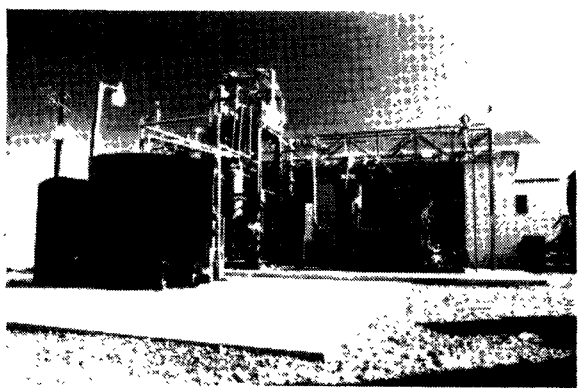
(Contact: Paul dePercin at FTS 684-7797 or 513-569-7797)

Chemical Waste Management, Inc., Geneva, Illinois

PO*WW*ER™ Evaporation and Catalytic Oxidation of Wastewater

Chemical Waste Management, Inc. (CWM) has developed a technology to treat leachate, groundwater, and process waters containing mixtures of salts, metals, and organics. The technology is a combination of evaporation and catalytic oxidation processes. The waste is concentrated in an evaporator by boiling off most of the water and volatile compounds, both organic and inorganic. Air or oxygen is added to the vapor, and the mixture is forced through a fluidized catalyst bed where the organic and inorganic compounds are oxidized. This stream, comprised mainly of steam, is then condensed or vented to the atmosphere. The brine remaining in the evaporator contains concentrated nonvolatile contaminants. The brine is either disposed of or treated further, depending on the nature of the waste. The system is currently being tested on landfill leachate and other aqueous wastes at CWM's Lake Charles, Louisiana, facility.

(Contact: Randy Parker at FTS 684-7271 or 513-569-7271)



Chemical Waste Management PO*WW*ER

Dames & Moore, Tallahassee, Florida

Hydrolytic Terrestrial Dissipation (HTD)

Dames & Moore developed its hydrolytic terrestrial dissipation (HTD) process for use at the Chemairspray site in Palm Beach County, Florida. Surface soils at the site are contaminated with toxaphene, a chlorinated pesticide. In alkaline environments, metal complexes act as catalysts to accelerate the hydrolysis reactions that dechlorinate the pesticides. This simple process involves excavating the soils, slaking the soils with lime, and allowing the mixture to be exposed to high temperatures and strong ultraviolet light conditions.

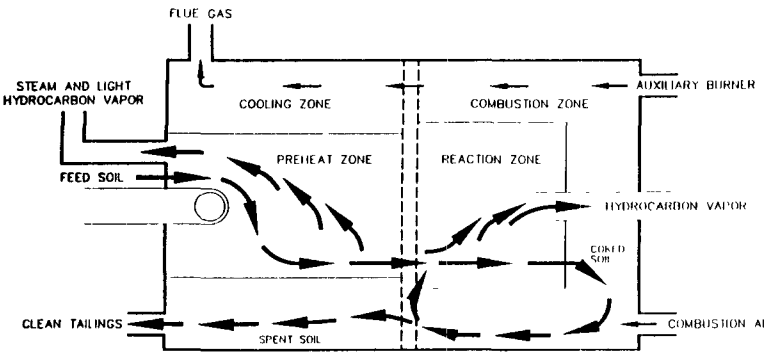
(Contact: Ron Lewis at FTS 684-7856 or 513-569-7856)

SoilTech, Inc., Englewood, Colorado

ATP Thermal Desorption

The ATP process is a physical separation treatment technology used to remove organics from soils and sludges. The process works on the principle that all organic compounds have substantial vapor pressures at elevated temperatures. Soil is heated in a specialized rotary kiln that is indirectly fired. The first zone in the kiln operates at between 400 to 600°F, and the second zone operates at up to 1100° F. The volatilized water and organics are collected, condensed, and separated. The noncondensable gases are burned with the fuel in an annular space around the kiln; the hot treated soil is also passed along the outside of the kiln to cool the treated soil and heat the incoming, contaminated soil. An extensive air pollution control system treats the combustion gases. The mobile system will be demonstrated at two sites -- the Wide Beach Superfund site near Buffalo, New York, and the Waukegan Harbor PCB site in Illinois.

(Contact: Paul dePercin at FTS 684-7797 or 513-569-7797)



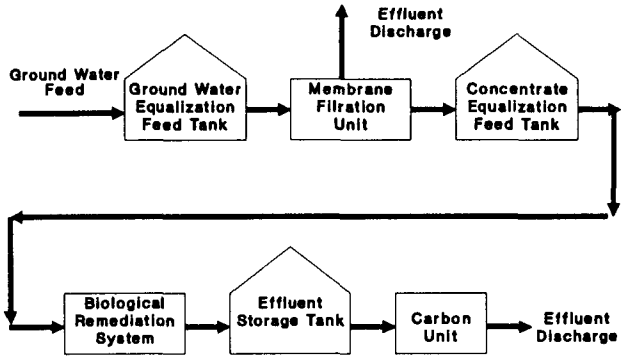
SoilTech ATP

Southern Bio Products, Inc., Atlanta, Georgia

Membrane Separation/Bioremediation

Southern Bio Products, Inc. has developed a sequential treatment strategy consisting of a filtration unit for extraction and concentration of contaminants, and a bioremediation system for treating concentrated groundwater and soil slurries. The SITE demonstration will evaluate its effectiveness on contaminated groundwater by concentrating and detoxifying creosote. The reverse osmosis filtration unit has specially designed, formed-in-place membranes which concentrate the creosote and produce a clean, dischargeable filtrate. After filtration, the concentrated creosote is mixed with proprietary and indigenous microorganisms in a bioreactor for detoxification. After treatment, small quantities of residuals will be shipped off-site for disposal. This process will be demonstrated at the American Creosote Works site in Pensacola, Florida.

(Contact: Kim Kreiton at FTS 684-7328 or 513-569-7328)



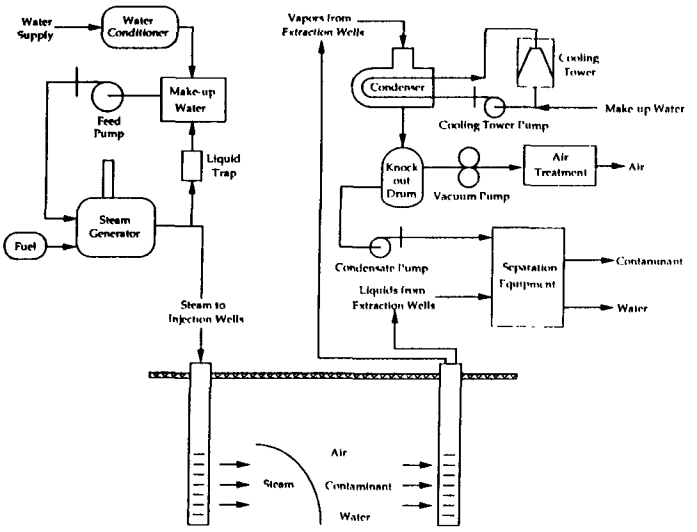
Southern Bio Products, Inc.
Membrane Separation/Bioremediation

Udell Technologies, Inc., Emeryville, California

Steam Injection/Vacuum Extraction

The steam injection and vacuum extraction (SIVE) process, developed by Udell Technologies, removes volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) from contaminated soils, above and perhaps below the water table. Steam is forced through the soil via injection wells to thermally enhance the vacuum extraction process. The extraction wells are dual purpose: groundwater is pumped and treated, and the steam and vaporized contaminants are transported under vacuum to the extraction well and then to the surface. Recovered contaminants are then either condensed and processed with the contaminated groundwater or trapped by gas-phase activated carbon filters. The technology uses readily available components such as extraction and monitoring wells, manifold piping, vapor-liquid separators, vacuum pumps, and gas emission control equipment. The technology will be demonstrated at two Department of Defense sites in California -- McClellan Air Force Base and Lemoore Naval Air Station.

(Contact: Paul dePercin at FTS 684-7797 or 513-569-7797)



Udell Technologies Steam Injection/Vacuum Extraction

UPCOMING DEMONSTRATIONS AND FUTURE OPPORTUNITIES

The following table lists 15 projects that are scheduled for field demonstration this year. For more information refer to descriptions in this bulletin or in the Technology Profiles document. To be placed on the SITE mailing list or to receive future SITE solicitations, write:

Bill Frietsch
U.S. EPA
Risk Reduction Engineering Laboratory
26 W. Martin Luther King Drive
Cincinnati, Ohio 45268

Upcoming Demonstrations for 1991

Technology	Developer	Site Location	Reference
Precipitation & Microfiltration, & Sludge Dewatering	EPOC Water, Inc.	Iron Mountain, CA	P
Carver-Greenfield Process	DehydroTech Corporation	PAB Oil Site, LA	P
In-Situ Vitrification	Geosafe Corporation	Parsons Site, MI	P
Rotary Thermal Desorber & Dechlorination (X*TRAX)	Chemical Waste Management	Resolve Site, MA	P
Evaporative & Catalytic Oxidation of Wastewater (PO*WW*ER®)	Chemical Waste Management	Lake Charles, LA	✓
Solidification/Stabilization	Wastech, Inc.	Robins AFB, GA	P
Thermal Desorption/Chemical Dehalogenation	SoilTech, Inc.	Wide Beach, NY & Waukegan Harbor, IL	✓
Membrane Separation/Bioremediation	Southern Bio Products, Inc.	American Creosote, FL	✓
Wetlands-Based Treatment	Colorado Dept. of Health	Idaho Springs, CO	E
Chemical Oxidation/Cyanide Destruction	Exxon Chemicals, Inc./Rio Linda Chemicals Company	T&E Facility, Cincinnati, OH	P
Hydrolytic Terrestrial Dissipation	Dames and Moore	Chemairspray, FL	✓
Pneumatic Fracturing	Accutech/NJIT	S. Plainfield, NJ	✓
Steam Injection/Vacuum Extraction	Udell Technologies, Inc.	McClellan AFB or Lemoore Naval Base, CA	✓
Extraksol™	Sanivan Group	Pinette Salvage, ME	P
Chemical Binding/Precipitation and Physical Separation	TechTran, Inc.	Rocky Flats, CO	P
Low Temperature Thermal Aeration	Canonie Environmental Services Corporation	Anderson Development Co., Adrian, MI	✓

Key: ✓ = Information contained in this update bulletin.
P = Information found in 1990 SITE Technology Profiles document.
E = Formerly an Emerging project -- listed in the SITE Technology Profiles document and updated in this bulletin.

EMERGING TECHNOLOGIES PROGRAM

Under the Emerging Technologies Program, EPA provides technical and financial support to technology developers for bench- and pilot-scale testing and evaluation of technologies that have already been proven on the conceptual level. Its goal is to promote the development of viable commercial technologies, and to provide future technologies that may be considered in the Demonstration Program.

Each year, EPA advertises the availability of a Request for Proposals (RFP) to the Emerging Technologies Program through the Commerce Business Daily (CBD) and various trade journals. After a technical review of the proposals submitted, selected candidates are invited to submit a cooperative agreement application and detailed project proposal that undergoes another full technical review. A cooperative agreement between EPA and the technology developer requires cost sharing. Projects are considered for either a 1- or 2-year developmental effort, providing awards of up to $150,000 per year, with a maximum of $300,000 over 2 years. Second-year funding depends on achieving significant progress during the first year.

In 1990, through an Interagency Agreement, the Department of Energy (DOE) co-funded seven SITE emerging technologies that could meet the treatment needs of its contaminated sites. These technologies address mixed hazardous and radioactive waste sites. DOE has continued support in the Emerging Technologies Program for 1991. Similarly, the Department of Defense (DOD) recently agreed to co-fund a number of emerging technologies selected in 1991. As with the DOE agreement, DOD has chosen certain technologies that may meet treatment needs for the wastes found at its sites. This interagency interest and cooperation enables EPA to accept additional promising candidates into the Emerging Technologies Program.

COMPLETED EMERGING TECHNOLOGIES EVALUATIONS

Emerging Technologies Program evaluations have been completed for six of the seven technologies accepted under the November 1987 solicitation (E01). These include technologies designed for chemical treatment/ultrafiltration, in-situ electroacoustic decontamination, biological sorption, wetlands-based treatment, laser-induced photochemical destruction, and contained recovery of oily waste using steam and hot water. Of these six technologies, four have been invited to participate in the Demonstration Program. The four "graduating" technologies are described below.

Bio-Recovery Systems, Inc., Las Cruces, New Mexico

AlgaSORB™ Biological Sorption Process

Bio-Recovery Systems, Inc., tested its AlgaSORB™ technology for the removal and recovery of heavy metal ions from groundwater. AlgaSORB™ is a biological sorption process based on the affinity of algae cell walls for heavy metal ions. The AlgaSORB™ sorption process was tested on mercury-contaminated groundwater at a hazardous waste site in Oakland, California, during Fall 1989 to determine optimum flow rates, binding capacities, and the efficiency of stripping agents. The project demonstrated the ability of the process to absorb mercury from groundwater with high levels of total dissolved solids and hard water components.

(Contact: Naomi Barkley at FTS 684-7854 or 513-569-7854)

Colorado Department of Health (developed by the Colorado School of Mines), Denver, Colorado

Wetlands-Based Treatment

The Colorado School of Mines investigated a constructed Wetlands-Based Treatment

technology that uses natural geochemical and biological processes inherent in a man-made wetland ecosystem to accumulate and remove metals from influent waters. Under first- and second-year funding, a pilot-scale system was built to assess the effectiveness of constructed wetlands in treating the effluent from the Big Five Tunnel near Idaho Springs, Colorado. Optimum results from two years of operation showed that zinc concentrations were reduced by 97 percent; aluminum, cadmium and lead concentrations were reduced by 90 to 100 percent; iron concentrations were reduced by 80 percent; copper concentrations were reduced to below detection limits; and pH was raised from 2.9 to 6.5.

(Contact: Ed Bates at FTS 684-7774 or 513-569-7774)

Energy and Environmental Engineering, Inc., East Cambridge, Massachusetts

Laser Induced Photochemical Oxidation Destruction

Energy and Environmental Engineering, Inc. investigated a technology designed to photochemically oxidize organic compounds in wastewater by applying ultraviolet radiation from a laser. The Laser Induced Photochemical Oxidative Destruction Process is envisioned as a final treatment step to reduce organic contamination in groundwater and industrial wastewater to acceptable discharge limits. Testing of the pilot-scale system showed greater than 95 percent destruction removal efficiency for several target compounds including chlorobenzene, chlorophenol, phenol, benzene, and dichloroethene. The process is now entering the initial phases of commercialization.

(Contact: Ronald Lewis at FTS 684-7856 or 513-569-7856)

Western Research Institute, Laramie, Wyoming

Contained Recovery of Oily Waste (CROW)

Western Research Institute developed a Contained Recovery of Oily Waste (CROW) process to recover oily hazardous waste from soils by adapting technology used for secondary petroleum recovery and primary production of heavy oil and tar sand bitumen. Steam and hot water displacement are used to move accumulated oily wastes and water aboveground for treatment. The technology was tested at the laboratory- and pilot-scale. One- and three-dimentional tests with chemical addition showed organics reduction to approximately 90 percent from soil with 3 percent by weight initial oily waste saturation.

(Contact: Eugene Harris at FTS 684-7862 or 513-569-7862)

NEW EMERGING TECHNOLOGIES

While work continued on one E01 and six E02 projects under second-year funding, and 17 E03 projects began, the Emerging Technologies Program continued its expansion through a forth solicitation (E04) in 1991. EPA reviewed 74 proposals submitted under E04, of which 20 developers were asked to submit cooperative agreement applications and detailed proposals. The 13 technologies listed in the following table were selected to participate in the program. Technology profiles will be developed for these projects after cooperative agreements with the developers are signed. For more information on any of the technologies, call the EPA contacts listed in the following table. To receive a Request for Proposals for the E05 solicitation scheduled for July 1991, write:

Bill Frietsch
U.S. EPA
Risk Reduction Engineering Laboratory
26 W. Martin Luther King Drive
Cincinnati, Ohio 45268

1991 E04 Emerging Technologies Tentatively Accepted*

Developer	Technology	Treatment Category	EPA Contact
PSI Technology Co.†	MIDAS Process for Solids Contaminated with Organics and Metals	Thermal	Mark Meckes FTS 684-7348 513-569-7348
Vortec Corporation	Vitrification Technology for Waste Treatment Processes	Thermal	Teri Shearer FTS 684-7949 513-569-7949
Center for Hazardous Materials Research	Secondary Lead Smelters for the Recovery of Lead from Waste Lead-Acid Battery Casings	Thermal	Patrick Augustin FTS 340-6992 908-321-6992
Western Product Recovery Group, Inc.†	Process for Sludge and Soils Contaminated with Organics and Heavy Metals	Solidification/ Stabilization	Dr. Joseph Farrell FTS 684-7645 513-569-7645
Warren Spring Laboratory	Physical Processing Techniques for Treatment of Contaminated Soils	Material Handling	Mary Stinson FTS 340-6683 908-321-6683
Davy Research & Development Ltd.†	Resin In-Pulp and Carbon In-Pulp Technology for Contaminated Land Treatment	Chemical	Kim Kreiton FTS 684-7328 513-569-7328
NULITE	Technology for Destruction of Organic & Inorganic in Aqueous Streams	Chemical	John Ireland FTS 684-7413 513-569-7413
IT Corporation	Treatment of Mixed Waste Contaminated Soils	Physical	Douglas Grosse FTS 684-7844 513-569-7844
Purus, Inc. (formerly Advanced Photolysis Technology, Inc.)	Ultraviolet Flashlamps for Air Phase Destruction of Organics in Groundwater & Soil	Physical	Norma Lewis FTS 684-7665 513-569-7665
Pulse Sciences, Inc.	X-Ray Treatment for Organic Wastes	Physical	Esperanza Renard FTS 342-4355 908-321-4355
Institute of Gas Technology	Integrated Chemical & Biological Treatment System for Site Remediation	Biological	Naomi Barkley FTS 684-7854 513-569-7854
New Jersey Institute of Technology and Hazardous Substances Management Research Center†	Integrated Pneumatic Fracturing Bioremediation for In-Situ Treatment of Contaminated Soil	Biological	Patricia Lafornara FTS 340-6988 908-321-6988
Groundwater Technology, Inc.	Bioremediation in In-Situ Reactors for Cyclodiene Pesticide-Contaminated Soil	Biological	Ron Lewis FTS 684-7856 513-569-7856

* Cooperative agreements pending
† DOD co-funded projects

MONITORING AND MEASUREMENT TECHNOLOGIES PROGRAM

The purpose of the Monitoring and Measurement Technologies Program (MMTP) is to accelerate the development, demonstration, and use of innovative monitoring, measurement, and characterization technologies at Superfund sites. These technologies are used to assess the nature and extent of contamination and evaluate the progress and effectiveness of remedial actions. The program places high priority on those technologies that provide cost-effective and faster, safer, and better methods than conventional technologies for producing real-time or near-real-time data.

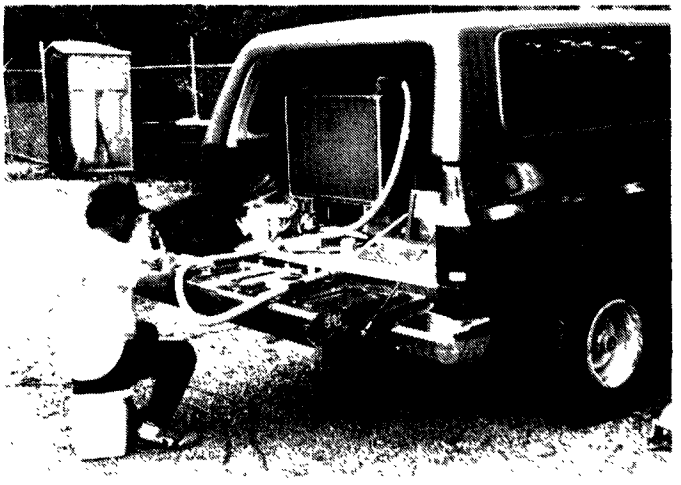
The MMTP is interested in new or modified technologies that can detect, monitor, and measure hazardous and toxic substances in the subsurface (saturated and vadose zones), air, biological tissues, wastes, and surface waters, as well as technologies that characterize the physical properties of sites. The types of technologies of interest to EPA include the following:

- Chemical sensors for in-situ measurements
- Groundwater sampling devices
- Soil and core sampling devices
- Soil-gas sampling devices
- Fluid sampling devices for the vadose zone
- In-situ and field portable analytical methods
- Expert systems that support field sampling or data acquisition and analysis

DEMONSTRATIONS CONDUCTED IN 1990

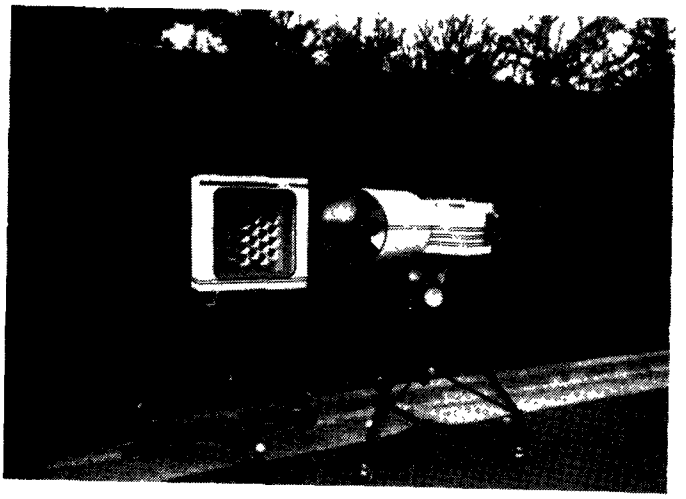
Three technologies were demonstrated under the MMTP during fiscal year 1990. These are described below. Fact sheets on technology demonstrations are available from the Environmental Monitoring Systems Laboratory in Las Vegas (EMSL-LV). Reports on technology performance are being prepared.

EPA demonstrated a **mobile environmental mass spectrometer** at two Superfund sites in Region 1. The purpose of the demonstration was to evaluate the performance of the instrument under field conditions. The contaminants analyzed were volatile organic compounds in water, and polynuclear aromatic hydrocarbons (PAH) and polychlorinated byphenyls (PCBs) in soils.

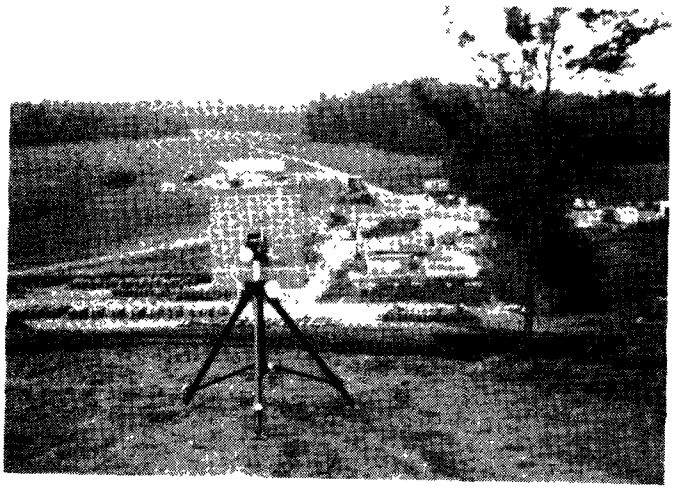


Mobile Environmental Mass Spectrometer

A **mobile open path Fourier transform infrared (FTIR) spectrometer** and three **air sector samplers** were demonstrated at a Superfund site in Region 4. These devices were used to measure the ambient air concentrations of volatile organic compounds around the perimeter of the site during remediation.



FTIR with Retroreflector



FTIR Remote Sensor

Finally, a laboratory demonstration of **ion mobility spectrometers (IMS)** was conducted. The configuration of commercially available units is not suited to demonstration under field conditions. However, the IMS technology has the potential for use as a field analytical method. The purpose of this demonstration was to have the two participating developers analyze performance evaluation materials (PEMs) in their laboratories. The PEMs (soil and water) contained individual compounds and mixtures of organic compounds.

OTHER MMTP ACTIVITIES

The MMTP has a variety of projects planned or being considered for fiscal year 1991. These projects involve emerging technologies and those ready for field demonstration. In addition, a few cooperative activities between the EPA and DOE are being negotiated. The projects include:

- Demonstration of an immunoassay field kit that measures benzene, toluene, ethylbenzene, and xylene (BTEX) in water
- Demonstration of another mobile mass spectrometer
- Laboratory and field demonstration of two or three air monitoring technologies
- Field demonstration of a transient electromagnetic geophysical instrument and the corresponding data interpretation software (a three-dimensional numerical method)
- Pilot-scale field demonstration of a device designed for placing monitoring and measurement technologies in cased and uncased boreholes
- Laboratory demonstration of a portable high-throughput liquid-adsorption sampler for a variety of air toxics
- Field demonstration of a prototype purge and trap manifold apparatus that is connected to a gas chromatograph

In addition to these projects, the MMTP will be field testing two PCB immunoassays during the Sanivan solvent extraction engineering demonstration at the Pinette's Salvage Yard site in Maine. This testing will be used as the basis for a future MMTP demonstration.

In February 1991, the EMSL-LV, along with other federal and non-federal cosponsors, convened the Second International Symposium on Field Screening Methods for Hazardous

Wastes and Toxic Chemicals. The objective of the symposium was to bring an international view to problems and solutions associated with characterizing and monitoring hazardous wastes and toxic chemicals in the field. The symposium had 10 technical sessions including 120 oral and poster presentations. In addition, over 60 vendors exhibited their technologies during the symposium. A proceedings document will be available through the National Technical Information Service (NTIS).

TECHNOLOGY IDENTIFICATION

The identification of candidate technologies is an ongoing process in the MMTP; therefore, technology developers are encouraged to submit new and updated information as it becomes available. EPA is interested in the following information regarding a technology or a method:

- Description of the device including size, weight, and requirements (power, gases, etc.) of equipment
- Types of environmental media to which the technology is applicable
- Toxic or hazardous chemicals detected, measured, or sampled
- Theory of operation including pertinent references in the literature or other documentation
- Existing performance data including successful application of the technology (laboratory and field)
- Detection limits, accuracy, precision, and bias of method
- Advantages of the method (time, cost, and other) compared to conventional methods
- Standard operating procedure and amount of operator training required
- Ability to commercialize or secure commercial interest in the technology

Submittals, which are accepted at any time, are used to define the universe of potential technologies that may be candidates for the SITE Program. The information submitted is reviewed, cataloged, and incorporated into a technology matrix, from which the Agency can make a preliminary determination of the types of innovative technologies that may be candidates for participation in the program. For more information on the format and content of technology information, call or write:

Eric N. Koglin (QAD)
U.S. EPA
Environmental Monitoring Systems Laboratory
P.O. Box 93478
Las Vegas, Nevada 89193-3478
702-798-2432

TECHNOLOGY TRANSFER

NEW ENTRANTS TO DEMONSTRATION PROGRAM

AccuTech Enviromental Services, Inc.
Cass Street Highway 35
Keyport, New Jersey 07735
Contact: Harry Moscatello
201-739-6444

Dames & Moore
1211 Governors Square Boulevard
Tallahassee, Florida 32301
Contact: Stoddard Pickrell, Jr.
904-942-5615

Canonie Environmental Services Corporation
800 Canonie Drive
Porter, Indiana 46304
Contact: Brian Bell
219-926-8651

Chemical Waste Management, Inc.
Geneva Research Center
1950 South Batavia Avenue
Geneva, Illinois 60134-3310
Contact: Erick Neuman
708-513-4500

Soil Tech, Inc.
c/o Canonie Environmental Services Corporation
94 Inverness Terrace East
Suite 100
Englewood, Colorado 80112
Contact: Martin Vorum
303-790-1747

Southern Bio Products, Inc.
5241 New Peachtree Road, Suite H
Atlanta, Georgia 30341
Contact: Heather Ford
404-498-6666

Udell Technologies, Inc.
4701 Doyle Street, Suite 5
Emeryville, California 94608
Contact: Lloyd Stewart
415-653-9477

UPDATED ADDRESSES AND PHONE NUMBERS FOR DEVELOPERS

Ogden Environmental Services
3550 General Atomics Court
San Diego, California 92121
619-455-3045
Contact: Brian Delledonne

CF Systems Corporation
500 West Cummings Pk., Suite 5600
Woburn, Massachusetts 01801
617-937-0800
Contact: Chris Shallice

Novaterra, Inc.
(formerly Toxic Treatments (USA), Inc.)
373 Van Ness Avenue, Suite 210
Torrance, California 90501
213-328-9433
Contact: Phillip N. LaMori

UPCOMING CONFERENCES

Third Forum on Innovative Hazardous Waste Treatment Technologies: Domestic and International
June 11-13, 1991
Fairmont Hotel - Dallas, TX
Contact: Lisa Moore
215-643-5466

HMCRI's 12th Annual National Conference and Exhibition: Hazardous Materials Control '91
(formerly Superfund Conference)
December 3-5, 1991
Sheraton Washington Hotel - Washington, DC
Contact: HMCRI
301-220-3870

QUICK CONTACT LISTS

Superfund Innovative Technology Evaluation (SITE) Program

Program Management	Robert Olexsey Stephen James	513-569-7861 513-569-7696
SITE Mailing List/ Solicitations (RFPs)	William Frietsch	513-569-7659
International Technologies	Donald Sanning	513-569-7861
Demonstration Program	John Martin	513-569-7758
Emerging Technologies Program	Norma Lewis	513-569-7665
Monitoring and Measurement Technologies Program	Eric Koglin	702-798-2432

OTHER CONTACTS

Superfund Technical Support Program	Ben Blaney	513-569-7406
Technology Innovation Office	Walter Kovalick	202-382-4363
Superfund Hotline	Hotline Operator	800-424-9346
Document Ordering		
Center for Environmental Research Information (CERI)	Operator	513-569-7562
National Technical Information Service (NTIS)	Operator	800-336-4700
Database Services		
Alternative Treatment Technology Information Center (ATTIC)	System Operator	301-816-9153

SITE REGIONAL CONTACTS

SITE Program Contact/Phone	*SITE Regional Coordinator Contact/Phone*
Region 1	
Kim Kreiton FTS 684-7328 513-569-7328	Diana King FTS 833-1676 617-573-9676
Region 2	
Ron Lewis FTS 684-7856 513-569-7856	Peter Moss FTS 264-4703 212-264-4703
Region 3	
Paul dePercin FTS 684-7797 513-569-7797	Paul Leonard FTS 597-8485 215-597-8485
Region 4	
Teri Shearer FTS 684-7949 513-569-7949	John Risher FTS 257-1586 404-347-1586
Region 5	
Laurel Staley FTS 684-7863 513-569-7863	Jack Barnette FTS 886-8963 312-886-8963
Region 6	
Randy Parker FTS 684-7271 513-569-7271	Don Williams FTS 255-2197 214-655-2197
Region 7	
Doug Grosse FTS 684-7341 513-569-7341	Steve Kinser FTS 276-7728 913-551-7728
Region 8	
Annette Gatchett FTS 684-7697 513-569-7697	Gerald Snyder FTS 330-7504 303-294-7504
Region 9	
Jack Hubbard FTS 684-7507 513-569-7507	Kenneth Erickson FTS 484-2324 415-744-2324
Region 10	
Norma Lewis FTS 684-7665 513-569-7665	John Barich FTS 399-8562 206-553-8562

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DOCUMENTS AVAILABLE FROM THE U.S. EPA RISK REDUCTION ENGINEERING LABORATORY SUPERFUND TECHNOLOGY DEMONSTRATION DIVISION

General Publications

☐ Technology Profiles (EPA/540/5-90/006)

Demonstration Project Results

American Combustion - Oxygen Enhanced Incineration

- ☐ Technology Evaluation (EPA/540/5-89/008)
- ☐ Applications Analysis (EPA/540/A5-89/008)

CF Systems Corp. - Solvent Extraction

- ☐ Technology Evaluation (EPA/540/5-90/002)
- ☐ Applications Analysis (EPA/540/A5-90/002)

Chemfix Technologies, Inc. - Chemical Fixation/Stabilization

- ☐ Technology Evaluation (EPA/540/5-89/011a)
- ☐ Applications Analysis (EPA/540/A5-89/011)

Hazcon - Solidification

- ☐ Technology Evaluation (EPA/540/5-89/001a)
- ☐ Applications Analysis (EPA/540/A5-89/001)

IWT In-Situ Stabilization

- ☐ Technology Evaluation (EPA/540/5-89/004a)
- ☐ Applications Analysis (EPA/540/A5-89/004)

Shirco-Infrared Incineration

- ☐ Technology Evaluation - Peake Oil (EPA/540/5-88/002a)
- ☐ Technology Evaluation - Rose Township (EPA/540/5-89/007a)
- ☐ Applications Analysis (EPA/540/A5-89/010)

Soliditech, Inc. - Solidification

- ☐ Technology Evaluation (EPA/540/5-89/005a)
- ☐ Applications Analysis (EPA/540/A5-89/005)

Terra Vac - Vacuum Extraction

- ☐ Technology Evaluation (EPA/540/5-89/003a)
- ☐ Applications Analysis (EPA/540/A5-89/003)

Ultrox International - UV Ozone Treatment for Liquids

- ☐ Technology Evaluation (EPA/540/5-89/012)
- ☐ Applications Analysis (EPA/540/A5-89/012)