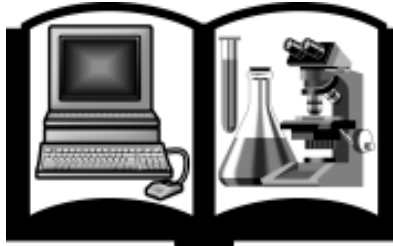




# Bibliography for Innovative Site Clean-Up Technologies

August 1999 Update

\*1999 UPDATE\*



\*LATEST EDITION\*

## Availability Information

### Documents with EPA numbers:

Unless otherwise noted, publications with EPA 510, 540, 542, 600, 625, and 630 numbers are available from NSCEP (Hard copies are available at no cost while supplies last):

National Service Center for Environmental Publications (NSCEP- formerly NCEPI)  
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Web: [www.epa.gov/ncepihom/](http://www.epa.gov/ncepihom/)  
Include the EPA document number with all orders.

### Government Printing Office (GPO)

Superintendent of Documents  
P.O. Box 371954  
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(202) 512-1800; Fax: (202) 512-2250  
Web: [www.gpo.gov/](http://www.gpo.gov/)

### OSWER Directives:

OSWER Hotline: (703) 412-9810, (800) 553-7672; or  
Superfund Docket & Document Center  
401 M Street (5202G)  
Washington, DC 20460  
(703) 603-9232; Fax: (703) 603-9240  
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[superfund.documentcenter@epa.gov](mailto:superfund.documentcenter@epa.gov)  
Web: [www.epa.gov/swerst1/directiv/](http://www.epa.gov/swerst1/directiv/) (or search on  
"oswer directive" at [www.epa.gov/swerrims/  
oswrrsch.htm](http://www.epa.gov/swerrims/oswrrsch.htm))

### Documents with PB numbers:

National Technical Information Service (NTIS)  
5285 Port Royal Rd.  
Springfield, VA 22161  
(800) 553-6847; (703) 605-6000; Fax: (703) 321-8547  
Web: [www.ntis.gov/](http://www.ntis.gov/)

**Note:** Many documents are available electronically on internet web sites (see addresses and symbols below). If a document is not accompanied by a web symbol or has been removed from a web site, check the NEPIS site listed on the next page for possible availability, or contact NTIS.

§ U.S. EPA Technology Innovation Office (TIO)  
[www.epa.gov/tio/](http://www.epa.gov/tio/)

▲ U.S. EPA TIO Hazardous Waste Clean-Up Information (CLU-IN)  
[www.clu-in.org](http://www.clu-in.org)

\* U.S. EPA Office of Research and Development (ORD),  
Cincinnati, OH (513) 569-7562  
[www.epa.gov/ORD/](http://www.epa.gov/ORD/)

▼ U.S. EPA ORD Superfund Innovative Technology Evaluation (SITE) Program  
[www.epa.gov/ORD/SITE/](http://www.epa.gov/ORD/SITE/)

□ U.S. EPA Office of Solid Waste and Emergency Response (OSWER), Hazardous Waste Division  
[www.epa.gov/epaoswer/hazwaste/ca/](http://www.epa.gov/epaoswer/hazwaste/ca/)

\* U.S. EPA Office of Underground Storage Tanks (OUST)  
[www.epa.gov/swerst1/resource/](http://www.epa.gov/swerst1/resource/)

Ω U.S. EPA National Risk Management Research Laboratory (NRMRL), Subsurface Remediation Information Center (SRIC), Robert S. Kerr Environmental Research Center, Ada, OK: (580) 436-8651; Fax: (580) 436-8503  
[www.epa.gov/ada/](http://www.epa.gov/ada/)

+ U.S. EPA Superfund Program  
[www.epa.gov/superfund/resources/](http://www.epa.gov/superfund/resources/)

○ U.S. EPA Environmental Technology Verification Program (ETV) - see section M for additional information  
[www.epa.gov/etv/](http://www.epa.gov/etv/)

(cont.)

❖ Remediation Technologies Development Forum (RTDF) - **see section O for additional information** [www.rtdf.org/](http://www.rtdf.org/)

● Federal Remediation Technologies Roundtable (FRTR) - **see section O for additional information** [www.frtr.gov/](http://www.frtr.gov/)

🌐 EPA's National Environmental Publications Information Service (NEPIS) web site offers more than 7000 EPA/ EPA-related full-text documents, with more added daily. These imaged documents can be viewed or printed only on a page-by-page basis. Documents can be located most quickly by document number (e.g., 542b98005). [www.epa.gov/clariton/](http://www.epa.gov/clariton/)

## A. Technology Survey Reports

### A1. General

Treatment Technologies for Site Cleanup: Ninth Annual Status Report  
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Site Remediation Technologies InfoBase: Guide to Federal Programs, Information Resources, and Publications on Contaminated Site Cleanup Technologies  
**EPA 542-B-98-006** ▲ ●

Best Management Practices (BMPs) for Soil Treatment Technologies: Suggested Operational Guidelines to Prevent Cross-Media Transfer of Contaminants During Clean-Up Activities  
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**EPA 542-B-96-002, PB96-153127** ▲ §

Guidance for Implementing Superfund Initiative 9A: Risk Sharing, March 24, 1998  
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Progress In Reducing Impediments to the Use of Innovative Remediation Technology  
**EPA 542-F-95-008, PB95-262556** 🌐

Initiatives to Promote Innovative Technology In Waste Management Programs  
**OSWER Directive 9380.0-25, EPA 540-F-96-012, PB96-963507** ▲ §

### A2. Remediation Case Studies ● 🌐

Abstracts, Volume 1  
**EPA 542-R-95-001, PB95-201711**

Abstracts, Volume 2  
**EPA 542-R-97-010, PB97-177570**

Abstracts, Volume 3  
**EPA 542-R-98-010, PB99-118499**

Volume 1: Bioremediation  
**EPA 542-R-95-002, PB95-182911**

Volume 2: Groundwater Treatment  
**EPA 542-R-95-003, PB95-182929**

Volume 3: Soil Vapor Extraction  
**EPA 542-R-95-004, PB95-182937**

Volume 4: Thermal Desorption, Soil Washing, and In Situ Vitrification  
**EPA 542-R-95-005, PB95-182945**

Volume 5: Bioremediation and Vitrification  
**EPA 542-R-97-008, PB97-177554**

Volume 6: Soil Vapor Extraction and Other In Situ Technologies  
**EPA 542-R-97-009, PB97-177562**

Volume 7: Ex Situ Soil Treatment Technologies (Bioremediation, Solvent Extraction, Thermal Desorption)  
**EPA 542-R-98-011, PB99-118481**

Volume 8: In Situ Soil Treatment Technologies (Soil Vapor Extraction, Thermal Processes)  
**EPA 542-R-98-012, PB99-106742**

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**EPA 542-R-98-013, PB99-106759**

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**EPA 542-R-98-015, PB99-106775**

Volume 12: On-Site Incineration  
**EPA 542-R-98-016**

Volume 13: Debris and Surface Cleaning Technologies, and Other Miscellaneous Technologies  
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### **A3. Site/Waste Types**

#### **Brownfields**

Road Map to Understanding Innovative Technology Options for Brownfields  
**EPA 542-B-97-002** ▲ §

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Innovative Uses of Compost: Composting of Soils Contaminated by Explosives  
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**EPA 402-R-97-006, PB98-123300** Ⓞ

Vitrification of Soils Contaminated by Hazardous and/or Radioactive Wastes: Emerging Technology Summary  
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Approaches for Remediation of Federal Facility Sites Contaminated with Explosives or Radioactive Waste  
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Metals Adsorption Workshop, May 5-6, 1998, Cincinnati, OH  
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Recent Developments for In Situ Treatment of Metal Contaminated Soils  
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Technology Alternatives for the Remediation of Soils Contaminated with Arsenic, Cadmium, Chromium, Mercury, and Lead: Engineering Bulletin  
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Molecular Bonding System® for Heavy Metals Stabilization, Solucorp® Industries, Ltd.: Innovative Technology Evaluation Report  
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**EPA 540-R-95-512, PB95-271961** Ⓞ

Literature Review Summary of Metals Extraction Processes Used to Remove Lead From Soils  
**EPA 600-R-94-006, PB94-140613**  
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#### **Pesticides**

Separation/Concentration Technology Alternatives for the Remediation of Pesticide Contaminated Soil: Engineering Bulletin  
**EPA 540-S-97-503, PB97-162820** Ⓞ

Contaminants and Remedial Options at Pesticide Sites  
**EPA 600-R-94-202, PB95-183869** Ⓞ

#### **Organics**

Sprinkler Irrigation as a VOC Separation and Disposal Method: Innovative Technology Evaluation Report  
**EPA 540-R-98-502** ▼

Contaminants and Remedial Options at Solvent-Contaminated Sites  
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#### **Underground Storage Tanks (USTs)**

Assessing UST Corrective Action Technologies: Lessons Learned about In Situ Air Sparging at the Denison Avenue Site, Cleveland, OH  
**EPA 600-R-95-040, PB95-188082**  
Project Summary **EPA 600-SR-95-040** \*

How to Effectively Recover Free Product at Leaking Underground Storage Tanks: A Guide for State Regulators  
**EPA 510-R-96-001, S/N 055-000-005532 (GPO)** \*

How to Evaluate Alternative Cleanup Technologies For Underground Storage Tank Sites: A Guide For Corrective Action Plan Reviewers  
**EPA 510-B-95-007, PB98-113525, S/N 055-000-00499-4 (GPO)** \*

List of Leak Detection Evaluations for UST Systems, Fifth Edition  
**EPA 510-B-98-005** \*

▲ CLU-IN \* ORD Ω SRIC ● FRTR ❖ RTDF § TIO \* OUST □ OSWER ▼ SITE + SF Ⓞ NEPIS ○ ETV

**See availability information on page one**

Pay-For-Performance Cleanups: Effectively Managing  
Underground Storage Tank Cleanups  
EPA 510-B-96-002 \* ④

Remediation of MTBE Contaminated Soil and Ground-  
water: MTBE Fact Sheet # 2  
EPA 510-F-98-002 ④

### **Wood Preserving/Treatment**

Treatment Technology Performance and Cost Data for  
Remediation of Wood Preserving Sites  
EPA 625-R-97-009, PB98-147069 ④

Presumptive Remedies for Soils, Sediments, and  
Sludges at Wood Treater Sites  
EPA 540-R-95-128, PB95-963410, OSWER Directive  
9200.5-162 †

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Technology Developers: Looking for Information?  
(Brochure)  
EPA 542-F-99-008

Consortium for Site Characterization Technology: Environ-  
mental Technology Verification (ETV) Reports (Factsheet)  
EPA 542-F-98-008 ④

Environmental Technology Verification Program: Quality and  
Management Plan for the Pilot Period  
(1995-2000)  
EPA 600-R-98-064 ○

Environmental Technology Verification (ETV) Program: Site  
Characterization and Monitoring Technologies Pilot  
EPA 542-F-99-009 ▲

EPA's Environmental Technology Verification Program  
Brochure (updated July 1999)  
EPA 600-F-98-015 ○

Remediation Technologies Development Forum (RTDF)  
EPA 542-F-97-016 ④

RTDF Questions and Answers Factsheet  
EPA 542-F-97-017 ④

RTDF Action Teams Fact Sheets:  
EPA 542-F-97-025 (Set) ④  
Lasagna™ Public-Private Partnership  
EPA 542-F-97-012a ④  
Bioremediation of Chlorinated Solvents Consortium  
EPA 542-F-97-012b ④

Permeable Reactive Barriers Action Team  
EPA 542-F-97-012c ④  
IINERT Soil-Metals Action Team  
EPA 542-F-97-012d ④  
In Situ Flushing Action Team  
EPA 542-F-97-013 ④  
Phytoremediation of Organics Action Team  
EPA 542-F-97-014 ④  
Sediments Remediation Action Team  
EPA 542-F-97-015 ④

EPA's Small Business Innovation Research (SBIR)  
Program: Innovative Solutions for Environmental Problems  
EPA 600-F-96-021 ④

**B2. Superfund Innovative Technology Evalua-  
tion Program** - see also the **SITE** web site (▼) for  
more full text reports

Superfund Innovative Technology Evaluation Program:  
Annual Report to Congress, FY 1997  
EPA 540-R-98-503 \*

Superfund Innovative Technology Evaluation (SITE)  
Technology Profiles, Ninth Edition  
EPA 540-R-97-502 ▲ \* §

Superfund Innovative Technology Evaluation: SITE on the  
Move: Fact Sheet  
EPA 540-F-97-500 ▼

### **B3. Treatability Studies - Guidance**

Considerations in Deciding to Treat Contaminated  
Unsaturated Soils In Situ: Engineering Forum Issue Paper  
EPA 540-S-94-500, PB94-177771

**Note: The following sections (C - J) list some  
documents for which several versions have been pro-  
duced. Full Reports average >20 pages in length, Bulle-  
tins average 10-20 pages in length, Summaries and  
Capsules average 4 pages in length.**

## **C. Ground Water (*In Situ* Treatment)**

\*see also GWRTAC, section M\*

### **C1. General**

Field Applications of In Situ Remediation Technologies:  
Groundwater Circulation Wells  
EPA 542-R-98-009 ▲ §

Remediation Case Studies: ● ●

Volume 2: Groundwater Treatment  
**EPA 542-R-95-003, PB95-182929**

Volume 9: Groundwater Pump and Treat (Chlorinated Solvents)

**EPA 542-R-98-013, PB99-106759**

Volume 10: Groundwater Pump and Treat (Nonchlorinated Contaminants)

**EPA 542-R-98-014, PB99-106767**

Volume 11: Innovative Groundwater Treatment Technologies

**EPA 542-R-98-015, PB99-106775**

Testing and Demonstration Sites for Innovative Groundwater Remediation Technologies

**EPA 542-R-97-002** ▲ §

Anaerobic Biodegradation of BTEX in Aquifer Material

**EPA 600-S-97-003** Ω

Pump and Treat Ground-Water Remediation: A Guide for Decision Makers and Practitioners

**EPA 625-R-95-005** \*

Innovative Measures for Subsurface Chromium Remediation: Source Zone, Concentrated Plume, and Dilute Plume: Research Brief

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Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites

**EPA 540-R-96-023, PB96-963508** †

Surfactant Injection for Ground Water Remediation: State Regulators' Perspectives and Experiences

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**EPA 600-S-94-002, PB95-111951** Ω

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Field Applications of In-Situ Remediation Technologies: Permeable Reactive Barriers

**EPA 542-R-99-002** ▲ §

Permeable Reactive Barrier Technologies for Contaminant Remediation

**EPA 600-R-98-125, PB99-105702** ▲ §

NATO/CCMS Pilot Study Evaluation of Demonstrated and Emerging Technologies for the Treatment and Clean Up of Contaminated Land and Groundwater. Phase III 1998 Special Session: Treatment Walls and Permeable Reactive Barriers

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Metal-Enhanced Dechlorination of Volatile Organic Compounds Using an In-Situ Reactive Iron Wall: Innovative Technology Evaluation Report

**EPA 540-R-98-501** ▼

Permeable Reactive Subsurface Barriers for Interception and Remediation of Chlorinated Hydrocarbon and Chromium (VI) Plumes in Ground Water

**EPA 600-F-97-008** Ω

## C3. Monitored Natural Attenuation

Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (April 1999)

**OSWER Directive 9200.4-17P** \* ▲ §

Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water

**EPA 600-R-98-128** ▲ Ω §

Proceedings of the Symposium on Natural Attenuation of Chlorinated Organics in Ground Water

**EPA 540-R-97-504** \*

Monitored Natural Attenuation for Groundwater: Seminar Series

**EPA 625-K-98-001** \*

Bioplume III Natural Attenuation Decision Support System User's Manual Version 1.0 - **see section M for software**

**EPA 600-R-98-010** Ω

Monitoring and Assessment of In-Situ Biocontainment of Petroleum Contaminated Ground-Water Plumes

**EPA 600-R-98-020, PB98-145329**

Project Summary **EPA 600-SR-98-020** \*

Natural Attenuation of Hexavalent Chromium In Ground Water and Soils

**EPA 540-S-94-505, PB95-182614** Ω

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**See availability information on page one**

Demonstrating Remediation by Natural Attenuation Using Numerical Ground Water Models and Annual Ground Water Sampling  
**EPA 600-A-97-037, PB97-193742**

Commonly Asked Questions Regarding the Use of Natural Attenuation for Chlorinated Solvent Spills at Federal Facilities  
**PB97-142087**

Commonly Asked Questions Regarding the Use of Natural Attenuation for Petroleum-Contaminated Sites at Federal Facilities  
**PB97-142079**

Natural Attenuation of Trichloroethene at the St. Joseph, Michigan, Superfund Site  
Video **EPA 600-V-95-001** Ω  
Project Summary **EPA 600-SV-95-001** \*

## D. Thermal Treatment

### D1. General

Remediation Case Studies: ● ●  
Volume 5: Bioremediation and Vitrification  
**EPA 542-R-97-008, PB97-177554**  
Volume 8: In Situ Soil Treatment Technologies (Soil Vapor Extraction, Thermal Processes)  
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How Heat Can Enhance In Situ Soil and Aquifer Remediation: Important Chemical Properties and Guidance on Choosing the Appropriate Techniques  
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### D2. Thermal Desorption

Remediation Case Studies: ● ●  
Volume 4: Thermal Desorption, Soil Washing, and In Situ Vitrification  
**EPA 542-R-95-005, PB95-182945**  
Volume 7: Ex Situ Soil Treatment Technologies (Bioremediation, Solvent Extraction, Thermal Desorption)  
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Thermal Desorption System, Maxymillian Technologies, Inc.: SITE Technology Capsule  
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Thermal Desorption Treatment: Engineering Bulletin  
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Thermal Desorption Remedy Selection, Guide For Conducting Treatability Studies Under CERCLA  
**EPA 540-R-92-074A, PB93-126597** ●

## E. Bioremediation

### E1. General

Remediation Case Studies: ● ●

Volume 1: Bioremediation

**EPA 542-R-95-002, PB95-182911**

Volume 5: Bioremediation and Vitrification

**EPA 542-R-97-008, PB97-177554**

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Bioremediation of Petroleum Hydrocarbons: A Flexible, Variable Speed Technology

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Bioremediation of Hazardous Wastes: Research, Development, and Field Evaluations

**EPA 540-R-95-532, PB96-130729** ▲\* §

Bioventing Principles and Practices

Volume I: Bioventing Principles Manual

**EPA 540-R-95-534A** \*

Volume II: Bioventing Design Manual

**EPA 540-R-95-534B** \*

Combined Chemical and Biological Oxidation of Slurry Phase Polycyclic Aromatic Hydrocarbons

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Grace Dearborn Inc., Daramend™ Bioremediation Technology: Innovative Technology Evaluation Report

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Demonstration Bulletin **EPA 540-MR-94-508** ●

SITE Technology Capsule **EPA 540-R-94-508a** ▼

In Situ Biodegradation Treatment: Engineering Bulletin

**EPA 540-S-94-502, PB94-190469** ●

### E2. Bioremediation Field Initiative Site Profiles \* ▲ §

Eielson Air Force Base, AK

**EPA 540-F-95-506B**

Escambia Wood Preserving Site, FL

**EPA 540-F-95-506G**

Hill Air Force Base Superfund Site, UT

**EPA 540-F-95-506C**

Libby Groundwater Superfund Site, MT

**EPA 540-F-95-506A**

Public Service Company of Colorado

**EPA 540-F-95-506D**

▲ CLU-IN \* ORD Ω SRIC ● FRTR ❖ RTDF § TIO \* OUST □ OSWER ▼ SITE + SF ● NEPIS ○ ETV

See availability information on page one

Reilly Tar and Chemical Corporation, MN  
EPA 540-F-95-506H

### **E3. Bioremediation Field Performance Evaluations**

Hill Air Force Base, UT  
EPA 540-R-97-505 ④

In Situ Bioremediation of the Upper Aquifer, Champion International Superfund Site, Libby, Montana  
EPA 600-R-97-044 ④

Eielson Air Force Base, Alaska  
EPA 540-R-95-533 \*

### **E4. Bioremediation In The Field Search System** - see section M for additional information

Bioremediation in the Field Search System (BFSS)  
Version 2.1: Fact Sheet  
EPA 540-F-97-502 ④

BFSS Database Version 2.1 ▲

## **F. Phytoremediation**

A Citizen's Guide to Phytoremediation  
EPA 542-F-98-011; EPA 542-F-96-025 (Spanish) ▲ §

Phytoremediation Resource Guide  
EPA 542-B-99-003 ▲ §

## **G. Soil Vapor Extraction & Enhancements**

Remediation Case Studies: ● ④  
Volume 3: Soil Vapor Extraction  
EPA 542-R-95-004, PB95-182937  
Volume 6: Soil Vapor Extraction and Other In-Situ Technologies  
EPA 542-R-97-009, PB97-177562  
Volume 8: In Situ Soil Treatment Technologies (Soil Vapor Extraction, Thermal Processes)  
EPA 542-R-98-012, PB99-106742

Multi-Phase Extraction: State-of-the-Practice  
EPA 542-R-99-004 ▲ §

Supplemental Bulletin, Multi-Phase Extraction (MPE)  
Technology for VOCs in Soil and Groundwater: Presumptive Remedy Fact Sheet  
EPA 540-F-97-004, PB97-963501 †

Analysis of Selected Enhancements for Soil Vapor Extraction  
EPA 542-R-97-007 ▲ §

Michigan Soil Vapor Extraction Remediation (MISER) Model: A Computer Program to Model Soil Vapor Extraction and Bioventing of Organic Chemicals in Unsaturated Geological Material  
EPA 600-R-97-099 ④  
Project Summary EPA 600-SR-97-099 Ω

Soil Vapor Extraction (SVE) Enhancement Technology Resource Guide: Air Sparging, Bioventing, Fracturing, Thermal Enhancements  
EPA 542-B-95-003 ▲ ④ §

Soil Vapor Extraction Implementation Experiences: Engineering Forum Issue Paper  
EPA 540-F-95-030, PB95-963315 ▲ §

Unterdruck-Verdampfer-Brunnen Technology (UVB) Vacuum Vaporizing Well: Demonstration Bulletin  
EPA 540-MR-95-500 ▼  
Site Technology Capsule EPA 540-R-95-500A ▼

Zenon Cross-Flow Pervaporation Technology, Zenon Environmental, Inc.: Demonstration Bulletin  
EPA 540-MR-95-511 ④  
Site Technology Capsule EPA 540-R-95-511A ④

Field Investigation of Effectiveness of Soil Vapor Extraction Technology (Final Project Report)  
EPA 600-R-94-142, PB94-205531

## **H. Physical/Chemical Treatment**

### **H1. General**

Field Applications of In Situ Remediation Technologies: Chemical Oxidation  
EPA 542-R-98-008 ▲ §

Advanced Photochemical Oxidation Processes: Handbook  
EPA 625-R-98-004, PB99-151169

Integration of Photocatalytic Oxidation with Air Stripping of Contaminated Aquifers: SITE Emerging Technology Summary  
EPA 540-SR-98-504

Molecular Bonding System® for Heavy Metals Stabilization, Solucorp® Industries, Ltd.: Innovative Technology Evaluation Report  
EPA 540-R-97-507 ▼  
Demonstration Bulletin EPA/540-MR-97/507 ▼

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See availability information on page one



Simultaneous Destruction of Organics and Stabilization of Metals in Soils: Emerging Technology Summary  
**EPA 540-SR-98-500 ▼**

Disc Tube™ Module Technology Rochem Separation Systems, Inc.: Innovative Technology Evaluation Report  
**EPA 540-R-96-507, PB 99-129827 ▼**  
SITE Technology Capsule **EPA 540-R-96-507a ▼**

Geotech Development Corporation Cold Top Ex-Situ Vitrification Technology: SITE Technology Capsule  
**EPA 540-R-97-506a ▼**

In Situ Electrokinetic Extraction System: Sandia National Laboratories Demonstration Bulletin  
**EPA 540-MR-97-509 ▼**

Electrokinetic Soil Processing, Electrokinetics, Inc.: Emerging Technology Bulletin  
**EPA 540-F-95-504** 🌐

Combined Chemical and Biological Oxidation of Slurry Phase Polycyclic Aromatic Hydrocarbons  
**EPA 600-A-95-065, PB95-217642**

Electron Beam Technology, High Voltage Environmental Applications Inc.: Innovative Technology Evaluation Report  
**EPA 540-R-96-504 ▼**  
Demonstration Bulletin **EPA 540-MR-96-504 ▼**

Metal-Enhanced Dechlorination of Volatile Organic Compounds Using an Aboveground Reactor  
**EPA 540-R-96-503 ▼**  
Site Technology Capsule **EPA 540-R-96-503a** 🌐

## **H2. Soil Washing**

Remediation Case Studies, Volume 4: Thermal Desorption, Soil Washing, and In Situ Vitrification  
**EPA 542-R-95-005, PB95-182945** ● 🌐

Biogenesis Soil Washing Technology: Innovative Technology Evaluation Report  
**EPA 540-R-93-510** 🌐

## **H3. Solvent Extraction**

Remediation Case Studies, Volume 7: Ex Situ Soil Treatment Technologies (Bioremediation, Solvent Extraction, Thermal Desorption)  
**EPA 542-R-98-011, PB99-118481** ● 🌐

Removal of PCBs From Contaminated Soil Using the CF Systems (trade name) Solvent Extraction Process: A Treatability Study  
**EPA 540-R-95-505, PB95-199030**  
Project Summary **EPA 540-SR-95-505** 🌐

Solvent Extraction: Engineering Bulletin  
**EPA 540-S-94-503, PB94-190477** 🌐

Solvent Extraction Treatment System, Terra-Kleen Response Group, Inc.: Innovative Technology Evaluation Report  
**EPA 540-R-94-521 ▼**

## **I. Other Conferences & International Surveys**

NATO/CCMS Pilot Study Evaluation of Demonstrated and Emerging Technologies for the Treatment and Clean Up of Contaminated Land and Groundwater:  
Phase II Final Report  
**EPA 542-R-98-001a** ▲ §  
Phase II Overview Report  
**EPA 542-R-98-001b** ▲ §  
Phase II Appendix IV—Project Summaries  
**EPA 542-R-98-001c** ▲ §  
Phase III 1998 Annual Report  
**EPA 542-R-98-002** ▲ §  
Phase III 1998 Special Session: Treatment Walls and Permeable Reactive Barriers  
**EPA 542-R-98-003** ▲ §

National Conference on Management and Treatment of Contaminated Sediments. Proceedings, Cincinnati, Ohio, May 13-14, 1997  
**EPA 625-R-98-001** \*

## **J. Site Characterization**

### **J1. General**

Innovations in Site Characterization: Interim Guide to Preparing Case Studies  
**EPA 542-B-98-009 ▼ ▲ §**

DNAPL Site Characterization  
**OSWER Directive 9355.4-16FS, PB94-963317**

Field Analytical and Site Characterization Technologies: Summary of Applications  
**EPA 542-R-97-011 ▲ §**

Innovations in Site Characterization Case Study: Hanscom Air Force Base, Operable Unit 1 (Sites 1, 2, and 3)  
**EPA 542-R-98-006, PB99-101362 ▲ §**

Application of the Electromagnetic Borehole Flowmeter  
**EPA 600-R-98-058** 🌐  
Project Summary **EPA 600-SR-98-058** Ω

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**See availability information on page one**

Innovations in Site Characterization: Dextsil L2000 PCB/ Chloride Analyzer for Drum Surfaces  
**EPA 542-R-99-003** ▲

Geophysical Techniques to Locate DNAPLs: Profiles of Federally Funded Projects  
**EPA 542-R-98-020** ▲

Field Sampling and Selecting On-Site Analytical Methods for Explosives in Soil: Federal Facilities Forum Issue Paper  
**EPA 540-R-97-501, PB97-186613** 🌐

Field Sampling and Analysis Technologies Matrix and Reference Guide  
**EPA 542-B-98-002** ●

Field Validation of a Penetrometer-Based Fiber Optic Petroleum, Oil, and Lubricant (POL) Sensor  
**EPA 600-R-97-055, PB98-400172** 🌐  
Project Summary **EPA 600-SR-97-055** \*

Environmental Technology Verification (ETV) Program: Site Characterization and Monitoring Technologies Pilot  
**EPA 542-F-99-009** ▲

Characterization of Organic Matter in Soil and Aquifer Solids: Environmental Research Brief  
**EPA 600-S-97-001** \*

Hydrogeologic Characterization of Fractured Rock Formations: A Guide for Groundwater Remediators: Project Summary  
**EPA 600-S-96-001** \*

Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)  
**EPA 402-R-97-016, S/N 052-020-00639-3 (GPO)**

Expedited Site Assessment Tools For Underground Storage Tank Cleanups  
**EPA 510-B-97-001, S/N 055-000-00564-8 (GPO)** \*

## **J2. Environmental Technology Verification (ETV) Program: Technology Verification Reports** ▲ § ○

**Cone Penetrometer-Deployed Sensor**  
The Rapid Optical Screening Tool (ROST™) Laser-Induced Fluorescence (LIF) System for Screening of Petroleum Hydrocarbons in Subsurface Soils  
**EPA 600-R-97-020**

Site Characterization Analysis Penetrometer System (SCAPS) Laser-Induced Fluorescence (LIF) Sensor and Support System  
**EPA 600-R-97-019**

**Field Portable Gas Chromatograph/Mass Spectrometer**  
Viking Instruments Corporation SpectraTrak™ 672: Environmental Technology Verification Report  
**EPA 600-R-97-148**

Bruker-Franzen Analytical Systems, Inc. EM640™ : Environmental Technology Verification Report  
**EPA 600-R-97-149**

**Field Portable X-Ray Fluorescence Analyzer**  
HNU Systems SEFA-P  
**EPA 600-R-97-144**

Metorex X-MET 920-MP  
**EPA 600-R-97-151**

Metorex X-MET 920-P and 940  
**EPA 600-R-97-146**

Niton XL Spectrum Analyzer  
**EPA 600-R-97-150**

Scitec Map Spectrum Analyzer  
**EPA 600-R-97-147**

Spectrace TN 9000 and TN Pb Field Portable X-Ray Fluorescence Analyzers  
**EPA 600-R-97-145**

### **PCB Analysis Technologies**

Electrochemical Technique/Ion Specific Electrode: Dextsil Corporation L2000 PCB/Chloride Analyzer  
**EPA 600-R-98-109**

Portable Gas Chromatograph/Surface Acoustic Wave Detector: Electric Sensor Technology 4100 Vapor Detector  
**EPA 600-R-98-114**

Immunoassay Kit: Envirologix, Inc. PCB in Soil Tube Assay  
**EPA 600-R-98-173**

Immunoassay Kit: Hach Company PCB Immunoassay Kit  
**EPA 600-R-98-110**

Immunoassay Kit: Strategic Diagnostics Inc. D TECH PCB Test Kit  
**EPA 600-R-98-112**

Immunoassay Kit: Strategic Diagnostics Inc. EnviroGard PCB Test Kit  
**EPA 600-R-98-113**

Immunoassay Kit: Strategic Diagnostics Inc. RaPID Assay System for PCB Analysis  
**EPA 600-R-98-111**

### **Soil/Soil Gas Sampling Technology**

Quadrel Services, Inc. EMFLUX Soil Gas System  
**EPA 600-R-98-096**

W. L. Gore & Associates Inc. GORE-SORBER Screening Survey  
**EPA 600-R-98-095**

Art's Manufacturing and Supply AMST™ Dual Tube Liner Sampler  
**EPA 600-R-98-093**

Clements Associates, Inc. JMC Environmentalist's Subsoil Probe  
**EPA 600-R-98-091**

Geoprobe Systems, Inc. Large-bore Soil Sampler  
**EPA 600-R-98-092**

Simulprobe Technologies, Inc. Core Barrel Sampler  
**EPA 600-R-98-094**

### **Well-Head Monitoring for VOCs**

Field-Portable Gas Chromatograph: Electronic Sensor Technology, Model 4100  
**EPA 600-R-98-141**

Field-Portable Gas Chromatograph: Perkin-Elmer Photovac, Voyager  
**EPA 600-R-98-144**

Field-Portable Gas Chromatograph: Sentex Systems, Inc. Scentograph Plus II  
**EPA 600-R-98-145**

Field-Portable Gas Chromatograph/Gas Spectrometer: Inficon, Inc., HAPSITE with Headspace Sampling Accessory  
**EPA 600-R-98-142**

Photoacoustic Spectrophotometer: Innova AirTech Instruments Type 1312 Multi-Gas Monitor  
**EPA 600-R-98-143**

### **J3. Superfund Innovative Technologies Evaluation (SITE) Program**

HNU-Hanby PCP Immunoassay Test Kit  
**EPA 540-R-95-515, PB96-116496 ▼**  
Demonstration Bulletin **EPA 540-MR-95-515** 🌐

Field Analytical Screening Program, PCP Method: Innovative Technology Evaluation Report  
**EPA 540-R-95-528, PB96-134184 ▼**  
Demonstration Bulletin **EPA 540-MR-95-528** 🌐

PCP Immunoassay Technologies: Innovative Technology Evaluation Report  
**EPA 540-R-95-514 ▼**  
Demonstration Bulletin **EPA 540-MR-95-514** 🌐

## **K. Technical Support**

Office of Research and Development Technical Assistance Directory  
**EPA 600-K-97-001 \***

Guide To Documenting and Managing Cost and Performance Information for Remediation Projects  
**EPA 542-B-98-007 ●**

Land Remediation and Pollution Control Division: Science and Technology to Treat Contaminated Soils, Sludges, and Sediments  
**EPA 540-F-98-501** 🌐

Underground Storage Tank Program Directory  
**EPA 510-B-98-003** 🌐

## **L. Community Involvement**

Second document numbers listed after the titles below are those for Spanish versions of these guides.

**El segundo número de los documentos enumerados corresponde a la versión en español de las guías.**

Citizen's Guides (series update to begin in 1999):

Citizens Guides to Understanding Innovative Technologies (a listing of all Citizens Guides, including those available in Spanish)

Bioremediation  
**EPA 542-F-96-007; EPA 542-F-96-023 ▲ §**

Chemical Dehalogenation  
**EPA 542-F-96-004; EPA 542-F-96-020 ▲ §**

Innovative Treatment Technologies for Contaminated Soils, Sludges, Sediments, and Debris  
**EPA 542-F-96-001; EPA 542-F-96-017 ▲ §**

In Situ Soil Flushing  
**EPA 542-F-96-006; EPA 542-F-96-022 ▲ §**

Natural Attenuation  
**EPA 542-F-96-015; EPA 542-F-96-026 ▲ §**

Phytoremediation  
**EPA 542-F-98-011; EPA 542-F-96-025 ▲ §**

Soil Vapor Extraction and Air Sparging  
**EPA 542-F-96-008; EPA 542-F-96-024 ▲ §**

Soil Washing

EPA 542-F-96-002; EPA 542-F-96-018 ▲ §

Solvent Extraction

EPA 542-F-96-003; EPA 542-F-96-019 ▲ §

Treatment Walls

EPA 542-F-96-016; EPA 542-F-96-027 ▲ §

Understanding Presumptive Remedies

EPA 540-F-97-019, PB97-963303 †

## M. Electronic Resources: Web Sites/ Databases/Software/Listservers

**EPA's TIO Hazardous Waste Clean-up Information Web Site: CLU-IN**

See page 15 for details.

**EPA REACH IT**

See page 15 for details.

**TechDirect Technology Information Service**

See page 14 for details.

**Alternative Treatment Technology Information Center (ATTIC)**

A comprehensive database providing current information on innovative treatment technologies. ORD's ATTIC Online is available at [www.epa.gov/attic/index.html](http://www.epa.gov/attic/index.html).

**Bioremediation in the Field Search System (BFSS):**

PC-based software that provides information on approximately 500 waste sites across the U.S. where bioremediation is being tested or implemented or has been completed. Version 2.1 is available from the ORD web site ([www.epa.gov/ORD/BBS.html](http://www.epa.gov/ORD/BBS.html)) and from CLU-IN. Diskettes are available from ORD publications at (513) 569-7562. A database update is scheduled for 1999.

**Remediation Technologies Screening Matrix and Reference Guide, Version 3.0**

An exhaustive cross-reference of technology descriptions, site characterization techniques, and contaminants. PB98-108590 ●

**Field Sampling and Analysis Technologies Matrix and Reference Guide, First Edition**

This document is intended to provide comparative screening information on analytical and sampling technologies.

EPA 542-B-98-002, PB99-101685INZ ●

**Completed North American Innovative Technology Demonstration Projects Database ▲**

A searchable version of the report can be downloaded.

**Environmental Technology Verification (ETV) Web Site:**

ETV was created to accelerate the entrance of new environmental technologies into the marketplace by verifying their performance in partnership with DOE's Sandia National Laboratories and Oak Ridge National Laboratories. For more information, visit the ETV web site at [www.epa.gov/etv](http://www.epa.gov/etv) or contact the ETV Pilot Managers:

Eric Koglin, EPA, (702) 798-2432

Rodger Jenkins, Oak Ridge, (423) 576-8594

Dan Horschel, Sandia, (505) 845-9836

**Ground-Water Remediation Technologies Analysis Center (GWRTAC) Web Site:**

GWRTC is operated by the National Environmental Technology Applications Center (NETAC), in association with the University of Pittsburgh's Environmental Engineering Program, under a cooperative agreement with the U.S. EPA's TIO. GWRTAC disseminates information on innovative ground-water remediation technologies through information available in hard copy or on the web site at [www.grwrtac.org](http://www.grwrtac.org).

Call (800) 373-1973, or (412) 826-5320, ext. 215;

Fax: (412) 826-5552; e-mail: [gwrnac@netac.org](mailto:gwrnac@netac.org).

**Tank Racer 99:** Software that estimates corrective action costs at underground storage tank sites.

\$1,500.00/person (multi-user discounts available)

Contact Talisman Partners, Ltd., Englewood, CO, at (303) 771-3103 or visit [www.talpart.com](http://www.talpart.com).

**BIOPLUME III Ω**

The natural attenuation decision support system software models two-dimensional contaminant transport under the influence of oxygen, nitrate, iron, sulfate, and methanogenic biodegradation.

NATO/CCMS Pilot Study Evaluation of Demonstrated and Emerging Technologies for the Treatment and Clean Up of Contaminated Land and Groundwater. Pilot Study Reports, 1985-1998

**EPA 542-C-98-004 (CD-ROM)**

Contains the following reports:

Phase II, Interim Status Report No. 203

**EPA 542-R-95-006, PB95-227849 ▲ §**

Phase II Final Report

**EPA 542-R-98-001a ▲ §**

Phase II Overview Report

**EPA 542-R-98-001b ▲ §**

Phase II Appendix IV—Project Summaries

**EPA 542-R-98-001c ▲ §**

Phase III 1998 Annual Report

**EPA 542-R-98-002 ▲ §**

Phase III 1998 Special Session: Treatment Walls and

Permeable Reactive Barriers

**EPA 542-R-98-003 ▲ §**

Site Characterization Library: National Exposure Research Laboratory (NERL), Las Vegas, Volume 1 (Release 2) (CD-ROM)

**EPA 600-C-98-001**

This electronic library contains dozens of electronic documents and computer programs related to the characterization of hazardous waste sites. It is available from the National Service Center for Environmental Publications (NSCEP) while quantities last.

Information Sources for Innovative Remediation and Site Characterization Technologies (CD ROM)

**EPA 542-C-98-003**

This electronic resource library contains over 60 items: bibliographies, status reports, case studies, engineering analyses, and fact sheets. It is available from the NSCEP.

## N. Technology Newsletters

**Tech Trends** (a newsletter on applied technologies for Superfund removals and remedial actions and for RCRA corrective actions)

Latest issue:

May 1999, Issue No. 33

**EPA 542-N-99-003 ▲**

**Ground Water Currents** (a newsletter on innovative ground-water treatment for Superfund remediation and RCRA corrective action)

Latest issue:

June 1999, Issue No. 32

**EPA 542-N-99-004 ▲**

**Technology Transfer Highlights**

Latest Issue: (updated annually)

September 1998

**EPA 625-N-98-001**

[www.epa.gov/ttbnrml](http://www.epa.gov/ttbnrml)

**RTDF Update** (a progress report on the Remediation Technologies Development Forum (RTDF))

Latest issue:

December 1998

**EPA 542-F-98-019 ❖**

**Contaminated Sediments News**

Latest Issue:

Number 23, Spring 1999

**EPA 823-N-99-003**

## O. Other Federal Programs and Partnerships

**\*See page one for web addresses**

**Federal Remediation Technologies Roundtable (FRTR)**

The Federal Remediation Technologies Roundtable is a forum for joint activity regarding the development and demonstration of innovative technologies for hazardous waste site remediation. Member agencies include EPA, DoD, DOE, and DOI. Links to case studies and Cost and Performance Reports for various technologies implemented at Superfund sites can be found on this web site.

**Remediation Technologies Development Forum (RTDF)**

The Remediation Technologies Development Forum is a consortium of partners from government, industry, and academia working to develop safer, more effective, and less costly hazardous waste characterization and treatment technologies.

## P. Innovative Site Remediation Engineering Technology Monographs

The WASTECH Consortium (the American Academy of Environmental Engineers (AAEE), EPA's Technology Innovation Office (TIO), DoD, and DOE) has developed a series of comprehensive, authoritative engineering monographs. These peer-reviewed state-of-practice publications range in size from 150-250 pages and provide definitive engineering information on the following innovative technologies:

### Phase I: Process Descriptions and Limitations

Bioremediation, Volume 1  
Chemical Treatment, Volume 2  
Soil Washing/Soil Flushing, Volume 3  
Solidification/Stabilization, Volume 4  
Solvent/Chemical Extraction, Volume 5  
Thermal Desorption, Volume 6  
Thermal Destruction, Volume 7  
Vacuum Vapor Extraction, Volume 8

### Phase 2: Design and Application

Bioremediation, Volume 1  
Chemical Treatment, Volume 2  
Liquid Extraction Technologies, Volume 3  
Solidification/Stabilization, Volume 4  
Thermal Desorption, Volume 5  
Thermal Destruction, Volume 6  
Vapor Extraction and Air Sparging, Volume 7

These monographs are available from AAEE, (410) 266-3390. Phase 1 publications cost \$79.95 each or \$495.00 for the full set, plus shipping and handling. Phase 2 publication prices are: \$99.95 for Vol. 1; \$89.95 for Vols. 3, 5, and 7; \$79.95 for Vols. 2 and 4; \$69.95 for Vol. 6; \$495.00 for the full set.



**TechDirect**

# TechDirect

## Technology Information Service

TechDirect is a free information service that highlights new publications and events of interest to site remediation and site assessment professionals. Each month, TechDirect will send you an e-mail message describing the availability of publications and information on upcoming events. For publications, the message will explain how to obtain a hard copy or how to download an electronic version.

**To *SUBSCRIBE* on the *CLU-IN* website:**

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If you have any questions or comments concerning this service, please contact the U.S. EPA Technology Innovation Office at (703) 603-9910 or e-mail [heimerman.jeff@epa.gov](mailto:heimerman.jeff@epa.gov).



# CLU-IN

## Hazardous Waste Clean-Up Information World Wide Web Site

<http://clu-in.org>

The Hazardous Waste Clean-Up Information (CLU-IN) System provides information about innovative site characterization and treatment technologies. The web site offers a variety of information for federal and state personnel, consulting engineers, technology developers, vendors, remediation contractors, researchers, community groups, and citizens.



[WWW.EPAREACHIT.ORG](http://WWW.EPAREACHIT.ORG)

The web-based REmediation And CHaracterization Innovative Technologies database combines information from three established EPA databases—the Vendor Information System for Innovative Treatment Technologies (VISITT), the Vendor Field Analytical and Characterization Technologies System (Vendor FACTS), and the Innovative Treatment Technologies (ITT)—to give users access to comprehensive information about treatment and characterization technologies and their applications.



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Washington, DC 20460

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EPA 542-B-99-004



# Bibliography for Innovative Site Clean-Up Technologies

August 1999 Update

