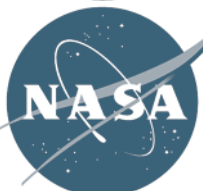


# FEDERAL REMEDIATION TECHNOLOGIES ROUNDTABLE

## REMEDIATION CASE STUDIES AND TECHNOLOGY ASSESSMENT REPORTS FACT SHEET



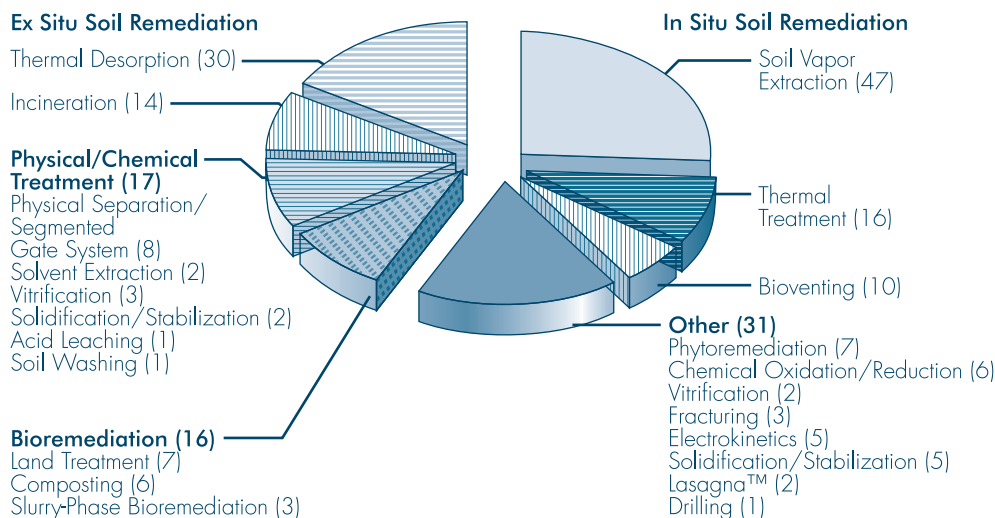
The Federal Remediation Technologies Roundtable (FRTR) promotes interagency cooperation to further the use of innovative technologies for remediation of hazardous waste sites. Primary members of the FRTR include the U.S. Department of Defense (DoD), the U.S. Department of Energy (DOE), the U.S. Department of the Interior (DOI), the National Aeronautics and Space Administration (NASA), and the U.S. Environmental Protection Agency (EPA). One of FRTR's priorities is documenting and distributing information on cost and performance for completed and ongoing remediation projects.

The remediation case studies and general technology assessment reports FRTR publishes are available at the Web site [www.frtr.gov](http://www.frtr.gov). These reports provide site-specific information about treatment and characterization technologies and long-term monitoring and optimization, based on information provided by federal and state agencies. Site managers, regulators, technology vendors,

### HIGHLIGHTS

- Four case studies prepared under EPA's Superfund Innovative Technology Evaluation (SITE) program.
- Three remediation case studies on phytoremediation.
- Three case studies on geophysical techniques for site characterization.
- Eight case studies on sensors for site characterization.
- One technology assessment report on remediation of persistent organic pollutants (POPs).
- Fifteen case studies prepared by federal agencies on long-term monitoring and optimization.

### EXHIBIT 1: SOIL TREATMENT CASE STUDIES BY TECHNOLOGY



Note: Case studies that cover more than one technology or media have been counted multiple times.

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contractors, and the public can benefit from these experiences to improve technology selection and operation. This fact sheet describes the status of cost and performance activities, including recent additions of completed case studies and reports. A total of 716 reports are now available with these recent additions. These reports represent a wide spectrum of technology deployment in the field, ranging from pilot-scale demonstrations to full-scale applications at single sites and at multiple sites. They also encompass long-term technology optimization.

FRTR recently announced the release of 40 new reports in four focus areas. The focus areas include:

- Soil and groundwater remediation technologies
- Site characterization and monitoring technologies
- Long-term monitoring and optimization; and
- Remediation technology assessment reports

Of the 40 reports, 10 on cost and performance describe soil and groundwater remediation technologies; 12 describe site characterization and monitoring technologies; 15 describe long-term monitoring and optimization; and three general assessment reports describe remedial technologies used at multiple hazardous waste cleanup sites. These technology assessment reports were prepared by federal agencies and the Interstate Technology Regulatory Council (ITRC).

## HIGHLIGHT OF NEW REMEDIATION CASE STUDY

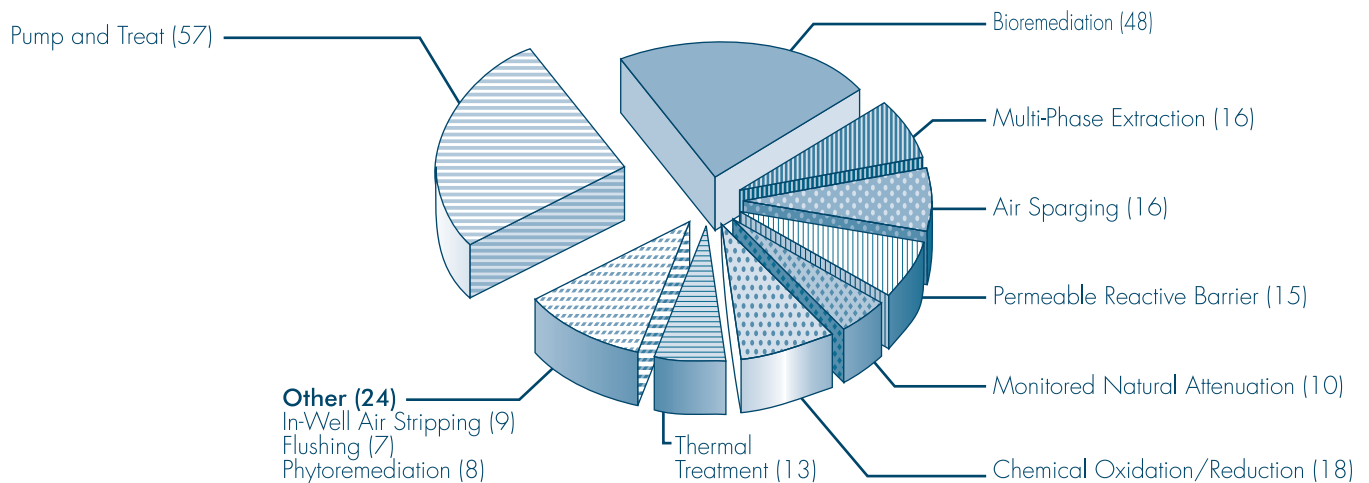
### Edible Oil Barriers for Treatment of Perchlorate-Contaminated Groundwater

A permeable reactive barrier (PRB) demonstration was conducted at a confidential site in Maryland where groundwater was contaminated with perchlorate and 1,1,1-trichloroethane (1,1,1-TCA). The demonstration evaluated the cost and effectiveness of an emulsified oil PRB to control migration of perchlorate plumes. The demonstration was conducted in October 2003 and consisted of a one-time injection of 110 gallons of emulsified oil substrate (EOS) and 2,070 gallons of chase water used to help distribute the EOS to create a 50-foot-long PRB. Within 5 days after the oil substrate was injected, concentrations of perchlorate were less than 4 micrograms per liter ( $\mu\text{g}/\text{L}$ ) in all of the injection area wells. In addition, 1,1,1-TCA had been reduced by more than 90 percent after 18 months. Based on these results, it was determined that all of the primary performance criteria for the project had been met.

## EXHIBIT 2: GROUNDWATER REMEDIATION CASE STUDIES BY TECHNOLOGY

### Ex Situ Groundwater Remediation

### In Situ Groundwater Remediation



Note: Case studies that cover more than one technology or media have been counted multiple times.

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## SOIL AND GROUNDWATER REMEDIATION TECHNOLOGY COST AND PERFORMANCE CASE STUDIES

FRTR has added 10 new case studies, for a total of 384. These case studies on the cost and performance of remediation technologies cover a wide range of technology types and contaminants. Each report (about 10 to 40 pages long) provides information about the site background and hydrogeology, a description of the technology design and operation, data about cost and performance, information about lessons learned from the project, and points of contact.

The new remediation case studies include several different technologies for treating soil or groundwater contamination, or both: three reports address soil cleanup, four reports concern groundwater, and three reports focus on both groundwater and soil. Exhibits 1 and 2 show the specific soil and groundwater technologies covered by all of the site remediation reports, along with the number of reports for each technology. Abstracts (2 pages long) are provided for each of the case studies to summarize key information about the site-specific technology application. Abstracts for the new reports are available in the tenth volume of *Abstracts of Remediation Case Studies* (542-R-06-002, June 2006). The 10 reports and associated abstracts, along with additional related FRTR resources, are on line at the Web site, [www.frtr.gov](http://www.frtr.gov).

## SITE CHARACTERIZATION AND MONITORING REPORTS

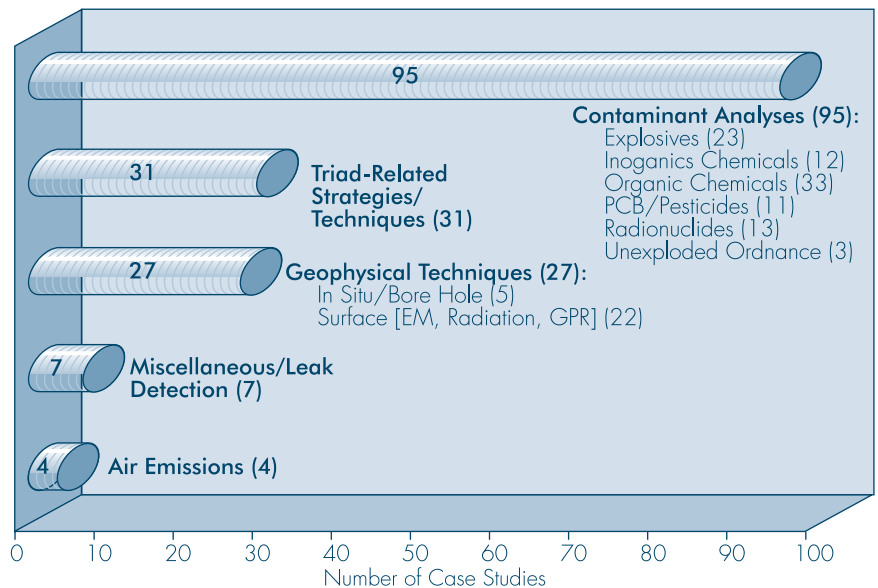
FRTR has added 12 new site characterization documents, including reports about using the Triad approach to expedite site characterization, characterization of organic chemicals, characterization to evaluate the performance of a remediation approach, and geophysical techniques. The 12

## HIGHLIGHT OF NEW CHARACTERIZATION REPORT

### Evaluation of a Former Landfill Site in Fort Collins, Colorado, Using Ground-Based Optical Remote Sensing Technology

Pump and treat was implemented at the Fort Lewis Logistics Center in Washington in 1995 to treat groundwater contaminated with TCE, DCE, and other halogenated organic compounds. Remedial action monitoring network optimization was conducted for the extraction and treatment system. Monitoring and Remediation Optimization System (MAROS) software developed by the Air Force Center for Environmental Excellence (AFCEE) was utilized for statistical analyses and network optimization. A small-scale increase in the overall number of remedial action monitoring wells and surface water locations sampled (increase of 20 locations), coupled with a reduction in the frequency at which samples are collected for a number of wells, is expected to result in a significant time and cost savings over the course of the remedial action monitoring program at the Logistics Center. In each of the first two years after implementation of the recommendations set forth in this report, a cost savings of approximately \$31,000 per year is likely to be achieved.

### EXHIBIT 3: SITE CHARACTERIZATION AND MONITORING TECHNOLOGIES



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reports cover a full range of site characterization and monitoring techniques, with many focused on technologies used in the investigation stage of site cleanup. A total of 164 characterization and monitoring reports are available. Exhibit 3 shows the specific technologies the site characterization and monitoring reports cover, along with the number of reports for each technology.

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## **LONG-TERM MONITORING AND OPTIMIZATION CASE STUDY REPORTS**

FRTR has added 15 new reports on long-term monitoring and optimization. With this recent addition, 101 long-term monitoring and optimization reports are now available. Optimization of remediation technologies consists of using defined approaches to improve the efficiency of treatment and the cost-effectiveness of the system. Long-term monitoring optimization involves identifying and then implementing strategies and tools to improve the overall effectiveness and reduce the costs associated with long-term monitoring programs without compromising quality and protectiveness. The reports describe long-term monitoring and optimization efforts that have either been implemented or evaluated and cover techniques such as evaluating the groundwater monitoring program and plume capture, and hydraulic optimization.

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## **REMEDICATION TECHNOLOGY ASSESSMENT REPORTS**

FRTR compiles general technology assessment reports prepared by federal agencies and the ITRC ([www.itrcweb.org](http://www.itrcweb.org)). As technologies mature, federal agencies and states are moving beyond documenting individual projects to providing more comprehensive analysis of technologies that have been used at multiple sites. These reports provide a summary of findings about technology applications based on practical field experience across multiple sites, including lessons learned. Some of these reports contain information about the selection, design, and implementation of a technology. Currently, 67 FRTR remediation technology assessment reports are available that cover 16 technology types and four contaminant or site-type focus areas. These areas include arsenic, dense non-aqueous phase liquids (DNAPLs), underground storage tank (UST) sites or fuel-contaminated sites, and persistent organic pollutants (POPs).

## **HIGHLIGHT OF LONG-TERM MONITORING AND OPTIMIZATION CASE STUDY**

### **Streamlined Remediation System Evaluation (RSE-Lite), Cape Fear Wood Preserving Site, Fayetteville, North Carolina**

Soil, sediment, and groundwater were contaminated with polycyclic aromatic hydrocarbons at the Cape Fear Wood Preserving Site in Cumberland County, North Carolina. A groundwater remedy consisting of pump and treat, air sparging, nutrient-enhanced degradation, monitored natural attenuation, and dense nonaqueous phase liquid (DNAPL) extraction was initiated in August 2001. A streamlined remediation system evaluation (RSE-Lite) was conducted at the site to optimize system performance. An RSE-Lite differs from a standard RSE in that a conference call with the project stakeholders is conducted instead of a site visit to identify opportunities for optimization. At the time the RSE-Lite was conducted, soil and sediment had been remediated, and only groundwater contamination remained. Recommendations to improve the effectiveness of the system included further delineation of the groundwater plume, and excluding water level measurements from active recovery wells and infiltration galleries when generating potentiometric surface maps. Cost reduction recommendations included use of local labor for operation and maintenance services and groundwater monitoring, and reduction in the frequency of sampling in the source area from quarterly to annually.

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## NON-COMBUSTION TECHNOLOGIES FOR PERSISTENT ORGANIC POLLUTANTS

Persistent organic pollutants, or POPs, are toxic compounds that are chemically stable, do not easily degrade in the environment, and tend to accumulate and biomagnify as they move up through the food chain. Under the Stockholm Convention, various countries have committed to the reduction or elimination of the production, use, and release of the 12 POPs of greatest global concern. Some of these POPs include aldrin, heptachlor, mirex, polychlorinated biphenyls, dioxins, and furans.

The new POPs technology assessment report provides a summary of information on the applicability of existing and emerging non-combustion technologies to remediate POPs in stockpiles and soil. The report provides short descriptions of these technologies and evaluates them based on the POPs and media treated, pretreatment requirements, performance, and cost. Case studies are provided and show various considerations associated with selecting a non-combustion technology. Some of the full-scale technologies discussed in the report include anaerobic bioremediation using blood meal, mechanochemical dehalogenation, and gas phase chemical reduction. Pilot-scale technologies discussed include base-catalyzed decomposition and sonic technology.

### REMEDIATION CASE STUDIES AND TECHNOLOGY ASSESSMENT REPORTS - ORDERING INFORMATION

The following FRTR documents are available free-of-charge from the U.S. EPA/National Service Center for Environmental Publications (NSCEP), while supplies last. To order, mail a request to:

U.S. EPA/National Service Center for Environmental Publications  
P.O. Box 42419  
Cincinnati, OH 45242

Or FAX to (513) 489-8695. In addition, telephone orders may be placed at (800) 490-9198 or (513) 489-8190.

- ❑ Abstracts of Remediation Case Studies, Volume 10, June 2006 (EPA-542-R-06-002).
- ❑ Remediation Case Studies and Technology Assessment Reports Fact Sheet, June 2006 (EPA-542-F-06-004).
- ❑ Remediation Technology Assessment Reports: Summary of Selected Documents, August 2005 (EPA-542-F-05-006).
- ❑ Guide to Documenting and Managing Cost and Performance Information for Remediation Projects, Revised Version, October 1998 (EPA-542-B-98-007).

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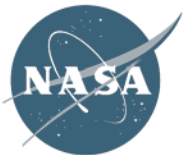


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*Federal  
Remediation  
Technologies  
Roundtable*



# Remediation Case Studies and Technology Assessment Reports

Fact Sheet

June 2006