EPA 542-F-01-032
May 2001
www.epa.gov
www.frtr.gov

FEDERAL REMEDIATION TECHNOLOGIES ROUNDTABLE

REMEDIATION CASE STUDIES: FACT SHEET AND ORDER FORM

The Federal Remediation Technologies Roundtable (FRTR) has announced the release of 56 new case study reports describing the cost and performance of remediation at hazardous waste sites. These 56 new reports cover timely subjects such as those shown in the highlight box.

Other areas of emphasis in previous updates have included *in situ* remediation, including bioremediation of chlorinated solvents and dense non-aqueous phase liquid (DNAPL) treatment (2000); groundwater pump and treat, incineration, and permeable reactive barriers (1998); and thermal desorption, soil vapor extraction, and land treatment (1995). A total of 274 remediation case study reports are now available. In addition, the FRTR is making available 39 case study reports on site characterization technologies.

The remediation case studies describe actual applications of technologies at full-scale or nearly full-scale. The case studies document real experiences and lessons learned in selecting and implementing technologies to treat a wide range of soil and groundwater contamination at a variety of sites. This information is used by project managers, technology providers, consulting engineers, and other interested parties in identifying smarter solutions for and making better engineering judgements about site remediation.

HIGHLIGHTS

- 56 new case studies with emphasis on methyl tertiary butyl ether (MTBE) treatment, groundwater treatment optimization, and cleanup of small dry cleaner sites
- Update features various *in situ* techniques such as bioremediation, flushing, oxidation, air sparging, and monitored natural attenuation
- On-line access with the ability to search and screen all 274 case studies <*www.frtr.gov*>

CASE STUDY REPORTS – CURRENT STATUS

The 274 FRTR case study reports now available cover a wide range of technology types and contaminants. Each report (10-20 pages in length) provides information about 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 274 reports, along with additional, related FRTR resources, are available on CD-ROM (EPA 542-C-01-003; May 2001).

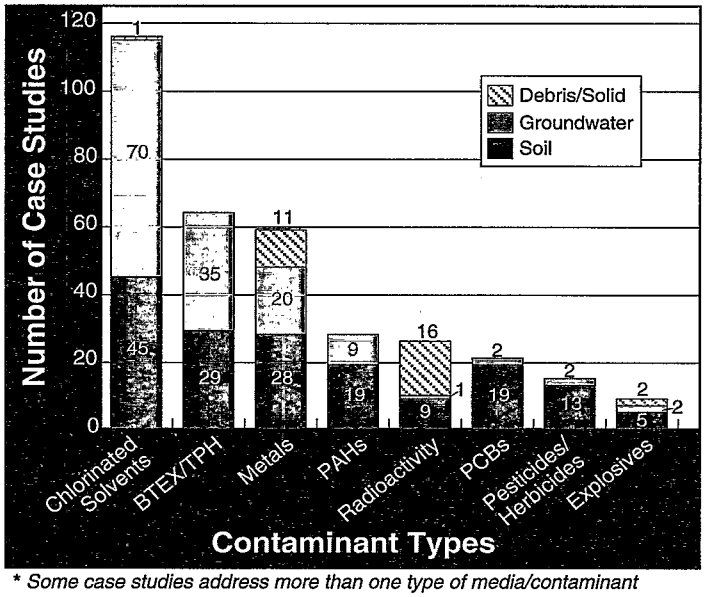
TECHNOLOGY TYPES

The FRTR case study reports include almost 30 types of technologies for treating soil and groundwater contamination, with 127 reports addressing soil cleanup and 118 reports concerning groundwater. Soil case studies cover eight *in situ* technologies, including soil vapor extraction, *in situ* thermal, and bioventing, and 10 *ex situ* technologies, including thermal desorption, incineration, and slurry-phase bioremediation. Groundwater studies cover nine *in situ* technologies, including bioremediation, air sparging, and chemical oxidation, and two *ex situ* technologies — pump and treat and drinking water treatment.

CONTAMINANTS AND MEDIA TYPES

The FRTR case studies cover a variety of contaminants and media types. As shown in Exhibit 1, chlorinated solvents, BTEX/TPH, and metals are the contaminants most frequently addressed.

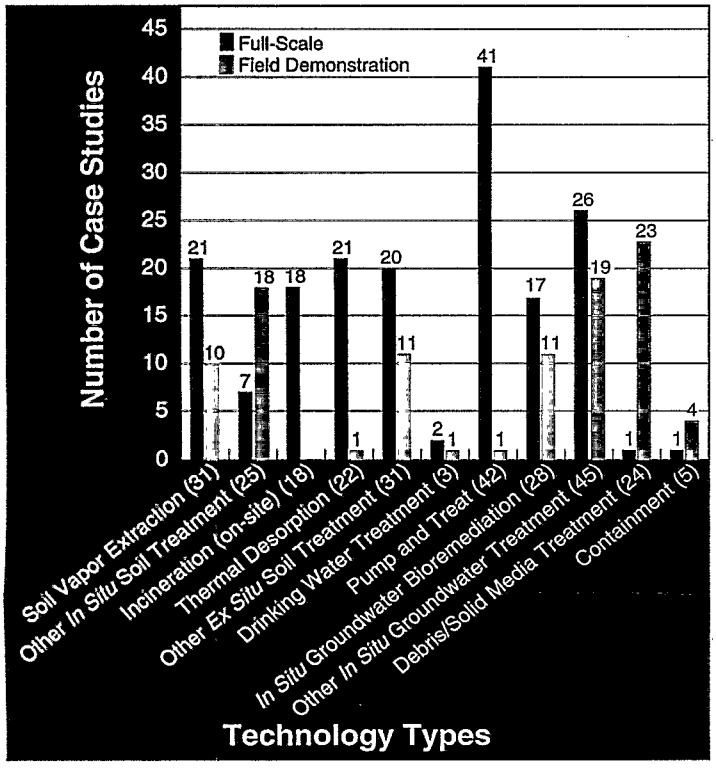
Exhibit 1.
Summary of Contaminants and Media Treated*



** Some case studies address more than one type of media/contaminant*

The FRTR has focused the cost and performance effort on full-scale and large field demonstration-scale projects, providing practical information about actual field experiences. Exhibit 2 shows the relative number of full-scale and field demonstration case studies by technology type. More than two-thirds of the case study reports are for full-scale applications.

Exhibit 2. Full-Scale and Field Demonstration Case Studies



In Situ vs. *Ex Situ*

The FRTR case studies also reflect the overall trend seen in the general hazardous waste remediation community regarding the use of *in situ* versus *ex situ* technologies. As shown in Exhibit 3, the relative percentage of *in situ* technologies deployed since 1990 has steadily increased, with the percentage of *ex situ* technology deployments decreasing.

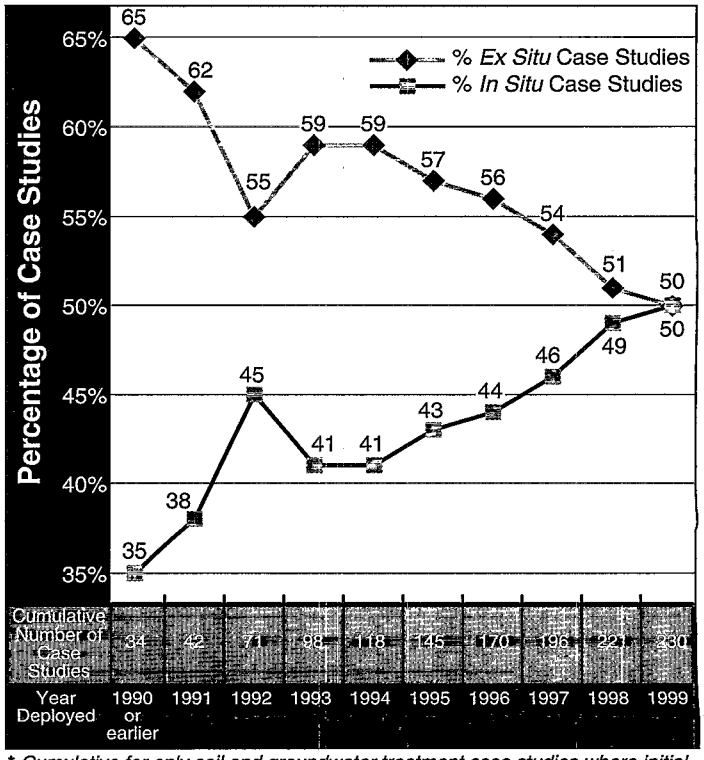
Progress Over Time

Over the past ten years, the FRTR has made a significant contribution to increasing the supply and availability of cost and performance information from federal cleanups. The inventory of reports now encompasses a wide variety of technologies and contaminants and is constantly being expanded by new case studies from contributing agencies. The new reports address technology applications which are deemed to be relevant and often correspond to technical themes which are discussed at regular FRTR meetings such as groundwater treatment system optimization.

In the future, the FRTR will continue to focus on providing cost and performance case studies about timely topics and sharing experiences and lessons learned based on actual field applications of technologies. For example, as shown in

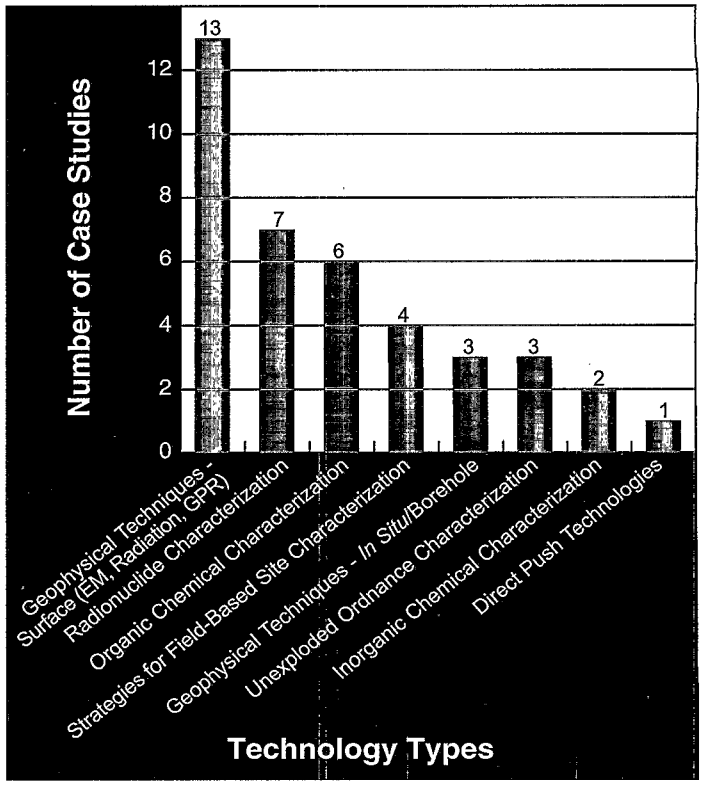
based site characterization technologies such as electromagnetic (EM), radiation, and ground penetrating radar (GPR) tools.

Exhibit 3. *In Situ* vs. *Ex Situ* Treatment*



** Cumulative for only soil and groundwater treatment case studies where initial year was reported (excludes case studies involving debris/solid media treatment and containment technologies)*

Exhibit 4. Site Characterization Case Studies



EPA 542-F-01-032
May 2001
www.epa.gov
www.frtr.gov

FEDERAL REMEDIATION TECHNOLOGIES ROUNDTABLE

REMEDIATION CASE STUDIES: FACT SHEET AND ORDER FORM

The Federal Remediation Technologies Roundtable (FRTR) has announced the release of 56 new case study reports describing the cost and performance of remediation at hazardous waste sites. These 56 new reports cover timely subjects such as those shown in the highlight box.

Other areas of emphasis in previous updates have included *in situ* remediation, including bioremediation of chlorinated solvents and dense non-aqueous phase liquid (DNAPL) treatment (2000); groundwater pump and treat, incineration, and permeable reactive barriers (1998); and thermal desorption, soil vapor extraction, and land treatment (1995). A total of 274 remediation case study reports are now available. In addition, the FRTR is making available 39 case study reports on site characterization technologies.

The remediation case studies describe actual applications of technologies at full-scale or nearly full-scale. The case studies document real experiences and lessons learned in selecting and implementing technologies to treat a wide range of soil and groundwater contamination at a variety of sites. This information is used by project managers, technology providers, consulting engineers, and other interested parties in identifying smarter solutions for and making better engineering judgements about site remediation.

HIGHLIGHTS

- 56 new case studies with emphasis on methyl tertiary butyl ether (MTBE) treatment, groundwater treatment optimization, and cleanup of small dry cleaner sites
- Update features various *in situ* techniques such as bioremediation, flushing, oxidation, air sparging, and monitored natural attenuation
- On-line access with the ability to search and screen all 274 case studies <*www.frtr.gov*>

CASE STUDY REPORTS – CURRENT STATUS

The 274 FRTR case study reports now available cover a wide range of technology types and contaminants. Each report (10-20 pages in length) provides information about 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 274 reports, along with additional, related FRTR resources, are available on CD-ROM (EPA 542-C-01-003; May 2001).

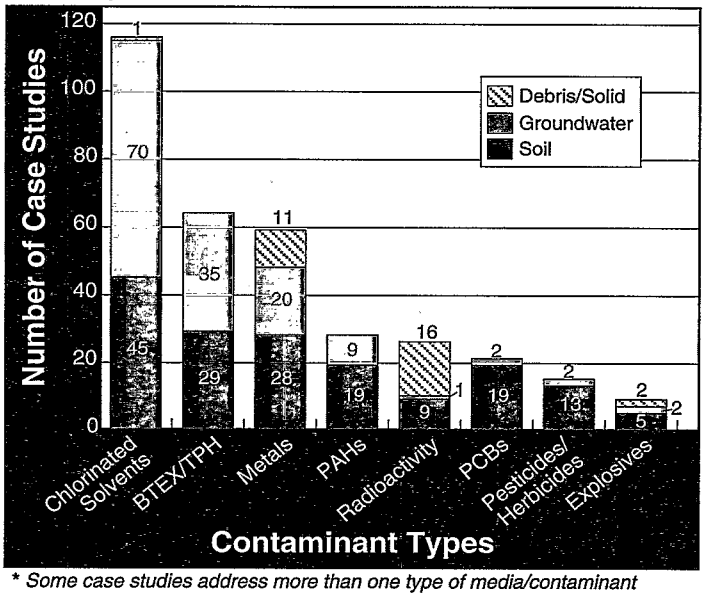
TECHNOLOGY TYPES

The FRTR case study reports include almost 30 types of technologies for treating soil and groundwater contamination, with 127 reports addressing soil cleanup and 118 reports concerning groundwater. Soil case studies cover eight *in situ* technologies, including soil vapor extraction, *in situ* thermal, and bioventing, and 10 *ex situ* technologies, including thermal desorption, incineration, and slurry-phase bioremediation. Groundwater studies cover nine *in situ* technologies, including bioremediation, air sparging, and chemical oxidation, and two *ex situ* technologies — pump and treat and drinking water treatment.

CONTAMINANTS AND MEDIA TYPES

The FRTR case studies cover a variety of contaminants and media types. As shown in Exhibit 1, chlorinated solvents, BTEX/TPH, and metals are the contaminants most frequently addressed.

Exhibit 1.
Summary of Contaminants and Media Treated*

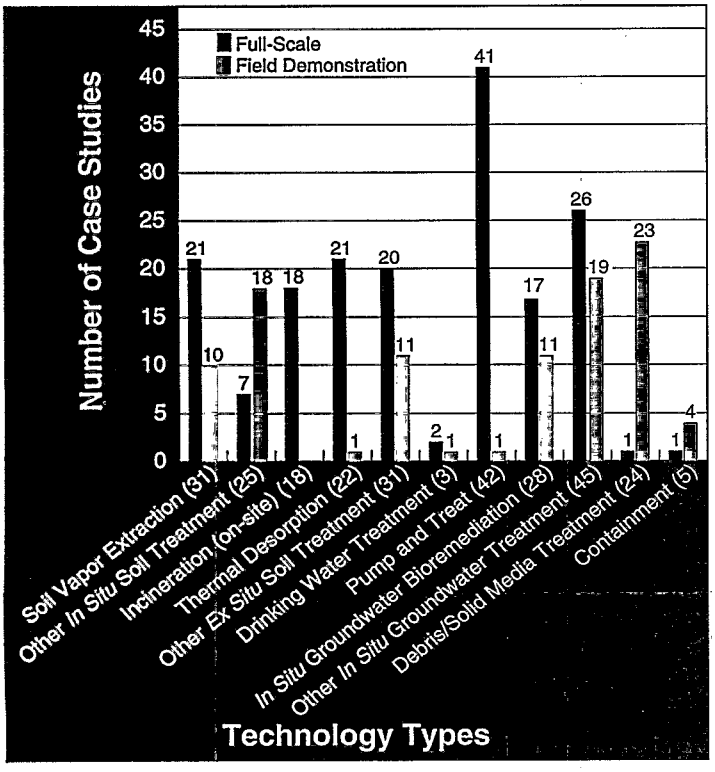


** Some case studies address more than one type of media/contaminant*

Project Scale

The FRTR has focused the cost and performance effort on full-scale and large field demonstration-scale projects, providing practical information about actual field experiences. Exhibit 2 shows the relative number of full-scale and field demonstration case studies by technology type. More than two-thirds of the case study reports are for full-scale applications.

Exhibit 2. Full-Scale and Field Demonstration Case Studies



In Situ vs. *Ex Situ*

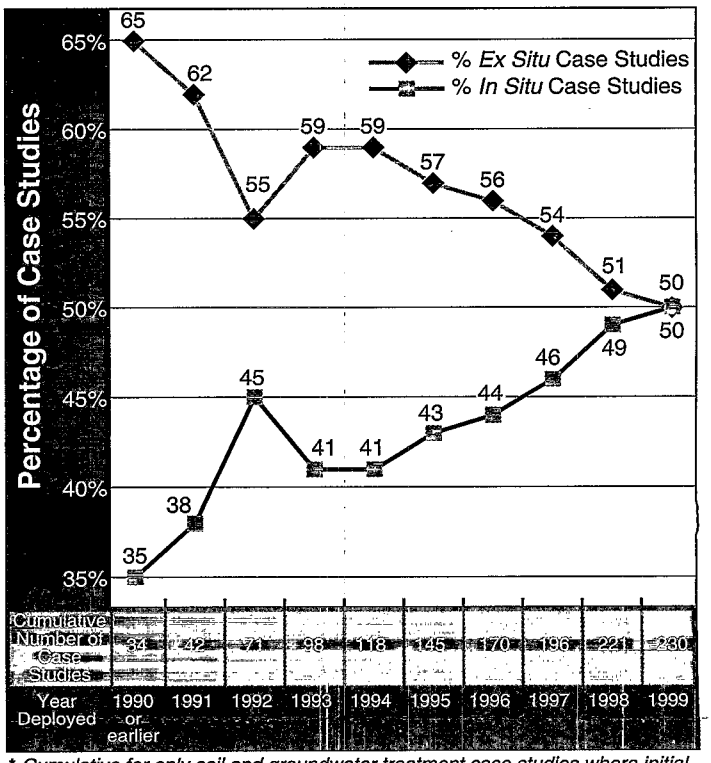
The FRTR case studies also reflect the overall trend seen in the general hazardous waste remediation community regarding the use of *in situ* versus *ex situ* technologies. As shown in Exhibit 3, the relative percentage of *in situ* technologies deployed since 1990 has steadily increased, with the percentage of *ex situ* technology deployments decreasing.

Progress Over Time

Over the past ten years, the FRTR has made a significant contribution to increasing the supply and availability of cost and performance information from federal cleanups. The inventory of reports now encompasses a wide variety of technologies and contaminants and is constantly being expanded by new case studies from contributing agencies. The new reports address technology applications which are deemed to be relevant and often correspond to technical themes which are discussed at regular FRTR meetings such as groundwater treatment system optimization.

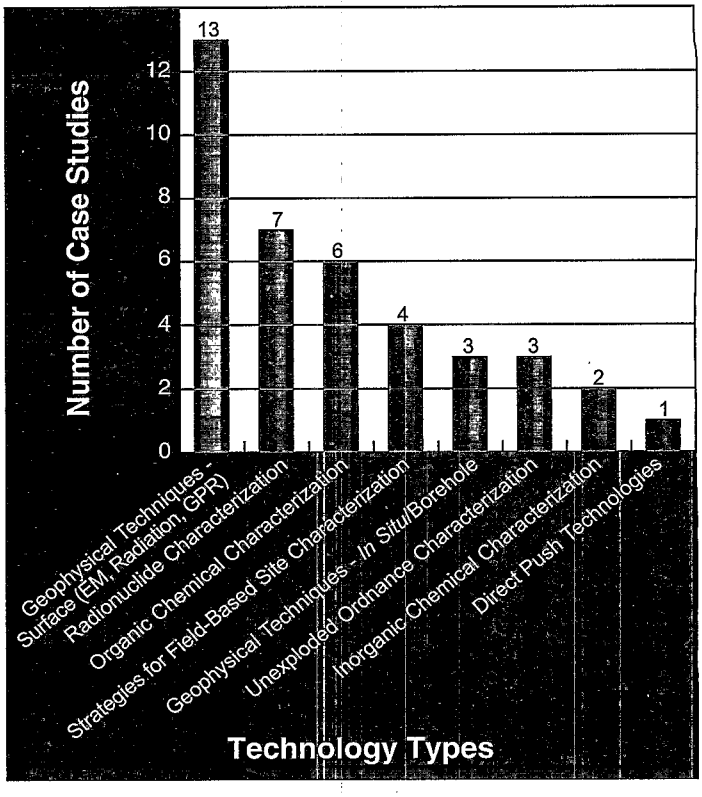
In the future, the FRTR will continue to focus on providing cost and performance case studies about timely topics and sharing experiences and lessons learned based on actual field applications of technologies. For example, as shown in Exhibit 4, the FRTR has added case study reports about field-based site characterization technologies such as electromagnetic (EM), radiation, and ground penetrating radar (GPR) tools.

Exhibit 3. *In Situ* vs. *Ex Situ* Treatment*



** Cumulative for only soil and groundwater treatment case studies where initial year was reported (excludes case studies involving debris/solid media treatment and containment technologies)*

Exhibit 4. Site Characterization Case Studies



About the FRTR and Ordering Information

The Federal Remediation Technologies Roundtable consists of senior executives from eight agencies with an interest in site remediation technology. The FRTR meets twice each year to coordinate the exchange of information on remediation technologies and to consider cooperative efforts. Primary members include the U.S. Departments of Defense, Energy, and Interior, National Aeronautics and Space Administration, and the U.S. Environmental Protection Agency. In addition, participants include the Nuclear Regulatory Commission, Tennessee Valley Authority, and the U.S. Coast Guard.

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 this completed form to:

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

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

CD-ROM

- ❑ FRTR Cost and Performance Remediation Case Studies and Related Information, Second Edition, May 2001 (EPA-542-C-01-003)

Abstracts of Remediation Case Studies

- ❑ Abstracts of Remediation Case Studies, Volume 1, March 1995 (EPA-542-R-95-001)
- ❑ Abstracts of Remediation Case Studies, Volume 2, July 1997 (EPA-542-R-97-010)
- ❑ Abstracts of Remediation Case Studies, Volume 3, September 1998 (EPA-542-R-98-010)
- ❑ Abstracts of Remediation Case Studies, Volume 4, June 2000 (EPA-542-R-00-006)
- ❑ Abstracts of Remediation Case Studies, Volume 5, May 2001 (EPA-542-R-01-008)

Abstracts (2 page summaries) of each case study are available in five volumes. Volume 1 covers the 37 reports published in March 1995, Volume 2 the 17 published in July 1997, Volume 3 the 86 published in September 1998, Volume 4 the 78 reports published in June 2000, and Volume 5 the 56 additional abstracts published in May 2001.

Guide to Documenting and Managing Cost and Performance Information for Remediation Projects

- ❑ Guide to Documenting and Managing Cost and Performance Information for Remediation Projects, Revised Version, October 1998 (EPA-542-B-98-007).

The FRTR Guide provides recommended procedures for documenting the matrix characteristics and technology operation, performance, and cost for conventional and innovative cleanup technologies. An example format is provided, as well as look-up tables for several key remediation parameters.

On-Line Access

The case studies and case study abstracts are available on the Internet through the FRTR home page at *http://www.frtr.gov*. The home page provides links to individual FRTR members' home pages, and includes a search function.

Send To:

Name: _____ **Date:** _____

Organization: _____

Address: _____

City/State/Zip: _____ **Telephone:** _____

E-mail Address: _____

United States
Environmental Protection Agency
(5102 G)
Washington, DC 20460

Official Business
Penalty for Private Use
$300

EPA 542-F-01-032

Federal Remediation Technologies Roundtable

Remediation Case Studies:

Fact Sheet and Order Form
May 2001