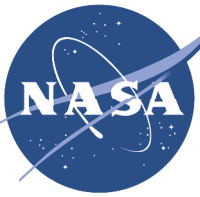


FEDERAL REMEDIATION TECHNOLOGIES ROUNDTABLE

ANNUAL SUMMARY OF ACTIVITIES: AUGUST 2008



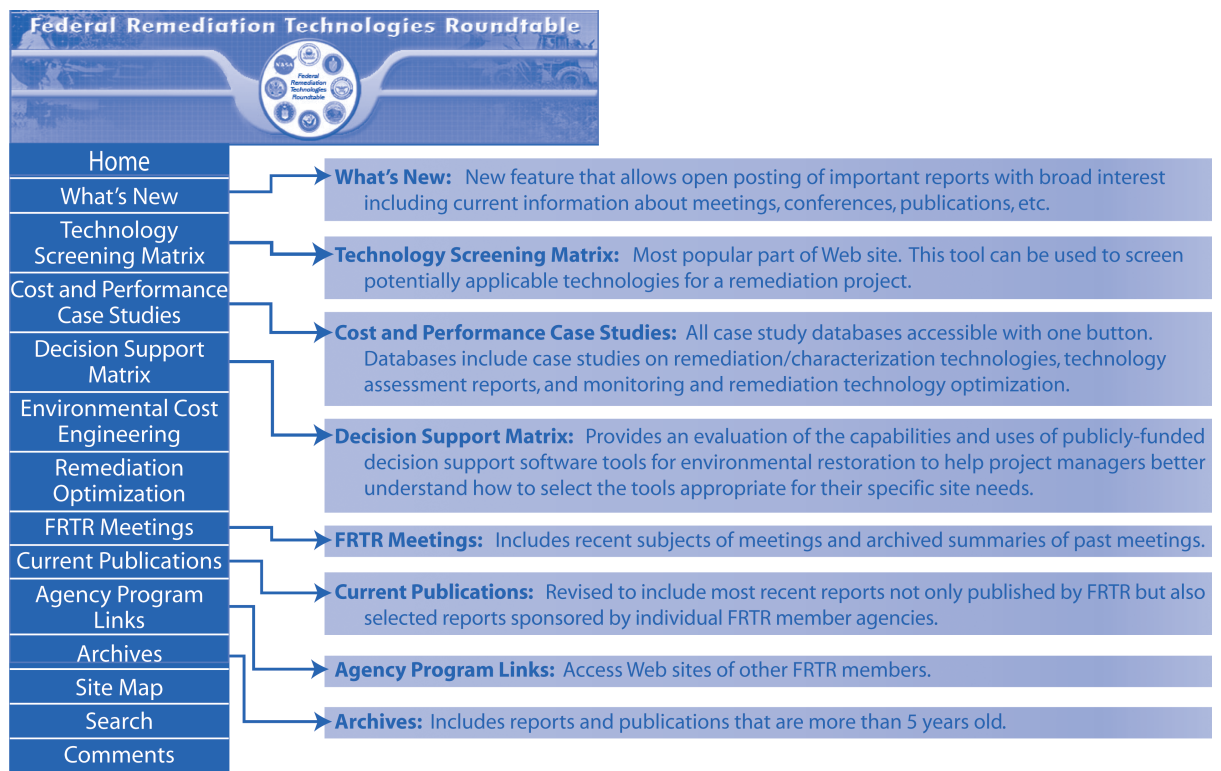
This fact sheet summarizes activities of the Federal Remediation Technologies Roundtable (FRTR) over the last year. The FRTR is an interagency working group that promotes cooperation among member agencies to further the development and use of new technologies for improved remediation of hazardous waste sites. Primary members of the FRTR include the U.S. Department of Defense (DoD), U.S. Department of the Army (Army), U.S. Department of the Navy (Navy), the U.S. Air Force (AF), 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).

The Roundtable meets twice a year to share information on topics of interest. Some topics of discussion at recent past meetings included Monitored Natural Attenuation (MNA) and *In*

HIGHLIGHTS

- New FRTR Web site design
- Over 30 new cost and performance case studies
- Improvements to the popular Remediation Technologies Screening Matrix
- Summary and presentations from FRTR meetings on
 - Monitored natural attenuation of metals and *in situ* bioremediation of inorganics
 - Sediment remediation
- New version of the RACER cost estimating tool with updated cost estimates and pricing factors

FIGURE 1: SUMMARY OF NEW WEB SITE ORGANIZATION



www.frtr.gov

Situ Bioremediation of inorganics, and DNAPL source treatment. The spring 2008 meeting focused on issues related to remediation of contaminated sediment.

A major activity of the Roundtable throughout the year is collection and distribution of information from federal and state agencies on the use of new technologies at their sites. Each year, the Roundtable compiles reports and makes them available at its Web site www.frtr.gov. This year, the Web site was revised to make it more functional and responsive to the needs of users. This fact sheet highlights some of the revisions and describes the status of new cost and performance information and federal and state reports that were added for the spring 2008 update.

Recent changes to the Web site will make it more user-friendly and easier to navigate. Figure 1 provides a snapshot of the new design and shows the variety of information available on the homepage. The navigation buttons are rearranged so that the frequently used sections are listed first. In addition, a new "Archives" section has been created to preserve

information in reports and publications that are older than five years. The "What's New" section provides notices about meetings, conferences, publications, etc. of interest to FRTR members and will be updated monthly to showcase noteworthy reports and events suggested by member agencies. The cost and Performance Case Studies section has been expanded to provide access to all FRTR case study databases.

REMEDIAION TECHNOLOGY COST AND PERFORMANCE CASE STUDIES

More than 400 Remediation (treatment or containment) Technology Cost and Performance Case Studies are available on the FRTR Web site. Eight new cost and performance case studies for remediation technologies have been added. These new case studies involve the use of *in situ* treatment technologies for treating contaminated soil and ground water. Three reports developed by the Air Force Center for Engineering and the Environment (AFCEE) involve enhanced *in situ*

NEW WEB SITE FEATURE: "WHAT'S NEW"

This feature will showcase notable events, reports, and projects of interest to FRTR members. FRTR member agencies are encouraged to contribute items for this page, which will be updated monthly. As an example, two items posted in this section are:

New DNAPL Web Site (www.cluin.org/DNAPL)

EPA's Technology Innovation Program has developed a new Web site that for the first time compiles in one location comprehensive information about the cleanup of dense nonaqueous-phase liquids (DNAPLs) at hazardous waste sites. The DNAPL Web site was developed as the result of a recommendation by the EPA Ground Water Task Force (www.gwtf.clu-in.org). The site covers the full range of potential DNAPL remediation technologies: bioremediation, containment, direct and multiphase recovery, *in situ* flushing, *in situ* oxidation, *in situ* reduction, permeable reactive barriers, soil vapor extraction and air sparging, solidification/stabilization, source area excavation, *in situ* and *ex situ* thermal treatment, and *in situ* treatment trains.

This initial phase of the DNAPL Web site addresses the most common DNAPL contaminants: chlorinated ethenes (for example, tetrachloroethene and trichloroethene) and multi-component wastes (creosotes, coal tars, and heavy

oils). For each individual contaminant, the material is organized in several categories: Policy and Guidance, Chemistry and Behavior, Environmental Occurrence, Toxicology, Detection and Site Characterization, and Treatment Technologies. The Web site will be continuously updated with new information as it becomes available.

National Research Council's Report on Sediments Dredging at Superfund Megsites: Assessing the Effectiveness

EPA sponsored a recent study by the National Research Council (NRC) to evaluate the effectiveness of dredging contaminated sediments from harbors, lakes, and rivers. The report prepared by NRC considers the technical limitations that affect successful implementation of dredging, the problems encountered by incomplete removal of sediments and resuspension, the value of centralizing data related to dredging, and the importance of increased monitoring at sites where dredging was used.

The report is available for purchase through the National Academies Press (www.nap.edu) and is also available to download for free on the EPA Web site (www.epa.gov/superfund/health/conmedia/sediment/pdfs/dredging.pdf).

anaerobic bioremediation of chlorinated solvents at Air Force bases in Florida, Ohio, and Missouri. Two reports prepared by DoD's Environmental Security Technology Certification Program (ESTCP) provide cost and performance data for treating contaminated soil and ground water using enhanced reductive dechlorination from substrate addition and using palladium catalysts and horizontal flow treatment wells. Two case studies developed by EPA include soil vapor extraction, and *in situ* chemical oxidation to treat former dry cleaner sites. Another EPA study documents use of electrical resistive heating and biosparging to remediate contamination at a pharmaceutical site.

SITE CHARACTERIZATION AND MONITORING REPORTS

This focus area includes reports on field-based site characterization and monitoring technologies and over 175 reports are currently available. Four new reports have been added, one each from Interstate Technology & Regulatory Council (ITRC) and DOE, and two from ESTCP. ITRC consists of a diverse mix of environmental experts and stakeholders from the private sector and public sectors including EPA, multiple federal partners, state agencies, industry participants, and other stakeholders. The ITRC report provides a general overview of the implementation of the Triad process. This report is a "How-To" guide to implement Triad and provides in-depth discussions on how to address organizational, cost, and technical challenges. The report provides supporting information in the appendices, such as sample implementation documents. This report is a companion document to the first Sampling, Characterization, and Monitoring Team document, Technical and Regulatory Guidance for the Triad Approach: A New Paradigm for Environmental Project Management (ITRC 2003).

The report from DOE describes a field validation study that was conducted to evaluate the performance of the Accu Core sampler to store volatile organic compounds (VOC) in soil samples during transportation to the laboratory for analysis. The report also compares the performance of the Accu Core with current sampling and storage techniques. The two reports from ESTCP provide information related to Passive Flux Meters (PFMs) and field demonstration and validation of this new device for measuring contaminant loadings from source zones.

HIGHLIGHT OF NEW REMEDIATION CASE STUDY

In Situ Catalytic Groundwater Treatment Using Palladium Catalyst and Horizontal Flow Treatment Wells (HFTW)

This ESTCP/Air Force report provides information on a technology demonstration that was conducted at the Edwards Air Force Base, Site 19, in California to treat trichloroethene (TCE) contaminated groundwater using palladium (Pd) catalyst and horizontal flow treatment wells (HFTW). The purpose of the demonstration was to (1) demonstrate the feasibility and efficacy of catalytic treatment for the destruction of chlorinated ethenes in groundwater using Pd



catalyst, (2) optimize treatment efficiency, and (3) develop cost and performance data for full scale application of the technology. The cleanup goal for TCE was 5 micrograms per liter ($\mu\text{g/L}$). The treatment system included a column reactor, a hydrogen feed system, and an automatic bleaching system to allow for catalyst regeneration. The column reactor was designed in conjunction with existing HFTWs at the site. Bleaching the Pd catalyst was required to prevent the growth of sulfidogenic bacteria and remove inhibitory materials from the catalyst surface. The treatment system was able to reduce the concentration of TCE that ranged from 800 to 1,200 $\mu\text{g/L}$ in the influent to below the cleanup goal after one pass through the Pd column reactor with a contact time of approximately one minute. Average removal percentage was 99.6 percent outside bleaching periods and 95.5 percent if concentrations during the bleaching periods were included. The total capital cost for this demonstration was \$574,000 and annual operation and maintenance cost was \$48,350.

HIGHLIGHT OF NEW CHARACTERIZATION REPORT

Field Demonstration and Validation of a New Device for Measuring Water and Solute Fluxes at CFB Borden

This ESTCP report provides information on a demonstration and validation of a new monitoring technology known as the passive flux meter (PFM). This device allows *in situ* measurement of cumulative ground water and contaminant fluxes in contaminated aquifers and could provide a new means for assessing the strength of source areas. The PFM measures water flux and can be used to calculate flux-averaged contaminant concentrations. The document outlines

the results of three field tests at the CFB Borden demonstration site in Toronto, Ontario. Two of the tests used perchloroethylene (PCE) and trichloroethylene (TCE) as the ground water contaminants, while MTBE was the contaminant of concern for the third test. The study concludes that PFM is a cost effective system to gather cumulative measures of water and contaminant flow, and produces the same information as that derived from the integration of continuous monitoring data. PFM was shown to be less sensitive to short-term fluctuations in flow and concentration, and took less time, per well, than other measurement technologies.

LONG-TERM MONITORING AND OPTIMIZATION CASE STUDY REPORTS

This focus area includes reports describing long-term management and optimization efforts covering techniques such as ground water monitoring program evaluation, plume capture evaluation, and hydraulic optimization. More than 125 reports are currently available under this focus area. New documents include seven reports from DOE and ten from EPA. Three of the DOE reports discuss optimization of pump and treat remediation systems; one of these also includes soil vapor extraction (SVE). All of these offer recommendations for optimizing the efficiency of systems for different operable units and sites. The other four reports cover a range of technologies; one study evaluates the use of chemical and biological amendments to improve the performance of the *in situ* redox manipulation (ISRM) barrier at the Hanford Site in Washington. The amendments evaluated to mend the barrier and restore its effectiveness include dithionite, calcium polysulfide, micron-scale iron, nanoscale iron, dissolved iron, and biostimulants. Other technologies that were evaluated for optimization include electrical resistance and steam heating.

Five of the ten reports prepared by EPA relate to optimization of pump and treat remediation systems. Three reports are Remediation System Evaluations (RSEs) that address free product recovery, *in situ* air

stripping, and chemical precipitation for dissolved metals in ground water. Two reports evaluate long-term ground water monitoring optimization at sites that use pump and treat system and *in situ* redox manipulation treatment technology.

REMEDIATION TECHNOLOGY ASSESSMENT REPORTS

The reports in this section provide broad assessments of technologies based on results from field experience gained from multiple sites. Five reports were added to this focus area, bringing the total to more than eighty. Two new reports (one from ITRC and one from AFCEE) provide information about *in situ* bioremediation for treating DNAPL and chlorinated solvents. The third report examines the use of soil amendments for remediation, revitalization and reuse. This report prepared by EPA provides an overview of issues related to soil amendments; types of problems addressed by soil amendments; types of sites where soil amendments can be used; types of soil amendments; logistics, permitting and regulations; and sampling and monitoring of amended sites. The fourth report provides a systematic approach for evaluating capture zones at pump and treat systems. The fifth report by ITRC provides remediation technologies for treating perchlorate in soil and water.

HIGHLIGHT OF LONG-TERM MONITORING AND OPTIMIZATION REPORT

Remedial System Evaluation: Northwest Pipe and Casing Site, Clackamas, Oregon

This Remedial System Evaluation (RSE) report by EPA provides recommendations to help identify opportunities for improvement by addressing effectiveness, cost reduction, technical improvements, and site close out. An RSE was conducted at the Northwest Pipe and Casing site located in Clackamas, Oregon. Recommendations for improving system effectiveness include improving delineation of the plume, finalizing institutional controls, and evaluating potential for vapor intrusion. Recommendations for cost reduction include eliminating the existing ground water circulation wells, which would result in a savings of approximately \$166,300 per year for operation and maintenance of the current system. Recommendations for technical improvement include revising sequencing for collecting site-wide water level data. Finally, recommendations for site closeout include clarifying and documenting goals for active remediation, and implementing *in situ* bioremediation in conjunction with natural remediation to reduce the highest concentrations of volatile organic compounds.

HIGHLIGHT OF REMEDIATION TECHNOLOGY ASSESSMENT REPORT

Remediation Technologies for Perchlorate Contamination in Water and Soil

This Interstate Technology & Regulatory Council document provides an overview of treatment technologies used to remediate perchlorate in contaminated water and soil. The report provides site evaluation, remedy selection, and regulatory considerations and treatment technologies. The report also provides three case studies for the remediation of perchlorate in soil and ground water using a variety of treatment technologies. Treatment technologies include six physical treatment processes (ion exchange, granular activated carbon, reverse osmosis, nanofiltration/ultrafiltration, electrodialysis, and capacitive deionization); three *in situ* biological treatment approaches (source zone treatment, plume containment using a biologically reactive barrier, and plume-wide restoration); three *ex situ* biological treatment systems (fluidized bed reactor, packed-bed reactor, and continuously stirred tank reactor); and phytoremediation and phytodegradation. Information on the availability, performance, and cost of each technology is also provided.

SUMMARY REPORT AND FACT SHEET — ORDERING INFORMATION

Copies of this summary report 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.

- Federal Remediation Technologies Roundtable, Annual Summary of Activities, August 2008 (EPA-542-F-08-005)

In addition, a fact sheet is available that describes some of the most useful technology assessment reports that have been produced by federal and state agencies:

- Remediation Technology Assessment Reports: Summary of Selected Documents, August 2005 (EPA-542-F-05-006).



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**Annual Summary of
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