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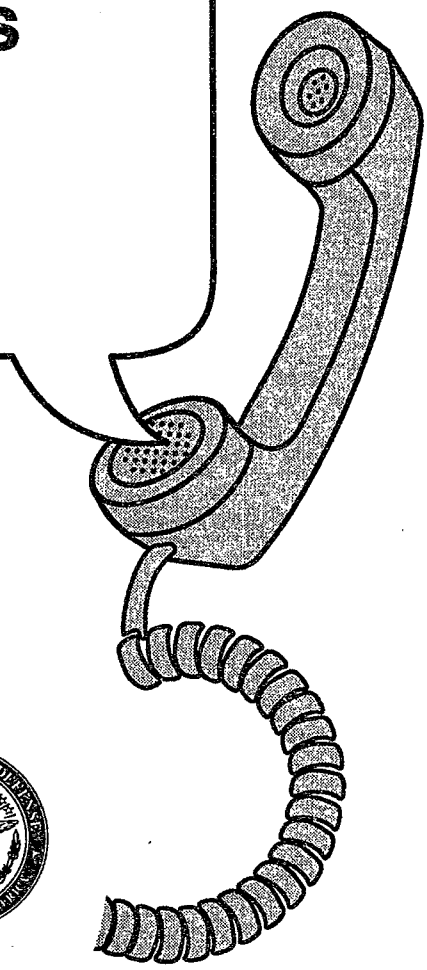
Accessing the Federal Government: Site Remediation Technology Programs and Initiatives

First Edition



Federal Remediation Technologies Roundtable

Prepared by the

Member Agencies of the Federal Remediation Technologies Roundtable

Accessing the Federal Government: Site Remediation Technology Programs and Initiatives

Technology Research and Development Assistance Programs

U.S. Environmental Protection Agency
Environmental Technology Initiative
Environmental Technology Verification Program
National Center for Environmental Research and Quality Assurance
Superfund Innovative Technology Evaluation

U.S. Department of Defense
Air Force Center for Environmental Excellence
Environmental Security Technology Certification Program
Naval Environmental Leadership Program

U.S. Department of Energy
Industry and University Program Area
Program Research and Development Announcements
Research Opportunities Announcements
Small Business Technology Transfer Pilot Program

Interagency Programs
National Environmental Technology Test Sites
Rapid Commercialization Initiative
Remediation Technology Development Forum
Small Business Innovative Research Program
Strategic Environmental Research and Development Program

Federal Cleanup Programs

U.S. Environmental Protection Agency
Superfund National Priorities List Sites
Underground Storage Tank Sites
RCRA Corrective Action Sites

U.S. Department of Defense
Installation Restoration Program
- U.S. Army Environmental Center
  - U.S. Army Corps of Engineers
- Navy Facilities Engineering Command
  - Navy CLEAN Contracts
- Air Force Major Commands

U.S. Department of Energy
Office of Environmental Restoration and Waste Management (EM)
- Maintenance and Operations Contracts
- Environmental Restoration Management Contracts

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Member Agencies of the Federal Remediation Technologies Roundtable

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Federal Remediation Technologies Roundtable:

U.S. Environmental Protection Agency
Department of Defense
- U.S. Air Force
- U.S. Army
- U.S. Navy

Department of Energy
Department of Interior
National Aeronautics and Space Administration
Tennessee Valley Authority
Coast Guard

1996

NOTICE

This document has been funded by the United States Environmental Protection Agency under Contract 68-W2-004. It has been subject to administrative review by all agencies participating in the Federal Remediation Technologies Roundtable, and has been approved for publication. Any mention of trade names or commercial products does not constitute endorsement or recommendation for use.

FOREWORD

The Federal Remediation Technologies Roundtable (Roundtable) has published this guide to provide information to developers and vendors of innovative and alternative hazardous waste remediation technologies on Federal remediation technology development programs. The Roundtable was established in 1990 as an interagency committee to exchange information and provide a forum for joint action regarding the development and demonstration of innovative technologies for hazardous waste remediation. Roundtable member agencies expect to complete many site remediation projects in the near future, and recognize the importance of providing expedited access to Federal resources for technology developers and others interested in innovative technology development.

This document includes information profiles on programs and initiatives that promote the development and use of innovative site remediation technologies, including joint ventures and public-private partnerships, available through Federal agencies interested in the development and use of emerging innovative site remediation technologies. These include site characterization and hazardous waste treatment technologies. This document contains descriptions of programs operated or sponsored by the U.S. Environmental Protection Agency (EPA), the U.S. Army, the U.S. Navy, the U.S. Air Force, the U.S. Department of Energy (DOE), and the U.S. Department of the Interior (DOI). Information on the programs was supplied by the members of the Roundtable.

Each profile also includes at least one program contact, with specific project contacts included where available, to help interested developers gather more information and initiate contact with the program. The appendix to this document contains more general contact information on Federal remediation technology research and development programs and initiatives.

This guide will be revised periodically. If your Agency has any programs or initiatives on innovative remediation technologies development that should be included in future versions of this guide, or if you have any suggestions for improving this document, please complete the suggestion form at the end of this document or contact **Naomie Smith, Technology Innovation Office, U.S. Environmental Protection Agency (5102G), 401 M Street, SW, Washington, D.C. 20460.**

Walter W. Kovalick, Jr., Ph.D.
Chairman
Federal Remediation Technologies Roundtable

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FEDERAL CLEANUP PROGRAMS

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U.S. Department of Defense Cleanup Programs

DoD Environmental Quality Mission and Challenges

The Department of Defense's Environmental Quality Research, Development, Testing, and Evaluation (EQ RDT&E) program is based on four requirements that constitute the pillars of DoD's environmental security mission. DoD is required to:

(1) **Cleanup** hazardous wastes resulting from past practices at active, formerly used, and to-be-closed military sites;

(2) **Comply** with the laws by controlling hazardous emissions from its systems and operations;

(3) **Prevent pollution** through substitutions through of materials and processes to significantly reduce or eliminate the generation of pollutants; and

(4) **Conserve** natural and cultural resources through proper stewardship and management.

Cleanup. DoD has identified 17,660 potentially contaminated sites at 1,877 DoD installations and 6,786 formerly used defense sites (FUDs). Of these, about 7,000 will require cleanup. DoD estimates that nearly all sites have been identified and that cleanup of the sites will be completed by 2011. Design and construction work will increase through 1998, then moderate until all cleanup is completed. The most common contaminants at DoD sites are: petroleum products, solvents, metals, pesticides, and paints. Some sites also contain more unusual wastes, such as unexploded ordnance or low-level radioactive materials.

Compliance. DoD must meet all regulatory requirements established by law relating to air, water, and land discharges. Many compliance deadlines have been met with best-available but costly technology; some operations continue under temporary waivers. Experience suggests that future regulations will likely be more stringent, and compliance through emission control will continue to be required, since it will not be possible to eliminate all hazardous discharge through pollution prevention strategies.

Pollution Prevention. DoD is required to reduce waste streams through material substitution and redesign of materials and processes that are environmentally superior while continuing to be functionally effective. The primary targets, derived from the Toxic Release Inventory and EPA's list of the 17 most toxic substances, are volatile organic compounds, ozone depleting substances, and hazardous/toxic materials.

Conservation. DoD must balance conflicting demands of more space-intensive training on diminishing military lands. Maintenance of national infrastructure for flood control, navigation, and other Corps of Engineers national civil works often result in competing uses for land resources. Protection of coastal and marine resources, while conducting operations for military readiness, also presents challenges.

DoD, as "owners" of environmental problems, and with both an interest in safeguarding the public and the legal responsibility for its own contamination, requires more effective and less costly technologies to address environmental security. DoD has an interest in the accelerated development and implementation of cost-effective advanced technologies since it must provide timely solutions for its mission-unique technology needs and its other extensive, costly, complex, and risky environmental needs.

DoD recognizes the need for competent in-house people for smart technology buying from academia, industry, or other agencies. Such competence can only be maintained by active pursuit of research and development in its laboratories and centers and simultaneous pur-

DoD Problem Areas and Development Mission Objectives

Problem Definition	Development Objectives
CLEANUP The remediation of soil, sediment, groundwater, surface water, and structures contaminated with hazardous and toxic materials from past military activities.	Provide new or improved cost effective methods to identify, evaluate, treat, control, and mitigate past hazardous and toxic materials disposal practices in three areas: site investigation/characterization; remediation; and environmental contaminant and effects.
COMPLIANCE EQ requirements relating to air, water, and land pollution through the control, treatment, and disposal of solid and hazardous wastes. Primary areas of emphasis are industrial activities, solid and liquid discharges from ships, and environmentally sound disposal of pyrotechnics, explosives, and propellants.	Technologies for advanced end-of-pipe control, treatment, and disposal of wastes to meet air, water, and land requirements. R&D is focused on characterization of pollutant and waste behavior, media-specific control and treatment technologies, and monitoring and assessment tools. To meet existing and future national/international regulatory constraints otherwise inhibiting the DoD mission.
POLLUTION PREVENTION Elimination and/or minimization of materials and materials development processes that produce or release hazardous, toxic, or excess wastes into the environment.	Technology in the form of materials, processes, and functional products allowing the eventual elimination of the use of VOC, ODC, and HAZMAT materials and processes in DoD maintenance, overhaul, and remanufacture of new weapons systems.
CONSERVATION Maintaining optimum training, testing, and operational mission effectiveness by stewardship and preservation of the natural and cultural resources on DoD lands.	Enhanced and continued testing and training mission effectiveness through effective management of ecological and cultural resources diversity and productivity. Advanced models and techniques for resource characterization/impact analysis and improved mitigation and rehabilitation measures.

suit of scientific understanding of issues, processes, and continued advances in technology, coupled with rigorous testing and evaluation through an integrated research and development program. Integration is provided through existing mechanisms led by Defense laboratories' balance of intramural and extramural activities.

DoD Environmental Quality RDT&E Process

DoD's EQ RDT&E effort is almost totally executed by the Services through Civil & Environmental Engineering, Combat Material, and Corporate laboratories. These laboratories provide the technical expertise to enable the Services to be smart buyers and users of new and improved technologies. Each laboratory generally performs the environmental work required by the primary weapon, platform, or installation mission it supports. For example:

- The U.S. Air Force Wright Laboratory and Armstrong Laboratory and the Naval Air Warfare Center share the lead on environmental work for aviation and maritime aviation.
- The Naval Surface Warfare Center does environmental RDT&E for ships in support of NAVSEA, the acquisition and life-cycle manager for surface weapons systems.
- The U.S. Army Engineer Waterways Experiment Station, where cleanup RDT&E is executed, is under the Command of Headquarters, U.S. Army Corps of Engineers, which administers the cleanup program for the Army.

In the continuous dialogue between technology users and R&D producers, the laboratories interpret science and technology to enable users to separate the R&D requirement from needs that can be addressed through existing and available technology. User stated requirements are cross-checked for commonality by the Tri-Service Project Reliance Joint Engineers' Panel teams for the four environmental security mis-

sion pillars. These pillars are comprised of R&D engineers and scientists from each Service who also sit on parallel teams of the interagency Strategic Environmental Research and Development Program (SERDP) (see p. 23). The personnel on the teams possess the subject matter expertise to understand the technology, interpret the requirements to create balanced and focused joint projects and evaluate technical program proposals for inclusion in SERDP, the Environmental Security Technology Certification Program (ESTCP) (see p. 27), and other agency programs. The teams provide for DoD interlaboratory integration and the leveraging of technical concepts, programs, and talents to create projects for innovative dual use technology, while providing for DoD user requirements.

Laboratory personnel play a key role in technology shortfall need identification and assisting field commands to understand and solve urgent problems requiring emerging technologies from *any* source. Laboratory scientists and engineers communicate their R&D accomplishments and DoD technology needs to professional, trade, and academic forums through scientific or technical papers and numerous other exchanges. The research engineers and scientists link their laboratories with field users and external suppliers of science and technology from industry, academia, and other agencies. This communication interaction that underlies the more formal and visible user requirements development and approval processes is the work of people who have ready access to peer organizations, the private sector, and the users who need their advice. They also have access to industry and academia peers to facilitate their understanding of DoD's specific needs and constraints.

The DoD Cleanup Pillar R&D Structure is appended to this section (see p. 6).

Defense Environmental Restoration Program

DoD cleanup policy is determined centrally under the Defense Environmental Restoration Program (DERP). DERP includes two major components: Other Hazardous Waste Operations (OHW) and the Installation Restoration Program (IRP). Under the IRP, DoD performs all required contaminated site cleanups. Although policy direction and oversight of IRP are responsibilities of the Deputy Assistant Secretary of Defense, each Service (Army, Navy, Air Force) is responsible for program implementation.

DERP has specified procedures for evaluating sites and procuring cleanup services under IRP that follow EPA guidelines for site investigations and remediation. These procedures cover all phases of site operations, including preliminary assessment/site inspection (PA/SI), remedial investigation/feasibility study (RI/FS), and remedial design/and remedial action (RD/RA).

Nearly all DoD assessment and remediation work is done through contractors. Generally, there are two types of contractors: those engaged in site assessments and investigations (PA/SI through RI/FS) and those that perform RD/RA. Contractors that work on PA/SIs and RI/FSs seldom work on the RD/RA phase. Vendors should ensure that their technologies are considered at the earlier stages of site investigation and assessment.

In selecting and designing remedies, DoD officials coordinate with EPA Regional officials to ensure that cleanup goals meet regulatory requirements. Most contracting is done on an installation-oriented basis, either through centralized contracting service centers or directly by the installation. Although each Service follows general procedures specified by DERP, each procures its own services.

DoD spends approximately $15 million annually on RDT&E, primarily to demonstrate promising technologies. Technologies demonstrated include: bioventing, *in situ* and *ex situ* vapor extraction, *in situ* soil venting, *in situ* bioventing, *in situ* bioremediation, *ex situ* bioremediation of petroleum products, chemical detoxification of chlorinated aromatic compounds, *in situ* carbon regeneration, incineration of soil contam-

inated with explosives, infrared thermal destruction, low temperature thermal stripping, thermal destruction, radio frequency thermal soil decontamination, and compacting of explosives-contaminated soil.

U.S. Army Defense Environmental Restoration Program

The management of the Army Installation Restoration Program is the responsibility of the U.S. Army Environmental Center (AEC) with support from the U.S. Army Corps of Engineers (USACE). USACE performs all phases of project execution as AEC is transitioning out of this area. Sites under the DoD Formerly Used Defense Sites (FUDS) program are solely the responsibility of USACE which performs all phases of environmental restoration.

U.S. Air Force Major Commands

The Air Force IRP is decentralized. It is executed by the Air Force Major Commands. Each may obtain specialized technical support from contractors in one of three ways: through task-order contracts administered by five contract service centers; through individual contracts issued by the commands themselves; or by individual installations. Much of the Air Force's restoration work is being conducted by the Army Corps of Engineers. In the future, the Air Force plans to issue contracts for this work.

U.S. Navy Facilities Engineering Command

The Navy Facilities Engineering Command (NAVFAC) manages the Navy IRP. Day-to-day operations of the IRP are conducted by ten field divisions that operate within distinct geographical boundaries. The majority of the IRP work is being done by support contractors under two distinct contract mechanisms, each managed by the field divisions:

- Comprehensive Long-Term Environmental Action Navy (CLEAN) contracts for procuring remedial study and design services.
- Remedial Action Contracts (RACs) for procuring remedial cleanup services.

DoD CLEANUP PILLAR R&D STRUCTURE

OBJECTIVES	SUB-AREAS	PROGRAM THRUSTS
IMPROVED SITE CHARACTERIZATION AND MONITORING	Remote Sensing	1A: Detection of Unexploded Ordnance
	Field Sampling and Analysis	1B: Site Characterization and Monitoring 1D: Analytical Systems
	Database Development	1E: Groundwater Systems
EXPEDITIOUS, LESS COSTLY REMEDIATION TECHNOLOGIES WHICH PROTECT HUMAN HEALTH AND THE ENVIRONMENT	Groundwater/Surface Water	1F: Explosives/Organics Contaminated Groundwater 1H: Solvents/Fuels Contaminated Soils 1I: Fuels Contaminated Groundwater
	Soils/Sludges	1G: Remediation of UXO Contaminated Sites 1J: Explosives/Organics Contaminated Soils 1H: Solvents/Fuels Contaminated Soils 1N: Inorganics Contaminated Soils
	Structures	1O: Heavy Metal Contaminated Structures 1P: Explosive/Chemical Agent Contaminated Structures
	Sediment	1R: Contaminated Sediments
DEVELOP USER-BASED RISK ASSESSMENT METHODOLOGIES	Fate Transport Models	1T: Fate/Transport Methods and Model Development 1U: Risk and Hazard Assessment Model

U.S. Department of Energy Cleanup Programs

Environmental Restoration Program Needs

DOE's Environmental Restoration Program is responsible for cleaning up 110 major installations and other locations. DOE estimates that remediation may be required at about 4,000 of its contaminated areas or sites. Most sites have been used for nuclear weapons research, development, and production. DOE installations tend to be much larger than non-DOE sites. Twenty-three DOE sites are listed on the Superfund National Priorities List.

Key considerations of DOE's Environmental Restoration program include the following:

- Most of the DOE cleanup effort is occurring at 64 installations managed under the Remedial Actions Program.
- Some contaminants at DOE installations are unique to nuclear production, while others are common to more typical industrial processes. Mixed waste (containing both radioactive and non-radioactive constituents) is a widespread problem.
- The Decontamination and Decommissioning Program will involve up to 1,000 facilities. This program manages retired government-owned facilities such as reactors, laboratories, buildings, and storage tanks.
- DOE conducts research and development, primarily in the form of demonstrations of technologies such as *in situ* bioremediation, air stripping, vitrification, soil washing, solvent extraction, solar detoxification, and above-ground biological treatment.

Contractors perform virtually all cleanup and restoration work at DOE installations. DOE awards remedial action contracts on a site-by-site basis. These contracts are managed by DOE's Operations Offices. Depending on the site, contractors may be responsible for management tasks, actual cleanup work, waste management duties, or various combinations. For example, contractors are responsible for day-to-day project management under Environmental Restoration Management Contracts (ERMCs) awarded at the Hanford and Fernald sites. ERMC contractors have the option of performing remedial investigation/feasibility studies themselves and are responsible for subcontracting remaining work to companies with specialized expertise and technology.

DOE has begun to implement a number of contract reforms that emphasize performance-based approaches and risk sharing, provide incentives for M&O contractors for cost-reduction and safety measures, and identify tasks that should be undertaken by qualified subcontractors. The first two integrated management contracts awarded under the new system have been multi-year efforts for management and cleanup of the Idaho National Engineering Laboratory and Rocky Flats sites.

Technology Focus Areas

DOE recognizes that DOE cleanups provide an opportunity for developers of innovative technologies. DOE's technology-related research and development activities target five "Focus Areas" that represent key remediation and waste management problems within the DOE complex. Five areas for the development of cross-cutting technologies also have been established.

Each Focus Area includes specific categories of technologies that require research and development. These are:

Contaminant Plume Containment and Remediation Focus Area, which concentrates on the use of emerging technologies that characterize contaminant plumes, contain sources, and control migration. Goals in this Area are to

achieve breakthroughs on problems for which remediation technologies do not exist, especially dense non-aqueous phase liquids (DNAPLs), heavy metals, and radionuclide contamination in aquifers and overlying soils.

Mixed Waste Characterization, Treatment, and Disposal Focus Area, which plans to conduct a minimum of three pilot-scale demonstrations of mixed waste treatment systems, using actual mixed waste, by 1997.

Radioactive Tank Waste Remediation Focus Area, which has concentrated on four DOE installations where most DOE underground storage tanks are located.

Landfill Stabilization Focus Area, which concentrates on developing, demonstrating, and implementing technologies to remediate buried waste in landfills located predominantly at seven DOE installations.

Facility Deactivation, Decontamination and Material Disposal Focus Area, which is in the process of selecting a site for a full-scale demonstration of facility decommissioning technology with an emphasis on the recycling of contaminated building materials for reuse within the DOE complex.

Cross-cutting technologies are defined as those which overlap the boundaries of Focus Areas, and technologies developed in these areas will be used in Focus Area testing and evaluations programs wherever they are applicable. These areas are: Characterization, Monitoring, and Sensor Technology; Efficient Separations and Processing; Robotics; Innovative Investment; and Pollution Prevention.

Environmental Technology Development Programs and Services

DOE provides a range of programs and services to assist universities, industry, and other private sector organizations and individuals interested in developing or applying environmental technologies. Working with DOE Operations Offices, as well as management and operating contractors, EM employs a number of mechanisms to identify, integrate, develop, and adapt promising emerging technologies. These mechanisms include collaborative arrangements, procurement provisions, licensing of technologies, consulting arrangements, reimbursable work for industry, and special consideration for small business.

EM awards grants and cooperative agreements if 51% or more of the value of the effort is related to a public interest goal. Such goals include advancement of present/future U.S. capabilities in domestic and international environmental cleanup markets, technology transfer, advancement of scientific knowledge, or education and training of individuals and businesses.

The Industry and University Programs Area (see p. 31) is a primary DOE vehicle for funding research and development partnerships with the public and private sectors to introduce new technologies into the programs managed by DOE's Office of Science and Technology.

DOE uses several mechanisms under the above Programs Area and otherwise to invite the private sector to participate in its technology research and development programs. These include Cooperative Research and Development Agreements (CRADAs) for collaborative R&D with non-federal partners, and procurements for technology development under Program Research and Development Announcements (PRDAs) (see p. 33) and Research Opportunity Announcements (ROAs) (see p. 35). The Small Business Technology Transfer Program (see p. 37) is a special program through which small businesses may participate in the above programs. DOE also is one of 11 federal agencies involved in the Small Business Innovation Research Program, administered by the Small Business Administration (see p. 21).

CRADAs are agreements between a DOE R&D laboratory and any non-federal source to conduct cooperative R&D that is consistent with the laboratory's mission. The partner may provide funds, facilities, people, or other re-

sources. DOE provides the partner with access to facilities and expertise; external participants receive no federal funds. Rights to inventions and other intellectual property are negotiated between the laboratory and the participant.

PRDAs are program announcements which solicit a broad mix of advanced development and demonstration proposals. A PRDA requests proposals for a wide range of technical solutions to specific EM problem areas. Multiple awards, which may have distinct approaches or concepts, are generally made.

The ROA seeks advanced research and technologies for a broad scope of cleanup needs and supports applied research ranging from concept feasibility to full-scale testing. Each ROA is open continuously for a full year following the date of issue and includes a partial procurement set-aside for small businesses.

Developers and vendors of innovative technologies interested in more information about DOE's technology development efforts should contact the DOE's Center for Environmental Management Information, toll-free, at 800-736-3282.

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U.S. Environmental Protection Agency Cleanup Programs

Hazardous Waste Cleanup Sites

The Superfund program for the cleanup of closed or abandoned hazardous waste sites is administered by EPA under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Since 1980, the primary responsibility for site cleanups has shifted from EPA to responsible parties. Currently, almost 75% of all cleanups are being implemented by responsible parties, with EPA or state oversight.

Superfund emphasizes remedies that include the use of hazardous waste treatment technologies. The use of innovative technologies for Superfund cleanup has been increasing. Innovative treatment technologies currently account for more than half of the treatment technologies selected for controlling waste sources.

EPA has an active research and demonstration program for innovative cleanup technologies. EPA's primary mechanisms for promotion of innovative technologies for site remediation are testing/verification programs such as the Superfund Innovative Technology Evaluation (SITE) Program (see p. 45) and the Environmental Technology Verification (ETV) Program (see p. 41). EPA sponsors other interagency technology development programs and initiatives.

Remedies have not yet been selected for hundreds of sites on the NPL. In addition, EPA estimates that 80% of future sites (either on the NPL or otherwise requiring remediation) will require remediation of contaminated ground water, 74% will require soil remediation, 15% sediments remediation, and 10% sludge treatment. The data available on these sites indicate the types and extent of treatment technology applications needed in the future:

- Volatile organic compounds are the most common contaminants, followed by metals and semi-volatile organic compounds.
- Chlorinated VOCs are the most common organic contaminant, followed by other VOCs, PCBs, PAHs, and phenols.
- The most common metal is lead, followed by chromium, arsenic, and cadmium.

Based on contaminant occurrence and historical technology trends, some general observations can be made about the potential Superfund market for specific technologies. These observations do not necessarily consider several other important factors in remedy selection, such as federal and state cleanup standards, competing technologies, other site characteristics, and public acceptance.

- Based on current trends, at least 30% of the Superfund sites will implement innovative technologies for some degree of source control. Innovative technology use should grow as more cost and performance data become available.
- The use of SVE technologies for all types of VOCs is expected to continue at current levels, and may even increase.
- Thermal desorption for the treatment of VOCs and PCBs may increase.
- The selection of bioremediation at Superfund sites may increase.
- Alternatives to incineration for the treatment of SVOCs are in demand.
- Treatment of metals in soil represents a potentially large, but untapped, market for innovative treatment.
- New *in situ* ground water treatment technologies are in great demand. Pump-and-treat technologies often cannot achieve desired cleanup goals.

Underground Storage Tank Sites

Underground storage tanks (USTs) containing petroleum products or hazardous chemicals are also regulated under RCRA. Tank owners are responsible for remediation under state UST programs. Major factors concerning UST site remediation include the following:

- As of 1995, approximately 306,000 UST sites require cleanup. Of these, 131,000 sites have completed cleanups, leaving a universe of 170,000 requiring some level of cleanup. An additional 100,000 releases are expected by 2000. There is an average of almost three tanks per site. Per site cleanup costs range from $10,000 to $125,000 for soil remediation and $100,000 to $1 million for ground water remediation. At an average cost of $125,000, the potential UST market could reach $34 billion.

- Approximately 98% of USTs contain petroleum products and 2% contain hazardous materials.

- About 68% of UST cleanups use innovative technology. For sites contaminated with petroleum, landfilling is used most frequently at sites (one-third), followed by natural attenuation, biopiles, soil vacuum extraction, landfarming, and thermal desorption. For sites with ground water contamination, natural attenuation is the most common remedy, followed by pump-and-treat, air sparging, and *in situ* bioremediation.

RCRA Corrective Action Sites

Approximately 5,100 hazardous waste treatment, storage, and disposal facilities (TSDFs) may be subject to corrective action under the Resource Conservation and Recovery Act (RCRA). The facility owners or operators are responsible for the necessary corrective action, with oversight by EPA or a state.

Between 1,500 and 3,500 of the regulated TSDFs will require corrective action. A wide variety of wastes, many of which are similar to those found at Superfund sites, will require corrective action. Some of the most prevalent wastes include corrosive and ignitable wastes, heavy metals, organic solvents, electroplating waste, and waste oil.

About half of all RCRA corrective action facilities use off-site disposal remedies and half use innovative treatment. Of the innovative technologies, about one-third each are SVE, *in situ* bioremediation, and above-ground treatment, primarily bioremediation.

FEDERAL SITE REMEDIATION TECHNOLOGY DEVELOPMENT ASSISTANCE PROGRAMS

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Interagency R&D Assistance Programs

National Environmental Technology Test Sites Program (NETTS)

Sponsors: U.S. Department of Defense/Environmental Protection Agency

Air Force:
Groundwater Remediation Field Laboratory
Dr. Mark Noll
Bldg. 459
P.O. Box 02063
Dover Air Force Base, DE 19902-2063
302-678-8284

Air Force:
Chlorinated Hydrocarbon Remediation Technologies
Bud Hoda
Sacramento Air Logisitics Center
SM-ALC/EMR
5050 Dudley Blvd., Suite 3
McClellan AFB, CA 95652-1389
916-643-1742, ext. 355

Navy:
Advanced Fuel Hydrocarbon Remediation Technologies
Ernest Lory
NFESC, ESC-411
1100 23rd Avenue
Port Hueneme, CA 93034-4370
(805) 982-1299

Army:
Explosives and Metals Remediation Technologies
Albert J. Walker
USAEC
SFIM-AEC-ETP
Aberdeen Proving Ground, MD 21010-5401
(410) 612-6858

EPA:
Site Characterization Technologies
Eric Koglin
U.S. EPA NERL, CRD-LV
P.O. Box 93478
Las Vegas, NV 89193-2478
(702) 798-2432

EPA:
In-situ Bioremediation Technologies
Dr. Michael J. Barcelona
1221 IST Building
The University of Michigan
2200 Bonisteel Blvd.
Ann Arbor, MI 48109-2099
(313) 763-6512

The National Environmental Technology Test Sites Program (NETTS) is an environmental technology testing and evaluation program that provides locations, facilities, and support for applied research, demonstration, and evaluation of innovative cleanup and characterization technologies that are candidates for Installation Restoration efforts at DoD facilities. NETTS promotes technology transfer from research to full-scale use and facilitates expeditious transfer of technologies between government agencies and the private sector.

Areas of responsibility are divided among the three services and EPA. These areas are:

Air Force: The **Groundwater Remediation Field Laboratory** (GRFL) at Dover AFB provides sites where research can be conducted on the transport, detection, monitoring, and cleanup of solvent and fuel contaminants in the subsurface. GRFL provides a unique opportunity for conducting experimental, contained releases of dense nonaqueous phase liquids (DNAPLs). GRFL also provides other well-characterized contaminated plume sites and support services.

The Air Force also manages the **Chlorinated Hydrocarbon Remedial Demonstration Site** at McClellan AFB, which provides areas to evaluate investigative technologies and remediation technologies for chlorinated hydrocarbons contamination in soil and groundwater.

Army: The U.S. Army sponsors two locations that provide sites to demonstrate systems for remediating soils and groundwater contaminated with heavy metals and explosives. The **Volunteer Army Ammunition Plant (AAP)**, near Chattanooga, Tennessee, and **Louisiana AAP**, near Shreveport, Louisiana, provide different hydrogeological and climatic conditions and variations in explosives and heavy metal contaminants. Demonstration sites include landfill, burning ground, redwater treatment, and production/process line areas.

Navy: The **Environmental Technology Demonstration Site** at Port Hueneme, California, provides *in-situ* and *ex-situ* locations to demonstrate advanced fuel hydrocarbon remediation technologies for treatment of Navy-specific fuels contamination in soil and groundwater. Areas include a contaminated soil stockpile facility contaminated with fuels; an 11-acre gasoline station plume; and underground storage tank and spill areas.

EPA: The **National Center for Integrated Bioremediation Research and Development** at Wurtsmith AFB, Michigan, co-sponsored by EPA and the University of Michigan, operates a controlled field test-bed facility for investigations to support the design and engineering of integrated bioremediation systems. This project focuses on *in-situ* bioremediation of surface soils, subsoils, surface water, and groundwater contaminated by fuels, solvents, and other organic substances.

EPA also co-sponsors the **Consortium for Site Characterization Technology**, established by the National Exposure Research Laboratory/ Characterization Research Division, Las Vegas, Nevada, which identifies, demonstrates, evaluates, verifies, and transfers data about innovative monitoring, measurement, and site characterization technologies. Planning assistance is offered to developers to ensure verified data collection and to extend the application of new technologies to other sites.

Rapid Commercialization Initiative (RCI)

Coordinating Sponsor:	U.S. Department of Commerce
Other Sponsors:	U.S. Department of Defense, U.S. Department of Energy, U.S. Environmental Protection Agency, California EPA, Western Governors' Association, Southern States Energy Board
Contact/Address:	Stanley Chanesman U.S. Department of Commerce H4418 Washington, DC 20230
Phone:	202-482-0825

The Rapid Commercialization Initiative (RCI), an interagency effort coordinated by the U.S. Department of Commerce, fosters cooperative interaction of the private sector, states, and Federal agencies to help bring environmental technologies to market more rapidly and efficiently. RCI acts as a gateway to other federal agency programs that provide opportunities for environmental technology demonstration, verification, and transfer. RCI provides in-kind assistance for selected companies with commercially-ready environmental technologies in four categories: avoidance; control; monitoring and assessment; and remediation and restoration.

The primary goal of RCI is to provide services to industry that help lower three key barriers to commercialization:

(1) finding sites for full-scale technology demonstrations;
(2) evaluating and verifying technical performance and the cost of performance of technologies;
(3) promoting regulatory acceptance of verified data and expediting the permitting process.

The selection of technologies for participation in RCI programs centers on two criteria:

- The technology addresses environmental and market needs, with a focus on solutions to private sector needs and added consideration for application to public sector environmental problems.

- There is a clear path to commercialization and the technology is only a few, final steps from commercialization, such that testing, evaluation and verification will complete the process.

Marketing, financing, or production assistance are not available under RCI. Exemptions from federal laws and regulations also are not available under RCI.

Participants in RCI are selected through program announcements and an intensive peer-review process that examines both technical and business soundness. The first announcement was made in August 1995. The selection of the first 10 RCI projects was announced in March 1996.

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Remediation Technologies Development Forum (RTDF)

Coordinating Sponsor:	U.S. Environmental Protection Agency
Contact/Address/Phone:	Robert Olexsey U.S. Environmental Protection Agency 26 West Martin Luther King Dr. Cincinnati, OH 45268 513-569-7861 Dr. Walter W. Kovalick, Jr. Technology Innovation Office (5102G) U.S. Environmental Protection Agency 401 M Street, SW Washington, DC 20460 703-603-9910

The Remediation Technologies Development Forum (RTDF) was established in 1992 by EPA to identify ways of working together with industry to solve complex hazardous waste remediation problems. The RTDF is open to all interested parties and has grown to a consortium of partners from private industry, government agencies, and academia who share the common goal of developing more effective, less costly hazardous waste characterization and treatment technologies. RTDF partnerships undertake research, development, demonstration, testing, and evaluation efforts to achieve common cleanup goals.

The RTDF advances the development of cost-effective technologies for the remediation of hazardous wastes, and works to achieve these goals by:

- identifying priority remediation technology development needs;
- establishing and overseeing action teams to plan and implement collaborative research projects to address these needs; and
- addressing scientific, institutional, and regulatory barriers to innovative treatment technologies.

RTDF members establish self-managed action teams that bring members together to work on their highest priority problems. These teams define technology research needs, develop and implement research project plans, and produce and disseminate scientifically credible results to facilitate broad acceptance of the technology.

EPA facilitates the operation of the Action Teams and the RTDF Steering Committee, and contributes its research efforts to the jointly-led projects. EPA provides funding for RTDF research activities and Action Team meetings. Other federal agencies, industry, and academic participants also provide funding, laboratory, and field support for Action Team projects. Participants in each Action Team provide funding and/or in-kind support for the Team's research efforts. The RTDF supports approximately $17 million of research efforts currently.

Six RTDF Action Teams had been formed:

- Bioremediation Consortium
- IINERT Soils-Metals Action Team
- Lasagna™ Consortium
- Permeable Barriers Action Team
- Sediments Remediation Action Team
- Surfactants/Soil Flushing Action Team

Three of the Action Teams are involved in field demonstration work. The Bioremediation Consortium sponsors projects on intrinsic bioremediation, accelerated anaerobic biodegradation, and co-metabolic bioventing at Dover Air Force Base, a Department of Defense site. The Permeable Barriers Team also has a project at Dover AFB. The Lasagna™ technology for treating chlorinated solvents in low permeability soil and groundwater is being demonstrated at the Portsmouth Gaseous Diffusion Site, a Department of Energy facility in Paducah, Kentucky.

Small Business Innovative Research Program (SBIR)

Sponsors: U.S. Environmental Protection Agency, U.S. Department of Energy, U.S. Department of Defense

Contact/Address:

Donald Carey
U.S. EPA (8722)
401 M St., SW
Washington, DC 20460
202-260-7899

Samuel Barish
U.S. Department of Energy
10091 Germantown Road
Germantown, MD 20874
301-903-3054

Jon Baron
U.S. Department of Defense
Small Business Affairs
Washington, DC 20301
703-697-1689

The Small Business Innovative Research (SBIR) Program is a multi-media assistance program designed to assist and promote U.S.-owned high technology companies with 500 or fewer employees. SBIR activities are overseen by the Small Business Administration. Funding is provided to companies through grants and contracts awarded by SBIR program offices in 11 Federal agencies. Each agency offers at least one SBIR program solicitation annually that specifies the types of research to be funded.

SBIR is a three-step grant and contract program. Phase I grants and contracts are awarded in amounts of $60,000 to $100,000 each for technology feasibility studies that can last up to six months. Only Phase I recipients are eligible for Phase II awards. Phase II grants and contracts can last from one to two years of principal research and development, and range from $150,000 to $750,000. Phase III funding assistance is provided either through commercial application with additional funding from the private sector, or through non-SBIR funding provided by the participating agency for research and development in areas of particular interest to the agency.

Notices of all SBIR opportunities are published by the SBA on its SBA Bulletin Board. The bulletin board can be accessed, using a modem, by dialing 1-800-697-4636. SBA Bulletin Board technical support is available by calling 202-205-6400. The SBA Bulletin Board also is available via Telnet at sbaonline.sba.gov.

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Strategic Environmental Research and Development Program (SERDP)

Coordinating Sponsor:	U.S. Department of Defense
Contact/Address:	Dr. Olufemi A. Ayorinde SERDP Program Office 901 N. Stuart St., Suite 303 Arlington, VA 22203
Phone:	703-696-2118

The Strategic Environmental Research and Development Program (SERDP) is a multi-agency program funded through the Department of Defense. SERDP responds primarily to environmental requirements of DoD, along with those it shares with the Department of Energy, the Environmental Protection Agency, and many other federal government agencies.

SERDP seeks to identify, develop, demonstrate, and transition technology for six thrust areas. Four of the thrust areas correspond to the four pillars of DoD's Environmental Quality Program (see p. 3): environmental cleanup technology is one of the thrust areas.

Specific objectives of the cleanup technology thrust area focus on conducting research and development to achieve more effective and efficient environmental characterization, assessment, monitoring, and cleanup of soil, sediment, groundwater, surface water, and structures contaminated by past defense practices with hazardous materials (included unexploded ordnance), radioactive wastes (low-level or mixed), and toxic substances. The cleanup technology area also seeks to:

- develop cost-effective methods to determine fate, transport, and effects of contaminants related to defense activities;
- develop risk-based modeling methods for establishing cleanup priorities; and
- facilitate transfer of technology to field use, particularly through the National Environmental Technology Test Sites (NETTS) Program (see p. 15).

For FY97, SERDP cleanup efforts will focus primarily on completing and transferring existing projects to respond to high priority DoD environmental requirements identified in the Environmental Quality Strategic Plan and Reliance Guidelines. SERDP is considering new starts in the following areas:

- Sensor technology for identification of unexploded ordnance on land (surface and subsurface) and underwater.
- Identification and remediation of dense non-aqueous phase liquids (DNAPLs) in the subsurface, emphasizing non- or minimally intrusive identification technologies and *in-situ* treatment technologies for chlorinated solvents.
- *In-situ* remediation technologies for sediments/soils/sludges contaminated with organics and/or heavy metals.
- Risk assessment methodologies and protocols emphasizing the evaluation of risk to environmental systems.

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U.S. Department of Defense R&D Assistance Programs

Air Force Center for Environmental Excellence/Innovative Technology Program

Sponsor:	U.S. Department of Defense
Address:	Air Force Center for Environmental Excellence (AFCEE) Technology Transfer Division 8001 Arnold Drive Brooks AFB, TX 78235-5357
Contact:	Steve Kelly
Phone:	210-536-5274

The Air Force Center for Environmental Excellence (AFCEE) has an Innovative Technology Program that identifies and field tests innovative site characterization, remediation, and pollution prevention technologies, with an emphasis on technologies that save time and money and facilitate compliance with air, soil, and water regulations.

Special areas of interest within the Innovative Technology Program include:

- remediation technologies to treat fuel, chlorinated solvent, pesticide, PCB, and heavy metal contamination;
- vapor phase capture and treatment;
- cost effective site characterization;
- stripping and removal of protective coatings;
- parts cleaning and degreasing; and
- industrial process sludge treatment.

Successful projects have been based on sound scientific principles and offer widespread applicability to Air Force sites and significant cost savings.

The Innovative Technology Program is included in an annual solicitation under a Broad Agency Announcement for Technology Demonstration. Copies of the current solicitation and a guide (*BAA Guide to Industry*) are available through the above contact.

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Environmental Security Technology Certification Program (ESTCP)

Sponsor:	U.S. Department of Defense
Address:	ESTCP Program Office 2001 N. Beauregard Street, Suite 800 Alexandria, VA 22311
Contact:	Dr. Jeffrey Marqusee
Phone:	703-695-3188
Website:	http://www.acq.osd.mil/ens/ESTCP.html

ESTCP was initiated in 1995 to promote the demonstration and validation of the most promising innovative technologies that target the Department of Defense's (DoD's) most urgent environmental needs and are projected to pay back the investment through cost savings and improved efficiency.

ESTCP focuses on the four DoD environmental pillars (see p. 3), including cleanup. In this area, efforts center on site investigation, characterization and remediation technologies. ESTCP's strategy is to select laboratory-proven technologies with DoD market application and aggressively move them to the field for rigorous trials documenting their cost, performance, and market potential. Successful demonstration facilitates the acceptance of innovative technologies by users and the regulatory community.

Supported technologies are projected to pay back the investment within five years through cost savings and improved efficiencies. ESTCP publishes an annual solicitation for proposals from DoD developers. Non-DoD developers may participate if teamed with a DoD entity.

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Naval Environmental Leadership Program (NELP)

Sponsor:	U.S. Department of Defense
Address:	Naval Facilities Engineering Command 200 Stovall (Code 41JG) Alexandria, VA 22332-2300
Contact:	Ted Zagrobelny
Phone:	703-325-8176

The objective of the Naval Environmental Leadership Program (NELP) is to expedite cleanup and compliance at two Naval installations (Naval Air Station North Island, San Diego, California, and Naval Station Mayport, Jacksonville, Florida) using innovative technologies and focused management. The two NELP bases serve as prototypes for identification, development, testing, implementation, evaluation, and refinement of new initiatives and export of successful applications for implementation as part of the Navy's Environmental Management Program.

Interested public or private sector parties in possession of innovative technologies that may be implemented at full-scale to address environmental problems at the two NELP bases and that address problems of concern in the Navy-wide environmental management program may be eligible to participate in NELP. Innovative technologies are selected and included in the Program through a variety of mechanisms. The NELP Initiative issues public solicitations for proposals for innovative technologies via the *Commerce Business Daily*.

NELP emphasizes full-scale technology implementation to solve an environmental problem at one of the NELP bases. It is not an R&D program; however, the NELP Initiative may serve as a host for technology demonstrations if the developer requires a demonstration site, one of the NELP bases meets the requirements for a successful demonstration, and funding is provided by the developer or other source. Successful demonstrations will lead to full-scale implementation at the NELP base and within the execution of the Navy's Installation Restoration Program.

The NELP Initiative is collaborating with EPA in their efforts to facilitate Public-Private Partnerships through a cooperative agreement with Clean Sites, Inc. Private firms may wish to participate under that agreement.

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U.S. Department of Energy R&D Assistance Programs

Industry and University Programs Area

Sponsor:	U.S. Department of Energy
Address:	U.S. Department of Energy Office of Environmental Management (EM) Office of Science and Technology (OST) 19901 Germantown Road Germantown, MD 20874-1290
Contact:	Jeffrey Walker
Phone:	301-903-7966
Fax:	301-903-7457

The mission of the Industry and University Programs Area is to identify and provide development support for technologies that show promise in addressing DOE's Environmental Management needs, but require proof-of-principle experimentation and already proven technologies in other fields that require critical path experimentation to demonstrate feasibility for adaptation to specific EM needs.

The underlying objective is to ensure that private industry, other Federal agencies, and universities are major participants in developing and deploying new and emerging technologies. Tools used to achieve this objective include Program Research and Development Announcements (PRDAs, see p. 33), Research Opportunity Announcements (ROAs, see p. 35), Cooperative Research and Development Agreements (CRADAs), other grants, and inter-agency agreements (IAGs).

A principal goal of OST's Industry and University Programs Area is to promote private sector ability to provide needed environmental cleanup technologies to meet DOE needs as well as to enhance the economic viability and competitiveness of the U.S. environmental industry.

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Program Research & Development Announcements (PRDAs)

Sponsor:	U.S. Department of Energy
Address:	U.S. Department of Energy Office of Environmental Management (EM) Office of Science and Technology (OST) 19901 Germantown Road Germantown, MD 20874-1290
Contact:	EM Central Point of Contact
Phone:	800-845-2096
Fax:	301-903-7238

The U.S. Department of Energy Office of Environmental Management (EM) is charged with overseeing DOE's environmental clean-up effort. To promote this task, EM leads a national research, development, demonstration, testing, and evaluation program to provide environmental restoration and waste management technologies to DOE sites and to manage DOE generated waste. As part of the effort, DOE supports the development of promising environmental clean-up technologies.

Program R&D Announcements (PRDAs) are one of DOE's major assistance vehicles for developing technologies. PRDAs solicit a broad mix of proposals where R&D, including demonstration, testing, and evaluation, is required within broadly defined areas of interest. DOE may issue a PRDA in response to an individual program need such as the cleanup of a particular contaminant at a specific site. Multiple awards for proposals, which may have varied approaches or concepts, are generally made. Numerous PRDAs may be issued each year.

For information on the full range of DOE/EM assistance programs, contact the EM Central Point of Contact (CPOC). The CPOC is a referral service that expedites and monitors private sector interaction with EM. The CPOC can identify links between technologies and program needs and connect potential partners with an extensive network of Headquarters and field program contacts.

Developers can gain more information on DOE's business and research opportunities by obtaining the *U.S. Department of Energy Environmental Cleanup Technology Development Program Business and Research Opportunities Guide* (DOE/EM-0115P). The *Guide* can be purchased from the National Technical Information Service (NTIS) by calling 703-487-4650.

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Research Opportunity Announcements (ROAs)

Sponsor:	U.S. Department of Energy
Address:	U.S. Department of Energy Office of Environmental Management (EM) Office of Science and Technology (OST) 19901 Germantown Road Germantown, MD 20874-1290
Contact:	EM Central Point of Contact
Phone:	800-845-2096
Fax:	301-903-7238

For information on ROA awards through the Morgantown Energy Technology Center:

Contact:	Thomas Martin
Phone:	304-291-4087

The U.S. Department of Energy Office of Environmental Management (EM) is charged with overseeing DOE's environmental clean-up effort. To promote this task, EM leads a national research, development, demonstration, testing, and evaluation program to provide environmental restoration and waste management technologies to DOE sites and to manage DOE generated waste. As part of the effort, DOE supports the development of promising environmental clean-up technologies.

Research Opportunity Announcements (ROAs) are one of DOE's major assistance vehicles for developing technologies. ROAs solicit industry and academic proposals throughout the year ("rolling admissions") for potential contracts in applied research. ROAs support research efforts for the development of technologies with potential application in the EM program. A proposed technology should improve DOE's capabilities in areas such as *in situ* remediation; detection, characterization, and monitoring; efficient separations technology for radioactive waste; and robotics.

ROAs are published in the *Commerce Business Daily*. The program includes some set-asides for small businesses. DOE anticipates making 25-30 awards through an active ROA at its Morgantown facility.

For information on the full range of DOE/EM assistance programs, contact the EM Central Point of Contact (CPOC). The CPOC is a referral service that expedites and monitors private sector interaction with EM. The CPOC can identify links between technologies and program needs and connect potential partners with an extensive network of Headquarters and field program contacts.

Developers can gain more information on DOE's business and research opportunities by obtaining the *U.S. Department of Energy Environmental Cleanup Technology Development Program Business and Research Opportunities Guide* (DOE/EM-0115P). The *Guide* can be purchased from the National Technical Information Service (NTIS) by calling 703-487-4650.

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Small Business Technology Transfer Pilot Program

Sponsor:	U.S. Department of Energy
Address:	U.S. Department of Energy Office of Environmental Management (EM) Office of Science and Technology (OST) 19901 Germantown Road Germantown, MD 20874-1290
Contact:	Joseph Paladino
Phone:	301-903-7449
Fax:	301-903-7238

DOE's Small Business Technology Transfer Pilot Program identifies funding to support innovative technology development by small businesses. The Program also sponsors workshops as a forum for face-to-face meetings between small business operators and DOE staff who can provide information on specific business opportunities. A small business coordinator is available at DOE Headquarters to provide one-on-one counseling for small, disadvantaged, or minority businesses and provide access to procurement offices at DOE sites.

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U.S. Environmental Protection Agency R&D Assistance Programs

Environmental Technology Initiative (ETI)

Sponsor:	U.S. Environmental Protection Agency
Address:	U.S. Environmental Protection Agency OPPE (2127) 401 M St., SW Washington, DC 20460
Contact:	Brendan Doyle
Phone:	202-260-2693

EPA's Environmental Technology Initiative promotes the development, commercialization, and use of environmental technology to improve environmental quality while fostering the creation of new jobs and businesses. EPA's Innovative Technology Council coordinates ETI activities. Under ETI, EPA seeks to coalesce private and public interests through partnerships in which all parties involved provide technical and financial support in pursuit of mutual goals that will further the objectives listed above.

Projects and partnerships under ETI correspond to the four objectives and five operating principles found in EPA's Technology Innovation Strategy. The four objectives are:

- Adapt EPA's policy, regulatory, and compliance framework to promote innovation;
- Strengthen the capacity of technology developers and users to succeed in environmental technology innovation;
- Strategically invest EPA funds in the development and commercialization of promising new technologies; and
- Accelerate the diffusion of innovative technologies at home and abroad.

The following are the five operating principles:

- Maximum consultation with stakeholders—continuing dialogue intended to improve EPA's strategy, programs, and their implementation
- Coordination with Federal, state, tribal, and local agencies—government partners will offer their respective talents, expertise, and perspectives
- Partnership and collaboration with the private sector and academia—convening public-private partnerships to target research and development, testing and demonstration, and the need for government policy change
- Cleaner technology, not just control technology—the best environmental solutions involve changes in production processes, feedstocks, and product design
- Measuring progress along the way—development and use of indicators and tools to benchmark EPA's progress

EPA issued a Program Solicitation for FY 1995 for participating in ETI, and received considerable interest. Currently, EPA is reviewing program options for future participation in ETI.

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Environmental Technology Verification Program (ETV)

Sponsor:	U.S. Environmental Protection Agency
Address:	U.S. Environmental Protection Agency TCS/NRMRL/ORD (8301) 401 M St., SW Washington, DC 20460
Contact:	Penelope Hansen
Phone:	202-260-2600

Throughout its history, EPA has evaluated technologies to determine their effectiveness in preventing, controlling, and cleaning up pollution. EPA has expanded these efforts by instituting the Environmental Technology Verification (ETV) Program to verify the performance of a larger universe of innovative technical solutions to problems that threaten human health or the environment. ETV substantially accelerates the entrance of new environmental technologies into the marketplace by supplying technology buyers and developers, consulting engineers, States, and EPA Regions with high quality data on the performance of new technologies.

ETV expands past verification efforts, such as the SITE program (see p. 45) for remediation technologies and the Pathogen Equivalency Committee for sludge systems, into five pilot areas. In these pilot areas, EPA utilizes the expertise of partner "verification organizations" to design efficient processes for conducting performance tests of innovative technologies. EPA selects its partners from both the public and private sectors including Federal laboratories, States, universities, and private sector facilities. Verification organizations will oversee and report verification activities based on testing and quality assurance protocols developed with input from major stakeholders/customer groups associated with the technology area. ETV is funded by EPA's Environmental Technology Initiative (see p. 39), which funded all five pilots in fiscal year 1995.

Verification under ETV means confirmation of the environmental performance characteristics of a commercial-ready technology through the evaluation of objective and quality assured data. ETV's targeted customers are:

- Technology users and purchasers
- Technology enablers
  - permitters, regulators
  - consulting engineers
- Technology developers and vendors

The five ETV pilots have begun on different schedules, but all are expected to be operational by the fall of 1996. Each pilot will announce its intention to begin accepting technologies for verification in the *Commerce Business Daily* and in the trade press. The five pilot areas (with the name of the partner in parentheses) include:

Small Package Drinking Water Systems
(NSF International)
EPA contact: Jeff Adams, 513-569-7835
NSF contact: Bruce Bartley, 1-800-673-6275

Pollution Prevention and Waste Treatment Systems (State of California)
EPA contact: Greg Carrol, 513-569-7948
Cal/EPA contact: Tony Luan, 916-322-3670

Consortium for Site Characterization Technology (U.S. DOE Sandia National Laboratory)
EPA contact: Eric Koglin, 702-798-2432
[see also NETTS program p. 16]

Indoor Air Products (Research Triangle Institute and the University of Illinois)
EPA contact: Les Sparks, 919-541-2458
RTI contact: David Ensor, 919-541-6735
U. of I. contact: Les Christianson, 217-333-8220

The fifth pilot is an Independent Entity Pilot. EPA is also testing the viability of a totally unstructured and independent private sector approach. The scope and focus of this pilot will be left to the private organization that is chosen through an open solicitation later this year. The EPA contact is Norma Lewis, 513-569-7665.

By the year 2000, EPA envisions a program that will be comprised of numerous public and private testing entities covering all major classes of environmental technology.

National Center for Environmental Research and Quality Assurance (NCERQA)

Sponsor:	U.S. Environmental Protection Agency
Address:	U.S. Environmental Protection Agency EERD/NCERQA (8722) 401 M St., SW Washington, DC 20460
Contact:	Steve Lingle
Phone:	202-260-4073
Fax:	202-260-4524
E-mail:	lingle.stephen@epamail.epa.gov

The EPA National Center for Environmental Research (NCERQA) has primary responsibility to issue and manage research grant and fellowship programs designed to expand EPA's science and technology base and the pool of qualified environmental professionals. NCERQA also serves as EPA's focal point on quality assurance and peer review. NCERQA is comprised of four divisions:

- Environmental Engineering Research
- Environmental Sciences Research
- Quality Assurance
- Peer Review

One of NCERQA's primary research programs is the Science to Achieve Results (STAR) Program. EPA's Office of Research and Development (ORD) developed STAR as a major component of its new risk-based Strategic Plan. STAR is a four-part program:

- Focused Requests for Applications (RFAs) that target research topics that address the specific science needs of EPA;
- the Exploratory Research Grants Program, providing support for investigator-initiated grants in broad topical areas;
- the Graduate Fellowships Program, supporting the development of the nation's scientific base to deal with environmental concerns; and
- the Environmental Research Centers Program, including competitively selected universities that focus on long-term, multidisciplinary issues.

The Environmental Engineering Research Division (EERD) is responsible for planning, administering, and managing the following programs:

- grants for research projects and centers in the engineering disciplines relevant to public health and ecosystem protection;
- EPA's participation in the Small Business Innovation Research Program (see p. 21) and the Strategic Environmental Research and Development Program (see p. 23); and
- coordination of ORD efforts in support of the EPA-wide Common Sense Initiative.

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Superfund Innovative Technology Evaluation Program (SITE)

Sponsor:	U.S. Environmental Protection Agency
Address:	U.S. Environmental Protection Agency National Risk Management Research Laboratory 26 W. Martin Luther King Drive Cincinnati, OH 45268
Contact:	Annette Gatchette
Phone:	513-569-7696
Fax:	513-569-7620

The Superfund Innovative Technology Evaluation Program was established by EPA's Offices of Research and Development (ORD) and Solid Waste and Emergency Response (OSWER) to promote the development and use of innovative technologies to remediate Superfund sites. The SITE Program places a special emphasis on demonstrating technologies, including support for bench-scale through pilot-scale and field-scale demonstrations, and includes reports of cost and performance data. The SITE Program consists of three major components to achieve these goals: a Demonstration Program; an Emerging Technology Program; and a Monitoring and Measurement Technologies Program.

The Demonstration Program generates performance, engineering, and cost data through innovative technology demonstrations. EPA publishes an annual solicitation for proposals from developers to demonstrate their technologies. Typical demonstrations take place at Superfund sites. Under the Program, the cost of the demonstration is split between the vendor and EPA. The vendor pays for the operation of the demonstration, while EPA pays for all planning, sampling, and analysis. EPA also reports the results of the demonstration.

The Emerging Technology Program supports bench-scale and pilot-scale development and testing of innovative treatment technologies. EPA publishes an annual solicitation for proposals from developers.

The Monitoring and Measurement Technologies Program supports the development and demonstration of innovative field technologies that monitor, or measure hazardous substances.

Over the years, the SITE Program has completed demonstrations and issued reports for over 100 technologies. The advent of environmental technology development and commercialization as national priorities in the last few years, along with the initiation of other EPA environmental technology programs, has led EPA to review and reconsider the future role of the SITE Program in the overall federal environmental technology strategy. For this reason, participation in the SITE Program by new partners has been temporarily suspended.

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Summary of Federal Site Remediation Technology Programs and Initiatives

INTERAGENCY SITE REMEDIATION TECHNOLOGY ASSISTANCE PROGRAMS

Program Title/Participating Agencies	Description	Assistance Available	Program Emphasis/Restrictions	Contact
National Environmental Technology Test Site Program/U.S. DoD, EPA	An interagency effort to establish a coordinated environmental technology testing and evaluation program. The Program currently supports testing and evaluation programs at six Centers: the Air Force's Groundwater Remediation Field Laboratory (GRFL) and Chlorinated Hydrocarbon Remedial Demonstration Site (CHRDS); the Army's Environmental Technology Evaluation Center; the Navy's Environmental Technology Demonstration Site for Advanced Fuel Hydrocarbon Remediation Technologies; and the EPA's National Center for Integrated Bioremediation Research and Development (NCIBRD) and Consortium for Site Characterization Technology (CSCT).	Each Center provides locations for demonstrations, testing, and evaluation of technologies of interest to the agencies.	The name of each Center indicates the type of contaminant and media that candidate technologies should address. The GRFL focuses on technologies that treat DNAPLs. The Army Center provides testing facilities for physical, chemical, and biological remedial technologies. The NCIBRD supports the design and engineering of integrated bioremediation systems. The CSCT focuses on monitoring, measurement, and site characterization technologies.	**GRFL:** Mark Noll 302-678-8284 **CHRDS:** Bud Hoda 916-643-1742 **Army:** Albert Walker 410-612-6858 **Navy:** Ernest Lory 805-982-1299 **NCIBRD:** Mike Barcelona 313-763-6512 **CSCT:** Eric Koglin 702-798-2432
Rapid Commercialization Initiative	The Rapid Commercialization Initiative (RCI), an interagency effort coordinated by the U.S. Department of Commerce, fosters cooperative interaction of the private sector, states, and Federal agencies to help bring environmental technologies to market more rapidly and efficiently. RCI acts as a gateway to other federal agency programs that provide opportunities for environmental technology demonstration, verification, and transfer.	In-kind assistance for selected companies with commercial-ready environmental technologies in four categories: avoidance; control; monitoring and assessment; and remediation and restoration.	Selection of participants centers on two criteria: 1) The technology addresses environmental and market needs, with a focus on solutions to private sector needs and added consideration for application to public sector environmental problems; 2) there is a clear path to commercialization and the technology is only a few steps from commercialization, such that testing and verification will complete the process. Marketing, financing, or production assistance are not available. Exemptions from federal statutes and regulations are not available.	U.S. DOC Stanley Chanesman 202-482-0825

Summary of Federal Site Remediation Technology Programs and Initiatives

INTERAGENCY SITE REMEDIATION TECHNOLOGY ASSISTANCE PROGRAMS

Program Title/Participating Agencies	Description	Assistance Available	Program Emphasis/Restrictions	Contact
Remediation Technologies Development Forum/U.S. EPA, DoD, DOE, other agencies	RTDF identifies ways for federal agencies to work together through partnerships with industry and academia to solve complex hazardous waste remediation problems through development of hazardous waste characterization and treatment technologies. RTDF partners form self-managed Action Teams to undertake research, development, demonstration, and evaluation efforts to achieve common cleanup goals.	EPA provides funding for RTDF research activities and Action Team meetings. Participants in each Action Team provide funding and/or in-kind support for the Team research efforts.	The RTDF is open to all interested parties and includes partners from industry, government agencies, and academia.	U.S. EPA Robert Olexsey 513-569-7861
Small Business Innovative Research Program	A multi-media assistance program designed to assist and promote small U.S.-owned high technology companies.	3-step program for grants and contracts. Phase I supports feasibility studies. Phase II supports general R&D. Phase III funds are provided through commercial sales or other funds from a Federal agency.	SBIR grants and contracts are solicited through 11 Federal agencies. Annual solicitations target U.S.-owned high technology companies with 500 or fewer employees.	U.S. EPA Donald Carey 202-260-7899 U.S. DOE Samuel Barish 301-903-3054 U.S. DoD Jon Baron 703-697-1689
Strategic Environmental Research and Development Program/U.S. DoD, EPA, other federal agencies	SERDP is a multi-agency program funded through the Department of Defense that identifies, develops, demonstrates, and transitions technology for six thrust areas, including cleanup. The cleanup thrust area focuses on programs for conducting technology research and development.	SERDP sponsors and funds a variety of other technology development programs and activities such as the National Environmental Technology Test Sites Program.	SERDP responds primarily to environmental requirements of DoD, along with those it shares with the Department of Energy, the Environmental Protection Agency, and other federal government agencies.	SERDP Program Office Dr. Olufemi Ayorinde 703-696-2118

Summary of Federal Site Remediation Technology Programs and Initiatives

INTERAGENCY SITE REMEDIATION TECHNOLOGY ASSISTANCE PROGRAMS

Program Title/Participating Agencies	Description	Assistance Available	Program Emphasis/Restrictions	Contact
Remediation Technologies Development Forum/U.S. EPA, DoD, DOE, other agencies	RTDF identifies ways for federal agencies to work together through partnerships with industry and academia to solve complex hazardous waste remediation problems through development of hazardous waste characterization and treatment technologies. RTDF partners form self-managed Action Teams to undertake research, development, demonstration, and evaluation efforts to achieve common cleanup goals.	EPA provides funding for RTDF research activities and Action Team meetings. Participants in each Action Team provide funding and/or in-kind support for the Team research efforts.	The RTDF is open to all interested parties and includes partners from industry, government agencies, and academia.	U.S. EPA Robert Olexsey 513-569-7861 Walter Kovalick 703-603-9910
Small Business Innovative Research Program	A multi-media assistance program designed to assist and promote small U.S.-owned high technology companies.	3-step program for grants and contracts. Phase I supports feasibility studies. Phase II supports general R&D. Phase III funds are provided through commercial sales or other funds from a Federal agency.	SBIR grants and contracts are solicited through 11 Federal agencies. Annual solicitations target U.S.-owned high technology companies with 500 or fewer employees.	U.S. EPA Donald Carey 202-260-7899 U.S. DOE Samuel Barish 301-903-3054 U.S. DoD Jon Baron 703-697-1689
Strategic Environmental Research and Development Program/U.S. DoD, EPA, other federal agencies	SERDP is a multi-agency program funded through the Department of Defense that identifies, develops, demonstrates, and transitions technology for six thrust areas, including cleanup. The cleanup thrust area focuses on programs for conducting technology research and development.	SERDP sponsors and funds a variety of other technology development programs and activities such as the National Environmental Technology Test Sites Program.	SERDP responds primarily to environmental requirements of DoD, along with those it shares with the Department of Energy, the Environmental Protection Agency, and other federal government agencies.	SERDP Program Office Dr. Olufemi Ayorinde 703-696-2118

Summary of Federal Site Remediation Technology Programs and Initiatives

U.S. DEPARTMENT OF ENERGY SITE REMEDIATION TECHNOLOGY ASSISTANCE PROGRAMS

Program Title	Description	Assistance Available	Program Emphasis/Restrictions	Contact
Industry and University Program Areas	Identifies and supports development of technologies that show promise in addressing specific DOE remediation needs, and to ensure that private industry, other agencies, and universities all participate in the development and use of new and emerging technologies.	PRDAs, ROAs, CRADAs, grants, and inter-agency agreements (IAGs).	The goal of the Area is to promote private sector capability to provide needed environmental cleanup technologies to meet DOE needs and enhance the economic viability and competitiveness of the U.S. environmental industry.	Jeffrey Walker U.S. DOE 301-903-7966
Program Research and Development Announcements	One of DOE's major assistance vehicles for developing technologies as part of DOE's national research, development, demonstration, testing, and evaluation program that provides environmental restoration and waste management technologies to DOE sites and to manage DOE generated waste.	PRDAs solicit a broad mix of proposals where R&D is required within broadly defined areas of interest.	Multiple awards for proposals, which may have varied approaches or concepts, are generally made. A PRDA may be issued in response to an individual program need such as the cleanup of a particular contaminant at a specific site.	EM Central Point of Contact 800-845-2096
Research Opportunity Announcements	One of DOE's assistance vehicles for developing technologies as part of DOE's national research, development, demonstration, testing, and evaluation program that provides environmental restoration and waste management technologies to DOE sites and to manage DOE generated waste.	ROAs solicit proposals for contracts in applied research for technology development with application to DOE environmental restoration efforts.	A proposed technology should correspond to a DOE need and improve DOE's capabilities in areas such as *in situ* remediation; detection, characterization, and monitoring; separation of radioactive waste; and robotics.	EM Central Point of Contact 800-845-2096
Small Business Technology Transfer Pilot Program	Identifies opportunities to support innovative technology development by small businesses.	The Program includes workshops and counseling for small businesses to provide information on specific business opportunities.	Support and counseling are available to small, disadvantaged, or minority businesses and provide access to procurement offices at DOE sites.	Joseph Paladino U.S. DOE 301-903-7449

Summary of Federal Site Remediation Technology Programs and Initiatives

U.S. ENVIRONMENTAL PROTECTION AGENCY SITE REMEDIATION TECHNOLOGY ASSISTANCE PROGRAMS

Program Title	Description	Assistance Available	Program Emphasis/Restrictions	Contact
Environmental Technology Initiative	Promotes the development, commercialization, and use of environmental technology to improve environmental quality while fostering new job and business creation.	Technical assistance and direct funding through an annual Program Solicitation Package.	Focus areas, specific selection criteria, and project evaluation criteria for the project-year are described in the annual Solicitation Package.	Brendan Doyle U.S. EPA 202-260-2693
Environmental Technology Verification	Seeks to accelerate the entrance of new environmental technologies into the domestic and international marketplace by providing purchasers and permitters with credible cost and performance data provided by disinterested third parties. The program supports and oversees testing and verification centers covering major classes of environmental technology.	Stakeholder groups, comprised of technology buyers, sellers, and enablers are the principal customers of the program. EPA, the testing centers, and vendors will fund the program.	The goal of the ETV program is to create testing and verification processes that will provide technology buyers and enablers (permitters, etc.) with credible cost and performance data from testing and verification centers. The program is open to all environmental technologies.	Penelope Hansen U.S. EPA 202-260-5735
Superfund Innovative Technology Evaluation Program	Promotes the development and use of innovative technologies to remediate Superfund sites through demonstrating technologies, including support for bench-scale through pilot-scale and field-scale demonstrations, and includes reports of cost and performance data. The Program has 3 major components: a Demonstration Program; an Emerging Technology Program; and a Monitoring and Measurement Technologies Program.	Demonstration Program costs are split between a vendor and EPA.	The Demonstration Program is open to all remediation technologies. The Emerging Technology Program supports testing and development of innovative treatment technologies. The Monitoring and Measurement Technologies Program supports innovative detection, monitoring, and measurement technologies.	Annette Gatchette U.S. EPA 513-569-7696

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APPENDIX

TECHNOLOGY PROGRAM CONTACTS

U.S. Department of Defense

U.S. AIR FORCE

GENERAL INFORMATION:

Col. Richard Drawbaugh
Office of Environment, Safety and Occupational Health
703-697-0997

RESEARCH PROGRAMS:

Dr. Michael Katona
Environics Directorate/Armstrong Laboratory
904-283-6272

U.S. ARMY

GENERAL INFORMATION:

Rick Newsome
Office of the Assistant Secretary for Installations, Logistics and Environment
703-614-9531

RESEARCH PROGRAMS AND GRANTS INFORMATION:

Dr. Clem Meyer
USACE Research and Development Directorate
202-761-1850

DEMONSTRATION PROGRAMS:

Dr. Donna Kuroda
USACE Environmental Restoration Division
202-761-4335

U.S. NAVY

DEMONSTRATION PROGRAMS:

Ted Zagrobelny
Naval Environmental Leadership Program
703-325-8176

TECHNOLOGY PROGRAM CONTACTS

U.S. Department of Energy

RESEARCH PROGRAMS:	Office of Technology Development 301-903-7911
DEMONSTRATION PROGRAMS:	Office of Technology Development 301-903-7917
SMALL BUSINESS TECHNOLOGY INTEGRATION:	Office of Technology Development 301-903-7449
COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS:	Office of Technology Development 301-903-7900

U.S. Environmental Protection Agency

GENERAL INFORMATION

Site Cleanup Technologies:	Technology Innovation Office 703-603-9910
Cleanup Technologies for Sites Contaminated with Radioactive Material:	Office of Radiation Programs 202-233-9350

RESEARCH PROGRAMS

General Information:	National Risk Management Research Laboratory 513-569-7418
Grants Information:	Office of Extramural Research and Quality Assurance 202-260-7473
COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS:	513-569-7960

Suggestions

If you know of additional programs or information that should be included in this guide, or if you are often in need of this type of information and don't know how to find it, please make a note below on this page. This is a self-addressed mailer—just fold, add postage, and drop it in the mail.

fold here

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