RISK REDUCTION ENGINEERING LABORATORY SITE REMEDIATION TECHNICAL SUPPORT PROGRAM: FY92 ANNUAL REPORT

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FOREWORD

Today's rapidly developing and changing technologies and industrial products and practices frequently carry with them the increased generation of materials that, if improperly dealt with, can threaten both public health and the environment. The U.S. Environmental Protection Agency is charged by Congress with protecting the Nation's land, air, and water resources. Under a mandate of national environmental laws, the Agency strives to formulate and implement actions leading to a compatible balance between human activities and the ability of natural systems to support and nurture life. These laws direct the EPA to perform research to define our environmental problems, measure the impacts, and search for solutions.

The Risk Reduction Engineering Laboratory is responsible for planning, implementing, and managing research, development, and demonstration programs to provide an authoritative, defensible engineering basis in support of the policies, programs, and regulations of the EPA with respect to drinking water, wastewater, pesticides, toxic substances, solid and hazardous wastes, and Superfund-related activities. This publication is one of the products of that research and provides a vital communication link between the researcher and the user community.

This report summarizes the activities and accomplishments of the Laboratory in providing technical support to EPA Regional Offices and others on contaminated soil site remediation engineering problems.

E. Timothy Oppelt, Director
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ABSTRACT

The Risk Reduction Engineering Laboratory provides technical support to the EPA Regional Offices and the Office of Solid Waste and Emergency Response on engineering problems associated with site remediation. As part of this program, the Laboratory also publishes technology transfer documents. The Laboratory's Technical Support Branch coordinates this support. This report summarizes the activities and accomplishments of the technical support program in fiscal year 1992.

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INTRODUCTION

In addition to its research functions, the Office of Research and Development (ORD) Risk Reduction Engineering Laboratory (RREL) provides engineering and scientific support to Environmental Protection Agency (EPA) Regional Offices, Program Offices, and others involved in the remediation of uncontrolled hazardous waste sites. RREL staff members have a wide range of expertise in technologies applicable to site remediation, including the treatment of aqueous streams, soils, sludges, and sediments; containment of contaminants; decontamination of debris; and related topics.

This report describes the technical support activities and accomplishments of RREL during Fiscal Year 1992 (FY92). The report is intended to provide a description of RREL's technical assistance program and its major accomplishments in FY92. The report is divided into six sections: highlights of FY92; support program overview; site-specific assistance; Superfund Revitalization Program; treatability assistance program; and technology transfer activities.

FY92 HIGHLIGHTS

In FY92 RREL has continued to demonstrate that it can provide quality expert technical support to the EPA Regional Offices and others in a timely manner. The number of site-specific requests continues to increase with a total of more than 200 in FY92. At many sites innovative technologies are being considered or implemented with RREL support. The laboratory has continued its treatability assistance program. This program is an important component of the Superfund program because efficient performance of quality treatability studies is critical to the proper selection of remediation technologies. Finally, the RREL program has further expanded its technology transfer activities to disseminate remediation information to as broad an audience as possible.

Site-Specific Assistance

- Administrator Reilly, in his October 3, 1991 address to a subcommittee of the House Committee on Public Works and Transportation, cited RREL's Superfund Technical Assistance Response Team (START) program for making **"a real impact on how Superfund uses innovative technologies"** and for **"accelerating Superfund cleanup actions."**

- In FY92 RREL provided assistance to 59 sites with complex remediation problems under the START program.

- Fourteen special investigations (in-depth evaluations of site-specific engineering problems) were completed; eight are ongoing.

- The RREL Technical Support Branch's Engineering Technical Support Center (ETSC), which provides focused, short-term technical assistance, responded to 128 requests in FY92.

- RREL's ETSC initiated a pilot program in FY91 to provide site-specific technical support to EPA Regional Office staffs responsible for Resources Conservation and Recovery Act (RCRA) Corrective Action (CA). **RREL responded to 21 requests for Corrective Action technical assistance in FY92.**

Superfund Revitalization and Superfund Accelerated Cleanup Model (SACM)

- **RREL technical assistance teams have contributed to work groups, decision teams, planning committees, and treatment technology teams directed at accelerating cleanups.** Presumptive remedies, treatment selection standardization, and impediment removal are important facets of these efforts.

Treatability Assistance Program

- **FY92 was the first year of full operation of the RREL remedy screening treatability study program, which includes capabilities to test nine soil remediation treatment technologies. Twenty-four screening-level tests were conducted.**

- RREL published a revision of its generic treatability guidance document. To date, six technology-specific treatability study guidance documents have also been published, and two others are in progress.

- RREL expanded the Treatability Database by approximately 3,200 new treatability data sets on the effectiveness of soil and aqueous stream treatment technologies.

Technology Transfer

- **RREL assumed responsibility in FY92 for the management of the Alternative Treatment Technology Information Center (ATTIC) and initiated a program to upgrade the system to make it even more user friendly.** ATTIC is an information management and retrieval system database containing abstracts and other information on waste treatability. **Currently, it contains about 2,200 entries, 600 of which were entered in FY92.**

- **RREL published one Technical Resource Document (TRD) for selection of control technologies at wood-preserving sites.** TRDs for two other site types are in progress.

- Nineteen Engineering Bulletins had been published by the end of FY92 and six more were nearing completion.

- ETSC published three ETSC Issue Papers; three others are in preparation.

- ETSC conducted three Superfund University Training Institute (SUTI) treatment technology training courses and one workshop on dust and vapor suppression.

SUPPORT PROGRAM OVERVIEW

Remediation technical support is provided by RREL staff under the leadership and coordination of the Technical Support Branch. The Branch provides the Regions with engineering technical assistance for site remediation in the following areas:

- Site-Specific Assistance
  - ETSC
  - START
  - RCRA CA
- Treatability Study Assistance
- Technology Transfer Activities.

Site-Specific Assistance

ETSC and START both handle site-specific remediation engineering problems for Regional Project Managers (RPMs). The following are examples of technical assistance that can be obtained through either program:

- Preliminary screening of treatment technologies
- Review of Remedial Investigation/Feasibility Study (RI/FS) treatability study work plans and final reports
- Oversight of RI/FS treatability studies
- Evaluation of alternative remedies
- Assistance with studies of innovative technologies
- Review of Remedial Designs
- Technology implementation assistance.

RREL's site-specific assistance programs place a special emphasis on evaluating the applicability of innovative technologies. An emphasis is also placed on recognizing problems replicated at similar types of sites such as lead battery reclaimers, wood preservers, solvent disposal, pesticide disposal, polychlorinated biphenyl (PCB) sites, mines, and landfills. By identifying commonalities in the problems at similar sites, RREL can match its experts with particular site problems. This also enables the publication of appropriate guidance and promotes nationwide consistency in the selection of site cleanup remedies.

ETSC also provides site-specific assistance to Regional RCRA CA projects. The assistance is very similar to the assistance provided for Superfund remediation.

Responses to requests for assistance are normally written, although RREL experts are often involved in consultations at scoping meetings, meetings with Potentially Responsible Parties (PRPs), public meetings, etc. RREL responds to requests by researching problems, evaluating the problems based on RREL field experience, and analyzing data from other pertinent studies. Answers to complex questions are provided to RPMs on a schedule established by the participants. Such services are typically free to the Regions, with the exception of large-scale treatability studies and special engineering studies that require regional funding and are negotiated with the RPM.

RREL's technical support capacity includes a full-time START staff, several in-house Technology Teams, and individual experts. Contract technical support is also provided. The contributions of the Technology Teams and RREL experts who respond to Regional requests are an important factor in the success of RREL's technical support program. Collectively, they addressed more than 200 technology-specific problems during FY92. They also provided the direction and expertise for the development of many of RREL's technology transfer products.

Site-specific, long-term technical assistance is provided through the START program to a limited number of Superfund sites that have been selected by the Regional Offices in conjunction with ORD. Sites selected for the START program receive comprehensive engineering assistance from early RI/FS scoping through remedial action. START sites typically involve complex remediation problems, requiring evaluation of a number of treatment options and other special engineering problems. RREL START personnel are directly involved in consulting with the Remedial Project Managers (RPMs), making site visits, and supporting the Regions in meetings with PRPs and the public.

Site-specific, short-term consultations are provided by RREL's ETSC. (RREL is one of four ORD laboratories that participate in the OSWER Technology Innovation Office (TIO) Technical Support Project.) ETSC and START provide assistance with the same types of remediation prob-

lems; however the problems encountered by ETSC do not generally require as much in-field support activities and may be less complex than those in the START program. ETSC is available on a first-come, first-serve basis, to the extent permitted by RREL support capacity.

Treatability Assistance

RREL's Treatability Assistance Program helps the Regions determine when and how to conduct treatability studies and collects data on treatability performance for reference purposes. Besides assisting with site-specific problems, the program has developed treatability study guides and treatability databases.

Technology Transfer

RREL also provides technical assistance on Superfund remediation problems to a broad audience through technology transfer. Technology transfer activities include the following.

- *TRDs* address the selection of control technologies for specific categories of contaminated sites.
- *Engineering Bulletins* describe various technologies and remediation problems in a brief (8- to 10-page) format which can be quickly read and updated.
- *ETSC Issue Papers* address remediation issues raised by RPMs through the OSWER Engineering Forum.
- *ATTIC* provides a computer-assisted waste treatment information system.
- *SUTI* provides treatment technology training.
- *Workshops* present information/training on selected remediation issues.

Although the documents associated with the above activities were prepared for the Superfund Program, most of them are directly applicable to other situations, including RCRA CA sites.

Technology Teams

RREL's technical assistance programs are led by the staff of the Technical Support Branch. The Branch also coordinates the involvement of a larger cadre of experts from RREL. Many of these individuals, whose principal mission is to conduct control technology research, are members of Technology Teams. In FY92 the Laboratory had eight Technology Teams:

- Thermal Treatment
- Bioremediation
- Extraction
- Solidification/Stabilization
- Chemical Treatment
- Aqueous Stream Treatment
- Materials Handling
- Mining.

Other laboratory experts are available to the Branch on an as-needed basis. The Technology Teams and other laboratory experts, with their extensive knowledge of technologies and their ability to convey their knowledge to others, are responsible for the success of the program. Collectively, they addressed over 200 technology-specific problems during FY92. They also provided the direction and expertise for the development of many of RREL's technology transfer products.

Further Information

Further information regarding RREL technical assistance may be obtained by contacting the Technical Support Branch at (513) 569-7406.

SITE-SPECIFIC ASSISTANCE

START Program Activities

The START program provided assistance to 59 sites during FY92, compared to 45 sites in FY91 (see Figure 1). The distribution of these sites is shown in Table 1. START assistance has increased at a relatively steady pace since the inception of the program. The number of sites in FY92 represents utilization of the available program capacity for the year.

Table 1. Summary of START Site Technical Assistance by Region - FY92

Region	Technical Assistance Sites
I	3
II	6
III	7
IV	13
V	6
VI	4
VII	3
VIII	5
IX	8
X	4

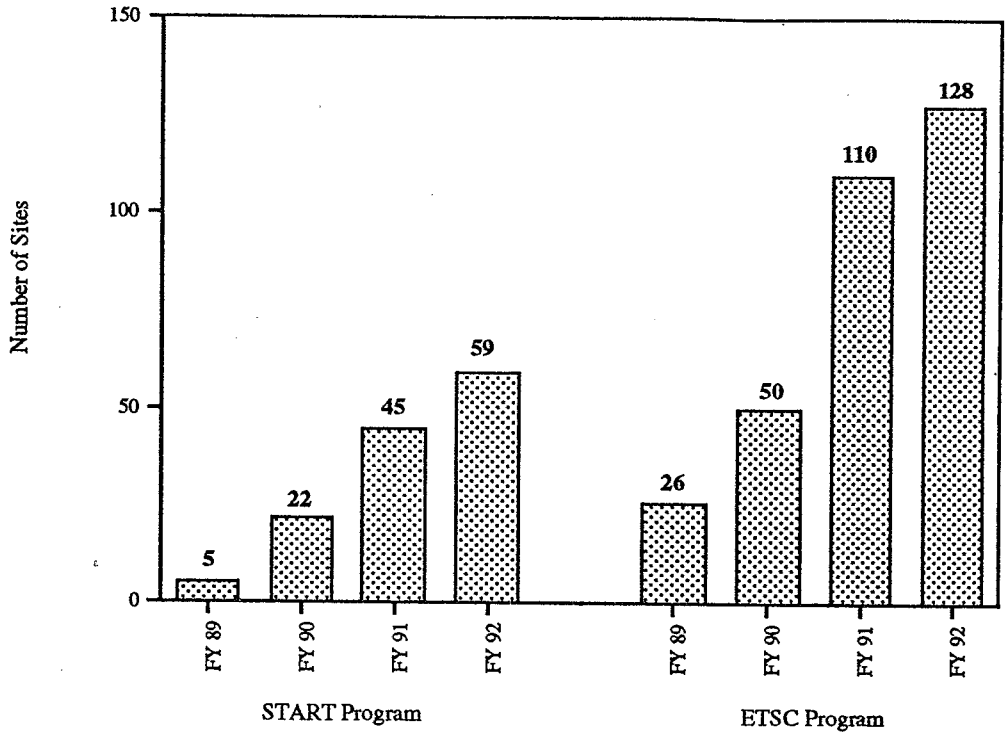

Figure 1. START and ETSC Program Assistance (FY 89, 90, 91, and 92)

The summary of waste types presented in Table 2 indicates the broad range of site types and contaminants at Superfund sites for which assistance has been provided. Problems of site remediation design are further complicated by the variety of soil matrices and geologic formations in which contaminants are found.

Many of the START sites have been chosen by the Regions because of the complex contamination or the soil matrix. As a result, innovative technologies are often evaluated for remediation. Table 3 lists the number of sites where 10 innovative technologies were considered.

In addition to standard site assistance activities, START initiated 13 special investigations in FY92; 10 additional special investigations were carried over from FY91. Special investigations cover a wide range of topics such as:

- in depth technology applicability evaluations
- air emissions estimations
- contaminant distribution modeling
- mine drainage source modeling
- technology field tests

Results of these studies are generally provided to the Regions in the form of detailed reports.

ETSC Program Activities

During FY92 the number of requests to ETSC was 128, 18 more than in FY91 (see Figure 1). Eighty-six percent of these were sites new to the program. The total number of requests for ETSC assistance in FY90, FY91, and FY92, by Region, are listed in Table 4. Note that 101 (about 79 percent) of the FY92 requests came from the five eastern Regions. The requests from Regions IV and V increased by more than 50 percent.

Most of the ETSC assistance is provided by RREL Technology Team members. A breakdown of FY90, FY91, and FY92 requests, by Technology Team, is presented in Table 5.

The Thermal Combustion Team responded to 39 technical assistance requests in FY92. The Team points out that when incineration has been ineffective this often has been directly related to the expertise of the equipment operators and their ability to control process variables properly.

The Solidification/Stabilization Team responded to 27 technical assistance requests in FY92. One example of an important FY92 effort involved an assistance request where a determination had to be made regarding the solidification

Table 2. START Site Classifications*

Site Type	# of Sites
Contaminated Groundwater	29
Landfills/Lagoons/Multiple Wastes	23
Chemical Processors	7
PCBs	7
Waste Oils	7
Wood Treatment	7
Mining/Ore Processing Wastes	6
Lead Battery Breaking	5
Smelting, Steel Manufacturing	5
Pesticides	5
Dioxins/Furans	2
Asbestos	2
Petroleum Refinery	2
Military Munitions	2
Aluminum Processing	2
Drum Recycling	1
Radioactives Wastes	1
Chrome/Tannery Wastes	1

* Classifications are for Operable Units; there may be more than one at each START site.

of waste that included arsenic. The Solidification/Stabilization Technology Team has been involved in a number of reviews evaluating the immobilization of organic contaminants.

The Extraction Team responded to 25 technical assistance requests in FY92. This Team was instrumental in the development and dissemination of information on soil washing, soil vapor extraction, and soil flushing technologies. In FY92 the Team was involved in reviewing and guiding soil washing treatability studies at screening and remedy selection scales by a firm from The Netherlands.

The Biotreatment Team responded to 24 technical assistance requests in FY92. Biotreatment is increasingly selected for remediation; the technology is also characterized by recent innovations. The Biotreatment Team has played an important role in expanding the use of this technology for site remediation. The Team provided technical assistance with bioventing and the treatment of pesticides by white rot fungus.

The Technology Teams often work together in screening technologies for a particular site and in proposing treatment trains. The teams have also played an important role in developing the treatability study protocols for the RREL screening laboratory and in evaluating site-specific screening tests.

Table 6 depicts FY90 through FY92 figures for certain types of site-specific requests. The distribution of the number of requests reflects the fact that most National Priority List (NPL) sites are still in the RI/FS stages of remediation. However, it can be seen that the site requests for assistance involving the latter stages of remediation [i.e., remedial design/remedial action (RD/RA) assistance] are increasing. Also, the prescreening of treatment technologies and treatability assistance continue to be strong areas of RREL support.

Table 3. Innovative Technologies Investigated in START Program

Technology	# of Sites
S/S of Organics	24
Solvent Extraction	11
Thermal Desorption	17
Soil Vapor Extraction	9
Biological	16
Soil Washing	7
Chemical Dehalogenation	3
Secondary Lead Smelter	2
In Situ Vitrification	1
Constructed Wetlands	3
Total	93

Table 4. ETSC Total Requests for Assistance

Region	FY90	FY91	FY92
I	5	8	7
II	9	14	19
III	4	23	22
IV	6	20	34
V	6	10	19
VI	4	11	9
VII	3	5	3
VIII	5	8	8
IX	5	8	5
X	3	3	2
Totals	50	110	128

Table 5. ETSC Requests by Technology Team

RREL Technology Team	Year* FY90	FY91	FY92
Thermal	14	34	39
Solidification/Stabilization	16	27	27
Chemical	10	9	10
Extraction	15	41	25
Materials Handling	1	6	3
Biodegradation	14	19	24
Aqueous	6	14	14
Mining	2	0	1
Miscellaneous (other RREL experts)	8	18	14

* Numbers in these columns exceed the number of annual requests due to multiple team involvement on some sites.

Table 6. ETSC Types of Site-Specific Requests

Request	FY90	FY91	FY92
Technology Prescreening	11	18	23
Treatment Study Assistance:			
• Workplan review	14	23	32
• Conduct studies	3	2	3
• Evaluate study results	6	12	20
Evaluate Single Technology	12	14	31
Other Special Studies	5	5	6
Review RI/FS	5	17	7
Review ROD	1	0	0
RD/RA Assistance	4	11	18
Miscellaneous	0	5	15

RCRA CA Technical Activities

In FY91, the Office of Solid Waste (OSW) determined that site-specific technical support from ORD to the Regional Offices would be needed to assist in carrying out the corrective actions required at RCRA-permitted facilities. There are approximately 3,700 treatment, storage, and disposal facilities that require corrective actions. Since the types of remediation problems are frequently similar to those encountered at Superfund sites, OSW and ORD agreed to institute pilot programs at four ORD laboratories that are involved in the Superfund Technical Support Project. RREL's ETSC was given the responsibility for developing a pilot program to provide engineering support to RCRA permitters in the Regions.

RREL structured the RCRA CA pilot program to provide assistance with the same types of problems that are addressed for Superfund. To provide this assistance, RREL designated a RCRA CA technical support leader who uses contracted technical experts.

A pilot program was initiated during the Fourth Quarter of FY91 and became a full operating program at the end of FY92. Despite the fact that RCRA CA sites are still in the characterization stage, 21 requests were received in FY92 from 7 of the 10 EPA Regions. The distribution of requests, by Region, is shown in Table 7.

It is anticipated that the number of requests will increase as the Regions become aware of the availability of technical support and their sites reach the corrective action stage. Because of the added workload, much of the RCRA CA technical assistance has relied upon contractor support.

Table 7. RCRA CA Requests in FY92, By Region

Region	Technical Assistance Sites
I	1
II	4
III	0
IV	3
V	6
VI	0
VII	0
VIII	1
IX	2
X	4

OSWER SUPERFUND REVITALIZATION PROGRAM

OSWER has been identifying ways to speed up remediations and to carry them out more effectively. RREL has been brought into the process and is contributing in various ways. The following are examples of FY92 contributions:

Evaluation of Technologies for Common Site Types

- Produced Technical Resource Documents (TRDs) on lead-battery recycling and wood-preserving sites.
- Initiated TRDs on sites contaminated with solvents and pesticides.

- Produced Engineering Bulletin on lead-battery sites.
- Participated in work group developing presumptive remedies at solvent sites and wood-treatment sites.
- Participated in national team on wood treatment presumptive remedies.

Individual Site Assistance on SACM and Regional Pilot Projects

- Provided technical support to McCormick/Baxter SACM site.
- Conducted screening treatability tests for two Region VI "Lightning RODs" (Record of Decision).
- Participated in Region I decision team for sites designated for SACM.

TREATABILITY ASSISTANCE PROGRAM

RREL's Treatability Assistance Program is designed to help the Regions make decisions concerning: the necessity for treatability studies; the design and conduct of cost-effective, technically sound treatability studies; and the interpretation of study results. In addition, the Program collects data and records experiences for guidance documents and databases. FY92 Treatability Assistance Program activities include the publication of a series of technology-specific treatability guidance documents; the operation of a laboratory to conduct preliminary evaluations of candidate treatment technologies; and the addition of data into RREL's Treatability Database on the treatment of contaminated soil and aqueous streams. More extensive abstracts of treatability study reports were entered into ATTIC, as described subsequently.

Improved Use of Treatability Studies

RREL has implemented several approaches to improve the effectiveness of the treatability study process, particularly during the RI/FS phases of remediation. The approaches are listed below.

- Publication of treatability study guidance documents and an inventory of treatability study vendors to provide information on when, how, and where to conduct treatability studies cost-effectively.
- Modification of the nomenclature for treatability studies. RREL has proposed three functional designators that apply directly to the remediation process:
  - Remedy screening;
  - Remedy selection; and
  - Remedy design.
- Preliminary engineering screening of potentially applicable treatment technologies, based on site characterization data and, where necessary, remedy screening tests, can help to ensure that more expensive remedy selection tests are conducted on only a limited number of technologies as part of the FS.
- Development of the capability by RREL to perform remedy screening treatability studies in-house, as described subsequently.

In FY92, RREL experts continued to visit EPA Regional offices to describe these approaches to RPMs and to discuss the specific treatability study problems. RREL worked in close cooperation with the Center for Environmental Research Information (CERI) to produce a series of seminars on the use of treatability guidelines in site remediation. In FY92, these seminars were presented in Regions 2, 4, 6, and 9. In addition, RREL provided similar seminars to the U.S. Army Corps of Engineers and to the Department of Energy.

Treatability Study Guidance Documents

The 1989 interim version of the *Guide for Conducting Treatability Studies Under CERCLA* was updated in FY92 and published as a final report by RREL under the same title (EPA/540/R-92/071A). A "Fact Sheet" for the guide will also be produced. The purpose of this generic guide is to present a logical approach to the conduct of treatability studies, thus aiding the selection of remedial technologies at Regional Superfund sites.

In FY92 RREL published three more technology-specific treatment guidance documents, nearing completion of a series covering major treatment technologies. Table 8 lists the guides thus far produced or in progress through FY92. To date a total of six technology-specific guides have been published or cleared for publication, and two are in progress.

Remedy Screening Treatability Study Laboratory

The idea for a remedy screening laboratory was developed in response to a perceived regional need for inexpensive screening tests to determine the potential applicability of various treatment technologies to a particular site. Screening tests have thus been made a component of the process of preliminary screening of technologies. If site characterization data are insufficient to screen a technology, screening studies can be run. This allows the feasibility study process

Table 8. Technology-Specific Treatability Study Guidance Documents

Published or Cleared for Publication Through FY92	Preparation in Progress During FY92
Aerobic Biodegradation: Remedy Screening (EPA/540/2-91/013a) Fact Sheet (EPA/540/2-91/013b)	Solidification/Stabilization
Soil Washing (EPA/540/2-91/020a) Fact Sheet (EPA/540/2-91/020b):	Aerobic Biodegradation: Remedy Selection
Soil Vapor Extraction (EPA/540/2-91/019a) Fact Sheet (EPA/540/2-91/019b)	
Solvent Extraction (EPA/540/R-92/016a) Fact Sheet (EPA/540/R-92/016b)	
Thermal Desorption (EPA/540/R-92/074a) Fact Sheet (EPA/540/R-92/074b)	
Chemical Dehalogenation (EPA/540/R-92/013a) Fact Sheet (EPA/540/R-92/013b)	

to focus on those technologies that have the best chance of successfully remediating a site and to conduct more in-depth evaluations (e.g., remedy selection treatability studies) on just a limited number of technologies.

During FY91, RREL completed development of nine treatability screening test protocols and installed and adjusted test equipment. The Technology Team members are the principal designers of protocols for the Remedy Screening Treatability Laboratory and are the expert reviewers of the results. The protocols include the following:

- Soil vapor extraction
- Solvent extraction
- Biotreatability
- Soil flushing
- Thermal desorption
- Dehalogenation (alkaline polyethylene glycol treatment)
- Solidification/stabilization of inorganics
- Soil washing
- Incineration.

Initial startup difficulties, mostly involving analytical services, were resolved in FY92, and the laboratory provided 24 screening-level tests to meet regional needs at 11 remediation sites (Table 9). The Technology Teams responded to three additional requests for which a judgment was made that tests were not necessary.

Table 9. Screening Level Treatability Tests - FY92

Technologies	Totals
Solvent Extraction	2
Biotreatment	4
Thermal Desorption	3
Incineration	2
Chemical Dehalogenation	1
Soil Washing	4
Soil Flushing	1
Soil Vapor Extraction	-
Solidification/Stabilization	7

Treatability Database

RREL's Treatability Database was originally developed to compile treatability data on a large number of chemicals in various types of water and wastewater. Only primary treatability references are used, and both the references and the data are peer reviewed. Each reference is then assigned a "quality" code which is included in the database files. The current version of the database contains 1,173 chemical compounds with 429 sets of isotherms; 7,652 sets of aqueous treatability data; and 4,814 sets of solids treatability data. Since its inception, RREL has continued to

update the database to include additional chemicals as well as data on soils, sludges, and sediments. During FY92, approximately 3,200 new treatability data sets were added to the database.

The database was initially developed for the National Pollution Discharge Elimination System (NPDES), RCRA, and Superfund programs in Regional and State Offices but now serves industry, publicly-owned treatment works (POTWs), consulting engineers, universities, drinking water facilities, health departments, etc. Approximately 2,500 copies of the database have been distributed in the United States. The database is also available in ATTIC.

TECHNOLOGY TRANSFER ACTIVITIES

Technical Resource Documents

RREL is developing a set of TRDs to provide detailed information on contaminants and remedial options at several types of Superfund and RCRA sites. Each document provides detailed, contaminant-specific site characterization and option selection information. The first document, "Selection of Control Technologies for Remediation of Lead Battery Recycling Sites" (EPA/540/2-91/014) was published in FY91. The second, "Contaminants and Remedial Options at Wood Preserving Sites," was submitted for publication in September, 1992. Three additional documents covering solvent-contaminated sites, pesticide-contaminated sites, and metal-contaminated sites will be published in late FY93 or early FY94. Taken as a set, the TRDs will cover characterization and cleanup options for a major fraction of contaminants at Superfund and RCRA sites.

Each of these documents has been prepared in conjunction with the Robert S. Kerr Laboratory in Ada, Oklahoma (which prepared the contaminant characterization information), numerous technical experts within RREL, and experienced RPMs and On-Scene Coordinators (OSCs). The documents cover technical information only, and are not intended to be policy guides relative to technology selection. The target audience is any site cleanup manager at the Federal, State, or private levels, using CERCLA, RCRA, or State guidelines to define suitable levels of cleanup for a subject site. Once cleanup levels are established, the TRDs assist the user in narrowing the range of applicable remedial options.

" Short Sheets," or bulletins, are being prepared as companion documents to the TRDs. The Short Sheet on wood preserving sites is being prepared by OSWER's Environmental Response Team (ERT) with RREL input as a policy guide on "presumptive remedies" for wood sites. This guide is intended to facilitate remedy selection under the SACM process. Similarly, a Short Sheet on presumptive remedies for solvents-only sites is being prepared. Finally, a bulletin on pesticide sites will be published in FY93, and one on metals sites is planned for late FY93 or early FY94.

The scope of the TRDs has been expanded to incorporate issues applicable to RCRA corrective action sites in addition to the initial focus on Superfund sites. This includes an increase in the scope of agency review and emphasis on containment options.

Engineering Bulletins

RREL Engineering Bulletins (Table 10) summarize available information on selected site-remediation technologies and related engineering issues. The bulletins are available to RPMs and others who wish to get an understanding of a topic quickly. Most bulletins are technology-specific and discuss the following: technology description; limitations of the technology; previous applications; cost information; and data requirements. As the publication series continues, the focus is shifting to broader site-remediation issues, i.e., general data requirements for technology prescreening and air emission controls. In developing these documents, RREL relies on experts from within and outside of EPA. Currently, RREL has published 19 bulletins. Two are in final draft form and will be published in FY93; four additional bulletins are nearly completed.

ETSC Issue Papers and Workshops

Numerous engineering and scientific issues must be addressed during site remediation. In collaboration with others on the Agency's Engineering Forum, RREL's ETSC develops issue papers that are intended to provide expert discussion of site remediation problems. During FY92, ETSC produced two issue papers and initiated three others. A database of technical requests and responses summarizes ETSC activities. The Center also conducts topical workshops at the request of the Regions and the Forum. A list of issue papers, workshops, and training courses is presented in Table 11.

ATTIC

ATTIC is a computer-assisted information management and retrieval system that provides up-to-date information on innovative waste treatment technologies. It is directly accessible by anyone with a personal computer and a modem. ATTIC allows quick screening of hundreds of source documents and databases. Information includes treatability information, case histories, and other technical information. Sources include the Superfund Innovative Technology Evaluation (SITE) project summaries, Records of Decision (RODs), State agency reports, international programs, and industry studies

ATTIC was transferred to RREL control from ORD Headquarters in early FY92. This was done because the

Table 10. Engineering Bulletins

Title	EPA Publication Number
Published	
Solvent Extraction Treatment	EPA/540/2-90/013
Mobile/Transportable Incineration Treatment	EPA/540/2-90/014
Chemical Dehalogenation Treatment: APEG Treatment	EPA/540/2-90/015
Slurry Biodegradation	EPA/540/2-90/016
Soil Washing Treatment	EPA/540/2-90/017
In Situ Steam Extraction	EPA/540/2-91/005
In Situ Soil Vapor Extraction	EPA/540/2-91/006
Thermal Desorption	EPA/540/2-91/008
In Situ Soil Flushing	EPA/540/2-91/021
Air Stripping of Aqueous Solutions	EPA/540/2-91/022
Control of Air Emissions From Material Handling	EPA/540/2-91/023
Granular Activated Carbon	EPA/540/2-91/024
Chemical Oxidation Treatment	EPA/540/2-91/025
Supercritical Water Oxidation	EPA/540/S-92/006
Rotating Biological Contactors	EPA/540/S-92/007
Slurry Walls	EPA/540/S-92/008
Technology Preselection Data Requirements	EPA/540/S-92/009
Pyrolysis	EPA/540/S-92/010
Selection of Control Technologies for Remediation of Lead Battery Recycling Sites	EPA/540/S-92/011
Final Draft	
Design Considerations for Ambient Air Monitoring at Superfund Sites	
Air Pathway Analysis	
In Process	
Solidification/Stabilization of Organics and Inorganics	
In Situ Vitrification Treatment	
Landfill Covers	
In Situ Biodegradation	

RREL staff is more familiar with the technologies and cleanup sites, and because RREL has a closer working relationship with the clients and the data sources.

There are about 2,200 entries in the ATTIC database, 600 of which were added in FY92. There were approximately 10,200 on-line calls to the database in FY92. ATTIC has more than 2,000 registered users, 55 percent of whom are in the private sector. Plans are in place to improve the user friendliness and content of ATTIC.

SUTI Treatment Technologies Course

In conjunction with the University of Cincinnati (UC), RREL has formed a SUTI for treatment technology training. SUTI at UC is one of six institutes in the United States developed to assist EPA in producing experienced, knowledgeable OSCs and RPMs.

The SUTI treatment technology course is designed to aid experienced Superfund project managers in evaluating and selecting remedial technologies for specific sites. SUTI focuses on current developments in treatment technologies and their application. In response to demand, SUTI training is being expanded and provided to the Regions. The two and one-half day course was presented initially in Cincinnati in August 1990 and again in April 1991. It was presented in Atlanta, San Francisco, and Seattle in FY92.

CONCLUSIONS

RREL's site remediation technical support program is assisting EPA's Regional Offices in a variety of ways on site-specific engineering problems. In addition, the program produces a number of different technical support documents for use by all site-remediation managers, and manages two databases for immediate access to treatment technology information. All these activities help to ensure more timely and effective remediation of contaminated sites.

Table 11. ETSC Issue Papers, Workshops, and Training Courses

Papers	
Published in FY 92	**In Progress in FY 92**
Considerations for Evaluating the Implications of Metals Partitioning during the Incineration of Contaminated Soils from Superfund Sites. (EPA/540/S-92/014)	Considerations in Deciding to Treat Contaminated Soils In Situ
Construction Quality Management for Remedial Action and Remedial Design for Contaminated Facilities. (EPA/540/R-92/073)	Transportation of Hazardous Materials
Database of Materials Handling Experts (disk and hard copy for Regional use)	Treatment of PCB-Contaminated Soils
Workshops and Training Courses	
FY 90-91	**FY 92**
Remediation of Explosives-Contaminated Soils	Dust and Vapor Suppression Workshop, Dallas - 11/91
Remediation of Lead-Contaminated Sites	SUTI Training Course Atlanta - 11/91 San Francisco - 5/92 Seattle - 6/92