EPA-542-R-96-010
Number 8
November 1996

Innovative Treatment Technologies: Annual Status Report (Eighth Edition)

Applications of New Technologies at Hazardous Waste Sites

U.S. Environmental Protection Agency
Office of Solid Waste and Emergency Response
Technology Innovation Office

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NOTICE

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U.S. EPA/ National Center for Environmental Publications and Information (NCEPI)
P.O. Box 42419
Cincinnati, OH 45242
Fax Number: (513) 489-8695
Phone Verification: (513) 489-8190 or
(800) 490-9198

Allow 4-6 weeks for delivery. The most current *ITT Database* is also available for downloading from the following sources:

- Cleanup Information Bulletin Board System (CLU-IN BBS). Internet Address: http://clu-in.com. Using Modem: (301) 589-8366 (8 Data Bits, 1 Stop Bit, No Parity, VT-100 or ANSI). Voice help: (301) 589-8368.
- Alternative Treatment Technology Information Center (ATTIC). Using modem: (703) 908-2138 (8 Data Bits, 1 Stop Bit, No Parity, VT-100 or ANSI). Voice help: (703) 908-2137.

* The *ITT Database, Version 2.0* will be available in Spring 1997.

FOREWORD

This report documents the status of application of innovative treatment technologies and on-site incineration in the Superfund program. It presents information on some, but not all, projects applying innovative treatment technologies at non-Superfund sites such as those subject to corrective action under the Resource Conservation and Recovery Act (RCRA), and those being addressed by the Department of Defense (DoD) and the Department of Energy (DOE). We have expanded the report to include many new innovative projects selected by the EPA in fiscal year 1995 and many graphics and tables to assist the reader in understanding the data. In addition, more detailed information on the status of on-site incineration projects has been added to the report. A software version of the report also is available.

The software version of the report, called the *Innovative Treatment Technologies Annual Status Report Database (ITT Database)*, is a Windows™-based system that contains all of the site-specific information as well as all of the text and graphics found in the hard copy version. Information provided about each site includes site type, technology selected or used, target contaminants, contaminated matrix, project status, and site contact names and telephone numbers. Additional information about completed projects includes periods of operation, typical pre- and post-treatment concentrations of key contaminants treated, cleanup goals, operating parameters (such as retention time and additives), materials handling required, and management of residuals. The database is searchable and can generate statistics and reports tailored to the user's specifications. Ordering information for the database and the hard-copy report is on the preceding page. If you have access, we encourage you to download the database from one of the sources listed.

We intend this information to improve communication between experienced technology users and those who are considering innovative technologies to clean up contaminated sites. The information will enable technology vendors to evaluate the market for possible application of innovative treatment technologies at Superfund sites and other contaminated sites for the next several years.

Our goal with this report is to increase the application of new, less costly, and more effective technologies to address the problems at Superfund sites as well as other contaminated sites.

ACKNOWLEDGMENTS

This document was prepared for the EPA's Technology Innovation Office.

Special acknowledgement is due to the federal and state staff and other remediation professionals listed as contacts for individual sites. They provided the detailed information in this document. Their cooperation and willingness to share their expertise on innovative treatment technologies encourages the application of those technologies at other sites.

ABSTRACT

This yearly report documents and analyzes the selection and use of innovative treatment technologies in the EPA Superfund Program and at some non-Superfund sites subject to corrective action under the RCRA Program, and those sites being addressed by DoD and DOE. The report updates the status of all the projects and includes 36 projects for which innovative technologies were selected in Superfund Records of Decision (RODs) signed during fiscal year 1995. Also new in this year's report is the addition of detailed status information for 43 on-site incineration projects at Superfund remedial sites. The information will improve communication between experienced technology users and those who are considering innovative technologies or on-site incineration to clean up contaminated sites. In addition, the information will enable technology vendors to evaluate the market for innovative technologies and on-site incineration at Superfund sites for the next several years.

Alternative treatment technologies are alternatives to land disposal or containment. Innovative treatment technologies are alternative treatment technologies for which use is inhibited by lack of data on cost and performance. This report documents the use of the following innovative treatment technologies to treat groundwater (in situ), soils, sediments, sludge, and solid-matrix wastes:

Soil Technologies

- Bioremediation (ex situ)
- Bioremediation (in situ)
- Contained Recovery of Oily Wastes (CROW™)
- Cyanide oxidation
- Dechlorination
- Hot air injection
- In situ flushing
- Vitrification
- Physical separation
- Plasma high temperature metals recovery
- Soil vapor extraction
- Soil washing
- Solvent extraction
- Thermal desorption

Groundwater Technologies

- Air sparging
- Bioremediation (in situ)
- Dual-phase extraction
- In situ oxidation
- In situ well aeration
- Passive treatment walls

This document includes a list of sites and analysis of 345 applications of innovative treatment technologies for remedial actions, 32 applications for removal actions, 10 applications under RCRA corrective actions, and 32 applications under other federal programs. The analysis includes the number of applications by technology, types of contaminants treated, quantities of soil treated, and status of the project. The information for these sections was collected through analyses of RODs; review of 68 RCRA corrective action statements of basis; review of EPA's Office of Solid Waste and Emergency Response (OSWER) tracking systems; and interviews with EPA regional staff, as well as with DoD and DOE staff.

OVERVIEW

INTRODUCTION

The Technology Innovation Office (TIO) of the U.S. Environmental Protection Agency's (EPA) Office of Solid Waste and Emergency Response (OSWER) has prepared this *Innovative Treatment Technologies: Annual Status Report, Eighth Edition*, to document the use of innovative treatment technologies to remediate contaminated hazardous waste sites. The report contains a list and an analysis of Superfund sites (both remedial and removal actions), Resource Conservation and Recovery Act (RCRA) corrective action sites, and other non-Superfund sites (that is, sites addressed under other federal programs) at which innovative treatment technologies are being used. Site managers can use this report to evaluate cleanup alternatives for similar sites. Innovative technology vendors can use it to identify potential markets. TIO also uses the information to track progress in the application of innovative treatment technologies.

> ***NEW IN THIS REPORT***
>
> - *36 innovative technologies selected in FY 95 RODs*
> - *Information on 18 completed Superfund innovative projects*
> - *Status on 43 Superfund on-site incineration projects*
> - *Updated searchable database system*

The report is updated annually. This Eighth Edition of the report updates and expands information provided in the September 1995 report. Information added to this update includes 36 innovative treatment technologies selected for remedial actions in fiscal year (FY) 1995 Superfund Records of Decision (RODs) — a ROD is the decision document used to specify the way a site, or part of a site, will be remediated — and information on 16 additional projects that have been completed. In addition, detailed information on 43 on-site incineration projects has been added to the report. Also added is information about two innovative technologies selected in statements of basis (SBs) for implementation at RCRA corrective action sites.

This report does not address sites that use nontreatment remedies, such as landfilling and capping. It contains only minimal information about sites that use solidification/stabilization, pump-and-treat remedies, off-site incineration, or natural attenuation. More information about RODs that specify such remedies is presented in the series of ROD annual reports published by the Office of Emergency and Remedial Response (OERR). For more information about those reports, call the Superfund Hotline at (800) 424-9346 (outside the Washington, D.C. metropolitan calling area) or (703) 412-9810 (inside the Washington, D.C. metropolitan calling area).

SOURCES OF INFORMATION FOR THIS REPORT

EPA initially used RODs for individual sites to compile information on remedial action, and pollution reports, on-scene coordinators' (OSC) reports, and the OSWER Removal Tracking System to compile data on emergency response actions. The U.S. Army Corps of Engineers (USACE) Hazardous, Toxic, Radioactive Waste (HTRW) Mandatory Center of Expertise in Omaha, Nebraska and RCRA corrective action SBs were consulted to compile information on projects under other federal programs. EPA then verified and updated the draft information through interviews with remedial project managers (RPM), OSCs, and other contacts for each site. The data on project status supplements data in the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), EPA's Superfund tracking system, by providing more detailed information on the specific portion of the remedy that involves an innovative technology. In addition, information about technologies and sites identified here might differ from information found in the ROD annual reports and the RODs database. Such differences are the result of changes in the remedy during the design phase of the project. The changes may not have required official documentation (that is, a ROD amendment or an explanation of significant differences [ESD]).

WHAT ARE ESTABLISHED AND INNOVATIVE TREATMENT TECHNOLOGIES?

Treatment technologies are alternatives to land disposal. Established treatment technologies are those for which cost and performance information is readily available. The most frequently used established technologies are incineration, solidification/stabilization, and pump-and-treat technologies for groundwater. Treatment of groundwater after it has been pumped to the surface often resembles traditional water treatment; therefore, in general, pump-and-treat groundwater remedies are considered established technologies.

OVERVIEW

Innovative treatment technologies are alternative treatment technologies for which routine use at Superfund and similar sites is inhibited by lack of data on performance and cost. In general, a treatment technology is considered innovative if it has had limited full-scale application. Often, it is the application of a technology or process to soils, sediments, sludge, and solid-matrix waste (such as mining slag) or groundwater that is innovative. This report documents the use of the following innovative treatment technologies to treat groundwater, soils, sediments, sludge, and solid-matrix waste:

Soil Technologies

- Bioremediation (ex situ)
- Bioremediation (in situ)
- Contained Recovery of Oily Wastes (CROW™)
- Cyanide oxidation
- Dechlorination
- Hot air injection
- In situ flushing
- Physical separation
- Plasma high temperature metals recovery
- Soil vapor extraction
- Soil washing
- Solvent extraction
- Thermal desorption
- Vitrification

Groundwater Technologies

- Air sparging
- Bioremediation (in situ)
- Dual-phase extraction
- In situ oxidation
- In situ well aeration
- Passive treatment walls

Over the past several years, a number of remedial technologies that are considered innovative have seen increased use at Superfund and other contaminated sites. In particular, an increasing number of soil vapor extraction and thermal desorption projects have been completed. Although those technologies have become accepted more generally, this report continues to track soil vapor extraction and thermal desorption as innovative technologies because the results of most of the projects are not widely known.

DEFINITIONS OF SPECIFIC INNOVATIVE TREATMENT TECHNOLOGIES

This document reports on the use of the innovative remediation technologies listed above, on-site incineration, and, to a lesser extent, on the use of other established technologies. The technologies reported in the following sections treat contaminants in very different ways. This section provides brief definitions of the 14 types of source control (primarily soil) innovative technologies, six types of innovative in situ groundwater technologies as they are used in this document.

Source Control Technologies

EX SITU BIOREMEDIATION uses microorganisms to degrade organic contaminants in excavated soil, sludge, and solids. The microorganisms break down the contaminants by using them as a food source. The end products typically are CO_2 and H_2O. Ex situ bioremediation includes slurry phase bioremediation, in which the soils are mixed in water to form a slurry, and solid-phase bioremediation, in which the soils are placed in a cell or building and tilled with added water and nutrients. Land farming and composting are types of solid-phase bioremediation.

In applications of IN SITU SOIL BIOREMEDIATION, an oxygen source and sometimes nutrients are pumped under pressure into the soil through wells, or they are spread on the surface for infiltration to the contaminated material. Bioventing is a common form of in situ bioremediation. Bioventing utilizes extraction wells to circulate air with or without pumping air into the ground.

The CONTAINED RECOVERY OF OILY WASTES (CROW™) process displaces oily wastes with steam and hot water. The contaminated oils are swept into a more permeable area and are pumped out of the soil.

In CYANIDE OXIDATION organic cyanides are oxidized to less hazardous compounds through chemical reactions.

DECHLORINATION is a chemical reaction which removes or replaces chlorine atoms contained in hazardous compounds, rendering them less hazardous.

For IN SITU FLUSHING, large volumes of water, at times supplemented with treatment compounds, are introduced into soil or waste, to flush hazardous contaminants from a site. Injected water must be isolated effectively within the aquifer and recovered.

With HOT AIR INJECTION, heated air is injected and circulated through the subsurface. The heated air volatilizes volatile organic compounds so they can be extracted and captured for further treatment or recycling.

PHYSICAL SEPARATION removes contaminants from a medium in order to reduce the volume of material requiring treatment.

PLASMA HIGH TEMPERATURE METALS RECOVERY is a thermal treatment process that purges contaminants from solids and soils as metal fumes and organic vapors. The organic vapors can be burned as fuel and the metal fumes can be recovered and recycled.

SOIL VAPOR EXTRACTION (SVE) removes volatile organic compounds from the soil in situ through the use of vapor extraction wells, sometimes combined with air injection wells, to strip and flush the contaminants into the air stream for further treatment.

SOIL WASHING is used for two purposes. First, the mechanical action and water (sometimes with additives) physically remove the contaminants from the soil particles. Second, agitation of the soil particles allows the more highly contaminated fine particles to separate from the larger ones, thus reducing the volume of material requiring further treatment.

SOLVENT EXTRACTION operates on the principle that, in the correct solvent, organic contaminants can be solubilized preferentially and removed from the waste. The solvent used will vary, depending on waste type.

For THERMAL DESORPTION, the waste is heated in a controlled environment to cause organic compounds to volatilize. The operating temperature for thermal desorption is usually less than 1,000°F (550°C). The volatilized contaminants usually require further control or treatment.

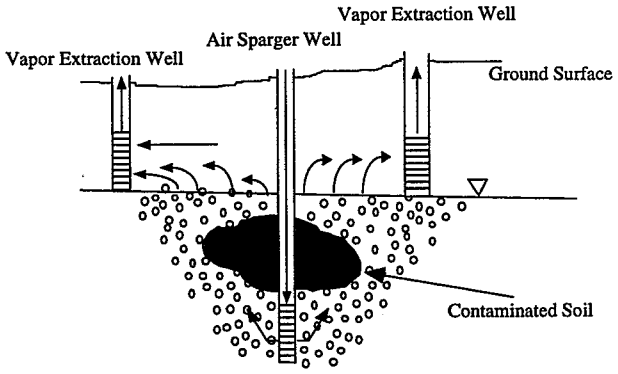
VITRIFICATION melts contaminated soil at temperatures of approximately 3,000°F (1,600°C). Metals are encapsulated in the glass-like structure of the solidified silicate compounds. Organics may be treated by combustion.

Groundwater Treatment Technologies

AIR SPARGING involves injecting air or oxygen into the aquifer to strip or flush volatile contaminants as the air bubbles up through the groundwater and is captured by a vapor extraction system. The entire system acts as an in situ air stripper. Stripped or volatilized contaminants usually will be removed through soil vapor extraction wells and usually require further treatment.

Air sparging often is combined with IN SITU GROUNDWATER BIOREMEDIATION, in which nutrients or an oxygen source (such as air) are pumped under pressure into the aquifer through wells to enhance biodegradation of contaminants in the groundwater.

MODEL OF AN AIR SPARGING SYSTEM



DUAL-PHASE EXTRACTION removes contaminants simultaneously from both the saturated and the unsaturated zone soils in situ. This new technology applies soil vapor extraction techniques to contaminants trapped in saturated zone soils, which are more difficult to extract than those in the unsaturated zone. In some instances, this result may be achieved by sparging the groundwater section of a well that penetrates the groundwater table. Other methods also may be employed.

IN SITU OXIDATION oxidizes contaminants that are dissolved in groundwater, converting them into insoluble compounds.

PASSIVE TREATMENT WALLS act like chemical treatment zones. Contaminated groundwater comes into contact with the wall, which is permeable, and a chemical reaction takes place. Limestone treatment zones increase the pH, which effectively immobilizes dissolved metals in the saturated zone. Another type of passive treatment wall contains iron filings that dechlorinate compounds.

SURFACTANT FLUSHING of non-aqueous phase liquids (NAPL) increases the solubility and mobility of contaminants in water, so that the NAPL can be biodegraded more easily in the aquifer or recovered for treatment aboveground by a pump-and-treat system.

OVERVIEW

CONTENTS OF THIS REPORT

The following sections contain summary information about and analysis of sites at which innovative treatment technologies are being or have been applied. Section 1: Superfund Remedial Actions covers all Superfund sites at which an innovative treatment technology or on-site incineration is being or has been implemented under a remedial action. Such actions usually are documented in a ROD. Soil and groundwater technologies are discussed separately. Section 2: Superfund Removal Actions provides information on Superfund removal action sites. Removal actions are usually conducted in response to a more immediate threat caused by a release of hazardous substances than threats addressed by remedial actions. Section 3: Actions Under Other Federal Programs covers non-Superfund sites being addressed under RCRA and other federal programs.

SECTION 1: SUPERFUND REMEDIAL ACTIONS

OVERVIEW OF RODS

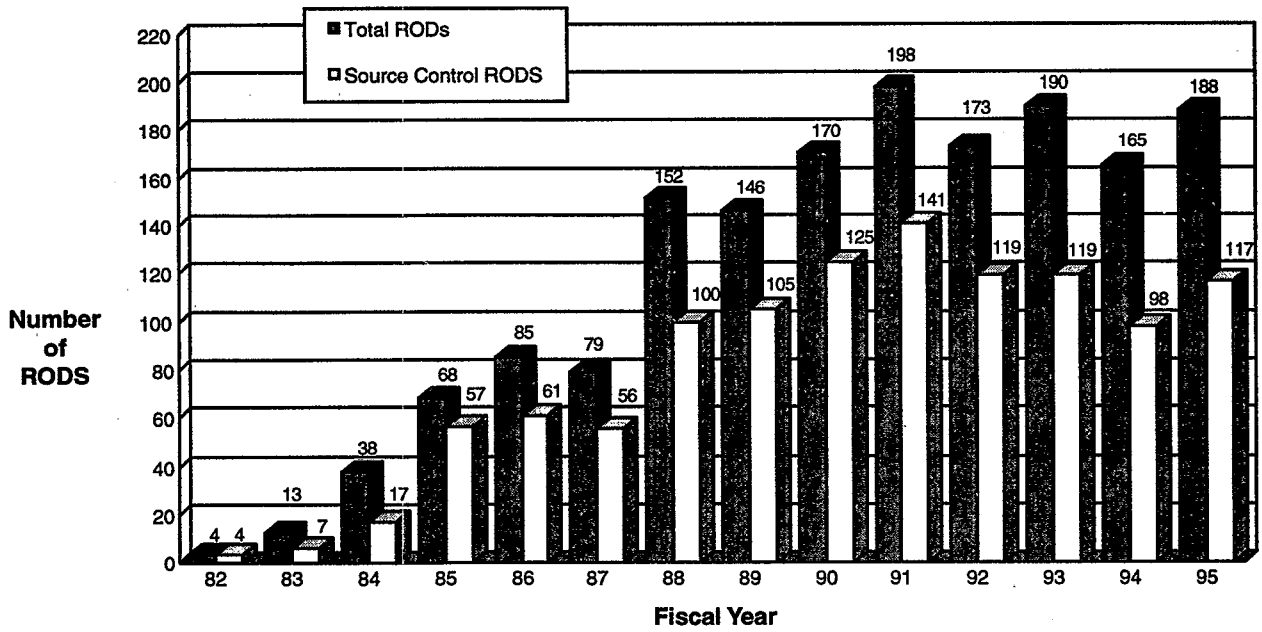
As of June 1996, there are 1,227 sites on the National Priorities List (NPL), excluding 82 sites deleted from the NPL. An additional 52 sites are proposed for the NPL. As of the end of FY 1995, 1,569 RODs (including ROD amendments) had been signed. Most RODs for remedial actions address the source of contamination, such as soil, sludge, sediments, and solid-matrix wastes. Such RODs are referred to as "source control" RODs. In addition to the source, source control RODs may address remedial action required for groundwater. Other, non-source control RODs address groundwater only or specify that no action is necessary. Figure 1 shows the number of source control RODs compared with the total number of RODs for each fiscal year since 1982.

Based on RODs available as of August 1996, a total of 188 RODs (including ROD amendments) were signed in FY 1995, an increase of 23 from the number signed in FY 1994. The number of source control RODs increased by 19 during FY 1995. The percentage of source control RODs relative to the total number of RODs increased slightly from 59 percent in FY 1994 to 62 percent in FY 1995.

SOURCE CONTROL RODS

Source control RODs can be classified by the general type of technology selected: (1) RODs specifying some alternative treatment, (2) RODs specifying containment or disposal only, and (3) RODs specifying institutional controls or other actions (such as restrictions on land use, monitoring, or relocation of the affected community).

Figure 1. Superfund Remedial Actions: RODs Signed by Fiscal Year

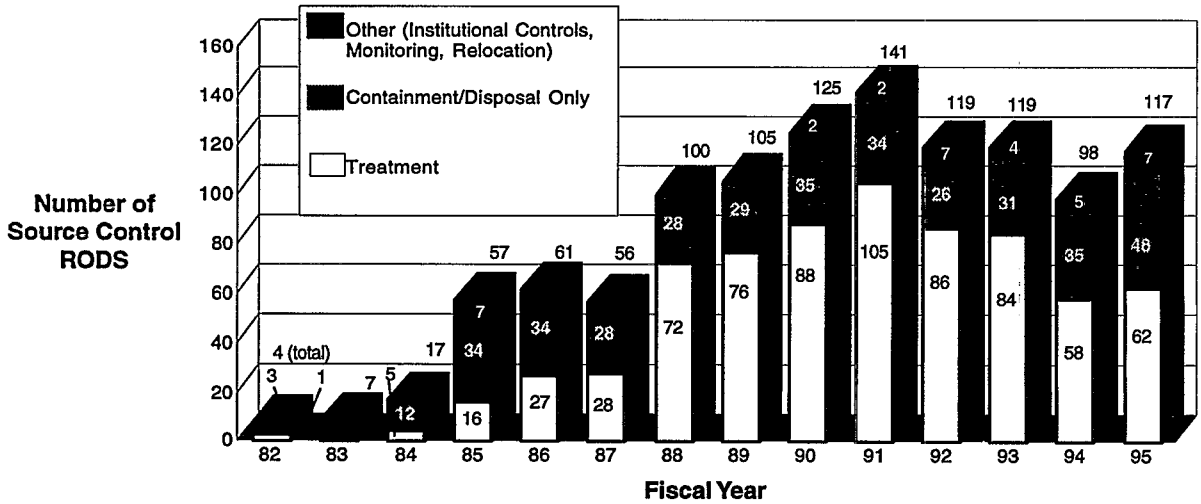


The difference between the total number of Records of Decision (RODs) (1,669) and the number of source control RODs (1,126) is the number of "groundwater treatment only" or "no action needed" RODs (total of 543).
Source: USEPA Office of Emergency and Remedial Response, 1996. Fiscal year 1995 data are preliminary.

Figure 2 shows the number of source control RODs that fall under each category. RODs in which some treatment is selected may include containment of treatment residues or waste from another part of the site. Overall, for 63 percent of all source control RODs (from FY 1982 to FY 1995) at least one treatment technology for source control was selected (Figure 3).

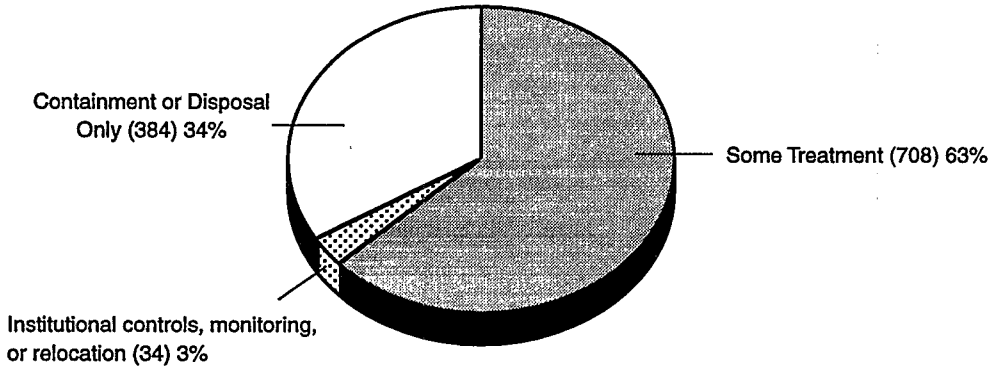
The Superfund Amendments and Reauthorization Act of 1986 (SARA) expressed a preference for permanent remedies (that is, alternative treatment) over containment or disposal to remediate Superfund sites. From FY 1988 through FY 1993, at least 70 percent of source control RODs provided provisions for treatment of wastes (Figure 4). The increase was most dramatic in FY 1988.

Figure 2. Superfund Remedial Actions: Source Control RODs by Fiscal Year



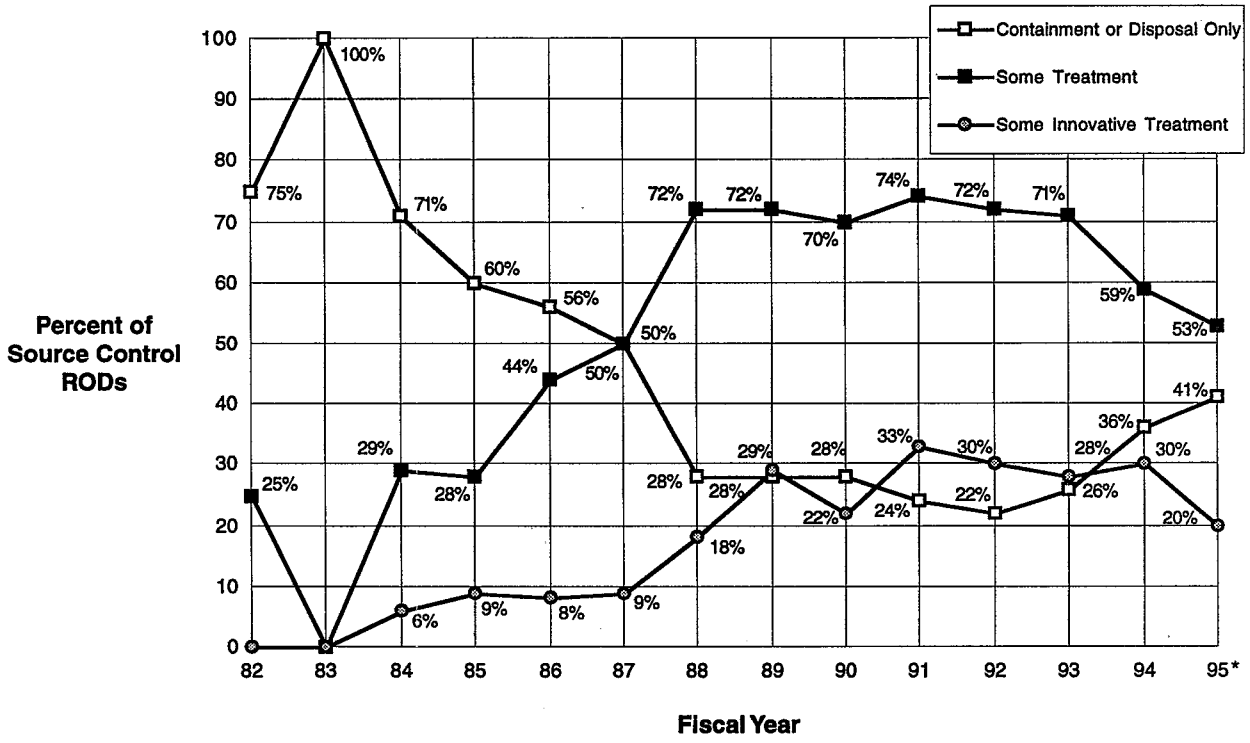
Source: USEPA Office of Emergency and Remedial Response, 1996. Fiscal year 1995 data are preliminary.

Figure 3. Superfund Remedial Actions: Overview of Source Control RODs Through Fiscal Year 1995



( ) Number of Records of Decision (RODs).
Source: USEPA Office of Emergency and Remedial Response; includes preliminary fiscal year 1995 data.

Figure 4. Superfund Remedial Actions: Treatment and Disposal Decisions for Source Control



* *Preliminary data.*

Note: Data for innovative technologies are derived from Records of Decision (RODs) for fiscal years (FY) 1982–1995 and anticipated design and construction activities as of August 1996. Remaining data (containment of disposal only and some treatment) based on FY 1982–1995 RODs.

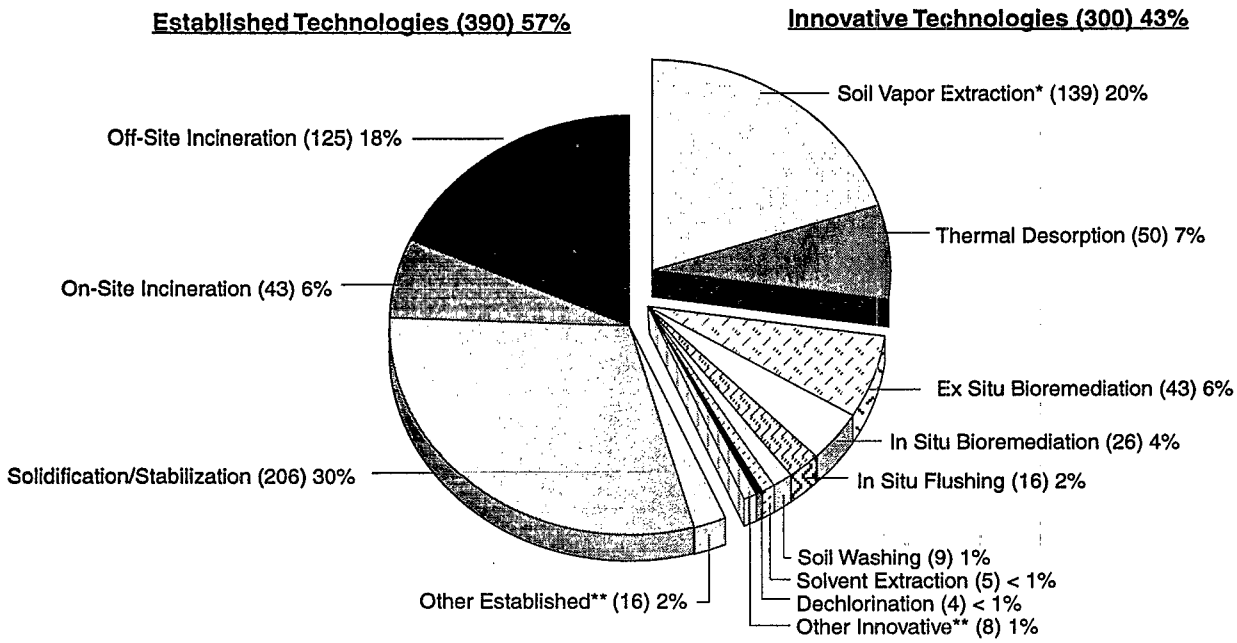
In 50 percent of RODs signed in 1987, some treatment for source control was selected, while some treatment was selected in 72 percent of those signed in FY 1988. However, the percentage in FY 1994 and FY 1995 decreased to 59 and 53 percent respectively. Correspondingly, in the last two years there was an increase in the number of source control RODs that specify containment or disposal only, compared with RODs under which some treatment of the source material was selected. Figure 4 also illustrates the percentage of RODs in which at least one innovative technology was selected, as updated by current project status information. Innovative technologies were selected and still are being considered or used under about 23 percent of the 1,126 source control RODs. Overall, innovative technologies have been selected in 17 percent of all 1,569 RODs signed since 1982.

SOURCE CONTROL TECHNOLOGIES

This section discusses the number and kinds of treatment technologies selected and used for source control in the Superfund remedial program. Most of the rest of the information in this section focuses on technologies, rather than RODs. In each ROD in which treatment was specified, more than one type of treatment technology may have been selected.

Figure 5 gives an overview of the established and innovative treatment technologies selected for source control. Through FY 1995, a total of 690 treatment technologies were selected in 708 source control RODs specifying some treatment. The selection of multiple technologies results from the use of treatment trains or from the treatment of different wastes or areas of the site. Figure 5 illustrates that, through FY 1995, 43 per-

Figure 5. Superfund Remedial Actions: Summary of Source Control Treatment Technologies Selected Through Fiscal Year 1995



Note: *Data for off-site incineration, solidification/stabilization, and other established technologies based on Records of Decision (RODs) for fiscal years 1982–1995. Data for innovative technologies and on-site incineration based on anticipated design and construction activities as of August 1996. A site may use more than one technology.*

( ) *Number of times this technology was selected or used.*

* *Includes three dual-phase extraction projects also listed as in situ groundwater technologies.*

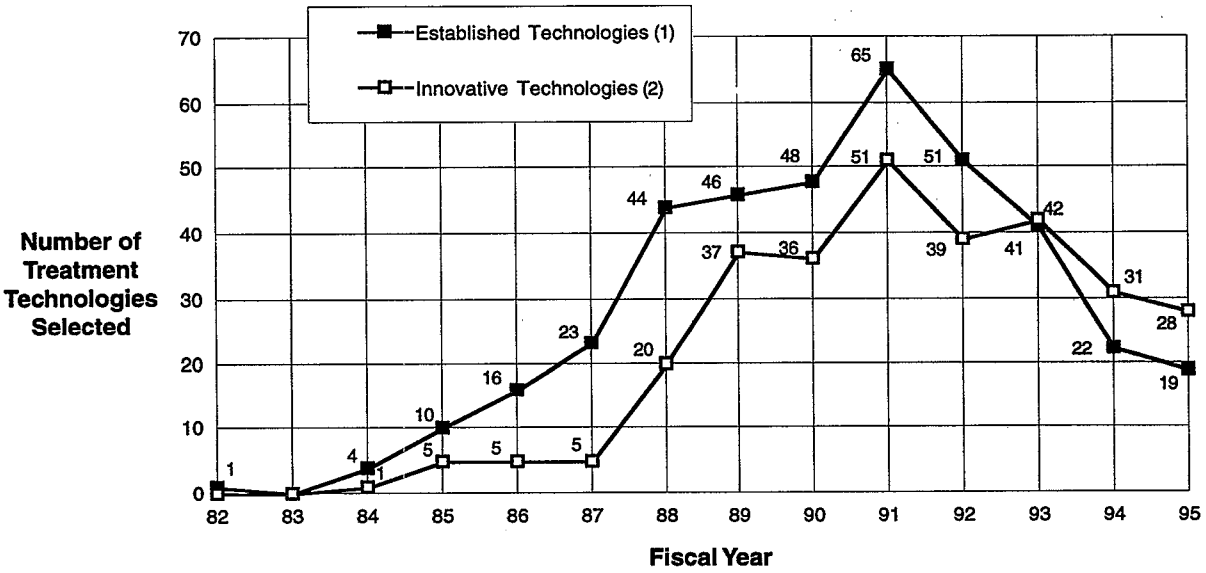
** *"Other" established technologies are soil aeration, open detonation, and chemical neutralization. "Other" innovative technologies are hot air injection, physical separation, contained recovery of oily wastes (CROW™), cyanide oxidation, vitrification, and plasma high temperature metals recovery.*

cent of the 690 treatment technologies selected were innovative and 57 percent were established. Soil vapor extraction and thermal desorption are indicated as a separate wedge on Figure 5 because of the large number of applications of those two technologies. Appendix A provides data on the selection of the 690 source control treatment technologies by fiscal year.

Appendix B, Innovative Technology Summary Matrix, lists each of the innovative and treatment technology projects for source control at remedial sites. (The summary matrix also includes innovative groundwater projects, removal actions, and non-Superfund projects that will be discussed in later sections.) Appendix C contains a matrix of established source control technologies. The *ITT Database* (see Notice) contains detailed information on specific sites at which innovative technologies or on-site incineration are being implemented. Information on established treatment technologies other than on-site incineration is based on a review of RODs rather than interviews of regional or state staff. Therefore, the only information provided for sites using established technologies other than on-site incineration is the name of the site and the year in which the ROD was signed. The list of sites does not reflect any changes in the remedy that may have occurred in the design phase of the cleanup and does not report the status of the projects.

Figure 6 compares the total number of established and innovative technologies for source control selected by fiscal year. The figure shows that more innovative technologies than established technologies were selected in RODs signed during FY 1993, FY 1994, and FY 1995. Figure 7 shows selection trends for the major established technologies, on-site and off-site incineration and solidification/stabilization. The selection of solidification/stabilization exhibited the most significant change, decreasing from 13 in FY 1994 to five in FY 1995. The selection of this technology has decreased steadily since peaking at 37 RODs in FY 1992. Figure 8 graphically depicts, by fiscal year, the frequency of selection for the three most often selected innovative treatment technologies: soil vapor extraction, thermal desorption, and bioremediation. These three technologies are discussed in more detail in later sections. Appendix A gives the number of established and innovative treatment technologies for both source control and groundwater by fiscal year.

Figure 6. Superfund Remedial Actions: Number of Established Versus Innovative Treatment Technologies for Source Control

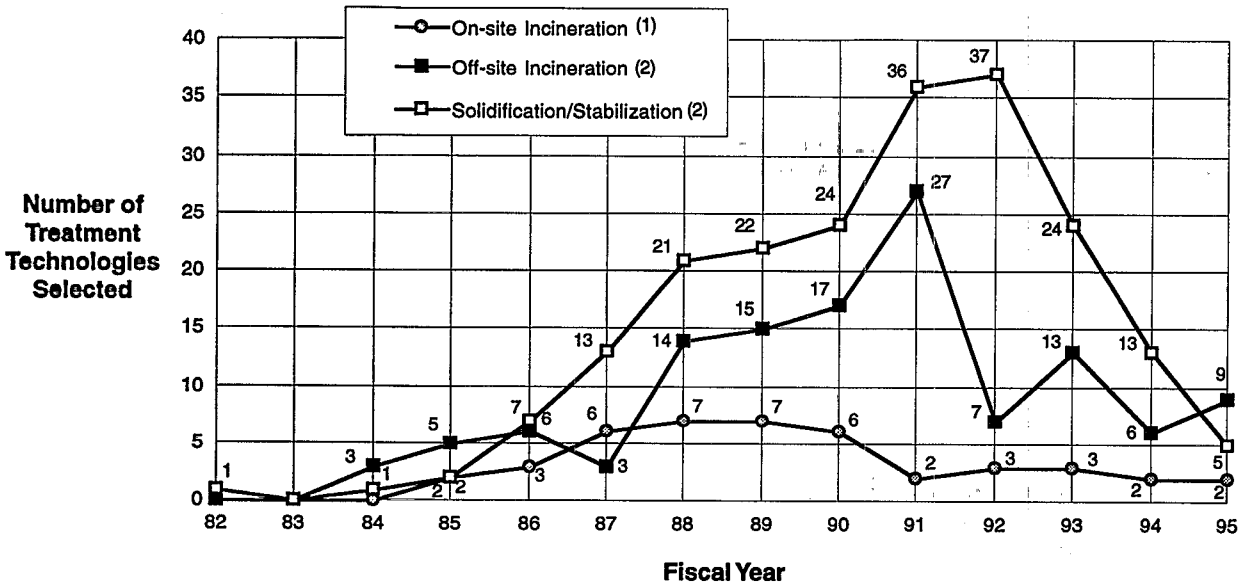


(1) *Data based on Records of Decision (RODs), except on-site incineration data, which are based on anticipated design and construction activities as of August 1996.*

(2) *Data based on anticipated design and construction activities as of August 1996.*

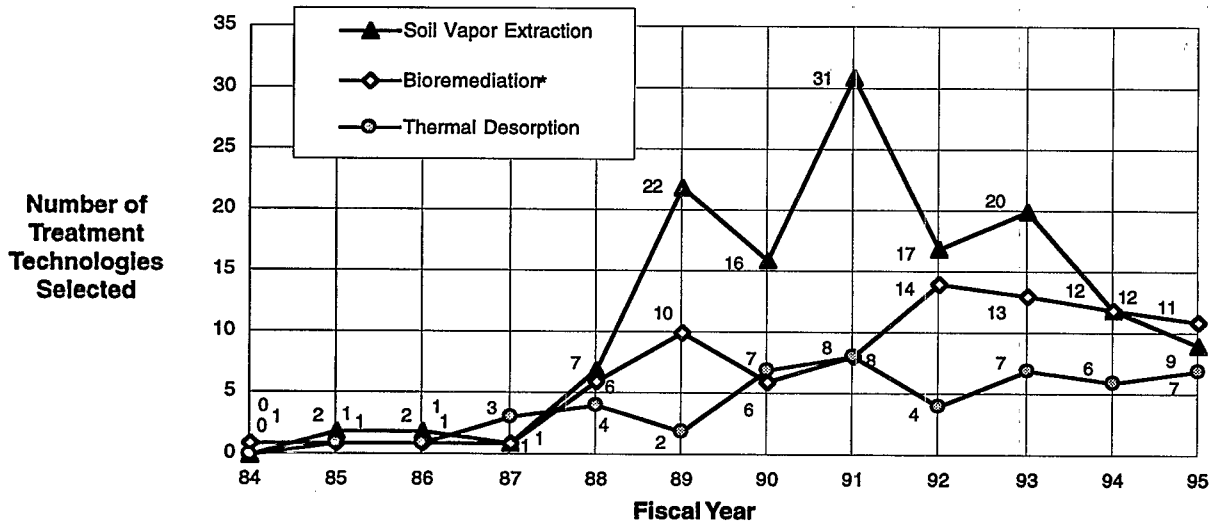
Note: A site may use more than one technology.

Figure 7. Superfund Remedial Actions: Trends for Three Most Frequently Selected Established Technologies for Source Control



(1) Data based on anticipated design and construction activities as of August 1996.
(2) Data based on Records of Decision (RODs).

Figure 8. Superfund Remedial Actions: Trends for Three Most Frequently Selected Innovative Technologies



** Includes soil and in situ groundwater treatment.*

Status of Innovative Treatment Technology Projects

An increasing number of innovative treatment technology projects are being implemented at remedial Superfund sites. In the past year, 21 additional innovative treatment technology projects for source control and in situ groundwater treatment have been implemented, and 16 source control projects have been completed. Appendix B gives the status of each project, and Figure 9 provides a summary of their status by technology type. The design of such projects typically takes one to three years. The *ITT Database* presents some brief performance and operating data on remedial, removal, and non-Superfund projects that have been completed. Data provided include periods of operation, typical pre- and post-treatment concentrations of key contaminants treated, cleanup goals, operating parameters (such as retention time and additives), materials handling required, and management of residuals.

Figure 9. Superfund Remedial Actions: Project Status of Innovative Treatment Technologies as of August 1996

Technology	Predesign/ In Design	Design Complete/ Being Installed	Operational	Completed	Total
Source Control Technologies					
Soil Vapor Extraction*	36	33	52	18	139
Thermal Desorption	14	8	4	24	50
Bioremediation (Ex Situ)	16	8	14	5	43
Bioremediation (In Situ)	9	5	10	2	26
In Situ Flushing	7	2	6	1	16
Soil Washing	6	2	0	1	9
Solvent Extraction	2	2	0	1	5
Dechlorination	1	1	0	2	4
Vitrification	2	0	0	1	3
Cyanide Oxidation	1	0	0	0	1
Hot Air Injection	1	0	0	0	1
CROW	0	0	0	1	1
Physical Separation	0	0	0	1	1
Plasma High Temperature Metals Recovery	1	0	0	0	1
TOTAL	**96 (32%)**	**61 (20%)**	**86 (29%)**	**57 (19%)**	**300**
In Situ Groundwater Technologies					
Air Sparging	6	8	8	0	22
Bioremediation (In Situ)	7	5	3	0	15
Passive Treatment Wall	3	0	0	0	3
Dual-Phase Extraction	1	2	0	0	3
In Situ Well Aeration	1	0	0	0	1
In Situ Oxidation	0	1	0	0	1
TOTAL	**18 (40%)**	**16 (36%)**	**11 (24%)**	**0 (0%)**	**45**

Note: Data are derived from Records of Decision (RODs) for fiscal years 1982–1995 and anticipated design and construction activities as of August 1996.

* *Includes three dual-phase extraction projects also listed as in situ groundwater technologies.*

Contaminants Addressed

The data collected for this report form the basis for an analysis of the classes of contaminants treated by each technology type at remedial action sites. Figure 10 provides that information, by technology, for three major groups of contaminants: volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals. For this report, compounds are categorized as VOCs or SVOCs, according to the lists provided in EPA's SW-846 test methods 8240 and 8270, respectively. The *ITT Database* contains information about specific contaminants treated at each site at which an innovative technology or on-site incineration is being used.

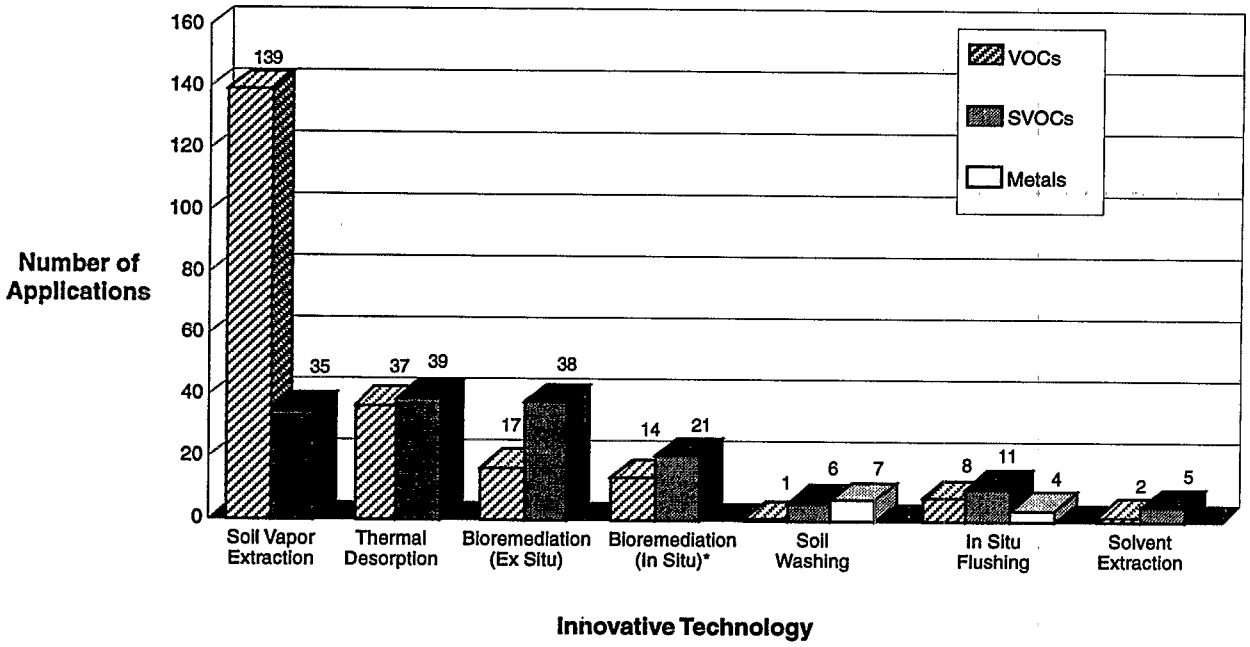
Quantity of Soil Addressed

EPA analyzed the quantity of soil treated at 241 remedial action sites at which innovative treatment technologies are being used, and for which data on the quantity of media treated are available (Figure 11). Typically, in situ technologies are used to address larger quantities of soil, while ex situ technologies are used to treat smaller quantities. Because quantities for in situ projects cannot be accurately determined and many projects are not completed, the quantities in Figure 11 should be considered estimates.

Treatment Trains

Figure 12 compares the number of innovative technologies selected for both source control and in situ groundwater treatment with the number of RODs in which these technologies were selected. The graph shows that some sites use more than one innovative technology, often together in treatment trains. Twenty-nine remedial sites use treatment trains for source control.

Figure 10. Superfund Remedial Actions: Applications of Innovative Treatment Technologies



Note: *Data are derived from Records of Decision (RODs) for fiscal years 1982–1995 and anticipated design and construction activities as of August 1996.*

* *Does not include in situ groundwater bioremediation.*

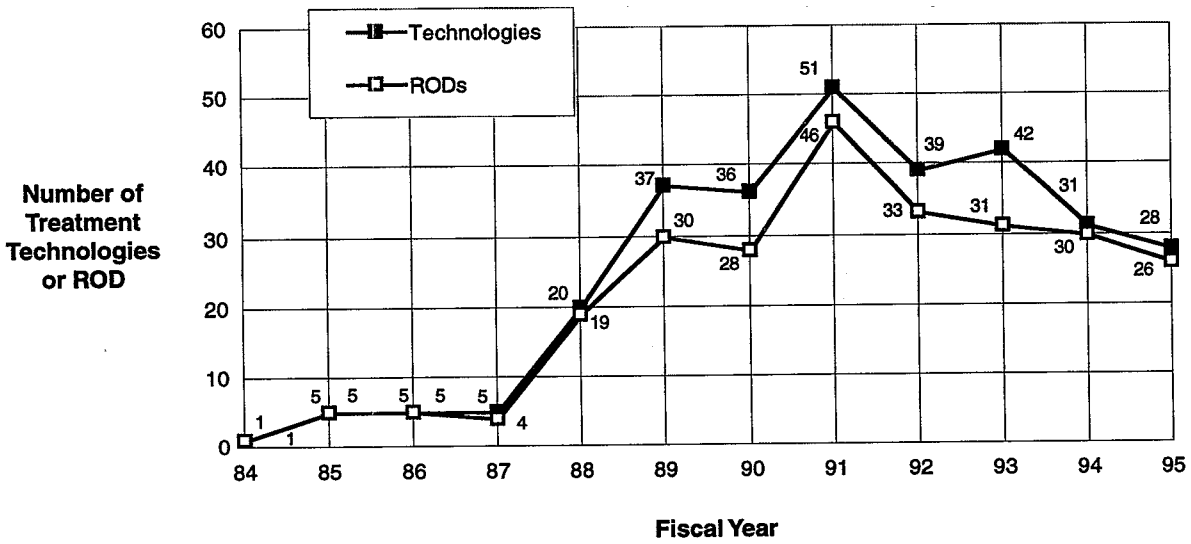
Figure 11. Superfund Remedial Actions: Estimated Quantities of Soil To Be Treated By Innovative Technologies

Technology	Total Number of Sites	Sites with Data	Quantity (Cubic Yards)		
			Range	Average	Total
Soil Vapor Extraction	137*	118	11 - 6,200,000	250,100	29,515,300
Bioremediation (In Situ Soil)	26	12	5,000 - 484,000	106,100	1,273,300
In Situ Flushing	16	12	5,200 - 750,000	97,400	1,168,600
Soil Washing	9	8	5,500 - 62,000	23,300	186,100
Bioremediation (Ex Situ)	43	35	400 - 208,000	34,600	1,210,700
Dechlorination	4	4	700 - 48,000	27,700	110,800
Solvent Extraction	5	5	7,000 - 100,000	27,500	137,700
Thermal Desorption	50	43	250 - 180,000	26,800	1,153,000
Cyanide Oxidation	1	1			3,000
CROW™	1	1			200
Physical Separation	1	1			8,000
Plasma High Temp, Recovery	1	1			65,000
Vitrification	3	1			4,600
TOTAL	297	**242**			34,836,300

Note: Data are derived from Records of Decision (RODs) for fiscal years 1982–1995 and anticipated design and construction activities as of August 1996.

* *Does not include sites conducting ex situ SVE or treating sediment or sludge.*

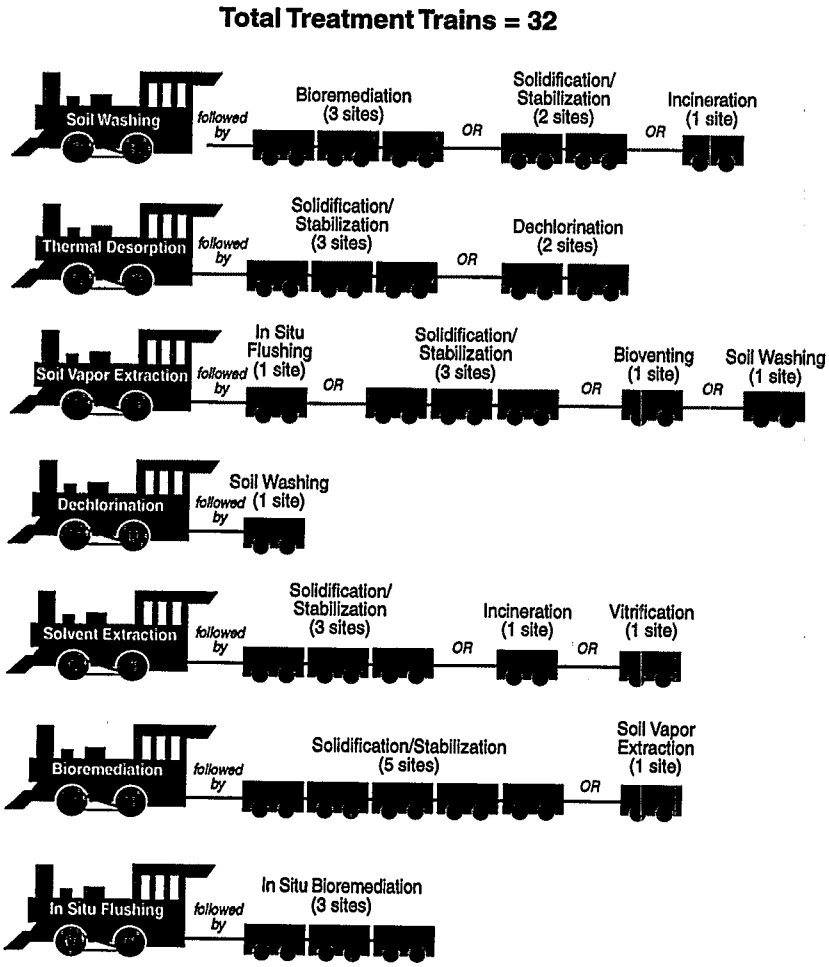
Figure 12. Superfund Remedial Actions: Number of Innovative Treatment Technologies Versus Corresponding RODs for Source Control



Note: Data are derived from Records of Decision (RODs) for fiscal years 1982–1995. and anticipated design and construction activities as of August 1996.

Figure 13 identifies specific treatment trains used in remedial actions. Appendix D provides the names of the sites that use treatment trains. Innovative treatment technologies may be used with established technologies or with other innovative technologies. The most common treatment trains are soil washing followed by aboveground bioremediation (usually slurry-phase treatment) and thermal desorption or bioremediation followed by stabilization/solidification. Technologies may be combined to reduce the volume of material that requires further treatment, as in the example given above, to prevent the emission of volatile contaminants during excavation and mixing, or to treat multiple contaminants in a single medium.

Figure 13. Superfund Remedial Actions: Treatment Trains with Innovative Treatment Technologies



Note: Data are derived from Records of Decision (RODs) for fiscal years 1982–1995 and anticipated design and construction activities as of August 1996.

Soil Vapor Extraction

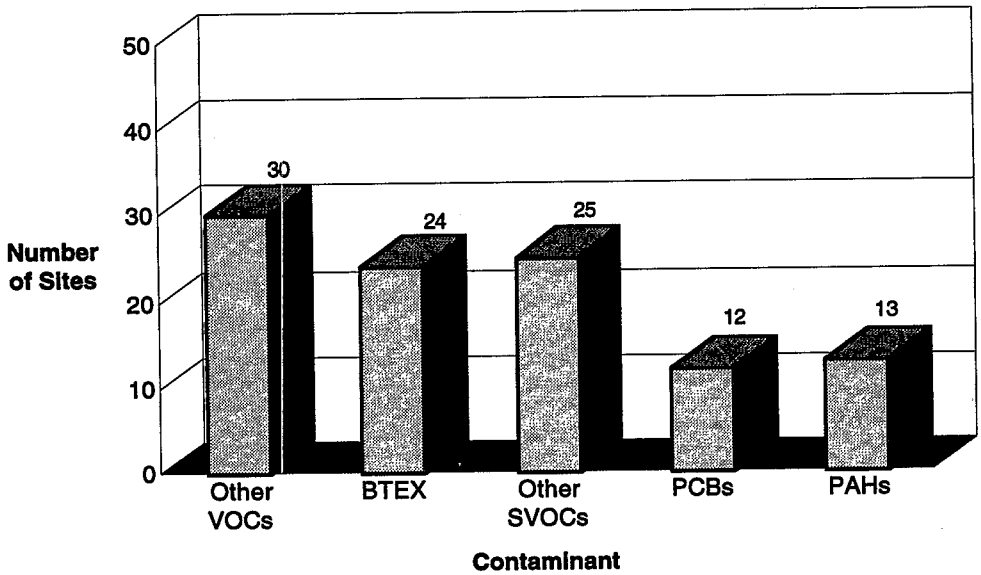
SVE is the most frequently selected innovative technology for treating soil. Currently 139 projects are planned, ongoing, or completed.

At some sites, several areas are being treated with SVE. This report counts and tracks each project separately. Only 18 SVE remedial projects have been completed, but an additional 85 are underway. Duration varies from one month to five years or more. Most projects target chlorinated or nonchlorinated VOCs for treatment; a few target semivolatiles, such as phenols and naphthalene. Most applications are vertical wells with activated carbon used to treat off-gases. Unusual applications include horizontal wells such as at the SMS Instruments site, New York and an aboveground (ex situ) project at the Valley Park trichloroethylene (TCE) site, Wainwright operable unit (OU), in Missouri.

Thermal Desorption

Currently, 50 thermal desorption projects are being implemented. Twenty-three of these projects are completed; another 12 are operating. Thermal desorption projects typically take less time to implement than SVE: from one to 22 months for the 23 remedial projects completed thus far. Contaminants treated are shown in Figure 14. This technology is used to treat SVOCs, such as polychlorinated biphenyls (PCBs) and polynuclear aromatic hydrocarbons (PAHs), as well as VOCs.

Figure 14. Superfund Remedial Actions: Contaminants Treated by Thermal Desorption

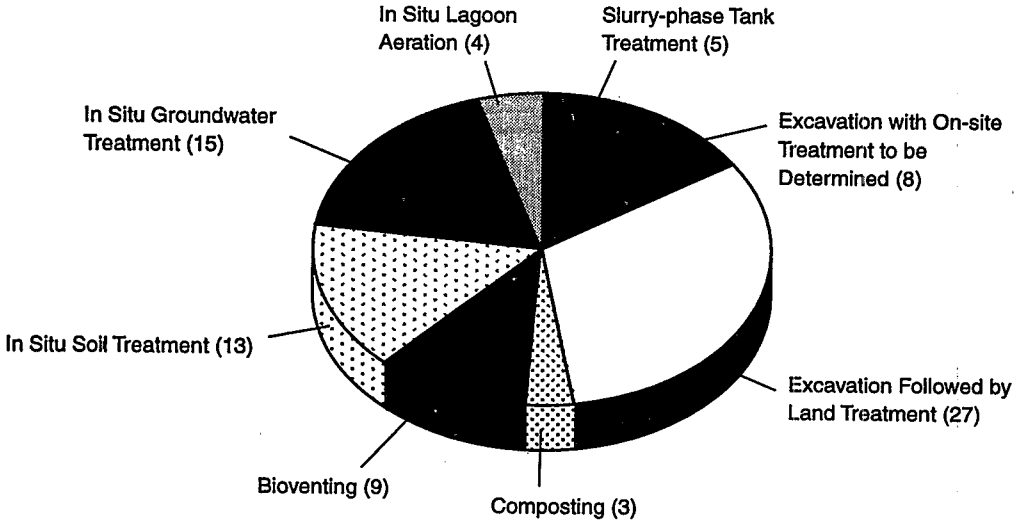


Note: Data are derived from Records of Decision (RODs) for fiscal years 1982–1995 and anticipated design and construction activities as of August 1996. At some sites, treatment is for more than one contaminant. Treatment may be planned, ongoing, or completed.

Bioremediation

Currently, 69 projects are implementing different forms of bioremediation for source control. Figure 15 illustrates the different types of bioremediation being used. Land treatment is the most common form of ex situ bioremediation, followed by slurry-phase treatment. Based on available data, bioventing has been specified for at least nine of the 26 in situ soil bioremediation remedies. Contaminants treated by bioremediation for source control and in situ groundwater treatment are shown in Figure 16. The contaminants treated most often by bioremediation are PAHs. Benzene, toluene, ethylbenzene, and xylene (BTEX) compounds are the VOCs addressed most frequently; halogenated VOCs are being treated at 14 sites. Available information at 10 sites indicates the halogenated VOCs are chlorinated. Figure 17 indicates the types of sites addressed by bioremediation. Wood preserving sites are addressed most frequently by bioremediation.

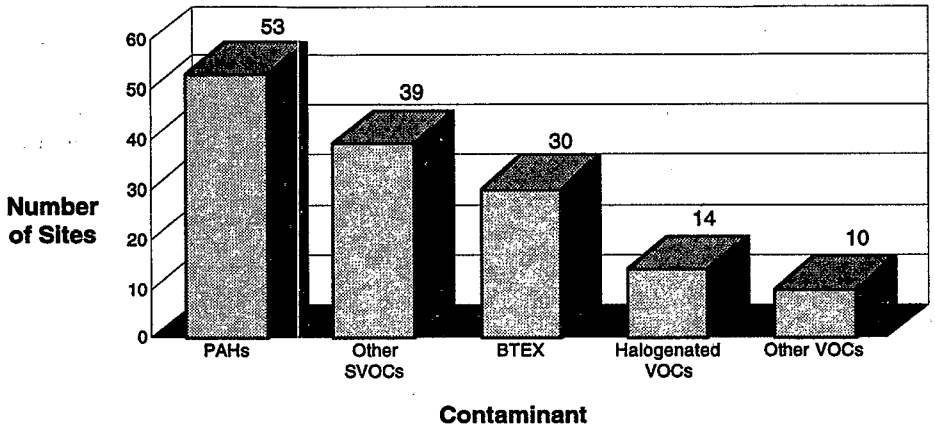
Figure 15. Superfund Remedial Actions: Bioremediation Methods



Note: Data are derived from Records of Decision (RODs) for fiscal years 1982–1995 and anticipated design and construction activities as of August 1996. Some RODs specify multiple remedies.

TBD: Specific treatment method to be determined.

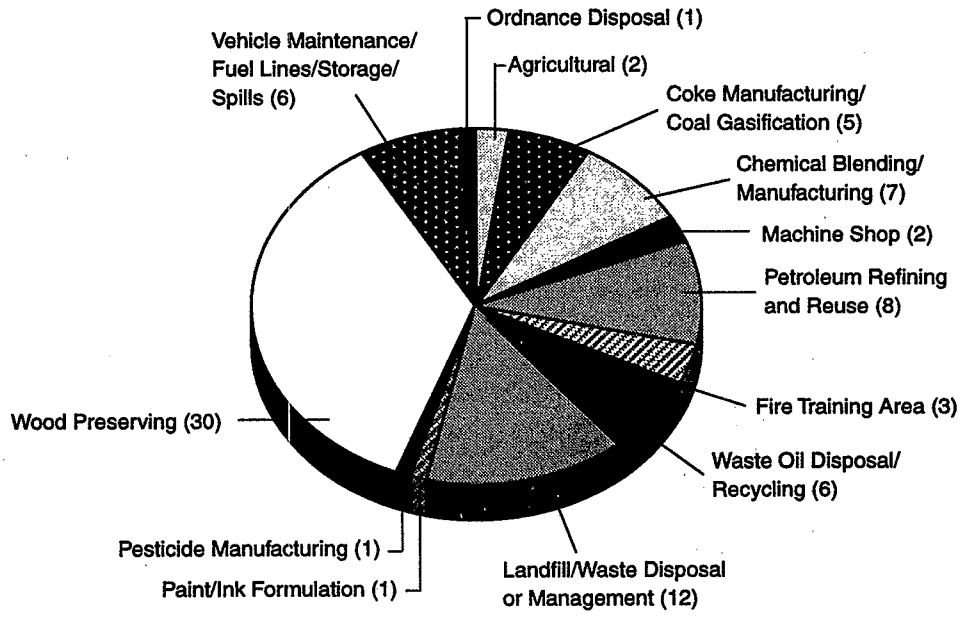
Figure 16. Superfund Remedial Actions: Contaminants Treated by Bioremediation*



* *Includes in situ groundwater innovative treatment technologies.*

Note: Data are derived from Records of Decision (RODs) for fiscal years 1982–1995 and anticipated design and construction activities as of August 1996. At some sites, treatment is for more than one contaminant. Treatment may be planned, ongoing, or completed.

Figure 17. Superfund Remedial Actions: Types of Sites Addressed by Bioremediation



Note: Data are derived from Records of Decision (RODs) for fiscal years 1982–1995 and anticipated design and construction activities as of August 1996.

On-Site Incineration

Currently, 43 on-site incineration projects are planned, ongoing, or completed. Twenty-four of the projects have been completed; another three are operating. Figure 18 provides a summary of the status for all on-site incineration projects. The duration of on-site incineration projects varies from one month to more than four years. The most frequently targeted contaminants are PCBs (13 sites), dioxins and furans (4 sites). Many projects involve several types of organic compounds. The quantity of material treated ranges from 1,150 cubic yards to 384,600 cubic yards.

Figure 18. Superfund Remedial Actions: Project Status of On-Site Incineration Projects

Technology	Predesign/ In Design	Design Complete/ Being Installed	Operational	Completed	Total
On-site Incineration	8	8	3	24	43

Note: Data are derived from Records of Decision (RODs) for fiscal years 1982–1995 and anticipated design and construction activities as of August 1996.

GROUNDWATER REMEDIATION TECHNOLOGIES

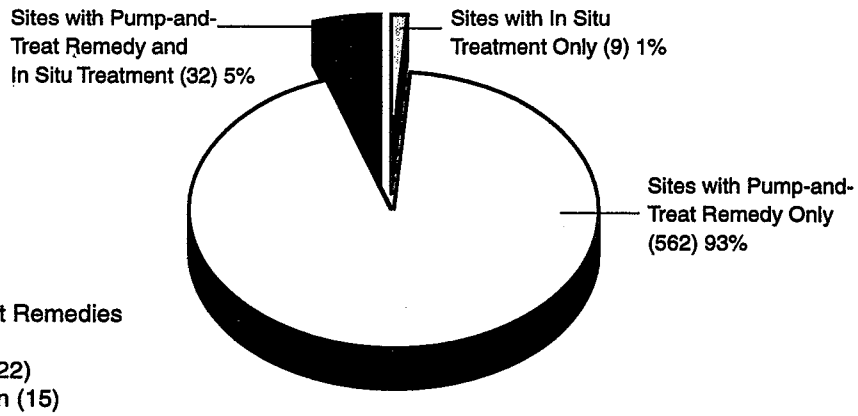
Groundwater treatment remedies include conventional pump-and-treat and in situ treatment or a combination of both. Figure 19 shows each type of groundwater treatment remedy selected. Groundwater treatment remedies have been selected for 603 sites. Of these, 562 sites are implementing pump-and-treat systems alone. In the case of another 32 sites, pump-and-treat systems and in situ treatment are being used, either for the same area of the site or for different areas. Nine sites have selected in situ treatment only to treat groundwater contamination.

EPA has selected in situ treatment of groundwater 45 times at 43 remedial sites. EPA selected in situ treatment of groundwater for eight remedial sites in FY 1995, including the first selection of in situ well aeration for VOCs in groundwater. Completion of these projects is expected to require five to 20 years. Figure 9 shows the overall status of in situ groundwater projects.

Appendix A gives the number of in situ groundwater treatment technologies selected each year. The summary matrix in Appendix B provides the site names, technologies, and project status.

Figure 19. Superfund Remedial Actions: Groundwater Treatment Remedies Through Fiscal Year 1995

Total sites with groundwater treatment remedies = 603



In Situ Treatment Remedies Include*:
- Air Sparging (22)
- Bioremediation (15)
- Passive Treatment Wall (3)
- Dual-Phase Extraction (3)
- In Situ Well Aeration (1)
- In Situ Oxidation (1)

Note: *Pump-and-treat remedy data based on Records of Decision (RODs) for fiscal years 1982–1995; in situ treatment data based on anticipated design and construction activities as of August 1996.*

* *The total numbers of in situ treatment remedies exceeds the total number of sites implementing treatment remedies because some sites are implementing more than one technology.*

SECTION 2: SUPERFUND REMOVAL ACTIONS

Removal actions are usually conducted in response to a more immediate threat caused by a release of hazardous substances than threats addressed by remedial actions. To date, innovative treatment technologies have been used in relatively few removal actions. The innovative technologies addressed in this report have been used 32 times in 27 removal actions (Figure 20). In addition, infrared incineration, no longer considered innovative, was used first at two removal actions. Since removal actions are responses to an immediate threat, and often involve smaller quantities of hazardous wastes than remedial activities, the implementation of the technology may progress faster at a removal site than at a remedial site. Figure 20 indicates that 87 percent of removal projects that involve innovative treatment technologies have been completed.

Many removal actions involve small quantities of waste or immediate threats that require quick action to alleviate the hazard. Often, such activities do not lend themselves to on-site treatment. In addition, SARA does not establish the same preference for innovative treatment for removal as it sets forth for remedial actions.

The *ITT Database* provides more detailed information for each application of an innovative technology at a removal site. The summary matrix in Appendix B lists each removal site and innovative technology.

Figure 20. Superfund Removal Actions: Project Status of Innovative Treatment Technologies as of August 1996

Technology	Predesign/ In Design	Design Complete/ Being Installed	Operational	Completed	Total
Source Control Technologies					
Soil Vapor Extraction	0	0	0	5	5
Thermal Desorption	0	0	1	2	3
Bioremediation (Ex Situ)	0	0	1	4	5
Bioremediation (In Situ)	0	0	2	3	5
Soil Washing	0	0	0	2	2
Dechlorination	0	0	0	2	2
Solvent Extraction	0	0	0	2	2
In Situ Vitrification	0	0	0	1	1
Chemical Treatment	0	0	0	6	6
TOTAL	**0 (0%)**	**0 (0%)**	**4 (13%)**	**27 (87%)**	**31**
Groundwater Technologies					
Air Sparging	0	0	0	1	1
Bioremediation (In Situ)	0	0	1	0	1
TOTAL	**0 (0%)**	**0 (0%)**	**1 (50%)**	**1 (50%)**	**2**

Note: Data based on a survey of EPA Superfund Removal Branch Chiefs and On-Scene Coordinators for each region.

SECTION 3: ACTIONS UNDER OTHER FEDERAL PROGRAMS

Innovative technologies also are being conducted under federal programs other than the Superfund program. Many of those projects are conducted at DoD and DOE facilities. The sites were identified through various sources of information, including discussions with DoD and DOE personnel and should not be considered exhaustive. The RCRA corrective action sites using an innovative technology were identified through the review of 68 statements of basis (SBs), which are decision documents prepared for some actions at corrective action sites. Because innovative technologies likely have been used at other RCRA sites, but not documented in SBs, the list in this report should not be considered complete. Figure 21 summarizes the types of innovative treatment technologies and the number of projects, and indicates the status of each. The summary matrix in Appendix B lists the name of each site, the technology selected, and the status of the project. The *ITT Database* provides more information on each application.

Figure 21. Sample Projects Under Other Federal and RCRA Corrective Action Programs: Status of Innovative Treatment Technologies as of August 1996

Technology	Predesign/ In Design	Design Complete/ Being Installed	Operational	Completed	Total
Other Federal Programs					
Soil Vapor Extraction	1	1	8	1	11
Bioremediation (Ex Situ)	0	0	2	4	6
Bioremediation (In Situ)*	0	0	7	3	10
Soil Washing	0	0	0	2	2
Dechlorination	0	0	1	0	1
Vitrification	0	0	2	0	2
Air Sparging	0	0	1	0	1
TOTAL	**1 (3%)**	**1 (3%)**	**21 (64%)**	**10 (30%)**	**33**
RCRA Corrective Action					
Soil Vapor Extraction	3	1	5	0	9
Thermal Desorption	1	0	0	0	1
TOTAL	**4 (40%)**	**1 (10%)**	**5 (50%)**	**0 (0%)**	**10**

Note: Data based on a survey of EPA RCRA Corrective Action, DoD, and DOE points of contact for each site.
* *Includes in situ groundwater treatment.*

Appendix A

Treatment Technologies by Fiscal Year

Treatment Technologies by Fiscal Year

Innovative Technologies — Fiscal Year

Source Control Technologies	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	Totals
Soil Vapor Extraction	0	0	0	2	2	1	7	22	16	31	17	20	12	9	139
Thermal Desorption	0	0	0	1	1	3	4	2	7	8	4	7	6	7	50
Bioremediation (Ex Situ)	0	0	1	0	1	0	4	6	4	4	9	5	5	4	43
Bioremediation (In Situ)	0	0	0	0	0	1	2	1	2	2	4	6	4	4	26
In Situ Flushing	0	0	0	1	1	0	1	3	1	2	2	2	3	0	16
Soil Washing	0	0	0	0	0	0	2	2	5	0	1	0	0	0	10
Solvent Extraction	0	0	0	0	0	0	0	1	0	1	0	1	1	1	5
Dechlorination	0	0	0	1	0	0	0	0	1	1	0	0	0	1	4
Vitrification	0	0	0	0	0	0	0	0	0	1	0	1	0	1	3
CROW	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Cyanide oxidation	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Hot Air Injection	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Plasma High Temperature Metals Recovery	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Totals	**0**	**0**	**1**	**5**	**5**	**5**	**20**	**37**	**36**	**51**	**39**	**42**	**31**	**28**	**300**

Groundwater Technologies	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	Totals
Air Sparging	0	0	0	0	0	0	1	2	1	5	3	5	2	3	22
Bioremediation (In Situ)	0	0	0	1	0	0	0	3	0	2	1	2	3	3	15
Passive Treatment Walls	0	0	0	0	0	0	0	0	0	0	2	0	1	0	3
Dual-Phase Extraction	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3
In Situ Well Aeration	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
In Situ Oxidation	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Totals	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**5**	**1**	**7**	**6**	**9**	**7**	**8**	**45**

Established Technologies — Fiscal Year

Source Control Technologies	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	Totals
Solidification/Stabilization	1	0	1	2	7	13	21	22	24	36	37	24	13	5	206
Off-Site Incineration	0	0	3	5	6	3	14	15	17	27	7	13	6	9	125
On-Site Incineration	0	0	0	2	3	6	7	7	6	2	3	3	2	2	43
Other	0	0	0	1	0	1	2	2	1	0	4	1	1	3	16
Totals	**1**	**0**	**4**	**10**	**16**	**23**	**44**	**46**	**48**	**65**	**51**	**41**	**22**	**19**	**390**

Appendix B

Innovative Technology Summary Matrix

Innovative Technology Summary Matrix

Region 1

Site Name	State	Status	Action	Source Control															Groundwater Remedies		
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
Kellogg-Deering Well Field	CT	I	Remedial										●									
Linemaster Switch Corporation	CT	BI	Remedial										●						●			
Cannon Engineering/Bridgewater	MA	C	Remedial													●						
Groveland Wells	MA	O	Remedial										●									
Hocomonco Pond, ESD	MA	I	Remedial															●				
Iron Horse Park, OU 1	MA	O	Remedial	●																		
Re-Solve	MA	C	Remedial													●						
Silresim Chemical	MA	PD	Remedial										●									
Wells G&H, OU 1 (New England Plastic)	MA	D	Remedial										●									
Wells G&H, OU 1 (Wildwood Conservation Trust)	MA	D/I	Remedial										●				●					
McKin	ME	C	Remedial													●						
Union Chemical Co., OU 1	ME	O	Remedial										●									
Mottolo Pig Farm	NH	O	Remedial										●									
Ottati & Goss	NH	C	Remedial													●						
Pease Air Force Base (Site 8)	NH	O	Remedial										●									
Pease Air Force Base (Site 45, NH)	NH	O	Remedial										●				●					
Pease AFB (Zone 2, NH)	NH	BI	Remedial										●				●					
Somersworth Sanitary Landfill Site	NH	D	Remedial																		●	
South Municipal Water Supply Well	NH	O	Remedial										●									
South Municipal Water Supply Well	NH	I	Remedial														●					
Tibbetts Road	NH	D	Remedial										●									
Tinkham Garage, OU 1	NH	C	Remedial										●									
Davis Liquid Waste	RI	PD	Remedial													●						
Peterson/Puritan Inc., OU 1	RI	BI	Remedial										●									
Peterson/Puritan Inc., OU 1	RI	D/I	Remedial																	●		
Picillo Farm Site	RI	BI	Remedial										●									
Stamina Mills	RI	D	Remedial										●									
IBM (Vermont)	VT	O	RCRA										●									

Status: PD = Predesign; D = Design; D/I = Designed but not installed; I = Installed; BI = Being Installed; O = Operational; C = Complete

Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; DoD = Actions under Department of Defense; DOE = Actions under Department of Energy; RCRA = RCRA Corrective Action

Innovative Technology Summary Matrix

Region 2

Site Name	State	Status	Action	Source Control														Groundwater Remedies			
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In Situ Well Aeration
A O Polymer, Soil treatment phase	NJ	O	Remedial										●									
Dayco Corp./L.E. Carpenter Co.	NJ	D	Remedial		●																	
FAA Technical Center	NJ	I	Remedial										●									
FAA Technical Center	NJ	I	Remedial														●					
Garden State Cleaners	NJ	C	Remedial										●									
Industrial Latex, OU 1	NJ	D/I	Remedial												●							
King of Prussia	NJ	C	Remedial											●								
Lipari Landfill Marsh Sediment, OU 3	NJ	C	Remedial												●							
Lipari Landfill, OU 2	NJ	O	Remedial						●													
Metaltec/Aerosystems, OU 1 - Soil Treatment	NJ	C	Remedial												●							
Myers Property	NJ	PD	Remedial					●						●								
Naval Air Engineering Center, OU 23	NJ	O	Remedial										●									
Reich Farms	NJ	C	Remedial												●							
South Jersey Clothing	NJ	D/I	Remedial										●									
Swope Oil & Chem Co., OU 2	NJ	BI	Remedial										●									
Universal Oil Products	NJ	BI	Remedial												●							
Vineland Chemical	NJ	C	Removal			●																
Vineland Chemical, OU 1, OU 3 and OU 4	NJ	D	Remedial						●					●								
Waldick Aerospace Devices, OU 1	NJ	C	Remedial												●							
Zschiegner Refining Company	NJ	C	Removal			●																
American Thermostat (Phase 1)	NY	C	Remedial												●							
American Thermostat (Phase 2)	NY	O	Remedial												●							
Byron Barrel & Drum, OU 2	NY	PD	Remedial						●													
Carroll & Dubies Sewage Disposal	NY	D	Remedial		●								●									
Claremont Polychemical - Soil Remedy	NY	BI	Remedial												●							
Fulton Terminals, Soil Treatment	NY	C	Remedial												●							
GCL Tie & Treating, OU 1	NY	D	Remedial												●							

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Innovative Technology Summary Matrix

Region 2 (Continued)

Site Name	State	Status	Action	Source Control														Groundwater Remedies				
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
GCL Tie & Treating, Inc. OU 2	NY	D	Remedial													●						
General Motors/Central Foundry Div. OU 1 & 2	NY	D	Remedial													●						
Genzale Plating Company, OU 1	NY	C	Remedial										●									
Hooker Chemical/Ruco Polymer Site, OU 1	NY	PD	Remedial						●													
Mattiace Petrochemicals Company, OU 4	NY	D	Remedial										●									
Pasley Solvents and Chemicals, Inc.	NY	D	Remedial										●				●					
Reynolds Metals Company Study Area Site, (RMC)	NY	D	Remedial													●						
Sarney Farm	NY	D/I	Remedial													●						
Shore Realty, OU 1 (Applied Environmental Services)	NY	O	Remedial										●				●	●				
Signo Trading/Mt. Vernon	NY	C	Removal					●														
SMS Instruments (Deer Park)	NY	C	Remedial										●									
Solvent Savers	NY	PD	Remedial													●						
Vestal Water Supply 1-1	NY	D/I	Remedial										●									
West Valley	NY	O	DOE							●												
Wide Beach Development	NY	C	Remedial					●														
GE Wiring Devices	PR	D/I	Remedial											●								
Janssen Inc.	PR	O	Remedial										●									
Upjohn Manufacturing Co.	PR	C	Remedial										●									

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Innovative Technology Summary Matrix

Region 3

Site Name	State	Status	Action	Source Control														Groundwater Remedies			
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
Delaware Sand and Gravel, OU 4 and 5	DE	D	Remedial		●								●									
Dover AFB, Target Area 2 of 6	DE	BI	Remedial															●				
Dover AFB, Target Area 3 of 6	DE	BI	Remedial		●																	
Standard of Chlorine of Delaware, Inc.	DE	PD	Remedial	●																		
Andrews Air Force Base	MD	I	DoD										●									
Southern Maryland Wood Treating	MD	D	Remedial													●						
Brodhead Creek, OU 1	PA	C	Remedial				●															
Brown's Battery Breaking Site, OU 2	PA	PD	Remedial									●									●	
Cryochem, OU 3	PA	PD	Remedial										●									
Lord-Shope Landfill	PA	O	Remedial										●									
Merck & Company, Inc.	PA	O	RCRA										●									
North Penn Area 6	PA	D	Remedial							●												
Raymark	PA	C	Remedial										●									
Revere Chemical Site, OU1	PA	PD	Remedial										●									
Saegertown Industrial Area Site	PA	PD	Remedial										●				●					
Superior Tube Co.	PA	PD	RCRA										●									
Tonolli Corporation	PA	D	Remedial																		●	
Tyson's Dump	PA	C	Remedial										●									
U.S.A. Letterkenny SE Area, OU1	PA	C	Remedial													●						
Uniform Tubes, Inc.	PA	D	RCRA										●									
Whitmoyer Laboratories, OU 3	PA	D	Remedial	●																		
William Dick Lagoons, OU 3	PA	PD	Remedial													●						
Arrowhead Associates/Scovill, OU 1	VA	D	Remedial										●									
Atlantic Wood Industry, OU 1	VA	PD	Remedial	●																		
Avtex Fibers	VA	C	Removal			●																
Defense General Supply Center, OU 5	VA	C	Remedial										●									
General Motors Corporation	VA	BI	RCRA										●									
IBM (Manassas)	WV	O	RCRA										●									
Langley AFB, IRP Site 28	VA	O	DoD										●									
Ordnance Works Disposal Areas	WV	D	Remedial	●																		

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Innovative Technology Summary Matrix

Region 4

Site Name	State	Status	Action	Source Control															Groundwater Remedies			
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
Ciba-Geigy (MacIntosh Plant), OU 3	AL	PD	Remedial		●																	
Stauffer Chemical Company, Cold Creek Plant, OU 2	AL	D	Remedial	●																		
Airco Plating Company, OU 10	FL	O	Remedial										●									
American Creosote Works, OU 2	FL	PD	Remedial														●					
Brown Wood Preserving	FL	C	Remedial	●																		
Cabot Carbon/Koppers	FL	PD	Remedial	●	●									●								
Dubose Oil Products	FL	C	Remedial	●																		
Hollingsworth Solderless	FL	C	Remedial										●									
Homestead Air Reserve, OU 6, Site SS-3	FL	PD	Remedial													●						
Jacksonville NAS, OU 2	FL	C	Remedial													●						
Naval Air Station, Cecil Field Site 17, OU 2	FL	C	Remedial													●						
Naval Air Station, Cecil Field Site 5, OU 2	FL	O	Remedial	●																		
Peak Oil/Bay Drums, OU 1	FL	PD	Remedial		●				●													
Whitehouse Waste Oil Pits (amended ROD)	FL	PD	Remedial	●										●								
Basket Creek Surface Impoundment	GA	C	Removal										●									
General Refining	GA	C	Removal												●							
Marzone Inc./Chevron Co. Superfund Site, OU 1	GA	D/I	Remedial													●						
Mathis Brothers - South Marble Top Road Landfill	GA	D	Remedial	●																		
Robins AFB, Landfill and Sludge Lagoon, OU 1	GA	D	Remedial										●									
Smith's Farm Brooks, OU 1	KY	C	Remedial					●								●						
Southeastern Wood Preserving	MS	C	Removal	●										●								
ABC One Hour Cleaners Site	NC	D/I	Remedial										●									
Aberdeen Pesticide Dumps, OU 1 and OU 4	NC	D	Remedial													●						
Benfield Industries	NC	D/I	Remedial	●																		
Cape Fear Wood Preserving	NC	BI	Remedial											●								
Carolina Transformer	NC	D/I	Remedial												●							
Charles Macon Lagoon, Lagoon #7, OU 1	NC	O	Remedial										●									
FCX - Statesville, OU 2	NC	D/I	Remedial					●								●						

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Innovative Technology Summary Matrix

Region 4 (Continued)

Site Name	State	Status	Action	Source Control																		Groundwater Remedies	
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
FCX-Washington Site	NC	C	Removal													●						
General Electric Company, Shepard Farm Site	NC	PD	Remedial														●					
JADCO-Hughes	NC	I	Remedial						●				●									
JFD Electronics/Channel Master	NC	D	Remedial			●																
Potter's Septic Tank Service Pits	NC	C	Remedial													●						
USMC Camp Lejeune Military Base, OU 2	NC	C	Remedial										●									
USMC Camp Lejeune Military Base, Site 35, OU 10	NC	PD	Remedial																		●	
CSX McCormick Derailment Site	SC	O	Removal														●					
CSX McCormick Derailment Site	SC	C	Removal										●									
Hinson Chemical	SC	C	Removal										●									
Medley Farm, OU 1	SC	O	Remedial										●									
Rochester Property	SC	O	Remedial														●					
Sangamo/Twelve-Mile/Hartwell PCB, OU 1	SC	O	Remedial													●						
Savannah River (TNX Area)	SC	I	Remedial														●					
Savannah River, M Area Settling Basin	SC	O	DOE		●								●				●					
Savannah River-Defense Waste Processing Facility	SC	O	DOE							●												
SCRDI Bluff Road	SC	O	Remedial										●									
Wamchem	SC	C	Remedial													●						
Arlington Blending & Packaging Co., OU 1	TN	C	Remedial													●						
Carrier Air Conditioning	TN	O	Remedial										●									

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Innovative Technology Summary Matrix

Region 5

Site Name	State	Status	Action	Source Control																			Groundwater Remedies	
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
Acme Solvent Reclaiming, Inc., OU 3	IL	C	Remedial												●							
Acme Solvent Reclaiming, Inc., OU 6	IL	O	Remedial										●									
Galesburg/Koppers	IL	D	Remedial	◒																		
Outboard Marine/Waukegan Harbor, OU 3	IL	C	Remedial												●							
American Chemical Services	IN	PD	Remedial										●		●							
Conrail Rail Yard, OU 2	IN	PD	Remedial										●			●						
Env. Conservation and Chemical (ROD Amendment)	IN	D	Remedial										●									
Fisher Calo	IN	D	Remedial										●									
Indiana Wood Treating	IN	C	Removal	●																		
Main Street Well Field	IN	O	Remedial										●									
MIDCO I	IN	PD	Remedial										●									
MIDCO II	IN	PD	Remedial										●									
Ninth Avenue Dump	IN	O	Remedial										●									
Ninth Avenue Dump	IN	C	Remedial						●													
Reilly Tar and Chemical	IN	O	Remedial												●							
Seymour Recycling	IN	C	Remedial		●																	
Seymour Recycling	IN	O	Remedial										●									
Wayne Reclamation and Recycling	IN	O	Remedial										●			●						
Anderson Development (ROD Amendment)	MI	C	Remedial												●							
Chem Central	MI	O	Remedial										●									
Clare Water Supply	MI	PD	Remedial												●							
Duell-Gardner Landfill	MI	PD	Remedial												◒							
Electro-Voice, OU 1	MI	O	Remedial										●			●						
Kysor Industrial Corp.	MI	I	Remedial										●									
Parsons Chemical (ETM Enterprise)	MI	C	Removal							●												
PBM Enterprises (Van Dusen Airport Service)	MI	C	Removal			●																
Peerless Plating	MI	D/I	Remedial										●									
Rasmussen Dump	MI	O	Remedial						●													

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Innovative Technology Summary Matrix

Region 5 (Continued)

Site Name	State	Status	Action	Source Control															Groundwater Remedies			
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
Saginaw Bay Confined Disposal Facility	MI	C	DoD										●									
Springfield Township Dump	MI	D	Remedial									●										
Sturgis Municipal Well Field	MI	D/I	Remedial									●										
ThermoChem, Inc., OU 1	MI	D	Remedial									●				●						
Verona Well Field (Thomas Solvent/Raymond Road)	MI	C	Remedial									●										
Verona Well Field, OU 2 (Paint shop area)	MI	I	Remedial									●										
Verona Well Field, OU 2 (Annex area)	MI	I	Remedial									●										
Arrowhead Refinery Co.	MN	C	Remedial											●								
Burlington Northern Railroad Tie Treating Plant	MN	C	Remedial	●																		
Joslyn Manufacturing and Supply Co.	MN	O	Remedial	●																		
Koppers Coke Site, Groundwater OU	MN	D	Remedial														●					
Long Prairie Groundwater Contamination	MN	D/I	Remedial									●										
Ritari Post and Pole, OU 1	MN	PD	Remedial	●																		
South Andover Salvage Yards, OU 2	MN	C	Remedial												●							
Twin Cities Army Ammunition Plant	MN	C	DoD										●									
Allied Chem & Ironton Coke, OU 2	OH	BI	Remedial	●	●																	
Allied Chem & Ironton Coke, OU 2[a]	OH	D/I	Remedial	●																		
Miami County Incinerator	OH	BI	Remedial									●										
Ormet Corporation	OH	D	Remedial						●													
Pristine (ROD Amendment)	OH	C	Remedial												●							
Pristine (ROD Amendment)	OH	I	Remedial									●										
USDOE Feed Materials Production Center, OU 4	OH	PD	Remedial							●												
Zanesville Well Field	OH	O	Remedial									●				●						
Hagen Farm Source Control OU	WI	O	Remedial									●										
Moss-American	WI	PD	Remedial	●									●									
Muskego Sanitary Landfill, Interim Action, OU 1	WI	I	Remedial									●										
Onalaska Municipal Landfill	WI	O	Remedial		●																	
Refuse Hideaway Landfill	WI	PD	Remedial														●					
Wausau Groundwater Contamination	WI	O	Remedial									●										

[a] Allied Chem & Ironton Coke, OU2 is conducting two types of bioremediation ex situ: land farming and magnetically enhanced land farming

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Innovative Technology Summary Matrix

Region 6

Site Name	State	Status	Action	Source Control															Groundwater Remedies			
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
Arkwood	AR	C	Remedial											●[A]								
MacMillan Ring Free Oil Company	AR	O	Removal	●																		
Popile	AR	D/I	Remedial	●														●				
American Creosote Works, Inc.(Winnfield Plant)	LA	D/I	Remedial		●																	
Gulf Coast Vacuum Services, OU 1	LA	D	Remedial	●																		
Old Inger Oil Refinery	LA	BI	Remedial	●																		
Pab Oil & Chemical Services	LA	D	Remedial	●																		
Atchison, Topeka, & Santa Fe Clovis/Santa Fe	NM	O	Remedial		●																	
Holloman AFB, BX Service Station	NM	O	DoD										●									
Holloman AFB, Main POL Area	NM	O	DoD										●									
Prewitt Abandoned Refinery	NM	O	Remedial	●									●				●					
Oklahoma Refining Co.	OK	D	Remedial	●	●																	
Traband Warehouse	OK	C	Removal												●							
Baldwin Waste Oil	TX	C	Removal		●																	
French Limited	TX	C	Remedial		●																	
Kelly AFB, Site 1100	TX	O	DoD		●								●									
Long Horn Army Ammunition Plant Burning Ground No. 3	TX	BI	Remedial													●						
Matagorda Island AF Range	TX	C	DoD	●																		
North Cavalcade Street	TX	O	Remedial	●																		
Petro-Chemical Systems, Inc., OU 2	TX	D	Remedial										●					●				
Sheridan Disposal Services	TX	PD	Remedial	●																		
South Cavalcade Street	TX	PD	Remedial						●					●								
United Creosoting	TX	BI	Remedial												●							

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A: Arkwood is classified as soil washing; however, the specific technology used at Arkwood was physical separation.

Innovative Technology Summary Matrix

Region 7

Site Name	State	Status	Action	Source Control																Groundwater Remedies		
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
Chemplex, OU 2	IA	D	Remedial										●									
McGraw Edison	IA	D	Remedial										●									
People's Natural Gas	IA	D/I	Remedial		●												●					
Vogel Paint & Wax	IA	O	Remedial	●																		
29th and Mead (Coleman OU)	KS	O	Remedial										●									
Pester Refinery Co. (Burn Pond Site, OU 1)	KS	O	Remedial		●																	
Pester Refinery Co.	KS	PD	Remedial						●													
Strother Field Industrial Park	KS	PD	Remedial										●									
Crown Plating	MO	C	Removal					●														
Lee Chemical	MO	O	Remedial						●													
Scott Lumber	MO	C	Removal	●																		
Valley Park TCE Site, Wainwright OU	MO	D	Remedial										●									
Hastings GW Contamination (Colorado Ave)	NE	O	Remedial										●									
Hastings GW Contamination (Far-Mar Co.), OU 3	NE	D/I	Remedial										●									
Hastings GW Contamination (Well No. 3)	NE	C	Remedial										●									
Lindsay Manufacturing	NE	O	Remedial										●									
Sherwood Medical	NE	PD	Remedial										●									
Waverly Groundwater Contamination	NE	O	Remedial										●									

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Innovative Technology Summary Matrix

Region 8

Site Name	State	Status	Action	Source Control																Groundwater Remedies			
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
Broderick Wood Products, OU 2	CO	O	Remedial	●	●																		
Chemical Sales Company, OU 1	CO	D/I	Remedial										●				●						
Fort Carson	CO	O	DoD		●								●										
Martin Marietta Corp., W C Astronautics Facility	CO	D	RCRA										●			●							
Rocky Flats, OU 2, Interim Remedial Action Plan	CO	PD	Remedial										●										
Rocky Mountain Arsenal, OU 18, Interim Response	CO	C	Remedial										●										
Sand Creek Industrial OU 1	CO	C	Remedial										●										
Sand Creek Industrial, OU 4	CO	PD	Remedial										●						●				
Sand Creek Industrial, OU 5	CO	C	Remedial													●							
Burlington Northern (Somers Plant)	MT	O	Remedial	●	●													●					
Former Glasgow AFB	MT	O	DoD	●																			
Idaho Pole Company	MT	D	Remedial															●					
Idaho Pole Company	MT	O	Remedial	●																			
Libby Ground Water Contamination	MT	O	Remedial	●														●					
Montana Pole and Treating Plant (Soil)	MT	BI	Remedial	●	●				●														
Montana Pole and Treating Plant (Groundwater)	MT	BI	Remedial															●					
Ellsworth Air Force Base, OU 1	SD	BI	Remedial										●						●				
Hill Air Force Base, OU 3	UT	D	Remedial										●										
Hill Air Force Base, OU 4	UT	PD	Remedial										●										
Utah Power and Light/American Barrel	UT	O	Remedial										●										
Wasatch Chemical	UT	C	Remedial	●						●													
Mystery Bridge Road/Highway 20, OU 2	WY	C	Removal										●				●						

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Innovative Technology Summary Matrix

Region 9

Site Name	State	Status	Action	Source Control: Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Termperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Groundwater Remedies: Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
Aua Fuel Farm, Aua Village, American Samoa	AZ	O	DoD		●																	
Davis Monthan AFB	AZ	D	DoD										●									
Davis Monthan AFB	AZ	C	DoD		●																	
Davis Monthan AFB, Site 35	AZ	C	DoD		●																	
Davis Monthan Air Force Base, Site 35	AZ	O	DoD										●									
Gila River Indian Reservation	AZ	C	Removal		●	●																
Hassayampa Landfill	AZ	BI	Remedial										●									
Indian Bend Wash, North Area (Area 12)	AZ	BI	Remedial										●									
Indian Bend Wash, North Area (Area 6)	AZ	PD	Remedial										●									
Indian Bend Wash, North Area (Area 7)	AZ	O	Remedial										●									
Indian Bend Wash, North Area (Area 8)	AZ	D/I	Remedial										●									
Indian Bend Wash, South Area, RD 1 of OU 7	AZ	BI	Remedial										●									
Luke AFB	AZ	C	DoD										●									
Luke Air Force Base, OU2	AZ	O	Remedial	●																		
Motorola 52nd Street	AZ	D	Remedial										●				●					
Navajo Toxaphene	AZ	O	Removal		●																	
Phoenix-Goodyear Airport Area (North Facility)	AZ	O	Remedial										●									
Phoenix-Goodyear Airport Area (South Facility)	AZ	O	Remedial										●									
Sanders Aviation	AZ	O	Removal													●						
Stanford Pesticide #1	AZ	C	Removal			●																
Williams AFB, OU 2	AZ	PD	Remedial		●																	
Williams AFB, OU 2	AZ	I	Remedial										●									
Fairchild Semiconductor (San Jose)	CA	C	Remedial										●									
Fort Ord Marina, Fritzche AAF Fire Drill Area	CA	C	DoD	●																		
Fort Ord, OU 4	CA	O	Remedial	●																		
Hewlett-Packard (620-640 Page Mill Rd)	CA	O	Remedial										●									
IBM (San Jose)	CA	O	Remedial										●									
Intersil/Siemens (Siemins)	CA	O	Remedial										●									

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Innovative Technology Summary Matrix

Region 9 (continued)

Site Name	State	Status	Action	Source Control																Groundwater Remedies		
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
Intersil/Siemins (Intersil)	CA	C	Remedial										●									
J.H. Baxter	CA	D	Remedial	●																		
Jasco Chemical Co.	CA	BI	Remedial	●																		
Lawrence Livermore National Laboratory	CA	O	Remedial										●									
Lawrence Livermore Nat'l Lab., Site 300 Bldg. 834	CA	PD	Remedial										●									
Lorentz Barrel and Drum, OU 1	CA	PD	Remedial										●									
Marine Corps., Mountain Warfare Center	CA	C	DoD	●																		
McClellan AFB, OU D	CA	O	DoD										●									
MEW- Fairchild Semiconductor (369 N. Whisman)	CA	O	Remedial										●									
MEW- Fairchild Semiconductor (401 National Ave.)	CA	O	Remedial										●									
MEW-Fairchild Semiconductor (515 N. Whisman)	CA	D/I	Remedial										●									
MEW-General Instrument Corp.	CA	BI	Remedial										●									
MEW-Siemins/Sobrato	CA	O	Remedial										●				●					
Monolithic Memories/AMD-Arques, OU 1, Subunit 2	CA	O	Remedial										●									
National Semiconductor Corp., OU 1, Subunit 2	CA	O	Remedial										●									
Norton Air Force Base, CBA OU	CA	O	Remedial										●									
Pacific Coast Pipeline	CA	O	Remedial										●									
Purity Oil Sales, OU 2	CA	D/I	Remedial										●									
Raytheon, MV (305 Ellis Street/415 Middlefield Rd.)	CA	O	Remedial										●									
Roseville Drums	CA	C	Removal		●																	
Sacramento Army Depot, Burn Pits OU	CA	C	Remedial										●									
Sacramento Army Depot, Tank 2 OU	CA	C	Remedial										●									
Seal Beach Navy Weapons Station IR Site 14	CA	O	DoD		●																	
Signetics (AMD 901) (TRW), Signetics OU 1165 E. Arques Ave.	CA	O	Remedial										●									
Solvent Service	CA	O	RCRA										●									
Southern California Edison, Visalia Pole Yard (groundwater)	CA	PD	Remedial															●				

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Innovative Technology Summary Matrix

Region 9 (continued)

Site Name	State	Status	Action	Source Control															Groundwater Remedies			
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ)	Dual-Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
Southern California Edison, Visalia Pole Yard (soil)	CA	PD	Remedial		●																	
Spectra Physics, OU 1	CA	O	Remedial										●									
Watkins-Johnson	CA	O	Remedial										●									
U. S. Public Works Center, Guam	GU	O	DoD					●														
Poly-Carb	NV	C	Removal	●										●								

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Innovative Technology Summary Matrix

Region 10

Site Name	State	Status	Action	Source Control: Bioremediation (Ex situ)	Source Control: Bioremediation (In situ)	Source Control: Chemical Treatment	Source Control: CROW	Source Control: Dechlorination	Source Control: In Situ Flushing	Source Control: Vitrification	Source Control: Hot Air Injection	Source Control: Plasma High Termperature Metals Recovery	Source Control: Soil Vapor Extraction	Source Control: Soil Washing	Source Control: Solvent Extraction	Source Control: Thermal Desorption	Source Control: Air Sparging	Groundwater Remedies: Bioremediation (In situ) GW	Groundwater Remedies: Dual Phase Extraction	Groundwater Remedies: In Situ Oxidation	Groundwater Remedies: Passive Treatment Wall	Groundwater Remedies: In situ Well Aeration
Arctic Surplus	AK	PD	Remedial												●							
Eielson Air Force Base OU 1 (refueling loop)	AK	O	Remedial		●																	
Eielson Air Force Base, OU 1 (power plant)	AK	O	Remedial		●																	
Eielson Air Force Base, OU 2 (fuel area)	AK	O	Remedial		●																	
Elmendorf Air Force Base, OU 2	AK	O	Remedial													●						
Elmendorf Air Force Base, OU 4	AK	O	Remedial		●																	
Elmendorf Air Force Base, OU 5	AK	I	Remedial	●																		
FAA Huslia Station	AK	O	DoD	●																		
FAA Northway Station	AK	O	DoD		●																	
FAA Strawberry Point Station	AK	O	DoD		●																	
Fort Wainwright	AK	C	DoD	●																		
Idaho National Engineering Lab, Pit 9, OU 7 - 10	ID	D	Remedial							●					●							
Idaho National Engineering Lab., OU 7-08, WAG 7	ID	O	Remedial										●									
Evanite Fiber Corporation	OR	O	RCRA										●									
Umatilla Army Depot (Lagoons), OU 3	OR	O	Remedial						●													
Umatilla Army Depot Activity, Soil OU	OR	O	Remedial	●																		
United Chrome Products	OR	O	Remedial						●													
Advance Electroplating	WA	C	Removal										●									
Bangor Naval Sub. Base, OU 6 Site D & OU 2 Site F	WA	O	Remedial	●																		
Bonneville Power Administration, OU A	WA	C	Remedial	●																		
Commencement Bay, South Tacoma Field OU	WA	PD	Remedial										●				●					
Commencement Bay/S. Tacoma Channel/Well 12A	WA	O	Remedial										●									
Drexler - RAMCOR	WA	C	Removal													●						
Fairchild AFB, Priority 1 OUs (OU 2) FT-1	WA	O	Remedial		●																	
Fairchild AFB, Priority 1 OUs (OU 2) FT-1	WA	D/I	Remedial														●					
Fort Lewis Military Reservation Solvent Refined	WA	BI	Remedial													●						
Fort Lewis Military Reservation, Landfill 4	WA	BI	Remedial										●				●					
Harbor Island (Soil and groundwater OU)	WA	PD	Remedial													●						

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Innovative Technology Summary Matrix

Region 10 (Continued)

Site Name	State	Status	Action	Source Control													Groundwater Remedies				
				Bioremediation (Ex situ)	Bioremediation (In situ)	Chemical Treatment	CROW	Dechlorination	In Situ Flushing	Vitrification	Hot Air Injection	Plasma High Temperature Metals Recovery	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Air Sparging	Bioremediation (In situ) GW	Dual Phase Extraction	In Situ Oxidation	Passive Treatment Wall	In situ Well Aeration
Lockheed Shipyard Facility/Harbor Island, OU 3	WA	C	Remedial												●						
Naval Submarine Base, Bangor Site A, OU 1	WA	O	Remedial					●													
Naval Communication Station, Scotland		C	DoD		●																

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Appendix C

Established Technology Summary Matrix

Established Technology Summary Matrix

Region 1

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
Beacon Heights Landfill	CT	1990			●				
Baird & McGuire, OU 2	MA	1986	O	●					
Baird & McGuire, OU 3 (sediments)	MA	1989	C	●					
Cannon Engineering/Plymouth	MA	1988			●				
Charles George Land Reclamation	MA	1988				●			
New Bedford	MA	1990				●			
PSC Resources	MA	1992				●			
Rose Disposal Pit	MA	1988	C	●					
Salem Acres	MA	1993				●			
Silresin Chemical	MA	1991				●			
Sullivan's Ledge	MA	1989				●			
Sullivan's Ledge	MA	1991				●			
W.R. Grace (Acton Plant)	MA	1989			●	●			
Wells G&H	MA	1989			●				
O'Connor	ME	1989			●	●			
Pinette's Salvage Yard	ME	1989			●				
Pinette's Salvage Yard	ME	1993			●				
Union Chemical	ME	1990			●	●			
Kearsarge Metallurgical	NH	1990			●				
Ottati & Goss	NH	1987	PD	●					
Davis Liquid Waste	RI	1987				●			
Davisville Naval Construction Battalion Center	RI	1993			●				

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Established Technology Summary Matrix

Region 2

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
American Cyanamid	NJ	1993				●			
Asbestos Dump	NJ	1991				●			
Bog Creek Farm, OU 1	NJ	1985	C	●					
Bog Creek Farm, OU 2	NJ	1989	C	●					
Bridgeport Rental & Oil	NJ	1984	C	●					
Caldwell Trucking (Amendment)	NJ	1995			●	●			
Chemical Control	NJ	1987				●			
Cosden Chemical Coatings	NJ	1992				●			
Curcio Scrap Metal	NJ	1991			●				
De Rewal Chemical	NJ	1989				●			
Ellis Property	NJ	1992			●				
Ewan Property	NJ	1988			●				
FAA Technical Center	NJ	1990			●				
Fried Industries	NJ	1994				●			
Nascolite Corp.	NJ	1991				●			
NL Industries, Inc. (OU 1)	NJ	1994				●			
NL Industries, Inc.	NJ	1991				●			
Reich Farms	NJ	1988			●				
Roebling Steel	NJ	1990				●			
Roebling Steel	NJ	1991				●			
Sayreville Landfill	NJ	1990			●				
Swope Oil & Chemical	NJ	1985			●				
Swope Oil	NJ	1991			●				
Waldick Aerospace Devices, Inc.	NJ	1991			●	●			
Waldick Aerospace	NJ	1987				●			
White Chemical Corp.	NJ	1991				●			
Williams Property	NJ	1987			●				

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Established Technology Summary Matrix

Region 2 (Continued)

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
				Technology Type					
Brewster Well Field	NY	1988			●				
Circuitron	NY	1991			●				
Claremont Polychemical	NY	1989			◓				
Facet Enterprises	NY	1992				●			
FMC-Dublin Road	NY	1993				●			
Hooker Chemical-Ruco Polymer	NY	1990			●				
Hooker (102nd Street Landfill)-Amendment	NY	1995			●				
Love Canal	NY	1988			●	●			
Marathon Battery	NY	1986				●			
Marathon Battery	NY	1988				●			
Marathon Battery	NY	1989				◓			
Mattiace Petrochemicals	NY	1990			●				
Mattiace Petrochemicals	NY	1991			●				
Preferred Plating	NY	1992				●			
Sealand Restoration	NY	1990			●				
York Oil	NY	1988				●			

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Established Technology Summary Matrix

Region 3

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
Dover Air Force Base, Lindane Source Area	DE	1995			●				
Dover Gas Light Superfund Site	DE	1994			●				
Halby Chemical	DE	1991				●			
Wildcat Landfill	DE	1988			●				
Mid-Atlantic Wood Preservers	MD	1991				●			
Alladin Plating	PA	1988				●			
Bendix Flight System	PA	1988					●		
Berks Sand Pit	PA	1988			●				
Brodhead Creek	PA	1991			●				
Bruin Lagoon	PA	1982				●			
Bruin Lagoon	PA	1986				●			
C & D Recycling	PA	1992				●			
Craig Farm	PA	1989				●			
Douglassville Disposal	PA	1988			●				
Douglassville Disposal	PA	1989	D/I	●					
Douglassville Disposal	PA	1989				●			
Drake Chemical/Phase II	PA	1986			●				
Drake Chemical/Phase III	PA	1988	I	●					
Eastern Diversified Metals	PA	1991			●	●			
Hebelka Auto Salvage Yard	PA	1989				●			
Hebelka Auto Salvage Yard	PA	1991				●			
Hunterstown Road	PA	1993			●	●			
M.W. Manufacturing	PA	1995			●	●			
Paoli Rail Yard	PA	1992				●			
Seagertown Industrial	PA	1993			●				
Tonolli	PA	1992				●			
U.S.A. Letterkenny SE	PA	1991				●			
Westline	PA	1986			●				

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Established Technology Summary Matrix

Region 3 (Continued)

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
				Technology Type					
Whitmoyer Laboratories, OU 2	PA	1991			●	●			
Whitmoyer Laboratories, OU 3	PA	1991				●			
Whitmoyer Laboratories	PA	1989			●				
Abex	VA	1992				●			
C&R Battery	VA	1990				●			
Dixie Cavern County Landfill	VA	1991			●				
First Piedmont Quarry 719	VA	1991				●			
Greenwood Chemical	VA	1990			●	●			
Rentokil Virginia Wood Preserving	VA	1993			●	●			
Rhinehart Tire Fire Dump	VA	1992				●			
Saunders Supply, OU 1	VA	1991			●	●			
Fike Chemical	WV	1988			●	●			
Fike Chemical	WV	1992			●	●		●	
Ordnance Works Disposal	WV	1989				●			
West Virginia Ordnance	WV	1987							●

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Established Technology Summary Matrix

Region 4

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
Alabama Army Ammunition Plant, Area B	AL	1995	O	●					
Alabama Army Ammunition Plant, OU 1	AL	1992	C	●					
Alabama Army Ammunition Plant, OU 2	AL	1994	C	●					
Ciba Geigy Corp. (McIntosh Plant), OU 2	AL	1991	D/I	●					
Ciba-Geigy Corp. (McIntosh Plant), OU 4	AL	1992	D/I	●					
Ciba-Geigy Corp. (McIntosh Plant), OU 4	AL	1992				●			
Interstate Lead Co.	AL	1991				●			
Mowbray Engineering	AL	1986				●			
62nd Street Dump	FL	1990				●			
Agrico Chemical	FL	1992				●			
Anodyne	FL	1993				●			
Brown Wood Preserving	FL	1988				●			
Cabot/Koppers	FL	1990				●			
Coleman-Evans Wood Preserving (Amendment)	FL	1990				●			
Davie Landfill	FL	1985				●			
Florida Steel Corp.	FL	1992				●			
Florida Steel Corp.	FL	1994				●			
Gold Coast	FL	1987				●			
Jacksonville Naval Air Station, OU 2	FL	1994				●			
Jacksonville Naval Air Station OU 2	FL	1995				●			
Kassouf-Kimerling Battery	FL	1989				●			
Kassourf-Kimerling Battery Disposal	FL	1990				●			
NAS Cecil Field Site 11, OU 6	FL	1994			●				
Peak Oil/Bay Drum, OU 1	FL	1993				●			
Peak Oil/Bay Drum, OU 3	FL	1993				●			
Pepper's Steel & Alloy	FL	1986				●			
Reeves Southeastern Galvanizing, OU 1	FL	1993				●			

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Established Technology Summary Matrix

Region 4 (Continued)

Site Name	State	FY	Status	Technology Type: On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
Sapp Battery Salvage	FL	1986				●			
Schuylkill Metal	FL	1990				●			
Tower Chemical	FL	1987	D/I	●					
Whitehouse Waste Oil Pits (Amendment)	FL	1992				●			
Yellow Wate Road	FL	1990				●			
Zellwood Groundwater Contamination (Amendment)	FL	1990				●			
Cedartown Industries	GA	1993				●			
Hercules 009 Landfill	GA	1993				●			
Marine Corps Logistics Base	GA	1992				●			
Mathis Brothers Landfill (South Marble Top Road)	GA	1993			●				
USAF Robins Air Force Base	GA	1991				●			
Howe Valley Landfill	KY	1990					●		
Maxey Flats Nuclear Disposal	KY	1991				●			
Smith's Farm Brooks	KY	1989				●			
Flowood	MS	1988				●			
Newsom Brothers Old Reichold	MS	1989			●				
Aberdeen Pesticide Dumps (Amendment)	NC	1991			●	●			
Bypass 601 Groundwater Contamination	NC	1993				●			
Bypass 601 Groundwater Contamination (Amendment)	NC	1993				●			
Cape Fear Wood Preserving	NC	1989				●			
Carolina Transformer	NC	1991				●			
Celanese	NC	1989				●			
Celanese	NC	1989	C	●					
Chemtronics	NC	1988				●			
JFD Electronics/Channel Masters	NC	1992				●			
Koppers (Morrisville Plant)	NC	1993			●				

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Established Technology Summary Matrix

Region 4 (Continued)

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
				Technology Type					
Sodyeco	NC	1987			●				
Geiger/C&M Oil	SC	1987				●			
Geiger/(C&M Oil) (Amendment)	SC	1993				●			
Golden Strip Septic Tank	SC	1991				●			
Helene Chemical	SC	1995			●				
Independent Nail	SC	1987				●			
Kalama Specialty	SC	1993				●	●		
Palmetto Wood Preserving	SC	1987				●			
Savannah River (USDOE), OU 1	SC	1992				●			
Amnicola Dump	TN	1989				●			
Arlington Blending and Packaging Co.	TN	1991				●			
Oak Ridge, OU 3	TN	1991				●			
Wrigley Charcoal	TN	1991			●	●			

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Established Technology Summary Matrix

Region 5

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
Acme Solvent Reclaiming	IL	1991			●	●			
Belvidere Municipal Landfill #1	IL	1988			●				
Byron/Johnson Salvage Yard	IL	1985			●				
Cross Brothers Pail	IL	1989			●				
LaSalle Electrical Utilities	IL	1986	C	●					
LaSalle Electrical Utilities	IL	1988	C	●					
Outboard Marine/Waukegan Harbor	IL	1989			●				
Sangamo/Crab Orchard National Wildlife Refuge	IL	1990	I	●					
Sangamo/Crab Orchard National Wildlife Refuge	IL	1990				●			
Savanna Army Depot	IL	1992	C	●					
Savanna Army Depot	IL	1992				●			
Velsicol Chemical	IL	1988				●			
American Chemical Services	IN	1992		●	●				
Fisher Calo	IN	1990	D						
Fort Wayne Reduction	IN	1988			●				
Main Street Wellfield	IN	1991			●				
MIDCO I	IN	1989				●			
MIDCO II	IN	1989				●			
Reilly Tar & Chemical (Indianapolis Plant)	IN	1993				●			
Wayne Waste Oil	IN	1990				●			
Wedzeb	IN	1989			●				
Auto Ion Chemicals	MI	1989				●			
Berlin & Farro Liquid Incineration	MI	1984			●				
Burrows Sanitation	MI	1986				●			
Carter Industries	MI	1991			●	●			
Cliff/Dow Dump	MI	1989			●				
Electrovoice	MI	1992				●			

Technology Type

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Established Technology Summary Matrix

Region 5 (Continued)

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
				Technology Type					
Forest Waste Products	MI	1986				●			
Forest Waste Products	MI	1988			●				
H. Brown Company	MI	1992				●			
Liquid Disposal	MI	1987				●			
Metamora Landfill	MI	1986			●				
Peerless Plating	MI	1992				●			
Rose Township Dump	MI	1987	C	●					
Spiegelberg Landfill	MI	1986			●				
Springfield Township Dump	MI	1990				●			
Tar Lake	MI	1992				●			
Thermo Chem	MI	1991			●				
MacGillis and Gibbs/Bell Lumber and Pole, OU 1	MN	1993	PD	●					
MacGillis and Gibbs/Bell Lumber and Pole, OU 3	MN	1994	PD	●					
MacGillis and Gibbs/Bell Lumber and Pole, OU 3	MN	1994				●			
New Brighton/Arden Hills	MN	1989	C	●					
Ritari Post and Pole, OU 1	MN	1994			●				
University of Minnesota	MN	1990	C	●					
Waite Park Wells, OUs 1, 2, & 3	MN	1994				●			
Allied Chem & Ironton Coke	OH	1991	D	●					
Alsco Anaconda	OH	1989			●				
Big D Campground	OH	1989	C	●					
Fields Brook	OH	1986			●				
Laskin/Poplar Oil	OH	1984			●				
Laskin/Poplar Oil	OH	1987	C	●					
Laskin/Poplar Oil	OH	1989	C	●					
Ormet Corp.	OH	1994				●			
Summit National Liquid Disposal	OH	1988	C	●					

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Established Technology Summary Matrix

Region 5 (Continued)

Site Name	State	FY	Status	Technology Type: On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
Summit National Liquid Disposal Service (Amendment)	OH	1991			●				
Mid-State Disposal Landfill	WI	1988				●			
N.W. Mauthe Site	WI	1994				●			
Northern Engraving	WI	1987				●			
Oconomowoc Electroplating	WI	1990				●			
Spickler Landfill	WI	1992				●			

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Established Technology Summary Matrix

Region 6

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
Arkwood	AR	1990			●				
Gurley Pit	AR	1987				●			
Industrial Waste Control	AR	1988				●			
Jacksonville Municipal Landfill	AR	1990			●	●			
Mid-South Wood	AR	1987				●			
Old Midland Products	AR	1988	C	●					
Rogers Road Municipal Landfill	AR	1990			●	●			
South 8th Street Landfill, OU 1	AR	1994				●			
Vertac	AR	1993			●				
Vertac	AR	1993	C	●					
American Cresote Works (Winnfield Plant)	LA	1993	I	●					
Bayou Bonfouca	LA	1987	C	●					
Bayou Bonfouca, Source Control OU (Amendment)	LA	1995			●				
Cleve Reber	LA	1987	C	●					
Cleve Reber	LA	1987				●			
Gulf Coast Vacuum Services, OU 1	LA	1992				●			
Pab Oil & Chemical Services	LA	1993				●			
Cal West Metals	NM	1992				●			
Cimarron Mining Corp.	NM	1991				●			
Double Eagle Refinery	OK	1992				●		●	
Fourth Street Abandoned Refinery	OK	1992				●		●	
Hardage/Criner (Amendment)	OK	1990			●				
Oklahoma Refining	OK	1992				●		●	
Sand Springs Petrochemical Complex	OK	1987			●	●			
Bailey Waste Disposal	TX	1988				●			
Bioecology Systems	TX	1984				●			
Brio Refining	TX	1988	PD	●					

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Established Technology Summary Matrix

Region 6 (Continued)

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
Brio Refining	TX	1988				●			
French Limited	TX	1988				●			
MOTCO	TX	1985			●				
Pesses Chemical	TX	1989				●			
Petrochemical (Turtle-Bayou)	TX	1991			●				
Sheridan Disposal Services	TX	1989				●			
Sikes Disposal Pit	TX	1986	C	●					
South Calvacade St.	TX	1988			●				
Texarkana Wood Preserving	TX	1990	D/I	●					
Triangle Chemical	TX	1985			●		●		
United Creosoting	TX	1989			●				

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Established Technology Summary Matrix

Region 7

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
				Technology Type					
EI Dupont de Nemours & Co. Inc.	IA	1991				●			
Fairfield Coal Gasification Plant	IA	1990			●				
Mid-America Tanning	IA	1991				●			
Midwest Manufacturing/North Farm	IA	1988				●			
Peoples Natural Gas	IA	1991			●				
Shaw Avenue Dump	IA	1991				●			
Vogel Paint & Wax	IA	1989				●			
Arkansas City Dump	KS	1988						●	
Ellisville Area/Bliss	MO	1986			●				
Ellisville Area	MO	1991			●				
Ellisville Area (Amendment)	MO	1991			●				
Kem-Pest Laboratories	MO	1991			●				
Minker/Stout/Romaine Creek (R&S)	MO	1988			●				
Missouri Electric Works	MO	1990	PD	●					
Shenandoah Stables	MO	1990			●	●			
Syntex	MO	1988			●				
Times Beach	MO	1988	O	●					
Weldon Spring Quarry/Plant/Pits (USDOE)	MO	1993				●			
Former Nebraska Ordnance Plant, OU 1	NE	1995	D	●					
Hastings Groundwater Contamination (East Industrial)	NE	1990			●	●			

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Established Technology Summary Matrix

Region 8

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
				Technology Type					
Broderick Wood Products	CO	1991			●				
Broderick Wood Products	CO	1992				●			
Denver Radium, OU 8	CO	1992				●			
Martin Marietta (Denver Aerospace)	CO	1990			●	●			
Rocky Flats (USDOE), OU 4	CO	1992				●			
Rocky Mountain Arsenal, OU 17	CO	1990				●			
Rocky Mountain Arsenal, OU 28	CO	1993				●			
Rocky Mountain Arsenal, OU 29	CO	1993			●				
Sand Creek Industrial	CO	1990			●				
Summitville Mine, OU 0	CO	1995						●	
Summitville Mine, OU 1	CO	1995						●	
Woodbury Chemical	CO	1985							
Woodbury Chemical	CO	1989			●				
Anaconda Co. Smelter	MT	1991				●			
Montana Pole and Treating	MT	1993			●				
Silver Bow Creek/Butte Area	MT	1992				●			
Hill AFB	UT	1991			●				
Ogden Defense Depot	UT	1990			●				
Ogden Defense Depot, OU 3	UT	1992			●				
Portland Cement (Kiln Dust #2 & #3)	UT	1992				●			
Tooele Army Depot-North Area, OUs 5,6,7,10	UT	1994			●				
Utah Power & Light/American Barrel	UT	1993			●	●			

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Established Technology Summary Matrix

Region 9

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
				Technology Type					
Apache Powder Site	AZ	1994			●	●			
Advanced Micro Devices Inc.	CA	1991			●				
FMC (Fresno Plant)	CA	1991				●			
Intel,Mountain View	CA	1989					●		
J.H. Baxter	CA	1990				●			
Koppers (Oroville Plant)	CA	1989				●			
McColl	CA	1993				●			
Purity Oil Sales	CA	1989				●			
Raytheon, Mountain View	CA	1989					●		
Rhone-Poulenc/Zoecon	CA	1992				●			
Sacramento Army Depot	CA	1993				●			
Sacramento Army Depot	CA	1995				●			
Selma Pressure Treating	CA	1988				●			
Valley Wood Preserving	CA	1991				●			
Westinghouse Electric (Sunnyvale Plant)	CA	1992			●				

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Established Technology Summary Matrix

Region 10

Site Name	State	FY	Status	On-Site Incineration	Off-Site Incineration	Solidification/Stabilization	Mechanical Soil Aeration	Neutralization	Open Detonation
				Technology Type					
Arctic Surplus	AK	1995				●			
Fort Wainwright, Chemical Agent Dump, OU 1	AK	1995						●	
Bunker Hill Mining and Metallurgical Complex	ID	1992				●			
Pacific Hide & Fur Recycling	ID	1988				●			
Pacific Hide & Fur Recycling (Amendment)	ID	1992			●	●			
U.S. DOE Idaho National Engineering Lab, OU 23	ID	1992			●	●			
Gould	OR	1988				●			
Teledyne Wah Chang Albany (TWCA)	OR	1990				●			
Umatilla Army Depot, OU 1	OR	1993				●			
Umatilla Army Depot (Lagoons)	OR	1994				●			
Umatilla Army Depot (Lagoons), OU 4	OR	1994				●			
Umatilla Army Depot (Lagoons), OU 7	OR	1994							●
American Crossarm & Conduit	WA	1993				●			
Commencement Bay, Nearshore/Tideflats	WA	1991			●				
Commencement Bay, Nearshore/Tideflats, OU 3	WA	1988				●			
Commencement Bay, South Tacoma Field OU	WA	1994			●	●			
FMC Yakima Pit	WA	1990	C	●					
Frontier Hard Chrome	WA	1988				●			
Hanford 1100-Area (DOE)	WA	1993			●				
Harbor Island-Lead	WA	1993			●				
Northwest Transformer - Mission Pole	WA	1991			●				
Western Processing Phase I	WA	1984			●				
Western Processing/Phase II	WA	1985				●			

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Note: The list of sites does not reflect any changes in off-site incineration, solidification/stabilization, mechanical soil aeration, neutralization, or open detonation that may have occurred in the design phase of the cleanup and the status of the project.

Appendix D

Treatment Trains With Innovative Treatment Technologies

Dechlorination Followed by

Soil Washing	Myers Property	NJ

Ex Situ Bioremediation Followed by

Solidification/Stabilization	Gulf Coast Vacuum Services, OU 1	LA
Solidification/Stabilization	J. H. Baxter	CA
Solidification/Stabilization	Oklahoma Refining Co.	OK
Solidification/Stabilization	PAB Oil	LA

In Situ Flushing Followed by

In Situ Bioremediation	Peak Oil/Bay Drums, OU 1	FL
In Situ Bioremediation	Pester Burn Pond	KS
In Situ Bioremediation	Montana Pole Company	MT

Soil Vapor Extraction Followed by

In Situ Flushing	JADCO - Hughes	NC
Solidification/Stabilization	Genzale Plating Company, OU 1	NY
Solidification/Stabilization	MIDCO I	IN
Solidification/Stabilization	MIDCO II	IN
Soil Washing	Zanesville Well Field	OH
Bioventing	Williams AFB, OU 2	AZ

Soil Washing Followed by

Bioremediation	Cabot Carbon/Koppers	FL
Bioremediation	Whitehouse Waste Oil Pits	FL
Bioremediation	Moss-American	WI
Incineration	Arkwood	AR
Solidification/Stabilization	Vineland Chemical OU 1 and OU 2	NJ
Solidification/Stabilization	Cape Fear Wood Preserving	NC

Solvent Extraction Followed by

Incineration	United Creosoting	TX
Solidification/Stabilization	Arrowhead Refinery Co.	MN
Solidification/Stabilization	Arctic Surplus	AK
Solidification/Stabilization	Carolina Transformer	NC
Vitrification	Idaho National Engineering Laboratory, Pit 9	ID

Thermal Desorption Followed by

Dechlorination	Smith's Farm Brooks, OU 1	KY
Dechlorination	FCX Statesville, OU 2	NC
Solidification/Stabilization	Waldick Aerospace Devices	NJ
Solidification/Stabilization	USA Letterkenny (SE Area, OU 1)	PA
Solidification/Stabilization	Acme Solvent Reclaiming, Inc., OU 2	IL

In Situ Bioremediation Followed by

Soil Vapor Extraction	Delaware Sand and Gravel, OUs 4 & 5	DE
Solidification/Stabilization	Oklahoma Refining Co.	OK

Appendix E

Innovative Technologies: Summary of Status Report Updates, Changes, and Deletions

Innovative Technologies: Summary of Status Report Updates, Changes, and Deletions

Each edition of this report has contained new information on the applications of innovative technologies at Superfund sites and has updated the status of existing innovative projects. The information from Records of Decision (RODs) that was deleted or changed in each edition (from the first edition of the report, published in January 1991, through this eighth edition) is listed below to allow tracking of specific projects from edition to edition.

Eighth Edition (November 1996): Additions, Changes, and Deletions from the Seventh Edition (September 1995)

The eighth edition of the report adds information about 38 innovative treatment technologies selected for remedial actions in FY 1995 RODs, two treatment technologies at non-Superfund DoD and DOE sites, and two innovative treatment technologies selected for two RCRA corrective actions. Other changes are listed below.

Region	Site Name, State (ROD Date)	Technology (Listed in 7th Edition)	8th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
1	Norwood PCBs, MA (09/29/89)	Solvent extraction		Yes		Remedy not implemented because of space constraints on-site and cost. Site will be capped instead.	Bob Cianciarulo 617-573-5778
1	Wells G&H, OU1, MA (09/14/89)	Soil vapor extraction	Soil vapor extraction and air sparging	Yes		Adding air sparging to existing SVE project to enhance pump-and-treat. Conducting SVE on a new area (New England Plastics). ESD to be issued.	Mary Garren 617-573-9613
2	Applied Environmental Services, OU 1, NY (06/24/91)	Bioventing		Yes		Misinterpretation of ROD.	Maria Jon 212-637-3967 Gerald Ridder (NY) 518-457-0927
2	Circuitron Corporation, OU 1, NY (03/29/91)	Soil vapor extraction		Yes		Further investigation indicated that VOCs were below action levels.	Miko Fayon 212-637-4250 Thomas Simmons (USACE) 816-426-2296

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology (Listed in 7th Edition)	8th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
3	Rentokil, VA (06/22/93)	Thermal desorption		Yes		Groundwater modeling indicated that there would be no further groundwater contamination if source soils were left in place. Site will be capped.	Andrew Palestini 215-597-1286
3	Saunders Supply Co., 0U 1, VA (09/30/91)	Dechlorination and Thermal desorption			Off-site incineration	Remedy changed to off-site incineration due to implementability, long and short-term effectiveness. Issuing amended ROD.	Andrew Palestini 215-597-1286
4	Ciba-Geigy (McIntosh Plant), OU 2, AL (09/30/91)	Thermal desorption			On-site incineration*	Treatability study showed that incineration was more cost-effective.	Charles L. King, Jr. 404-562-8931
4	Ciba-Geigy (McIntosh Plant), OU 2, AL (09/30/91)	In situ flushing		Yes		Treatability study showed percolation from precipitation was just as effective. Minimal benefit would be gained from soil flushing.	Charles L. King, Jr. 404-562-8931
4	Ciba-Geigy (McIntosh Plant), OU 4, AL (07/14/92)	Thermal desorption			On-site incineration	Treatability study showed that incineration was more cost-effective.	Charles L. King, Jr. 404-562-8931
4	Ciba-Geigy (McIntosh Plant), OU 4, AL (07/14/92)	In situ flushing		Yes		Treatability study showed percolation from precipitation was just as effective. Minimal benefit would be gained from soil flushing.	Charles L. King, Jr. 404-562-8931
4	American Creosote Works, Inc., OU 2, FL (02/03/94)	Surfactant flushing -groundwater		Yes		Determined that pump-and-treat alone would be effective.	Mark Fite 404-562-8927
4	Para-Chem Southern, Inc., SC (09/27/93)	Bioremediation (ex situ) slurry-phase		Yes		Remedy canceled because of concerns about feasibility, performance, and treatment time. Will excavate and dispose off-site.	Judy Canova 803-896-4046

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

* Technology listed in the seventh edition

Region	Site Name, State (ROD Date)	Technology (Listed in 7th Edition)	8th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
4	Cape Fear Wood Preserving, NC (06/30/89)	Bioremediation (ex situ) slurry-phase		Yes		Original remedy called for soil washing followed by slurry-phase bioremediation of fines, based on an 80% reduction in volume of contaminated soil achieved by soil washing. Soil washing bidders claimed a 96% reduction in volume of contaminated soil, thus making slurry-phase bioremediation too costly for the 0.4% of contaminated fines remaining.	Jon Bornholm 404-562-8820
5	Ott/Story/Cordova Chemical, MI (09/27/93)	Thermal desorption		Yes		The state revised the cleanup goals. Consequently, the amount of soils requiring remediation was reduced. Also shallow groundwater present at the site would continue to contaminate clean backfilled soil. Cost was also a factor. No alternative remedy has been selected at this time.	John Fagiolo 312-886-0800
5	Thermo-Chem, Inc., OU 1, MI (09/30/91)	Soil vapor extraction	Air sparging			Added to enhance SVE system.	Jim Hahnenberg 312-353-4213
5	Skinner Landfill OU 2, OH (06/04/93)	Soil vapor extraction		Yes		Further investigation through a feasibility study indicated that the site conditions would not be amenable to SVE. Will cap instead.	Jamey Bell 312-886-6436
5	Van Dale Junkyard, OH (03/31/94)	Bioremediation (in situ) - soil		Yes		Predesign sampling indicated that contaminant levels had decreased. No active bioremediation is occurring. The site will be capped and will rely on natural attenuation with monitoring.	Lawrence Schmitt 312-353-6565 James Campbell 412-351-6132
5	Zanesville Well Field, OH (09/30/91)	Soil vapor extraction	Air sparging			Implemented by PRPs to accelerate groundwater remediation.	Dave Wilson 312-886-1476

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology (Listed in 7th Edition)	8th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
5	Zanesville Well Field, OH (09/30/91)	Soil washing		Yes		Will excavate and dispose off-site because soil volume was much smaller that originally projected.	Dave Wilson 312-886-1476
5	City Disposal Corporation Landfill, WI (09/28/92)	Soil vapor extraction		Yes		Rise in groundwater table prevented implementation of SVE. Remedy changed to capping with gas collection.	Russ Hart 312-886-4844 Mike Schmoller (WI) 608-275-3303
5	Hagen Farm, Groundwater Control OU, WI (09/30/92)	Bioremediation (in situ) - groundwater		Yes		Treatability studies indicated that bioenhancement would not provide any additional benefit. Relying on natural attenuation. Explanation of Significant Differences (ESD) signed on 08/27/96.	Steve Padovani 312-353-6755
6	Petro-Chemical Systems, Inc. OU 2, TX (09/06/91)	Air Sparging			Bioremediation (in situ) groundwater	Bioremediation thought to be more effective.	Chris Villarreal 214-665-6758
7	People's Natural Gas, IA (06/16/91)	Bioremediation (in situ) - soil	Air sparging				Diana Engeman 913-551-7797
7	Sherwood Medical, NE (09/28/93)	Thermal desorption			Soil vapor extraction (ex situ)	Soil vapor extraction (ex situ) will be more cost-effective. ESD issued 09/05/95.	Steve Auchterlonie 913-551-7778
7	Valley Park TCE Site, Wainwright OU, MO (09/29/94)	Air sparging		Yes		Air sparging would be difficult to implement and nearby residences might be adversely affected. Will do pump-and-treat instead. ESD issued on 04/02/96.	Steve Auchterlonie 913-551-7778 Dave Mosby (MO) 573-751-1288

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology (Listed in 7th Edition)	8th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
7	Valley Park TCE Site, Wainwright OU, MO (09/24/94)	Thermal desorption			Soil vapor extraction (ex situ)*	Soil vapor extraction (ex situ) more cost-effective. ESD issued on 04/02/96.	Steve Auchterlonie 913-551-7778 Dave Mosby (MO) 573-751-1288
8	Lockheed/Martin (Denver Aerospace), CO (Remedial Action) (09/24/90)	Soil vapor extraction and thermal desorption		Listing as a Superfund remedial action has been deleted.		Remedial action being handled as a RCRA corrective action.	George Dancik 303-312-6935 Charles Johnson (CO) 303-692-3348
8	Idaho Pole Company, MT (09/28/92)	In situ flushing			Bioremediation (ex situ) - land treatment*	Further investigation indicated flushing would not be effective. Soils were excavated and will be treated as part of the land treatment remedy. ESD issued on 05/21/96	Jim Harris 406-441-1150
8	Summitville Mine, OU 1, CO (12/15/94)	This is a FY 1995 ROD and was not listed in the seventh edition. The FY 1995 ROD specified bioremediation (in situ)		Yes		When heap leach pad rinsed with water, contaminant concentrations were reduced and bioremediation was not necessary.	James Hanley 303-312-6725 Victor Ketellepepper 303-312-6578
9	Motorola 52nd Street, AZ (09/30/88)	Soil vapor extraction	Air sparging				Fred Schauffler 415-744-2359 Mana Font 602-207-4194
9	Seal Beach Navy Weapons Station, IR Site 14, CA (DoD Action)	Soil vapor extraction		Yes		Research project, not a full-scale cleanup.	Ken Reynolds 619-532-2912

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

* Technology listed in the seventh edition

Region	Site Name, State (ROD Date)	Technology(Listed in 7th Edition)	8th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
9	Hexcel, CA (09/21/93)	Air sparging, bioremediation (in situ) - groundwater, soil vapor extraction		Yes		Hexcel was removed from the National Priorities List (NPL) on November 1, 1993.	Mark Johnson 510-286-0305
9	Intel Mountain View (355 Middlefield Road), CA (06/09/89)	Soil vapor extraction		Yes		Groundwater table rose, leaving too little unsaturated soil to warrant SVE. Soils were excavated and aerated.	Elizabeth Adams 415-744-2235 Michael Maley 510-450-6159
9	Koppers Company, Inc. (Oroville Plant), CA (09/13/89)	Soil washing		Yes		Further analysis determined soil washing would be ineffective. Soil will be disposed of in a landfill with the potential for two percent of the most contaminated soil treated through solidification/stabilization. ROD amendment being prepared.	Fred Schauffler 415-744-2359
9	Koppers Company, Inc. (Oroville Plant), CA (09/13/89)	Bioremediation (in situ) - soil		Yes		Presence of metals and dioxins made bioremediation infeasible. Soil will be disposed of in a landfill with the potential for two percent of the most contaminated soil treated by solidification/stabilization. ROD amendment being prepared.	Fred Schauffler 415-744-2359
9	Middlefield-Ellis-Whisman (MEW) - Siemins/Sobrato (455 & 487 Middlefield Road), CA (06/30/93)	Soil vapor extraction	Air sparging				Elizabeth Adams 415-744-2235
9	Van Waters and Rogers, CA (09/30/91)	Soil vapor extraction		Yes		Site was proposed for listing on the NPL but has been removed. Responsibility was picked up under RCRA and subsequently dropped from RCRA authority.	Belinda Wei 415-744-2280 Duazo Ricco 510-268-0837

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology (Listed in 7th Edition)	8th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
10	Eielson AFB, OUs 3, 4, and 5, AK (9/22/95)	This is a FY 1995 ROD and was not listed in the seventh edition. The FY 1995 ROD specified bioventing and soil vapor extraction.		Yes		Remedy changed to institutional controls because there was not enough contamination present to warrant active remediation. Groundwater also was contained, preventing risk due to groundwater.	Mary Jane Nearman 206-553-6642
10	Idaho National Engineering Laboratory, Pit 9 (OU7-10), ID (09/23/93)	Solvent extraction	Vitrification			Misinterpretation of the ROD.	Mary Jane Nearman 206-553-6642
10	USDOE Hanford 100 Area, OUs 100-BC-1, 100-DR-1, 100-HR-1, WA (9/27/95)	This is a FY95 ROD that was not listed in the seventh edition. The FY95 ROD specified thermal desorption for soil contaminated with organic compounds		Yes		Remedy changed to off-site disposal because further investigation did not indicate that organics were present.	Doug Sherwood 509-376-9529 Audrey Dove 509-376-6865

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Seventh Edition (September 1995): Additions, Changes, and Deletions from the Sixth Edition (September 1994)

The seventh edition of the report added information about 42 innovative treatment technologies selected for remedial actions in FY 1994 RODs and eight innovative treatment technologies selected for seven RCRA corrective actions.

Region	Site Name, State (ROD Date)	Technology Listed in 6th edition	7th edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
1	Linemaster Switch Corporation, CT (07/21/93)	Soil vapor extraction			Dual-phase extraction	Groundwater also is being treated with this technology.	Elise Jakabhazy 617-573-5760
2	American Thermostat, NY (06/29/90)	Thermal desorption	Thermal Desorption (phase 2)			Project is being conducted in two phases. Phase 1 has been completed and is listed as a separate project.	Christo Tsiamis 212-637-4257
2	GCL Tie and Treating, NY (Removal Action)	Composting			Thermal desorption (being implemented as a remedial action with the ROD signed 09/30/94)	Site is not amenable to composting because of the presence of long-chain PAHs and the time constraints of the removal process. A treatability study achieved over 90% reduction but little degradation of long chain carcinogenic hydrocarbons occurred.	Joe Cosentino 908-906-6983
2	General Motors Central Foundry Division (OU 1 and OU 2), NY (12/17/90) & (03/31/92)	Bioremediation (slurry phase)			Thermal desorption	Both OUs were combined under the thermal desorption remedy. ROD amended to combine both OUs under a thermal desorption remedy.	Lisa Jackson 212-637-4274
2	Pasley Solvents and Chemicals, Inc., NY (04/24/92)	Soil flushing and soil vapor extraction	Air sparging		Soil vapor extraction and air sparging	SVE, in combination with air sparging, will eliminate the need for soil flushing. ROD amendment was signed 05/22/95.	Sherrel Henry 212-637-4273
3	Bendix, PA (09/30/88)	Soil vapor extraction		Yes		It was determined that SVE was not a viable remedy; soil was too tightly compacted. No alternative has been selected.	Jim Harper 215-597-6906

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology Listed in 6th edition	7th edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
3	Brown's Battery Breaking Site, OU 2, PA (07/02/92)	Fuming gasification			Plasma high-temperature metals recovery	The name of the technology was changed to reflect the treatment process more accurately.	Richard Watman 215-566-3219
4	Helena Chemical, SC (09/08/93)	Bioremediation (ex situ) and dechlorination		Yes	Off-site incineration	Technologies could not meet cleanup goal.	Bernie Hayes 404-562-8822
5	Carter Industries, MI (09/18/91)	Thermal desorption		Yes		Thermal desorption was too costly (~$300/yd^3). It is less expensive to dispose of the wastes at TSCA landfill (~$186/ton).	Jon Peterson 312-353-1264
5	Cliffs/Dow Dump, MI (09/27/89)	Bioremediation (ex situ)		Yes		Remedy could not reduce concentrations of benzo(a)pyrene to acceptable level. Contaminated soil was excavated and placed in a permitted landfill.	Ken Glatz 312-886-1434
5	Electro-Voice, OU 1, MI (06/23/92)	Soil vapor extraction	Air sparging			Technology actually is a combination of SVE and air sparging called the Subsurface Volatilization and Ventilation System™.	Eugenia Chow 312-353-3156
5	Ionia City Landfill, MI (09/29/89)	Vitrification (in situ)		Yes		Remedy was canceled. Conditions at the site had changed since 1989. Project was implemented as a time critical removal action.	Michael Gifford 312-886-7257
5	Seymour Recycling, IN (09/30/86)	Bioremediation (in situ groundwater)		Yes		Bioremediation of groundwater was not actively pursued. Contamination degraded through natural attenuation.	Jeff Gore 312-886-6552

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology Listed in 6th edition	7th edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
5	Verona Well Field OU 2, MI (06/28/91)	Soil vapor extraction	Soil vapor extraction			Conducting soil vapor extraction at two separate sites under this ROD: Annex area and Paint shop area. Projects are listed as separate entries in the ASR seventh edition.	Janice Bartlett 312-886-5438
5	Wayne Reclamation and Recycling, IN (03/30/90)	Soil vapor extraction	Air sparging			Air sparging was added under the existing ROD to treat groundwater.	Duane Heaton 312-886-6399
6	Koppers/Texarkana, TX (09/23/88)	Soil washing		Yes		Volume of soil was not as large as originally had been projected. The small volume did not warrant bringing a soil washing unit on-site. Will excavate and dispose of soil off-site.	Ursula Lennox 214-665-6743
6	Koppers/Texarkana, TX (09/23/88)	In situ flushing		Yes		In situ flushing was never intended as a treatment at the site. Misinterpretation of the ROD during ROD analysis.	Ursula Lennox 214-665-6743
8	Chemical Sales Company (OU 1), CO (06/27/91)	Soil vapor extraction	Air sparging			Air sparging was added under the existing ROD to treat groundwater.	Armando Saenz 303-312-6559
8	Mouat Industries, MT (Removal Action)	Chemical treatment		Yes		Reducing chromium VI to chromium III not considered innovative.	Ron Bertran 406-449-5720
9	Phoenix-Goodyear Airport Area (North and South Facilities), AZ (09/26/89)	Soil vapor extraction	Soil vapor extraction			Site is divided into 2 areas: North area & South area. Each area is listed as an individual project in the seventh edition ASR.	Craig Cooper 415-744-2370 Rusty Harris-Bishop 415-744-2365 Nancy Moore (AZ) 602-207-4180

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology Listed in 6th edition	7th edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
9	Fairchild Semiconductor, CA (06/30/89)	2 listings for soil vapor extraction	3 more SVE projects			Soil vapor extraction systems are being implemented at 5 different areas at the site.	Elizabeth Adams 415-744-2235
9	Indian Bend Wash, AZ (09/27/93)	Soil vapor extraction	4 distinct areas using soil vapor extraction			SVE is being conducted at four distinct areas; areas 6, 7, 8, and 12, at the site. Each site is considered as an individual project.	Emily Roth 415-744-2247
9	Intersil, CA (09/27/90)	Soil vapor extraction				Site renamed to Intersil/Siemens (Intersil)	Belinda Wei 415-744-2280
9	Solvent Service, CA (09/27/93)	Soil vapor extraction			Soil vapor extraction under RCRA corrective action	Project was changed from a Superfund remedial action to a RCRA corrective action.	Tony Mancini 510-286-0825
10	Fairchild AFB Priority 1 OUS (OU 1) Craig Rd Landfill, WA (02/13/93)	Soil vapor extraction		Yes		Remedy was not implemented because of the following concerns: • Generation of combustible gases • Heterogeneous stratigraphy • Reluctance to put holes into the landfill, which could lead to leaching of contaminants Will cap the landfill and conduct pump-and-treat operations.	Cami Grandinetti 206-553-8696
10	Gould, Inc., OR (03/31/88)	Soil washing		Yes		Remedy was shown to be ineffective due to varying site conditions and problems with the technology.	Chip Humphries 503-326-2678

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology Listed in 6th edition	7th edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
10	Naval Submarine Base, Bangor Site A, OU 1, WA (12/10/91)	Soil washing			Soil flushing (ex situ)	Will excavate and place soil in a lined pit. Soil will be sprayed with water and leachate and will be collected and treated.	Harry Craig 503-326-3689 Craig Thompson (WA) 360-407-7234 Chris Drury (Navy) 206-396-0062
10	Union Pacific Railroad Sludge Pit, ID (09/10/91)	Soil flushing		Yes		Remedy was not implemented. Excavation of sludge did not indicate that contaminants were present. Amended ROD was signed 9/94. Will excavate and treat off-site, in addition to a pump-and-treat operation.	Ann Williamson 206-553-2739 Clyde Cody (ID) 208-334-0556
10	Fort Lewis Military Res. Landfill 4 and Solvent Refined Coal Plant, WA (09/24/93)	Soil washing			Thermal Desorption	ROD specified soil washing or thermal desorption as the remedy. Thermal desorption was selected based on the results of a treatability study.	Bob Kievit 206-753-9014
10	Eielson Air Force Base, AK (9/29/92)	Bioventing and soil vapor extraction		Soil vapor extraction		Soil vapor extraction written into ROD as a contingency.	Mary Jane Nearman 206-553-6642 Rielle Markey (AK) 907-451-2117

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Sixth Edition (September 1994): Additions, Changes, and Deletions from the Fifth Edition (September 1993)

The sixth edition of the report added information about 53 innovative treatment technologies selected for remedial actions in FY 1993 RODs. Other changes are listed below.

Region	Site Name, State (ROD Date)	Technology Listed in 5th Edition	6th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
1	Union Chemical Co., OU 1, ME (12/27/90)	Thermal desorption			Soil vapor extraction	It was determined that SVE would be the more cost-effective of the two. ESD was signed April 1994.	Terry Connelly 617-573-9638 Christopher Rushton (ME DEP) 207-287-2651
1	Tibbetts Road, NH (09/29/92)	In situ soil flushing		Yes		Misinterpretation of ROD during ROD analysis. Soil was not targeted for treatment.	Darryl Luce 617-573-5767 Mike Robinette (NH) 603-271-2014
2	Ewan Property, OU 2, NJ (09/29/88)	Soil washing and solvent extraction		Yes		Reevaluation of site found significantly less contaminated soil than originally had been estimated. Soil will be disposed of off-site. ESD was signed July 1994.	Kim O'Connell 212-637-4399 (temporary)
2	Naval Air Engineering Center, OU 7, Interim Action, NJ (03/16/92)	In situ flushing		Yes		Misinterpretation of the ROD during ROD analysis.	Jeff Gratz 212-637-4320 Robert Wing 212-264-8670
2	Solvent Savers, NY (09/28/90)	Soil vapor extraction		Yes		Soil vapor extraction is a secondary remedy that may be used instead of thermal desorption, the primary remedy, if treatability studies show it to be effective.	Lisa Wong 212-637-4267
3	U.S. Titanium, VA (11/21/89)	In situ flushing			Neutralization with lime (ex situ)	Treatability studies indicated that the technology was not feasible. ESD is under preparation.	Vance Evans 215-597-8485 Jeff Howard (VA) 804-762-4203

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology Listed in 5th Edition	6th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
3	L.A. Clarke & Sons, OU 1 (Soils), VA (03/31/88)	Bioremediation (in situ)		Yes		Facility is no longer in operation, and excavation can be done. Remedies being considered include thermal desorption.	Andy Palestini 215-597-1286
3	L.A. Clarke & Sons, OU 1 (Soils), VA (03/31/88)	In situ flushing		Yes		Facility is no longer in operation, and remedies being considered include thermal desorption.	Andy Palestini 215-597-1286
3	L.A. Clarke & Sons, Lagoon Sludge OU, VA (03/31/88)	Bioremediation (ex situ)			Reuse off-site as fuel	Technology changed because of uncertainty about the ability of bioremediation to reach treatment goals. ESD was signed on 3/94.	Andy Palestini 215-597-1286
3	Henderson Road, PA (06/30/88)	Soil vapor extraction		Yes		Conducted air injection only to facilitate pump-and-treat system. Vapors were not extracted. Further investigation revealed that the vadose zone was not an area of concern.	Joe McDowell 215-566-3192
4	Cabot Carbon/Koppers (Groundwater), FL (09/27/90)	Bioremediation (in situ groundwater)		Yes		Groundwater is not being treated; only soil is being treated.	Patsy Goldberg 404-562-8543
4	Benfield Industries, NC (07/31/92)	Soil washing and bioremediation (slurry phase)			Land treatment	Land treatment was determined to be a more cost-effective technology.	Jon Bornholm 404-562-8820
4	Charles Macon Lagoon, Lagoon #10, NC (09/31/91)	Bioremediation (ex situ)		Yes		Treatability study indicated that the technology could not treat the contaminants of concern because of materials problems. Will excavate and dispose of wastes off-site. ROD amendment was signed in 3/94.	Geizelle Bennett 404-562-8824 David Lown (NC) 919-733-2801
4	Palmetto Wood Preserving, SC (09/30/87)	Chemical treatment		Yes		Waste will be disposed of more cost-effectively off-site.	Al Cherry (404) 342-7791

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology Listed in 5th Edition	6th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
4	Arlington Blending & Packaging Co., OU 1, TN (06/28/91)	Dechlorination		Yes		Another disposal method is likely to be used.	Derek Matory 404-562-8800
5	South Andover Salvage Yard, OU 2, MN (12/24/91)	Bioremediation (ex situ)		Yes	Thermal treatment	Technology changed to off-site thermal treatment (either thermal desorption or incineration) because of reduced volume of contamination found during RD investigations. ROD amendment was signed 5/31/94.	Bruce Sypniewski 312-886-6189
5	Allied Chem & Ironton Coke, OU 2, OH (12/28/90)	Bioremediation (in situ)	Bioremediation (ex situ) (land farming)			Adding technology to treat more highly contaminated soil.	Tom Alcamo 312-886-7278
5	Allied Chem & Ironton Coke, OU 2, OH (12/28/90)	Bioremediation (in situ)	Bioremediation (ex situ) (magnetically enhanced land farming)			Adding technology to treat more highly contaminated soil.	Tom Alcamo 312-886-7278
5	United Scrap Lead/SIA, OH (09/30/88)	Soil washing		Yes		Determined to be too expensive. Other alternatives being evaluated. ROD amendment planned.	Anita Boseman 312-886-6941 Timothy Hull (OH) 513-285-6357
5	MacGillis and Gibbs Co./Bell Lumber and Pole Co., MN (12/31/92)	Soil washing and Bioremediation (ex situ) of fines		Yes	Incineration (on-site)	Incineration was contingency remedy in ROD. State had concerns about effective means of soil washing, and cost of incineration has decreased. ESD will be signed in fall 1994.	Daryl Owens 312-886-7089
6	Fruitland Drum, NM (09/08/90)	Dechlorination			Incineration (off-site)	Dechlorination is not being pursued because of cost considerations.	Gregory Fife 214-655-6773
6	Holloman AFB, Main POL Area, NM	Bioremediation (in situ) (groundwater)		Yes		Groundwater remediation is not planned for this area.	Ron Stirling (USACE) 402-221-7664

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology Listed in 5th Edition	6th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
6	Holloman AFB, Main POL Area, NM	Air sparging		Yes		Groundwater remediation is not planned for this area.	Ron Stirling (USACE) 402-221-7664
6	South Valley, NM (09/30/88)	Soil vapor extraction		Yes		Determined there was insignificant concentration to warrant remediation. No further action.	Bert Gorrod 214-655-6779
6	Tinker AFB (Soldier Creek Bldg. 3001), OK (08/16/90)	Soil vapor extraction		Yes		Determined that SVE was not viable. No alternative has been selected.	Susan Webster 214-655-6784 Major Richard Ashworth (USAF) 405-734-3058
8	Rocky Mountain Arsenal, M-1 Basins (OU 16), CO (02/26/90)	In situ vitrification		Yes		Remedy has been canceled because of problems with the contractor. New ROD is being negotiated.	Connally Mears 303-293-1528
8	Portland Cement Co. (Kiln Dust No. 2 and No. 3) OU2, UT (03/31/92)	Chemical treatment		Yes		Technology is not considered innovative.	Mike McCeney 303-293-1526
9	Mesa Area Groundwater Contamination, AZ (09/27/91)	Soil vapor extraction		Yes		Site has been removed from National Priorities List (NPL), referred to the state	Maurice Chait 602-962-2187 Richard Oln 602-207-4176
9	Castle Air Force Base, OU 1, CA (08/12/91)	Bioremediation (in situ groundwater)		Yes	Pump and treat with air stripping	Bench-scale test indicated that the technology did not work. No ESD or ROD amendment is being issued.	David Roberts 415-744-1487 Brad Hicks (USAF) 209-726-4841
9	Teledyne Semiconductors (Spectra Physics), CA (03/22/91)	Soil vapor extraction		Yes		ROD was misinterpreted. SVE was intended only for Spectra Physics, the adjacent site.	Sean Hogan 415-744-2233 Carla Dube 510-286-1041

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology Listed in 5th Edition	6th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
9	FMC (Fresno), CA (06/28/91)	Soil washing		Yes		Soil washing did not work because the soil contained too many fines. Thermal desorption and solidification and stabilization are being considered as possible remedies.	Tom Dunkelman 415-744-2296 Mike Pfister (CA) 209-297-3934
9	Signetics (Advanced Micro Devices 901), CA (09/11/91)	Soil vapor extraction		Yes		Site is subject to a combined ROD for Signetics, AMD 901/902 and TRW Microwave site. SVE is not being done at the TRW OU. ROD was misinterpreted.	Darrin Swartz-Larson 415-744-2233 Kevin Graves (CA) 510-286-0435
9	Sacramento Army Depot, Oxidation Lagoons, OU 4, CA (09/30/92)	Soil washing		Yes		Technology canceled because of cost; solidification is being considered as an alternative.	Marlin Mezquita 415-744-2393
10	McChord AFB Washrack Treatment Area, AK (09/28/92)	Bioremediation (ex situ)		Yes		Additional studies showed that treatment is not needed.	Marie Jennings 206-553-1173

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Fifth Edition (September 1993): Additions, Changes, and Deletions from the Fourth Edition (October 1992)

The fifth edition of the report added information about 49 innovative treatment technologies selected for remedial action under FY 1992 RODs and 15 innovative treatment technologies used in removal actions. Other changes are listed below.

Region	Site Name, State (ROD Date)	Technology Listed in 4th Edition	5th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
1	Re-Solve, MA (09/24/87)	Dechlorination		Yes		Pilot study showed that dechlorination increased the volume and that the waste still required incineration. An ESD to incinerate residuals off-site is in peer review.	Joe Lemay 617-573-9622
1	Pinette's Salvage Yard, ME (05/30/89)	Solvent extraction		Yes		Will incinerate off-site.	Ross Gilleland 617-573-5766
2	Naval Air Engineering Center, OU 1, NJ (02/04/91)	In situ flushing		Yes		Remedy involves pump-and-treat system, with on-site discharge. Soil is not being targeted.	Jeff Gratz 212-637-4320
2	Naval Air Engineering Center, OU 2, NJ (02/04/91)	In situ flushing		Yes		Remedy involves pump-and-treat system, with on-site discharge. Soil is not being targeted.	Jeff Gratz 212-637-4320
2	Naval Air Engineering Center, OU 4, NJ (09/30/91)	In situ flushing		Yes		Remedy involves pump-and-treat system, with on-site discharge. Soil is not being targeted.	Jeff Gratz 212-637-6320
2	Caldwell Trucking, NJ (09/25/86)	Thermal desorption		Yes		Thermal desorption is not necessary because highly contaminated soil will be incinerated off-site. Remainder of soil will be stabilized. ESD issued.	Ed Finnerty 212-637-4367
3	Tobyhanna Army Depot, PA (Non-Superfund project)	Bioremediation (in situ)		Yes		Will conduct ex situ passive volatilization.	Drew Lausch 215-597-3161 Ross Mantione (Tobyhanna) 717-894-6494
4	Smith's Farm Brooks, KY (09/30/91)	Dechlorination	Thermal desorption			Will alter chemistry to achieve dechlorination during thermal desorption.	Tony DeAngelo 404-562-8826

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology Listed in 4th Edition	5th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
4	American Creosote Works, FL (09/28/89)	Soil washing		Yes		Bench-scale study of soil washing showed that the concentrations of carcinogenic PAHs were not reduced adequately. Dioxins also were discovered at much higher concentrations.	Mark Fite 404-562-8927
4	American Creosote Works, FL (09/28/89)	Bioremediation (ex situ)		Yes		Bench-scale study of bioremediation (ex situ) showed that the concentrations of carcinogenic PAHs were not reduced adequately. Dioxins also were discovered at much higher concentrations.	Mark Fite 404-562-8927
4	Hollingsworth Solderless, FL (04/10/86)	None	Soil vapor extraction			Listed as soil aeration in the third edition.	John Zimmerman 404-562-8936
5	Cliffs/Dow Dump, MI (09/27/89)	Bioremediation (in situ)		Yes		Bioremediation (in situ) was a misinterpretation of the ROD. All soil will be excavated and treated by bioremediation (ex situ).	Ken Glatz 312-886-1434
6	Tenth Street Dump/Junkyard, OK (09/27/90)	Dechlorination		Yes		Remedy has been suspended because of difficulties in implementation and escalating cost; Actual cost was double the cost projected in ROD. ROD amendment to cap in place is being issued.	Mike Overbay 214-655-8512
7	Fairfield Coal & Gas, IA (09/21/90)	Bioremediation (in situ)		Yes		Pilot study showed in situ bioremediation was too costly. It appears that the present pump-and-treat system will achieve cleanup levels.	Bruce Morrison 913-551-7755
8	Sand Creek Industrial OU 5, CO (09/28/90)	Soil washing			Thermal desorption	Soil washing did not meet performance standards and was expensive. ROD amendment was issued in early September 1993.	Erna Acheson 303-312-6753

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Region	Site Name, State (ROD Date)	Technology Listed in 4th Edition	5th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
9	Koppers Company (Oroville), CA (04/04/90)	Bioremediation (ex situ)		Yes		Misinterpretation of ROD during ROD analysis.	Fred Schlauffler 415-744-2359
9	Signetics (AMD 901) TRW OU, CA (09/11/91)	None	Soil vapor extraction			Remedy added.	Joe Healy 415-744-2331 Kevin Graves (CA) 510-286-0435
9	Teledyne Semiconductors, CA (03/22/91)	None	Soil vapor extraction			Dropped by mistake from fourth edition.	Sean Hogan 415-744-2233
10	IDEL Warm Waste Pond, ID (12/05/91)	Acid extraction		Yes		Treatability study of acid extraction did not achieve good extraction rates. Did not reduce the volume of waste. Will excavate, consolidate, and cap.	Linda Meyer 206-553-6636 Nolan Jenson (DOE) 208-526-0436
10	IDEL Warm Waste Pond, ID (12/05/91)	Soil washing		Yes		Treatability study of soil washing did not achieve acceptable results. Did not reduce the volume of waste. Will excavate, consolidate, and cap.	Linda Meyer 206-553-6636 Nolan Jenson (DOE) 208-526-0436

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Fourth Edition (October 1992): Additions, Changes, and Deletions from the Third Edition (April 1992)

The fourth edition of the report added information about 10 innovative treatment technologies selected for remedial action under FY 1992 RODs and 21 innovative treatment technologies implemented at non-Superfund sites. Other changes are listed below.

Region	Site Name, State (ROD Date)	Technology (Listed in 3rd Edition)	4th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
2	Lipari Landfill Marsh Sediment, NJ (07/11/88)	None	Thermal desorption			Missed during original ROD analysis.	Tom Graff 816-426-2296
2	GE Wiring Devices, PR (09/30/88)	Thermal desorption			Soil washing		Caroline Kwan 212-637-4275
5	University of Minnesota, MN (06/11/90)	Thermal desorption		Yes	Incineration (in the fifth edition)	An ESD was issued in August 1991 to change remedy to thermal desorption *or* incineration. Incineration was chosen because it was the less expensive of the two.	Darrel Owens 312-886-7089
6	Sol Lynn/Industrial Dechlorination Transformers, TX (03/25/88)	Dechlorination		Yes		Discontinued because of difficulties in implementation.	John Meyer 214-667-6742
6	Koppers/Texarkana, TX (09/23/88)	Soil washing	In situ flushing			Remedy added by ROD amendment.	Ursula Lennox 214-655-6735
9	Poly Carb, NV (Removal)	Bioremediation (in situ)			Bioremediation (ex situ)	Reclassified technology.	Bob Mandel 415-744-2290
9	Teledyne Semiconductors, CA (03/22/91)	Soil vapor extraction		Yes		Mistakenly deleted from report.	Sean Hogan 415-744-2233
10	Gould Battery, OR (03/31/88)	Soil washing	Soil washing			Missed during original ROD analysis.	Chip Humphries 503-326-2678

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Third Edition (April 1992): Additions, Changes, and Deletions from the Second Edition (September 1991)

The third edition of the report added information about 70 innovative treatment technologies selected for remedial actions under FY 1991 RODs. Other changes are listed below.

Region	Site Name, State (ROD Date)	Technology (Listed in 2nd Edition)	3rd Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
2	Marathon Battery, NY (09/30/88)	Thermal desorption		Yes		During design, soil gas concentration at hot spots was below state standards. Groundwater monitoring will continue.	Pam Tames 212-264-1036
2	Goose Farm, NJ (09/27/85)	In situ soil flushing		Yes		Incorrectly classified. A pump-and-treat system with reinjection of treated water is being used.	Laura Lombardo 212-264-6989
2	GE Wiring Services, PR (09/30/88)	Soil washing			Thermal desorption	Possible pre-wash of debris with surfactants.	Caroline Kwan 212-637-4275
4	Coleman-Evans Wood Preserving, FL (09/26/90)	Soil washing		Yes		Problems due to the presence of furans; incineration is likely.	Tony Best 404-347-2643
5	Sangamo/Crab Orchard National Wildlife Refuge, IL (08/01/90)	In situ vitrification		Yes	Incineration	ROD specified the remedy as in situ vitrification or incineration; incineration was chosen.	Nan Gowda 312-353-9236
5	Anderson Development, MI (09/28/90)	In situ vitrification			Thermal desorption	Because of concern on the part of the community, the remedy was changed. A ROD amendment was signed on 9/30/91, and an ESD was signed on 10/2/92.	Jim Hahnenberg 312-353-4213
5	U.S. Aviex, MI (09/07/88)	In situ flushing		Yes		Cleanup levels were reached by natural attenuation.	Robert Whippo 312-886-4759
6	Atchison/Santa Fe/Clovis, NM (09/23/88)	Bioremediation (ex situ)		Yes			Ky Nichols 214-655-6783
6	Crystal Chemical, TX (09/27/90)	In situ vitrification		Yes		Remedy was reconsidered after commercial availability of the technology was delayed. Revised remedy will consist of capping and off-site disposal and consolidation of soils.	Lisa Price 214-655-6735
9	Solvent Service, CA (09/27/90)	Bioremediation (in situ)		Yes		ROD was misinterpreted during ROD analysis.	Kevin Graves 510-286-0435 Steve Morse (CA) 570-286-0304
9	Poly Carb, NV (Removal)	Bioremediation (ex situ)			Bioremediation (in situ)	Reclassified technology.	Bob Mandel 415-744-2290

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Second Edition (September 1991): Additions, Changes, and Deletions from the First Edition (January 1991)

The second edition of the report added information about 45 innovative treatment technologies selected for remedial actions in RODs signed during fiscal year (FY) 1990 and 18 innovative treatment technologies used in removal actions. Other changes are listed below.

Region	Site Name, State (ROD Date)	Technology (Listed in 1st Edition)	2nd Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
3	Leetown Pesticides, WV (03/31/86)	Bioremediation		Yes		No further action. Risk was re-evaluated and it was determined that risk was not sufficient for remedial action.	Andy Palestini 215-597-1286 Philip Rotstein 215-566-3232
3	Harvey-Knott Drum, DE (09/30/85)	In situ soil flushing		Yes		During remedial design, sampling indicated VOCs were no longer present in the soils. Heavy metals remained at the surface. An ESD was issued in December 1992. Remedy will consist of capping the site.	Kate Lose 215-566-3240
2	SMS Instruments (Deer Park), NY (09/29/89)	Thermal desorption		Yes (changed to soil vapor extraction in third edition)		ROD was misinterpreted during ROD analysis.	Miko Fayon 212-637-4250
1	Re-Solve, MA (09/24/87)	Chemical treatment			Dechlorination	Reclassified technology.	Lorenzo Thantu 212-637-4240
2	GE Wiring Services, PR (09/30/88)	Chemical extraction			Soil washing	Reclassified technology.	Caroline Kwan 212-637-4275
6	Sol Lynn/Industrial Transformers, TX (03/25/88)	Chemical treatment			Dechlorination	Reclassified technology.	John Meyer 214-665-6742
10	Northwest Transformer, WA (09/15/89)	In situ vitrification		Yes		Technology dropped because commercial availability was delayed.	Christine Psyk 206-553-6519

Information on the date and issuance of Explanations of Significant Differences (ESDs) and ROD Amendments is not complete.

Appendix F

On-site Incineration: Summary of Status Report Updates, Changes, and Deletions

On-Site Incineration: Summary of Status Report Updates, Changes, and Deletions

Eighth Edition (November 1996): Additions, Changes, and Deletions In On-Site Incineration Applications From the Seventh Edition (September 1995)

This eighth edition of the report contains new information on the application of on-site incineration remedies at Superfund sites. Changes from the seventh edition to this edition are listed below.

Region	Site Name, State (ROD Date)	Technology (Listed in 7th Edition)	8th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
1	New Bedford, MA (04/06/90)	On-site incineration		Yes		Remedy canceled because of community concerns. No alternative selected at this time.	David Dickerson 617-573-9632
1	Wells G&H, MA (09/14/89)	On-site incineration			Off-site incineration	Remedy changed to off-site incineration because of community concerns. Explanation of significant difference (ESD) signed 04/25/91.	Mary Garren 617-573-9613 Paula Fitzsimmons (MA) 617-223-5572
1	Davis Liquid Waste, RI (09/29/87)	On-site incineration			Thermal desorption	Thermal desorption more cost-effective. ESD signed 6/96.	Neal Handler 617-543-9636
2	Brook Industrial Park, OU 1, NJ (09/30/94)	On-site incineration		Yes		Misinterpretation of ROD. Will conduct off-site incineration or disposal.	Donna Vizian 212-637-4295
2	De Rewal Chemical, NJ (09/29/89)	On-site incineration		Yes		Remedy changed to off-site disposal because more cost-effective. Much less volume of contaminated material than originally projected.	Romona Pezzella 212-637-4385
2	Lipari Landfill, NJ (07/11/88)	On-site incineration			Thermal desorption*	ROD specified thermal treatment of marsh sediments. Thermal desorption was selected as the treatment.	Fred Cataneo 212-637-4428
2	Love Canal, NY (09/26/88)	On-site incineration			Off-site incineration	PRP was conducting on-site incineration at another site. Waste was transported to that site for incineration.	Damian Duda 212-637-4269 Doug Carbarini 212-637-4263
2	Sarney Farm, NY (09/27/90)	On-site incineration			Thermal desorption*	Misinterpretation of the ROD.	Kevin Willis 212-637-4271

* Technology listed in the seventh edition

Region	Site Name, State (ROD Date)	Technology (Listed in 7th Edition)	8th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
3	Delaware Sand & Gravel, DE (04/22/88)	On-site incineration			Soil vapor extraction* and bioremediation (in situ)*	Remedy was revised to address previously unrecognized site conditions. ROD amendment signed on 09/30/93. SVE subsequently changed to bioventing.	Eric Newman 215-566-3237
3	Southern Maryland Wood Treating, MD (06/29/88)	On-site incineration			Thermal desorption	Remedy changed to thermal desorption, because of cost and community concerns. ROD issued on 09/08/95.	Stephanie Dehnhard 215-566-3234
3	Eastern Diversified Metals, PA (03/29/91)	On-site incineration			Off-site incineration	ROD specified on or off-site incineration. Off-site being conducted because of reduced amount of material to be treated.	Steven Donohue 215-566-3215
3	MW Manufacturing, PA (06/29/90)	On-site incineration		Yes		Pilot-scale trial burn could not achieve emission standards. Remedy to be determined; considering solidification/ stabilization at this time.	Bhupi Khona 215-566-3213
3	Sagertown Industrial, PA (01/29/93)	On-site incineration			Off-site incineration	Remedy changed because of cost and faster treatment time. ESD signed on 03/09/95.	Steven Donohue 215-566-3215
3	Whitmoyer Laboratories, OU 2, PA (12/17/90)	On-site incineration			Off-site incineration	Remedy changed because the volume of wastes was less than originally projected. ESD signed on 12/28/94.	Chris Corbet 215-566-3220
3	Ordnance Works Disposal, WV (03/31/88)	On-site incineration		Yes	Bioremediation (ex situ)*	Remedy changed because of community concerns. ROD amended in 1/89.	Melissa Whittington 215-566-3235

* Technology listed in the seventh edition

Region	Site Name, State (ROD Date)	Technology (Listed in 7th Edition)	8th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
4	Mowbray Engineering, AL (09/25/86)	On-site incineration			Solidification/ stabilization	Remedy changed because of cost.	Tim Woolheater 404-347-2643
4	Zellwood Groundwater, FL (12/17/87)	On-site incineration			Solidification/ stabilization*	Remedy changed because of community concerns and because the state would not concur with incineration. ROD amendment issued on 03/01/90.	Pam Scully 404-347-6246
4	Mathis Brothers Landfill (South Marble Top Road), GA (03/24/93)	On-site incineration			Off-site incineration and bioremediation (ex-situ)*	Remedy changed because of community concerns and cost effectiveness. Bioremediation will treat dicamba wastes. Off-site incineration will treat all other wastes.	Charles L. King.Jr. 404-562-8931
4	Smith's Farm Brooks, KY (09/29/89)	On-site incineration			Dechlorination*, thermal desorption* and, Solidification/ Stabilization*	Remedy changed because of community concerns. Amended remedy is dechlorination and thermal desorption followed by solidification/stabilization. ROD amendment issued on 09/30/91.	Antonio DeAngelo 404-562-8826
4	Aberdeen Pesticide Dump Fairway, NC (06/30/89)	On-site incineration			Thermal desorption *	Remedy changed because of community concerns, cost, and a preference for using an innovative technology. ROD amendment signed on 09/30/91.	Kay Crane 404-562-8795 Randy McElveen (NC) 919-733-2801
4	Geiger/C&M Oil, SC (06/01/87)	On-site incineration			Solidification/ stabilization*	Further investigation found that organics were not present at their previous levels. ROD amendment issued 07/13/93.	Sherry Panabaker 404-562-8810
4	American Creosote Works (Jackson Plant), TN (01/05/89)	On-site incineration		Yes		Action completed as a removal by excavating and disposing off site. ESD issued in 1992.	Femi Akindale 404-347-7791

* Technology listed in the seventh edition

Region	Site Name, State (ROD Date)	Technology (Listed in 7th Edition)	8th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
5	Acme Solvent Reclaiming, IL (09/27/85)	On-site incineration		Yes		PRPs excavated and disposed of soil off-site.	Deborah Orr 312-886-7576
5	Fort Wayne Reduction, IN (08/26/88)	On-site incineration			Off-site incineration	Remedy changed to ROD contingency off-site incineration because of community concerns, cost, and implementability.	Fred Mickey 312-886-5123
5	Ninth Avenue Dump, IN (06/30/89)	On-site incineration			Soil vapor extraction	Remedy changed because of cost. Soil vapor extraction will treat larger area than soil flushing remedy that was completed in 1994. Soil flushing removed most of the heavier contaminants. ROD amendment signed on 9/13/94.	Bernard Schorle 312-886-4746
5	Bofors Nobel, MI (09/17/90)	On-site incineration		Yes		Remedy changed from on-site incineration to disposal in an on-site landfill because of cost. Volume of material to be treated much greater than expected. ROD amendment signed on 07/22/92. Now proposing containment via slurry wall because of cost.	John Fagiolo 312-886-0800
5	Forest Waste Products, MI (03/31/88)	On-site incineration			Off-site incineration	Original ROD specified either on-site or off-site incineration as the remedy. ESD signed on 05/04/93.	Beth Reiner 312-886-6337
5	Springfield Township Dump, MI (09/29/90)	On-site incineration		Yes		Remedy canceled because of community concerns. ROD amendment projected to be issued in Fall 1996. Remedy to be determined.	Kashual Khanna 312-353-2663
5	Arrowhead Refinery Co., MN (09/30/86)	On-site incineration			Solvent extraction*	Remedy was changed to solvent extraction because of cost-effectiveness and short-term effectiveness. ROD amendment signed on 02/09/94.	Edwin Smith 312-353-6571

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Region	Site Name, State (ROD Date)	Technology (Listed in 7th Edition)	8th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
5	Ritari Post and Pole, OU 1, MN (06/30/94)	On-site incineration			Off-site incineration	Misinterpretation of ROD. Remedy now being reconsidered. Capping is a contingency.	Ramon Torres 312-886-3010
5	Fields Brook, OH (09/30/86)	On-site incineration			Off-site incineration	Remedy changed because of cost and community concerns. ESD will be issued in 1997.	Ed Hanlon 312-353-9228
5	Pristine, OH (12/31/87)	On-site incineration			Soil vapor extraction* and thermal destruction*	Misinterpretation of ROD specified in situ vitrification. This remedy was changed to SVE and thermal destruction. Thermal desorption was selected as the thermal destruction technology. ROD amendment issued on 03/30/90. (see below)	Tom Alcamo 312-886-7278
5	Pristine, OH (03/30/90) (Amendment)	On-site incineration			Thermal desorption*	1990 ROD amendment specified thermal destruction. Thermal desorption selected as the thermal destruction technology.	Tom Alcamo 312-886-7278
6	Gulf Coast Vacuum Services, OU 1, LA (09/30/92)	On-site incineration			Bioremediation (Land Treatment)	Agreement between PRPs and EPA to meet the treatment standards using bioremediation.	Kathleen Aisling 214-665-8509
6	Vertac, AR (09/27/90)	On-site incineration		Yes		Incinerator would not function properly. Will dispose on-site. ROD amendment will be issued in Fall 1996.	Phillip Allen 214-665-8516
6	MOTCO, TX (03/15/85)	On-site incineration			Off-site incineration	Remedy changed because of contractor problems and cost. ESD has been issued.	Mary Ann Abramson 214-665-6754

* Technology listed in the seventh edition

Region	Site Name, State (ROD Date)	Technology (Listed in 7th Edition)	8th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
7	Hastings Groundwater Contamination (East Industrial), NE (09/28/90)	On-site incineration			Off-site incineration	Remedy changed because volume of soil was less than originally projected. More cost-effective to incinerate off-site. ROD amendment issued 02/28/95.	Ron King 913-551-7063
8	Broderick Wood Projects, CO (06/30/88)	On-site incineration		Yes	Off-site incineration*	Remedy canceled based on new technical data and cost. Will excavate and recycle and incinerate off-site. ROD amendment signed on 09/24/91.	Armando Saenz 303-312-6559

* Technology listed in the seventh edition