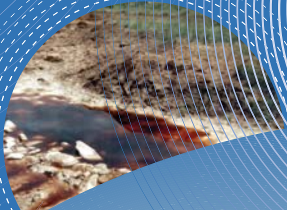
United States Environmental Protection Agency

Treatment Technologies for Site Cleanup:
Annual Status Report

TWELFTH EDITION



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Treatment Technologies for Site Cleanup: Annual Status Report (Twelfth Edition)

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Notice

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A portable document format (PDF) version of the ASR is available for viewing or downloading from the Hazardous Waste Cleanup Information (CLU-IN) Web site at *http://clu-in.org/asr*. Printed copies of the ASR can also be ordered through that web address, subject to availability.

The data for the ASR are available in a searchable online database (the ASR Search System) at *http://cfpub.epa.gov/asr/*.

List of Acronyms

ASR	Annual Status Report
BTEX	Benzene, toluene, ethylbenzene, and xylene
CC	Construction completion
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
CLU-IN	EPA's CLeanUp INformation system
DCE	Dichloroethene
DNAPL	Dense nonaqueous phase liquid
DRE	Destruction and removal efficiency
EOU	Excess, obsolete, or unserviceable
EPA	U.S. Environmental Protection Agency
ESD	Explanation of significant differences
FRTR	Federal Remediation Technologies Roundtable
FY	Fiscal year
LNAPL	Light nonaqueous phase liquid
MNA	Monitored natural attenuation
MSW	Municipal solid waste
NA/NFA	No action/no further action
NAPL	Nonaqueous phase liquid
NPL	National Priorities List
NSCEP	National Service Center for Environmental Publications
OB	Open burn
OD	Open detonation
OSC	On-Scene Coordinator
OSRTI	Office of Superfund Remediation and Technology Innovation
OSWER	Office of Solid Waste and Emergency Response
OU	Operable unit
P&T	Pump and treat
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyls
PCE	Tetrachloroethene
PCOR	Preliminary close-out report
PDF	Portable document format
PRB	Permeable reactive barrier
RA	Remedial action
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RPM	Remedial Project Manager
RSE	Remediation System Evaluation
S/S	Solidification/stabilization
SARA	Superfund Amendments and Reauthorization Act
SVE	Soil vapor extraction
SVOC	Semivolatile organic compound
TCA	Trichloroethane
TCE	Trichloroethene
UV	Ultraviolet
VC	Vinyl chloride
VEB	Vertical engineered barrier
VOC	Volatile organic compound

Executive Summary

The Twelfth Edition of *Treatment Technologies for Site Cleanup: Annual Status Report* (ASR) documents the status, achievements, and trends associated with treatment technologies at National Priorities List (NPL) sites for remedy decisions between 1982 and 2005. Information collected and analyzed for this report helps document the progress and contributions of technologies implemented at NPL sites. In addition to presenting information about remedy decisions based solely on records of decision (ROD), this report provides data about projects that relate to their operational status and treatment accomplishments. The report includes information about:

- **Treatment technologies for source control**: *In situ* and *ex situ* treatment technologies for sources of contamination (such as soil, sludge, sediment, other solid matrix wastes, and nonaqueous phase liquids [NAPL]).
- **Treatment technologies and other remedies for groundwater:** *In situ* and *ex situ* (pump and treat [P&T]) groundwater treatment technologies and monitored natural attenuation (MNA) remedies for groundwater.
- **On-site containment remedies:** Vertical engineered barriers (VEB), caps, and liners used to prevent the migration of contaminants or contaminated media.

This edition of the ASR provides:

- Information about 192 treatment technologies selected from fiscal year (FY) 2002 to 2005 ("new" for the ASR Twelfth Edition)
- Updates to more than 1,200 projects from 1982 to 2002
- A total of 1,915 treatment technologies and 57 groundwater VEBs are included with updated information
- Analysis of 133 on-site containment projects ("new" analysis for the ASR Twelfth Edition)

The data contained in the report were gathered from the Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) for FY 1982 to 2005 (as documented as of October 2006), from site-specific decision documents, and online U.S. Environmental Protection Agency (EPA) sources.

Major Findings

Use of Treatment Remedies at NPL Sites

The Superfund Amendments and Reauthorization Act of 1986 (SARA) expressed a preference for permanent remedies (that is, treatment) over containment or removal and disposal in the remediation of Superfund sites. As of September 2005, 1,536 sites had been listed on the NPL. Of those, 307 sites had been deleted, leaving 1,229 sites on the NPL. An additional 54 sites were proposed for listing at that time.

- At nearly two-thirds of NPL sites (63 percent), source control treatment, groundwater treatment, or both, have been implemented or are planned as a remedy for some portion of the site.
- More than a quarter of the sites (28 percent) selected treatment for both source control and groundwater.
- The selected remedies do not include treatment for 24 percent of sites.
- No ROD has been issued for 13 percent of all NPL sites.

Some 56 percent (1,677) of all RODs analyzed for the ASR (2,976) contained provisions for treatment of source media or groundwater. EPA currently tracks the status of 1,915 projects for application of treatment technologies at Superfund sites, including *in situ* and *ex situ* treatment projects for both source control and groundwater. These applications include:

- 515 *ex situ* source control treatment projects (27 percent of all projects)
- 421 *in situ* source control treatment projects (22 percent)
- 725 P&T projects (38 percent)
- 213 *in situ* groundwater treatment projects (11 percent)
- 41 *in situ* source control and *in situ* groundwater treatment projects (2 percent)

Use of Treatment for Source Control

A total of 977 projects were planned or implemented for the 1,104 source control treatment RODs and ROD amendments. Those projects include a wide range of *in situ* and *ex situ* technologies used to address many types of contaminants, and represent various stages of design and implementation. Trends and general observations include:

- The selection of *in situ* treatment for source control continues to increase. *In situ* source control treatment projects represented 60 percent of source treatment projects from FY 2002 to 2005. Cumulatively, from FY 1982 through 2005, *in situ* source control projects make up 47 percent of the projects.
- From FY 2002 to 2005, projects that used *in situ* technologies of multi-phase extraction and chemical treatment are being selected at an increasing rate compared with soil vapor extraction (SVE) projects that are not being selected as frequently as in past years.
- Historically, incineration projects have represented a high percentage of *ex situ* source treatment projects (29 percent reported in the eleventh edition of the ASR for FY 1982 to 2005). During the period from FY 2002 to 2005, incineration represented only 6 percent of *ex situ* treatment projects.
- In FY 2004, the percentage of projects that selected innovative technologies reached 47 percent, nearly equaling the percentage for established technologies. This trend continued in FY 2005, with partial data indicating 48 percent of projects selected innovative technologies.
- Nearly 80 percent of *ex situ* source control projects are completed and 10 percent are operational. Approximately 40 percent of *in situ* source control projects are completed, while another 40 percent are operational.

Use of Treatment for Groundwater

Of the RODs that select groundwater treatment, 18 percent (195) used *in situ* treatment remedies, whereas more than 90 percent (958) used P&T remedies. A total of 254 *in situ* treatment projects and 725 P&T projects are planned or have been implemented from those RODs. Trends and general observations about groundwater treatment RODs and projects include:

- RODs that select *in situ* groundwater treatment have been generally increasing, from none in FY 1982 through 1986 to a high of 31 percent in FY 2005.
- RODs that select P&T alone have decreased from about 80 percent before FY 1992 to an average of 20 percent over the last 5 years (FY 2001 through 2005).
- RODs that select MNA experienced a decline from FY 1999 to 2002, coinciding with publication of EPA guidance on the use of MNA in 1999. Since FY 2002, RODs that select MNA have been increasing, with almost half of all groundwater RODs selecting MNA in FY 2005.
- The most common *in situ* technologies include air sparging, bioremediation, chemical treatment, permeable reactive barriers (PRB), and multi-phase extraction. Cumulatively, air sparging represents almost 30 percent of all *in situ* groundwater treatment projects and bioremediation represents 27 percent.
- *In situ* bioremediation and chemical treatment have increased significantly in recent years, with approximately 70 to 80 percent of these projects selected in the past six years.
- More than 70 percent of P&T projects selected are currently operational. Another 10 percent have been shut down. Eighteen percent of *in situ* groundwater projects have been completed, and nearly 50 percent continue to operate.

Project Completion at NPL Sites

A total of 1,915 treatment remedies have been planned or implemented at NPL sites. Of these treatment remedies:

- 687 projects (36 percent) have been completed or shut down
- 857 projects (45 percent) are operational
- 371 projects (19 percent) are being designed or constructed

Trends and general observations about completed projects include:

- Approximately 60 percent of all source control projects are completed.
- Most of the completed projects are *ex situ* source control treatments (57 percent) that usually involve excavation of contaminated soil and application of an aggressive treatment technology in a controlled environment. Nearly all incineration projects have been completed. Approximately 80 percent of the solidification/stabilization (S/S) and thermal desorption projects have been completed.
- *In situ* treatments are applied to contaminated media in place, without excavation. These projects typically require longer treatment times because they take place in a less controlled environment, which may limit the treatment rate. *In situ* treatment technologies represent

31 percent of completed projects, with 170 of those 216 projects being *in situ* source control treatment only (with no groundwater treatment).

- More *in situ* source control projects have been completed than *in situ* groundwater projects. For instance, approximately 65 percent of *in situ* S/S projects and 45 percent of *in situ* SVE projects have been completed. In contrast, less than 30 percent of air sparging for *in situ* groundwater treatment have been completed.
- P&T projects, which represent the largest number of treatment projects (725), typically require long treatment times and represent only 11 percent of all completed and shut down projects.
- Ten percent of P&T projects have been completed or shut down.

Section 1: Introduction

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund) to address the dangers of abandoned or uncontrolled hazardous waste sites. CERCLA provides the U.S. Environmental Protection Agency (EPA) and other federal agencies the authority to respond to a release or a substantial threat of a release of a hazardous substance into the environment, or a release or substantial threat of a release of "any pollutant or contaminant, which may present an immediate and substantial danger to public health or welfare."

Since the inception of the Superfund program, EPA has responded to thousands of actual or potential releases of hazardous substances through short-term or emergency removal actions and longer-term cleanup efforts known as remedial actions. These remedial actions, undertaken to provide more permanent solutions to protect human health and safety, may require years to design, implement, and complete.

Although remedial options may include a variety of possible remedies, ranging from containment of wastes to treatment to institutional controls, the Superfund Amendments and Reauthorization Act of 1986 (SARA) expressed a preference for permanent remedies (that is, treatment) over containment or removal and disposal in remediation of Superfund sites. EPA currently tracks the status of projects where treatment technologies are applied at National Priorities List (NPL) sites to collect and analyze information about the progress and contributions of technologies that have been implemented. This report documents the status, achievements, and trends associated with treatment technologies at NPL sites with remedy decisions from fiscal year (FY) 1982 through 2005.

Reporting on the Status of Treatment Technologies

The Twelfth Edition of Treatment Technologies for Site Cleanup: Annual Status Report (ASR) documents treatment technology applications for soil, other solid wastes, liquid wastes, and groundwater at NPL sites. The report includes information about:

- Treatment Technologies for Source Control - *In situ* and *ex situ* treatment technologies for sources of contamination (such as soil, sludge, sediment, other solid matrix wastes, and nonaqueous phase liquids [NAPL]).
- Treatment Technologies and Other Remedies for Groundwater - *In situ* and *ex situ* (pump and treat [P&T]) groundwater treatment technologies and monitored natural attenuation (MNA) remedies for groundwater.
- Containment Remedies - Vertical engineered barriers (VEB), caps, and liners used to prevent the migration of contaminants or contaminated media.

The Twelfth Edition of the ASR uses information from the ASR Eleventh Edition (EPA 542-R-03-009), published by EPA in February 2004, and updated data from the following sources:

- FY 2002 decision documents (e.g., records of decision [ROD], ROD amendments, and Explanations of Significant Differences [ESD]). Data includes the estimated 30 percent of decision documents that were not included in the ASR Eleventh Edition.
- FY 2003 decision documents.
- FY 2004 decision documents.
- FY 2005 decision documents available as of October 2006 (an estimated 76 percent of the total signed decision documents).
- Other sources of information, including 5-year review reports, preliminary close-out reports (PCOR), and online regional site summaries.

Box 1. New in the Twelfth Edition

- Information about 192 treatment technologies selected from FY 2002 to 2005 ("new" for the ASR Twelfth Edition).
- Updates to more than 1,200 treatment technologies selected from FY 1982 to 2002.
- A total of 1,915 treatment technologies and 57 groundwater vertical engineered barriers (VEBs) are included with updated information.
- Analysis of 133 on-site containment projects ("new" for the ASR Twelfth Edition).

Information about technologies and sites identified in this report was obtained, in part, from the CERCLA Information System (CERCLIS) as of October 2006. Some data may differ from information found in the CERCLIS database as a result of review of individual decision documents, site summaries, or other sources obtained while preparing this report.

Treatment Technologies Included in this Report

Remedies selected for NPL sites are documented in RODs and ROD amendments. Throughout the ASR, the term "RODs" is generally used inclusively to mean both RODs and ROD amendments. Many RODs for remedial actions address the source of contamination, such as soil, sludge, sediments, and solid-matrix wastes; these "source control" RODs select "source control remedies." A groundwater remedial action is also known as "a non-source control action." These actions are described in the report as "groundwater remedies." The graphic at the right illustrates a remedial site with source media contamination and groundwater contamination. A ROD may include both "source control" and "groundwater" components. Appendix F to this document is a detailed description of the methodology used to classify RODs, including detailed definitions of "source control remedies," "groundwater remedies," and other remedy types. Box 3 provides a summary of the remedy types presented in Appendix F.

Box 2. *In Situ* and *Ex Situ* Treatment

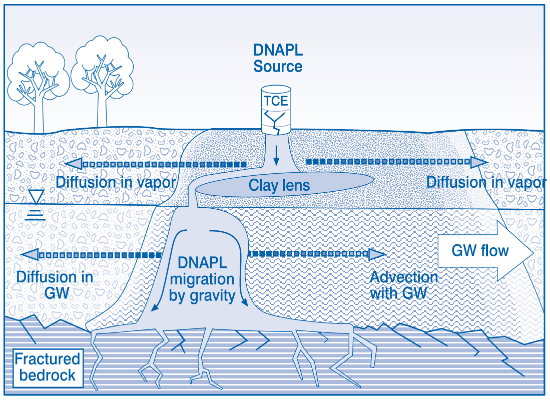
In situ: In its original place; unmoved, unexcavated; remaining at the site or in the subsurface.

In situ treatment technologies treat or remove the contaminant from source media without excavation or removal of the source media, or from groundwater without extracting, pumping, or otherwise removing the groundwater from the aquifer.

Ex situ: Moved, excavated, or removed from the site or subsurface.

Implementation of ex situ remedies requires excavation or removal of the contaminated source media or extraction of groundwater from an aquifer before treatment may occur above ground.

Site with Source Media and Groundwater Contamination



The term "treatment technology" means any unit operation or series of unit operations that alters the composition of a hazardous substance or pollutant or contaminant through chemical, biological, or physical means so as to reduce toxicity, mobility, or volume of the contaminated materials being treated. Treatment technologies are an alternative to land disposal of hazardous wastes without treatment (March 8, 1990 Federal Register [55 FR 8819], see Title 40 Code of Federal Regulations [CFR] Part 300.5, "Definitions").

Information on cost and performance is often available for treatment technologies that are considered "established." The most frequently used established technologies are on- and off-site incineration, solidification/stabilization (S/S), soil vapor extraction (SVE), and thermal desorption for source control, and P&T technologies for groundwater. Treatment of groundwater after it has been pumped to the surface usually involves traditional water treatment; as such, groundwater P&T remedies are considered established technologies.

Innovative technologies are alternative treatment technologies with a limited number of applications and limited data on cost and performance. Often, these technologies are established in other fields, such as chemical manufacturing. In such cases, it is the application of a technology or process at a waste site (to soils, sediments, sludge, and solid-matrix waste such as mining slag, or groundwater) that is innovative, and not the technology itself. Innovative technologies for source control are discussed in Section 2. Innovative technologies for *in situ* treatment of groundwater are discussed in Section 3.

BOX 3. SUMMARY OF SOURCE CONTROL AND GROUNDWATER REMEDY TYPES

SOURCE CONTROL REMEDY TYPES*

Source Control Treatment

- Treatment of a contaminant source *in situ* or *ex situ*.
- Can include any of the source control treatment technologies described in this report, such as chemical treatment and thermal desorption.

Source Control Containment

- Containment of a contaminant source.
- Can include the use of caps, liners, covers, and landfilling, both on and off site.

Source Control Other

- Other remedies for contaminant sources.
- Can include institutional controls, monitoring, and population relocation.

GROUNDWATER REMEDY TYPES*

***In Situ* Treatment**

- Treatment of groundwater in place without extracting it from an aquifer.
- Can include any of the *in situ* groundwater treatment technologies identified in this report, such as air sparging and permeable reactive barriers.

Pump and Treat (P&T)

- Extraction of groundwater from an aquifer and treatment aboveground.
- Groundwater usually is extracted by pumping from a well or trench.
- Treatment can include any of the P&T technologies described in this report, such as air stripping and ion exchange.

Monitored Natural Attenuation (MNA)

- The reliance on natural attenuation processes (within the context of a carefully controlled and monitored approach to site cleanup) to achieve site-specific remediation objectives on a schedule that is reasonable compared with other alternatives.
- Natural attenuation processes include a variety of physical, chemical, and biological processes.

Groundwater Containment

- Containment of groundwater through a vertical, engineered, subsurface, impermeable barrier.
- Containment of groundwater through a hydraulic barrier created by pumping.

Groundwater Other

- Groundwater remedies that do not fall into the categories of groundwater *in situ* treatment, P&T, MNA, or containment remedies.
- Can include a variety of remedies, such as water use restrictions and alternative water supply.

* See Appendix F for further definitions of Source Control and Groundwater Remedies.

In addition to the remedy types identified in Box 3 and the classifications of remedies discussed in Appendix F, specific treatment technologies are discussed throughout this report. Appendix C defines 17 types of source control (primarily soil) treatment technologies, 9 types of *in situ* groundwater treatment technologies, 8 types of groundwater P&T technologies, and 3 on-site containment technologies.

Framework for Discussion of Treatment Technology Data

From FY 1982 through 2005 (including an estimated 76 percent of FY 2005 decision documents), 2,976 RODs and ROD amendments were signed. Multiple RODs may be prepared for some sites to address different areas of the site known as operable units (OU) and different media within a site. In addition, each OU may require a number of RODs to address different media or contaminants, or ROD amendments to revise the selected remedy. Box 4 identifies the numbers of RODs and ROD amendments issued for NPL sites. On average, 2.3 RODs are signed for each NPL site. While a majority of sites (53 percent of 1,309 sites for which ROD data was available) have a single ROD, and 95 percent have 5 or fewer RODs and ROD amendments, some sites may have a significant number of RODs and ROD amendments. The majority of these sites are very large and complex federal facilities (e.g., Savannah River [68 RODs and ROD amendments], Oak Ridge Reservation [29], Idaho National Engineering Lab [25], Naval Air Engineering Center [25] and Cecil Field [24]).

Box 4. NPL SITES AND RODS

Number of Sites	Number of RODs and Amendments Per Site
697	1
360	2
111	3
46	4
33	5
12	6
7	7
5	8
8	9
25	10-18
4	24-29
1	68

Box 5. EVOLUTION OF TREATMENT TECHNOLOGIES

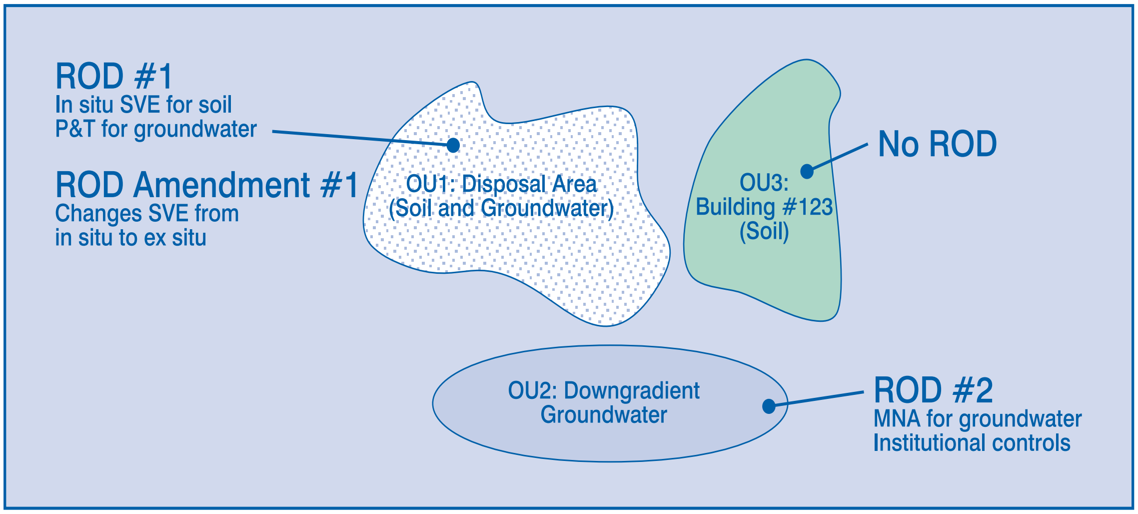
Driven by the need for more effective, less costly approaches (i.e., "smarter solutions") to clean up contaminated sites, new remediation technologies are developed and deployed on a continual basis. Since the inception of the Superfund program, several treatment technologies have evolved from "innovative" bench- and pilot-scale demonstrations to commonly used "established" technologies. As technologies mature, their applications become better defined and cost and performance are documented, enabling them to become established. With the ongoing use of these technologies, new needs are identified and new technologies emerge, continuing the cycle.

For example, in the early 1980s, SVE was considered innovative and was used infrequently. Since then, SVE has become an established technology, representing 26 percent of the total source control treatment projects planned or implemented at NPL sites from 1982 to 2005. However, data in the ASR Twelfth Edition now indicate that projects using innovative *in situ* technologies like multi-phase extraction and chemical treatment are being selected at an increased rate relative to SVE over the period from 2002 to 2005.

Each ROD or ROD amendment issued for a site or OU may result in one or more projects consisting of treatment, contaminant, or another remedy. Alternatively, multiple RODs and ROD amendments may be issued for a single project over the duration of its operation. As such, the ratio of RODs and ROD amendments to projects varies. The graphic on the following page illustrates an example of a remedial approach at a site with multiple OUs, RODs, and projects.

The remedy selected in a ROD may not be the remedy that is actually implemented at a site. For example, a different remedy may be used when a treatment technology that was selected in a ROD based on bench-scale treatability testing proves ineffective in pilot-scale tests conducted during the design phase. Likewise, additional contamination may be discovered at the site during the

EXAMPLE REMEDIAL APPROACH AT A SITE



implementation of a remedy, which may warrant a change in the remedy. Furthermore, a particular remedy may have been included in a ROD only as a contingent remedy, but future site investigations reveal that implementation of the contingent remedy was not necessary. The changes usually are documented in an ESD or ROD amendment when significant and fundamental changes are made to remedies selected in the ROD.

Given the preference established by SARA for permanent remedies (that is, treatment) over containment or disposal in remediation of NPL sites, EPA currently tracks the status and accomplishments of projects for the application of treatment technologies at NPL sites, including *in situ* and *ex situ* treatments for both source media and groundwater. Some 56 percent of all RODs analyzed for the ASR contained provisions for treatment.

For this report, as with the previous ASR Eleventh Edition, EPA reviews and analyzes data from CERCLIS and site documents and compiles information about remedies selected in RODs and the projects subsequently implemented at NPL sites. It should be noted that data have been included for a limited number of sites for which RODs have been signed, but which have not been listed on the NPL. Box 6 summarizes the format for presenting data in this report. ROD-level figures and site-level figures may present remedy selection data in two ways, depending on the objective of the figure, because a ROD or a site may have multiple remedies. For some figures, RODs (or sites) that selected multiple remedies are counted in each category of remedy type as appropriate. For example, a single ROD that selects two remedy types is listed in each applicable category. For other figures, a hierarchy is used to classify a ROD (or site) into a single category of remedy types. This hierarchy has been established to represent the data consistent with the preferred remedial approach (treatment over containment or other remedies). Notes on individual figures and tables indicate whether or not a hierarchy was used. Additionally, although data have been collected since 1982, some figures do not include earlier years to minimize their size and simplify their format, or because little information was available

Project-level data portray information about actual treatment projects (remedies) planned or under way at NPL sites. These data are based on the specific technology (such as bioremediation or chemical treatment) selected or being implemented for a site. (See the definitions of specific treatment technologies in Appendix C.) Each individual treatment system is considered its own project. For example, where two air sparging systems (or two separate P&T systems) are treating separate plumes at a site, the site would contribute two separate air sparging projects (or two P&T projects). Project-level data are not only based on RODs, amendments, or ESDs, but also on 5-year review reports, PCORs, and site summaries. In addition to the technology implemented, project-level data include information about the status of the project, the media and contaminants treated, and other information. Projects are updated based on the technology actually implemented at a site (or OU). For instance, the treatment associated with a project is updated accordingly if a technology changes from one treatment technology to another. Project data may change until the project is completed or project managers decide that the technology will not be used. Site-level data combines project-level data and ROD data for all remedies at a particular site.

Box 6. Reporting of ROD and Project Data in the ASR

ROD Data:

ROD data (remedy selection data) are reported:

- By media (source control or groundwater), or
- Grouped using a hierarchy (each ROD being listed once) under the categories of treatment, containment, and other.

ROD data for source control are reported:

- With each of the remedies selected in a ROD classified under a specific remedy type* (with more than one remedy identified if appropriate), or
- With all remedies selected by a single ROD grouped using a hierarchy (each ROD being listed only once) under the categories of treatment, containment, and other.

ROD data for groundwater are reported:

- With each of the remedies selected in a ROD classified under a specific remedy type* (with more than one remedy identified if appropriate), or
- With all remedies selected by a single ROD grouped using a hierarchy (each ROD being listed only once) under the categories of treatment, MNA, containment, and other.

Project Data:

Project data portrays information about actual projects planned or underway at NPL sites.

Each remedy is considered a single project, for which technology, status, contaminant, and other information is provided.

Site Data:

These data combine ROD data and project-level data for all remedies at a particular site.

Site data are reported:

- With each of the remedies selected for a site classified under a specific remedy type* (with more than one remedy identified if appropriate), or
- With all remedies selected for a site grouped using a hierarchy (each remedy being listed only once) under the categories of treatment, MNA, containment, and other. These groupings may be subdivided according to media (source control and groundwater).

*See Box 3 and Appendix F for additional information about remedy types.

Organization of the ASR Twelfth Edition

The ASR Twelfth Edition consists of the following major sections:

- Executive Summary - Summarizes the major findings of the report.
- Section 1: Introduction - Provides an introduction to the ASR, the types of data contained in the report, and the framework used for reporting data.
- Section 2: Overview of Data - Presents an overview of the remedies selected in decision documents and status of projects planned or underway at NPL sites.
- Section 3: Treatment Technologies for Source Control - Reports data and trends associated with remedy decisions and projects to address contaminated source media.
- Section 4: Treatment Technologies for Groundwater - Reports data and trends associated with remedy decisions and projects to address contaminated groundwater.
- Section 5: Report Focus Area - On-Site Containment Remedies - Provides data and analysis for a limited sample of on-site containment remedies.
- Section 6: References and Sources of Additional Information - Identifies references for data used in the development of the ASR and sources of additional data. Note: Section 6 contains references to online sources of ASR data and ASR appendices not included in the print version of the report.

Section 2: Overview of Data

As of September 2005, 1,536 sites had been listed on the NPL. Of those, 307 sites had been deleted, leaving 1,229 sites on the NPL. An additional 54 sites were proposed for listing at that time. Updated information on site listings and deletions is available at *http://www.epa.gov/superfund*.

Figure 1 provides a summary of the number of NPL sites (both current and deleted) by type of remedial action. The types of remedies planned or under way at each site were identified and the sites were classified based on the most recent information about the implementation status of the remedies. At nearly two-thirds of NPL sites (63 percent), source control treatment, groundwater treatment, or both, have been implemented or are planned as a remedy for some portion of the site. More than a quarter of the sites (28 percent) selected treatment for both source control and groundwater. The selected remedies do not include treatment for 24 percent of sites. No ROD has been issued for 13 percent of all NPL sites.

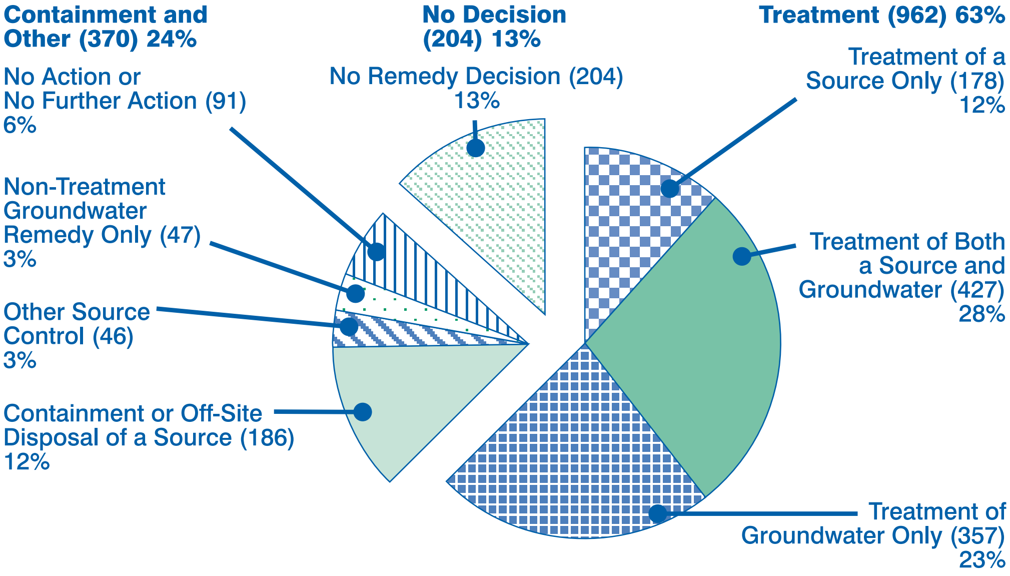
For the 1,536 sites that were listed on the NPL from 1982 through 2005:

- 2,976 RODs and ROD amendments were signed
- 1,915 treatment projects have been implemented or are planned

As discussed in the Introduction, each ROD and ROD amendment, and the remedies they selected, have been classified by the remedy types identified in Appendix F. The following text presents a brief overview of remedies selected in RODs and the status of projects undertaken.

Figure 1: Actual Remedy Types at Sites on the NPL (FY 1982 - 2005)*

Total Number of Sites = 1,536



Treatment remedies are planned or implemented at 63 percent of NPL sites.

**Includes final or deleted NPL sites as of September 2005. Also includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*

Each NPL site is listed only once using the following hierarchy: treatment, containment, and other. Sites with treatment remedies may also include containment and other non-treatment remedies. Sites with containment/disposal may include other non-treatment remedies. Other source control (described in Appendix F) includes institutional controls and other non-treatment/non-containment remedies. Non-treatment groundwater remedies include MNA, containment, and other remedies defined in Appendix F.

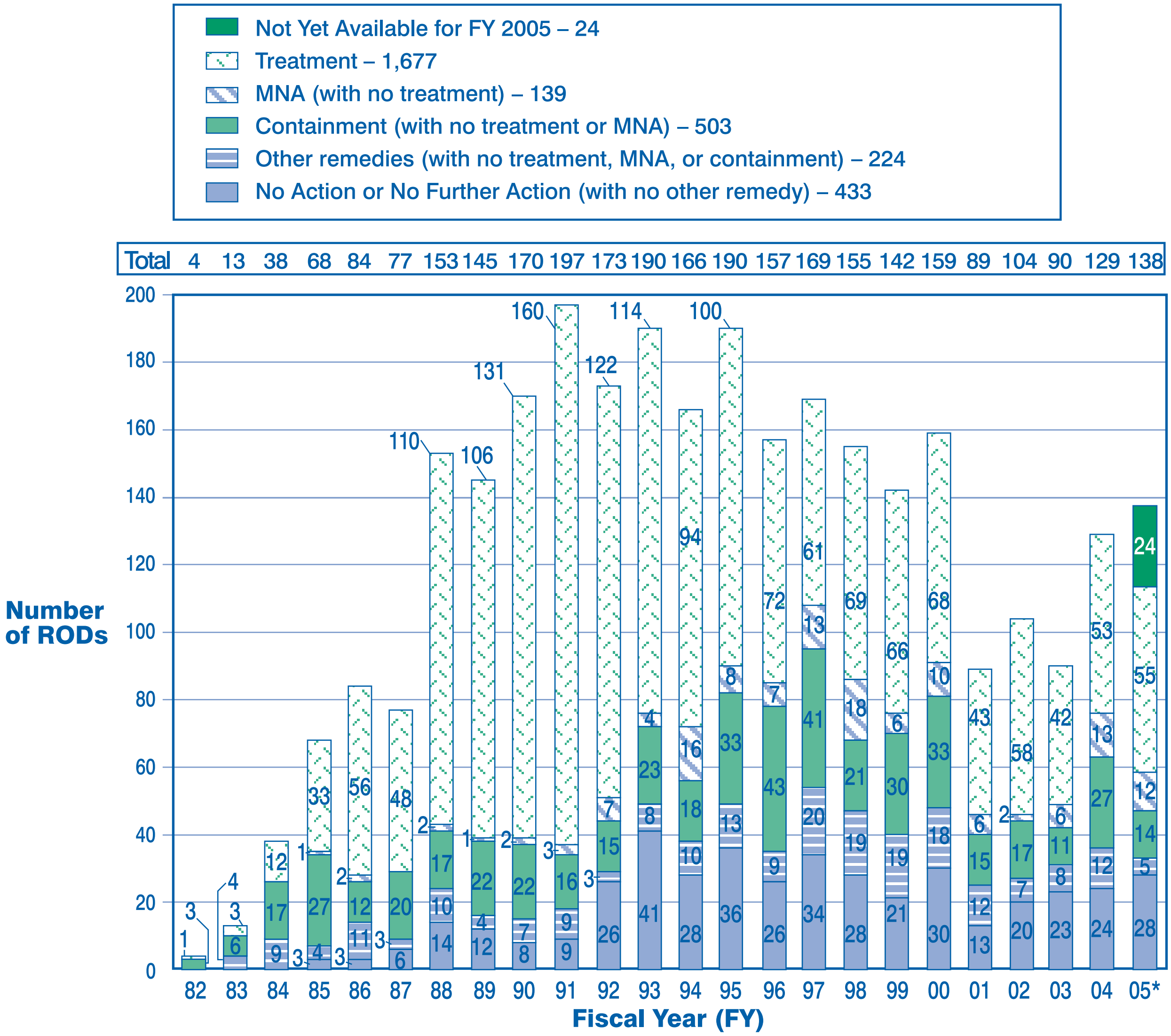
Sources: 1, 2, 3, 4, 7. Data sources are listed in Section 6.

Remedies Selected in RODs

Superfund remedy decisions are documented in RODs. ROD amendments are used to document changes to remedies that occur after a ROD has been signed. Figure 2 presents remedy decisions from FY 1982 to 2005. During that period, 2,976 RODs and ROD amendments were signed documenting groundwater and source control remedies (as well as no action and no further action). Since FY 1991, the number of RODs signed per year generally decreased. Recent years indicate that the trend may be leveling off or beginning to increase.

Figure 2: Remedies Selected in RODs (FY 1982 - 2005)*

Total Number of RODs = 2,976



The number of RODs signed each year peaked at 197 in FY 1991, 11 years after CERCLA was enacted.

MNA = Monitored natural attenuation
ROD = Record of Decision (Note: Data include ROD amendments)
**Includes information from an estimated 74 percent of FY 2005 RODs and amendments available as of October 2006. The following hierarchy was used for this figure to count RODs only once: treatment, MNA, containment, other non-treatment remedies, and no action/no further action.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

Using the previously described hierarchy for classifying remedies selected, the 2,976 RODs and ROD amendments signed between FY 1982 and 2005 may be classified as:

- Treatment remedies - 1,677 (56 percent)
- MNA for groundwater (with no treatment) - 139 (5 percent)
- Containment remedies (without treatment) - 503 (17 percent)
- Other remedies such as institutional controls or monitoring (with no treatment, MNA, or containment) - 224 (7 percent)
- No action or no further action (with no treatment, MNA, containment, or other remedy) - 433 (15 percent)

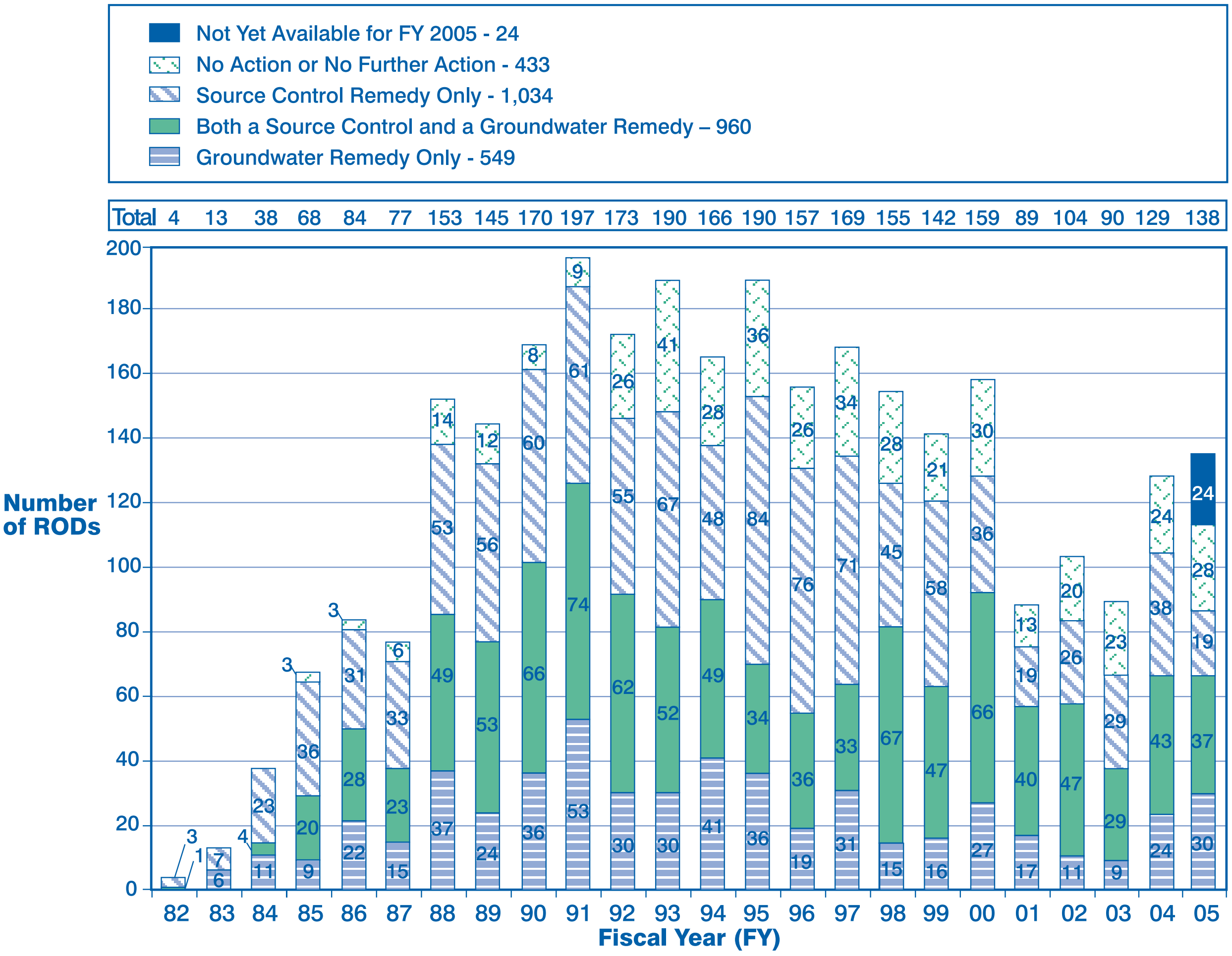
RODs may include a single remedy to address source control or groundwater or may contain multiple remedies for both sources and groundwater within a single OU, for multiple OUs, or across the entire site.

Figure 3 shows the number of RODs for each fiscal year that selected:

- Only source control remedies
- Both groundwater and source control remedies
- Only groundwater remedies
- No action or no further action remedies

Figure 3: Media Addressed in RODs (FY 1982 - 2005)*

Total Number of RODs = 2,976



In most years since FY 1998, many RODs include remedies that address both source control and groundwater media.

ROD = Record of Decision (Note: Data include ROD amendments)
**Includes information from an estimated 74 percent of FY 2005 RODs available as of October 2006. RODs are counted only once in this figure as appropriate.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

Status of Superfund Remediation Projects

Information collected and analyzed for this report helps document the progress and contributions of technologies implemented at NPL sites. In addition to presenting information about remedy decisions based on RODs and ROD amendments, this report provides project-related data concerning operational status and treatment applications. This section presents a brief overview of the progress of treatment technologies at Superfund remedial action sites. Box 7 explains how the status of a project is classified.

Some 56 percent (1,677) of the 2,976 RODs analyzed for the ASR contained provisions for treatment of source media or groundwater. EPA currently tracks the status of 1,915 treatment projects at NPL sites, including *in situ* and *ex situ* treatment projects for both source control and groundwater. These applications include:

- 515 *ex situ* source control treatment projects (27 percent of all projects)
- 421 *in situ* source control treatment projects (22 percent)
- 725 P&T projects (38 percent)
- 213 *in situ* groundwater treatment projects (11 percent)
- 41 *in situ* source control and *in situ* groundwater treatment projects (2 percent)

Box 7. Classifying the Status of Projects

The Superfund cleanup process begins with Site Discovery followed by NPL Listing, Remedial Investigation/Feasibility Study, ROD, Remedial Design/Remedial Action, Construction Completion, and NPL Deletion. These stages are based on the site as a whole, not individual actions (or projects) at the site. In contrast, the ASR evaluates projects individually based on the following classifications. After a remedy is selected in a ROD, the project begins in the "predesign/design" phase where the project team is formed and the design of the remedy is developed. Additional data may be collected and bench-scale or pilot-scale testing may also be conducted during this phase, if necessary. The next phase is called "design complete/being installed" and continues through installation until construction is complete. The third phase includes the "operational" phase where the technology is operating and treatment is being conducted. The final phase, "completion," occurs when operations are ceased and the treatment system is shut down.

Figure 4 presents data about 687 completed treatment projects by media (i.e., projects where treatment is no longer under way). The term "completed" does not necessarily indicate that treatment goals have been achieved. Although most source control treatment projects that are completed have achieved their treatment goals, groundwater projects may have been completed or shut down because of issues with the treatment technology. These issues can include technical problems with the equipment, continuing sources of contamination, or may result because concentrations have been reduced significantly but not to the point of cleanup goals. It may therefore be more appropriate to describe these projects as "shut down" rather than "completed" in this report. Appendix G lists the 73 P&T projects that are shut down and the reasons that were identified for making the decision. EPA is currently gathering additional data to better understand, across the Superfund program, the decisions that result in the shutdown of P&T systems. In many cases, this decision appears to be driven by a "treatment train" approach, where P&T is supplemented by a different remedy such as *in situ* treatment or MNA.

For the 1,915 treatment projects:

- 687 projects (36 percent) have been completed or shut down
- 857 projects (45 percent) are operational
- 371 projects (19 percent) are being designed or constructed

Box 8. Definition of a Completed Project

Project completion and construction completion (CC) are different terms used in defining progress in Superfund. The first refers to a specific project (for example, a soil vapor extraction system that has been shut down after cleanup levels have been achieved), whereas CC refers to construction of all remedies for an entire site (all remedial construction at the site has been completed). Note that project completion does not always indicate that all cleanup goals have been achieved, as projects may sometimes be shut down for other reasons.

Most of the completed projects are *ex situ* source control treatments (57 percent). *Ex situ* source control projects usually involve excavation of contaminated soil and application of an aggressive treatment technology in a controlled environment. Therefore, this type of remedy typically requires a shorter amount of time to complete. Additional information on source control projects is presented in Section 3.

In situ treatments are applied to contaminated media in place, without excavation. These projects typically require longer treatment times because they take place in a less controlled environment, which may limit the treatment rate. *In situ* treatment technologies represent approximately 31 percent of completed projects, with 170 of those 216 projects addressing *in situ* source control treatment only (with no groundwater treatment).

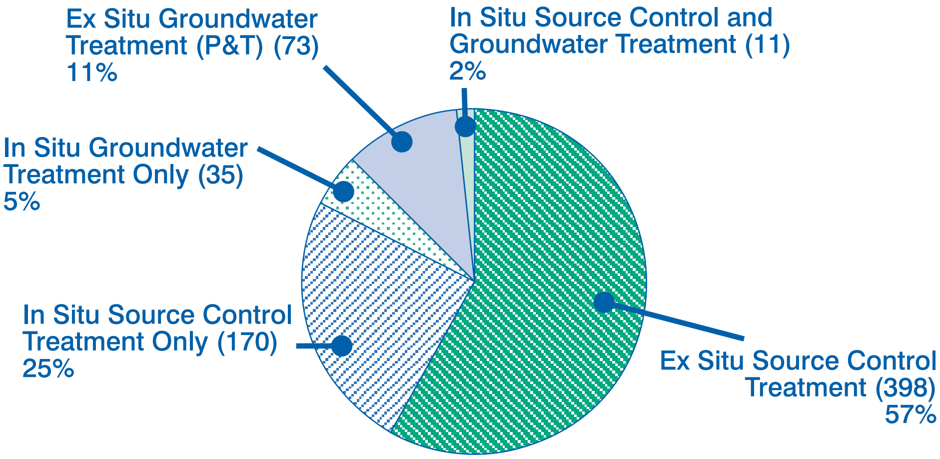
P&T projects, which represent the largest number of treatment projects (725), also typically require long treatment times, and in fact represent only 11 percent of all completed and shut down projects. The application of P&T is often limited by environmental factors, including the rate contaminated groundwater can be extracted from an aquifer and the presence of continuing sources of groundwater contamination such as DNAPLs. Additional information on groundwater projects is provided in Section 4.

Figure 5 shows the number of completed and shut down projects for the most commonly used technologies for *ex situ* source control, *in situ* source control, *in situ* groundwater, and P&T. Nearly all incineration projects have been completed. Additionally, nearly 80 percent of the S/S (*ex situ*) and thermal desorption projects have been completed.

Approximately 64 percent of S/S projects *(in situ*) and 43 percent of SVE projects have been completed. Fewer *in situ* groundwater projects have been completed compared to source control projects. However, these technologies tend to be innovative and have been selected in more recent RODs. Ten percent of P&T projects have been shut down.

Figure 4: Completed Treatment Projects by Remedy Type (FY 1982 - 2005)*

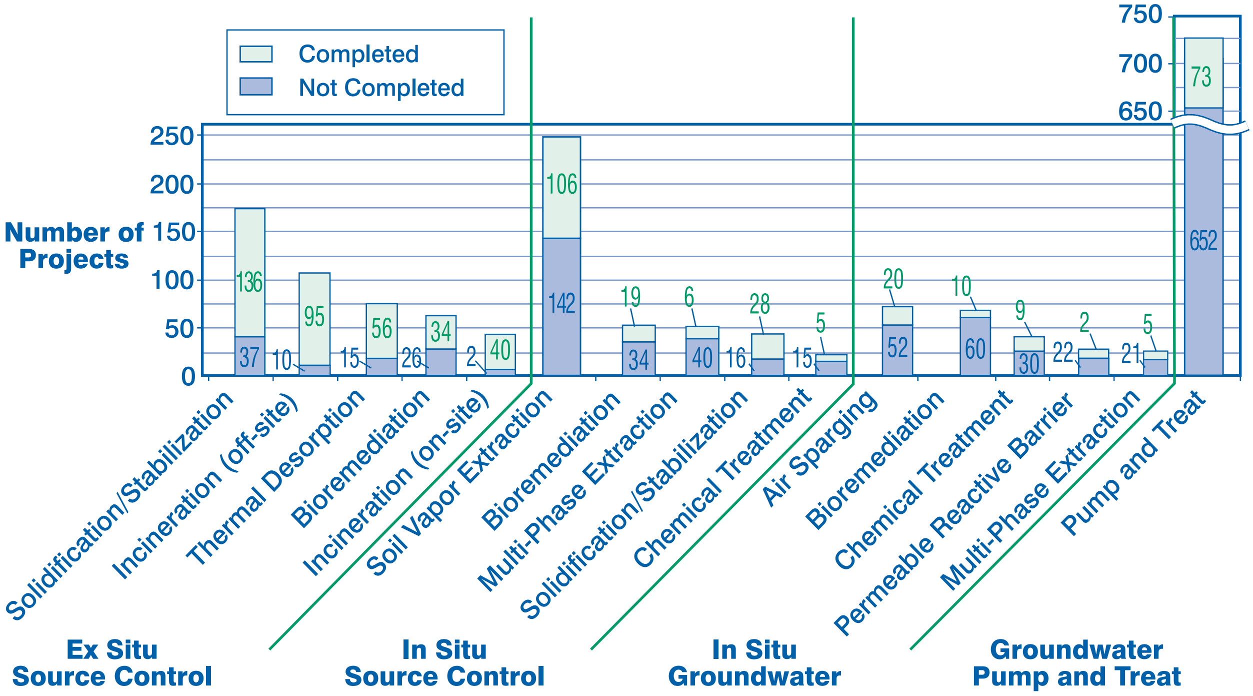
Total Projects Completed = 687



Nearly one-third of completed treatment projects are in situ technologies.

**Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006. Completed does not always indicate that cleanup goals have been met.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

Figure 5: Projects Completed for the Most Common Technologies (FY 1982 - 2005)*



Most ex situ treatment projects have been completed; in situ treatment and pump and treat projects tend to have longer operation times.

**Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006. Completed does not always indicate that cleanup goals have been met. Only the most common technologies are included in this figure (representing 644 of the 687 total completed treatment projects).*
Sources: 3, 4, 7. Data sources are listed in Section 6.

Section 3: Treatment Technologies for Source Control

Source control remedies address soil, sediment, sludge, solid-matrix wastes, or NAPL (in other words, the source of contamination) and do not address groundwater directly. Source control remedies can be delineated by the general type of remedy specified: (1) source control treatment that is either *in situ* or *ex situ*, (2) source control containment that uses caps or liners, or (3) other actions (such as population relocation or institutional controls). Box 9 delineates source control remedies by remedy type and provides a description for each category.

Box 9. SOURCE CONTROL REMEDY TYPES

Source Control Treatment

- Treatment of a contaminant source *in situ* or *ex situ*.
- Includes any of the source control treatment technologies described in this report, such as chemical treatment and thermal desorption.

Source Control Containment

- Containment of a contaminant source.
- Includes the use of caps, liners, covers, and landfilling both on and off site.

Source Control Other

- Other remedies for contaminant sources.
- Includes institutional controls, monitoring, and population relocation.

Beyond categorization by remedy type, source control treatment projects may be classified as 1 of 17 specific technologies. Definitions for these remedies are presented in Appendix C. Specific key words in decision documents determine the remedy classification into 1 of the 17 technologies. Key words used to classify source control treatment remedies are listed in Appendix F. Some of these technologies may also be used in other applications, such as to treat contaminated groundwater. Technology definitions are based on the Remediation Technologies Screening Matrix and Reference Guide, Version 4.0, which can be viewed at the Federal Remediation Technologies Roundtable (FRTR) Web site at http://www.frtr.gov.

Of the 1,104 source control treatment RODs, a total of 977 projects were planned or implemented at 605 sites. Tables 1 and 2 provide breakdowns of the source control remedies by sites and RODs, respectively. The following section of this report discusses the latest data and historical trends associated with these RODs and source control treatment projects.

Table 1. Actual Source Control Remedy Types at NPL Sites (FY 1982 - 2005)*

Total Number of Sites with a Source Control Remedy = 1,055

Remedy Type	Number of Sites
Treatment of a Source	605
Containment or Off-Site Disposal of a Source	632
Other Source Control	682

**Includes final or deleted NPL sites as of September 2005. Also includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*
No hierarchy is used for this table; sites may be included in more than one category.
Sources: 1, 2, 3, 4, 7. Data sources are listed in Section 6.

Download file containing source data for Table 1.

Table 2. RODs Selecting Source Control Remedies (FY 1982 - 2005)*

Total Number of RODs with a Source Control Remedy = 1,994

Remedy Type	Number of RODs
Treatment of a Source	1,104
Containment or Off-Site Disposal of a Source	953
Other Source Control	507

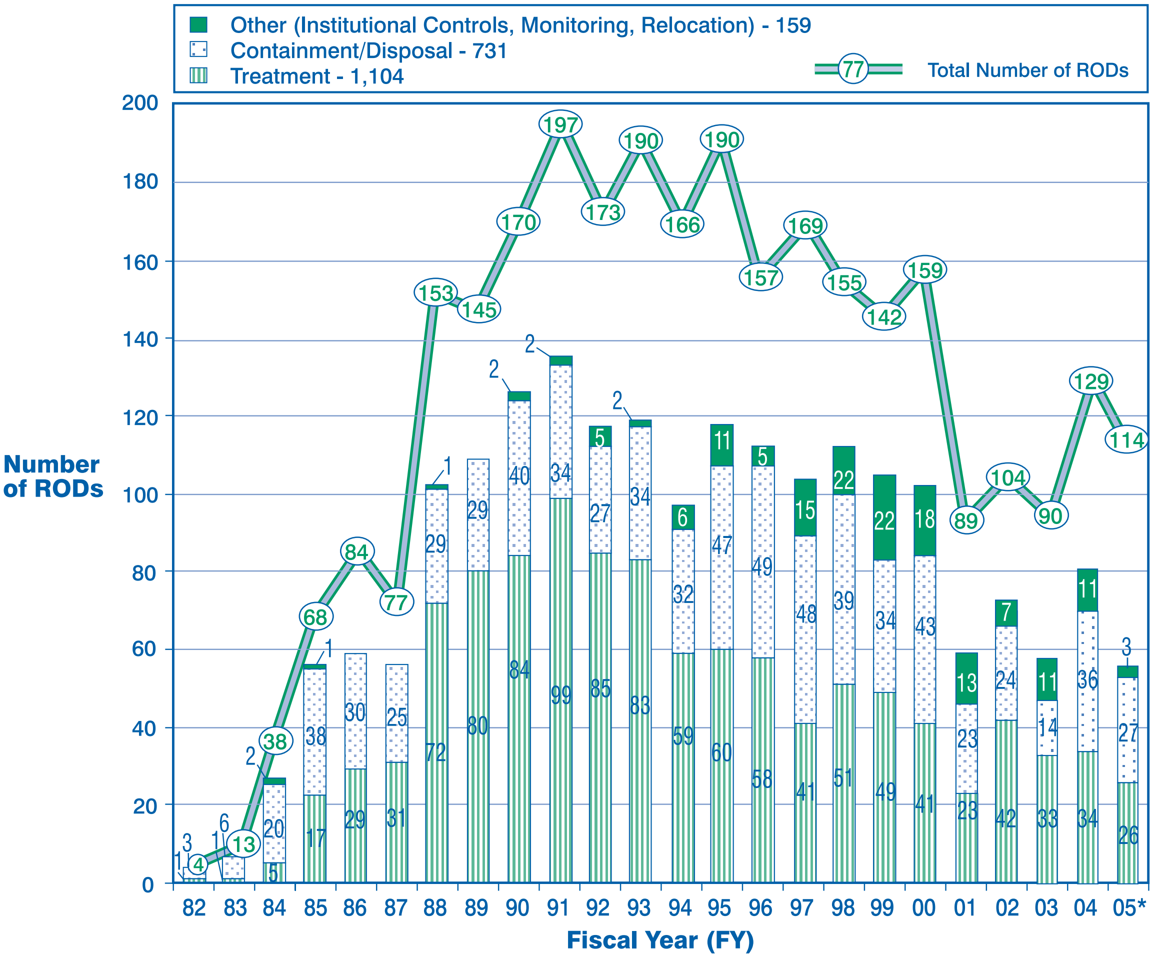
ROD = Record of Decision (Note: Date include ROD amendments)
**Includes information from an estimated 74 percent of FY 2005 RODs and amendments available as of October 2006.*
No hierarchy is used for this table; RODs and amendments may be counted in more than one category.
Sources: 3, 4, 7. Data sources are listed in Section 6.

The following subsections provide information about (1) the selection of source control remedies and (2) technologies, status, and contaminants treated for source control treatment projects.

Source Control RODs

Of the 2,976 RODs and amendments signed between FY 1982 and 2005, 67 percent (1,994) addressed the source of contamination. Figure 6 delineates source control RODs, showing annual totals for treatment, containment and disposal, and other categories. The trends exhibited for all source control remedies and source control treatment generally track with the trends for RODs overall, with the number of source treatment RODs ranging from 23 to 42 annually over the last 5 years. Figure 7 shows the percentage of source control RODs of each type for each fiscal year. For Figures 6 and 7, each ROD, which may select multiple remedies, is assigned a single remedy type based on the classification hierarchy discussed in the Introduction (i.e., source control treatment, source control containment, and other). For example, RODs that select treatment are considered "source control treatment RODs" even though they may also have selected additional remedies including containment or other remedies. "Source control containment" includes those using containment but no treatment. Containment RODs may also have selected other non-treatment source control remedies. Other source

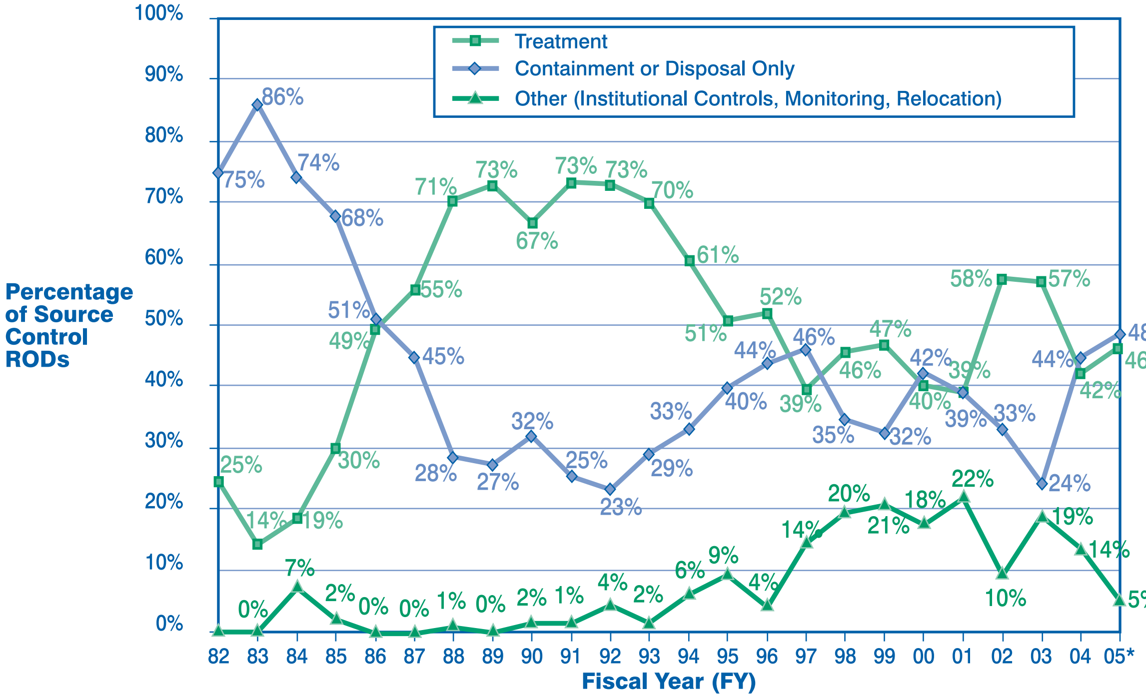
Figure 6: Source Control RODs
(FY 1982 - 2005)*
Total Number of RODs = 1,994



For most years, the majority of source control RODs selected treatment.

ROD = Record of Decision (Note: Data include ROD amendments)
**Includes information from an estimated 74 percent of FY 2005 RODs available as of October 2006. RODs are only counted once in this figure using the following hierarchy: source control treatment, source control containment or disposal with no treatment, then source control other remedies only.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

Figure 7: Trends in Types of Source Control RODs
(FY 1982 - 2005)*
Total Number of RODs = 1,994



Since 1986, the percentage of source control RODs selecting treatment usually has been greater than those for containment/disposal without treatment; however, the gap appears to be closing.

ROD = Record of Decision (Note: Data include ROD amendments)
**Includes information from an estimated 74 percent of FY 2005 RODs available as of October 2006.*
RODs are only counted once in this figure using the following hierarchy: source control treatment, source control containment or disposal with no treatment, then source control other only.
Sources: 3, 4, 7. Data sources are listed in Section 6.

control remedies (such as institutional controls, relocation, and others) are the only remedy type represented in the other column.

As shown in Figure 7, from FY 1987 to 2003 (with the exception of FY 1997 and 2000), the percentage of RODs including a source control treatment remedy has equaled or exceeded the percentage of RODs with source control containment (and no treatment). Over the last two years, the percentage of source control containment RODs has slightly exceeded those with some treatment. Cumulatively:

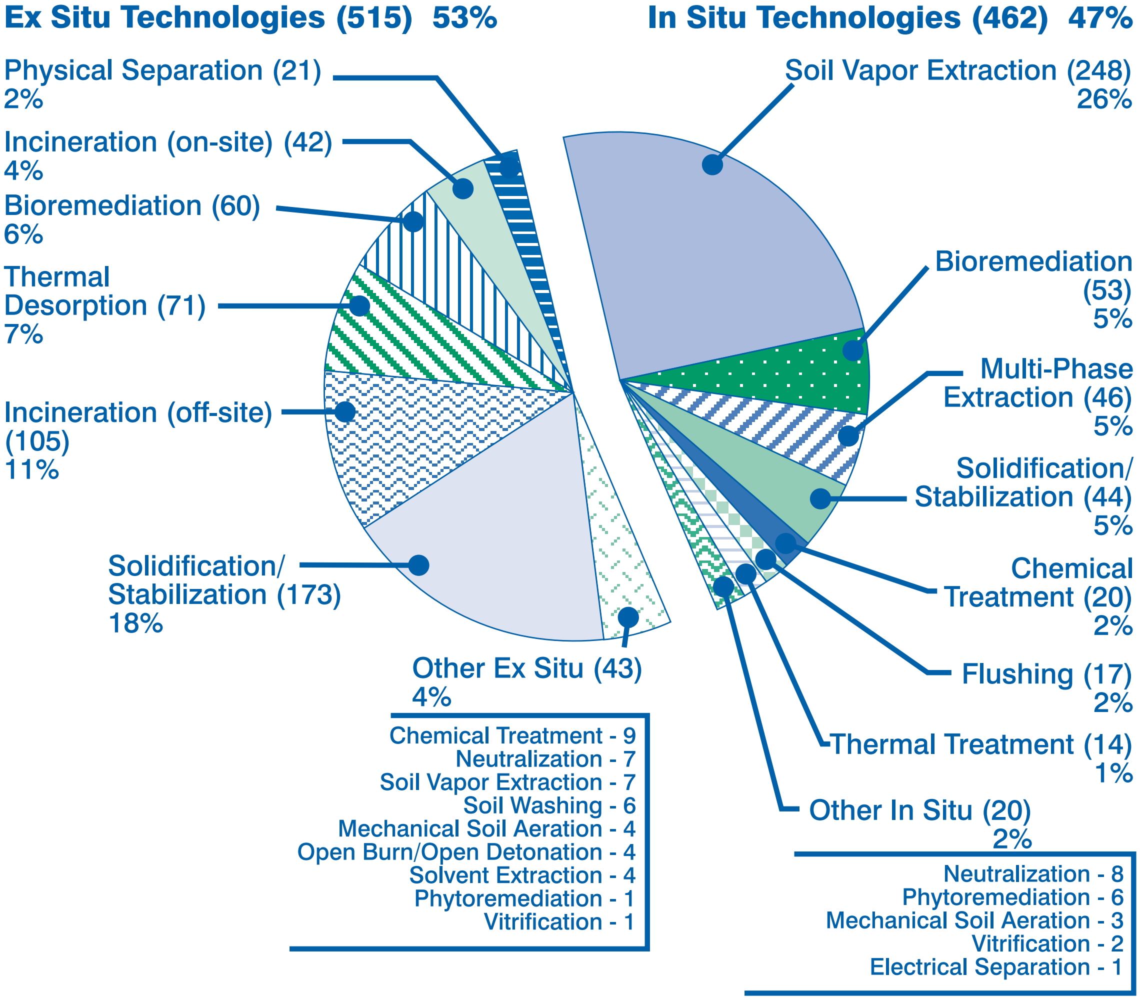
- 55 percent of source control RODs use some form of "treatment"
- 37 percent are "containment or disposal" RODs that do not include "treatment"
- 8 percent are "other source remedy" and use remedies such as institutional controls, monitoring, or population relocation (with no treatment or containment)

From FY 2002 to 2005, the percentage of each type of source control remedy has remained consistent with the cumulative percentages, with approximate values of 51 percent treatment, 37 percent containment, and 12 percent other. The percentage of source control treatment RODs was generally higher from FY 1988 through 1996, ranging from 51 percent to 73 percent, while the percentages of containment and other source control remedies were generally lower.

Source Control Treatment Projects

From FY 1982 through 2005, 977 treatment projects were selected for source control. Figure 8 provides a cumulative overview of these treatment technologies.

Figure 8: Source Control Treatment Projects
(FY 1982 - 2005)*
Total Number of Projects = 977



Cumulatively, more than half of source control treatment projects have been ex situ, although the single most common treatment technology has been in situ soil vapor extraction.

**Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

In Situ Versus Ex Situ Technologies

In situ treatment technologies for source control treat or remove the contaminated medium without excavating, pumping, or otherwise moving the contaminated medium to the surface. Implementation of *ex situ* technologies requires excavation, dredging, or other processes to remove the contaminated medium before treatment either on site or off site.

As Figure 8 indicates, the most common *in situ* technologies, together making up 85 percent of all *in situ* source control treatment projects, are:

- SVE (248 projects, 26 percent of all source control treatment projects)
- Bioremediation (53 projects, 5 percent)
- Multi-phase extraction (46 projects, 5 percent)
- S/S (44 projects, 5 percent)

The most common *ex situ* technologies, representing 88 percent of all *ex situ* source control treatment projects, are:

- S/S - 173 projects (18 percent)
- Incineration, both on and off site - 147 projects (15 percent)
- Thermal desorption - 71 projects (7 percent)
- Bioremediation - 60 projects (6 percent)

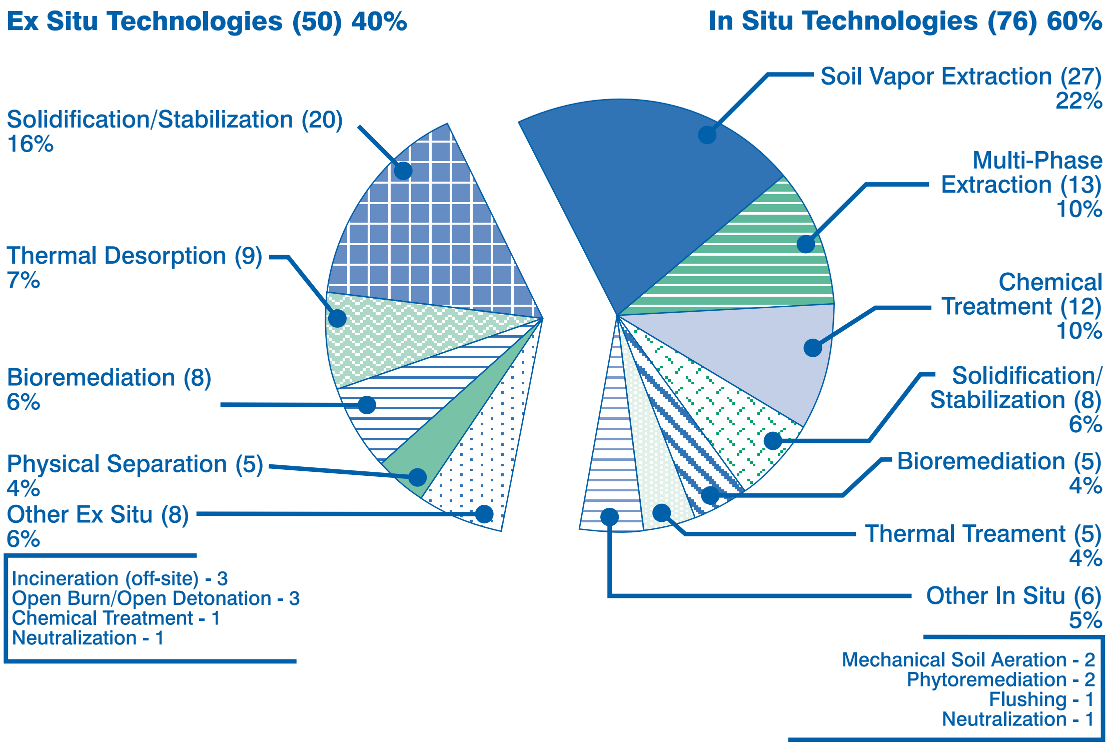
More recently, 126 source control treatment projects have been selected from FY 2002 to 2005. As shown in Figure 9, S/S (both *in situ* and *ex situ*), *in situ* SVE, and bioremediation (both *in situ* and *ex situ*) are still the technologies most frequently selected. Multi-phase extraction has been selected more frequently recently, with a third of the total number of projects (13 of 46) selected in the last 4 years. Selection of *in situ* chemical treatment has also increased, with more than half of the projects (12 of 20) being selected during the period from FY 2002 to 2005. Some of the more common established technologies, including incineration (off-site) and thermal desorption, were selected less frequently.

As shown in Figure 10, *in situ* source control treatment technologies display a gradual increase as a percentage of all treatment technology projects between FY 1985 and 2005. The figure does not include FY 1982 through 1984 because too few RODs were signed during those years to develop accurate information about trends in remedy selection. A 5-year moving average of the percentage of *in situ* treatment technologies has nearly doubled from 33 percent (FY 1985 to 1989) to 64 percent (FY 2001 to 2005). The following factors may play a role in this upward trend:

- Because *in situ* technologies require no excavation, risk from exposure to contaminated media is reduced, compared with levels of risk associated with *ex situ* technologies that require excavation.

Figure 9: Source Control Treatment Projects (FY 2002 - 2005)*

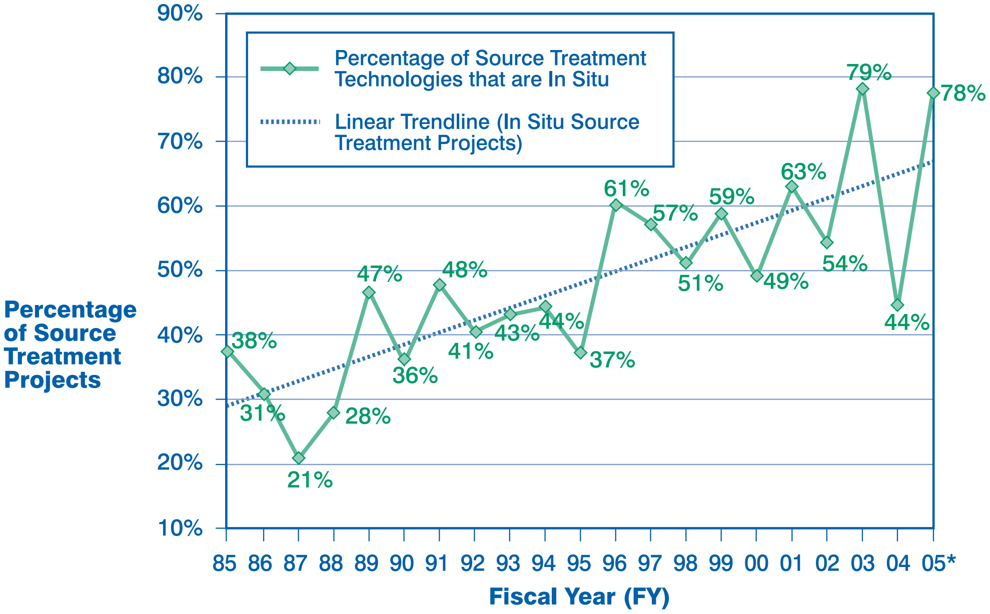
Total Number of Projects = 126



In recent years, more than half of the selected treatment technologies for source control have been in situ. Soil vapor extraction continues to be the most commonly selected in situ remedy, now followed by multi-phase extraction and chemical treatment.

**Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

Figure 10: In Situ Technologies for Source Media (FY 1985 - 2005)*



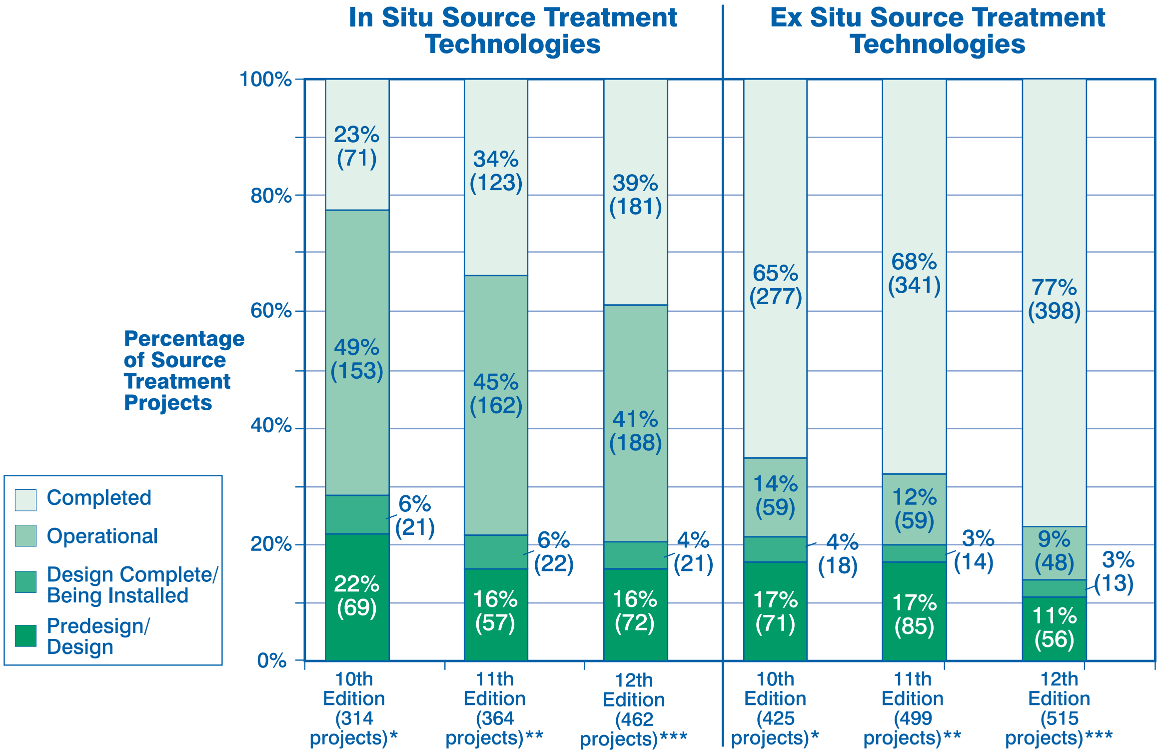
On average, the number of in situ treatment projects has gradually increased. In situ remedies can reduce potential risks from waste because there is no excavation, and can be more cost effective than ex situ technologies.

**Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

BOX 10. *IN SITU* CHEMICAL TREATMENT AT EASTLAND WOOLEN MILL, MAINE

In situ chemical treatment is being used to treat soil, DNAPL, and groundwater contamination at the Eastland Woolen Mill site in Maine. This site served as a textile mill from 1909 to 1996 and related activities led to chlorobenzene (mono, di, tri, and tetra) contamination in soil, groundwater, and nearby surface water. DNAPL has also been observed at the site. A non-time critical removal action (NTCRA) was conducted between 1999 and 2003. This action removed all soil contamination above the water table and most soil contamination, including the DNAPL, below the water table, and resulted in decreasing groundwater contamination levels. However, since contamination would remain in a few areas that were inaccessible to excavation, a ROD was signed in 2002, which selected *in situ* chemical treatment to reduce the mass of contamination in the soil and bedrock fractures to achieve groundwater restoration. Based on pilot studies that were conducted as part of the NTCRA, iron-catalyzed sodium persulfate was determined to be the optimal oxidant for use at this site. The *in situ* chemical treatment system was constructed in September 2006 and is currently operational. Following chemical oxidation, bioremediation may be conducted if cleanup levels are not achieved. A ROD Amendment was issued in 2006, which eliminated two components of the original ROD (P&T to limit the migration of contaminated groundwater and *in situ* flushing), because it was determined these actions were no longer necessary following the success of the removal action.

Figure 11: Status of In Situ and Ex Situ Source Treatment Projects - Comparison Between Tenth, Eleventh and Twelfth Editions of the ASR (FY 1982 - 2005)***



The percentage of projects at the end of the Superfund pipeline, those completed, has increased while the percentage of projects at the beginning of the pipeline, in predesign/design,has decreased.

ROD = Record of Decision (Note: Data include ROD amendments)
**Includes information from RODs through FY 1999 available as of summer 2000.*
***Includes information from an estimated 70 percent of FY 2002 RODs available as of March 2003.*
****Includes information from an estimated 74 percent of FY 2005 RODs available as of October 2006 and project data available in CERCLIS as of October 2006.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

- *In situ* technologies are often more cost-effective at large sites where excavation and materials handling for *ex situ* technologies can be expensive.
- As *in situ* treatment technologies are used more frequently, site managers, regulators, and other remediation professionals are coming to accept them as a reliable technology.

Status of Source Control Treatment Projects

Figure 11 shows the status of *in situ* and *ex situ* source control treatment projects, comparing the projects in the Tenth Edition of the ASR (data collected through FY 1999) and the Eleventh Edition (data collected through March 2003) with the Twelfth Edition (data collected through October 2006). Based on the data in Figure 11, in this 3-year period:

- The number of completed *in situ* source control projects increased from 123 to 181 (a 47 percent increase), while completed *ex situ* source control projects increased from 341 to 398 (a 17 percent increase).
- *In situ* source control projects completed since the Eleventh Edition included 33 SVE, 10 bioremediation, 6 S/S, 6 multi-phase extraction, 4 chemical treatment, 3 neutralization, 2 flushing, 1 thermal treatment, 1 phytoremediation, and 1 electrical separation project.
- *Ex situ* source control projects completed since the Eleventh Edition included 20 S/S, 7 bioremediation, 7 incineration (off-site), 7 physical separation, 4 thermal desorption, 2 solvent extraction, and 1 soil washing project.

Table 3. Status of Source Treatment Projects by Technology (FY 1982 - 2005)*

Technology	Predesign/ Design	Design Complete/ Being Installed	Operational	Completed	Total
In Situ					
Soil Vapor Extraction	23	9	110	106	248
Bioremediation	8	1	25	19	53
Multi-Phase Extraction	8	2	30	6	46
Solidification/Stabilization	13	1	2	28	44
Chemical Treatment	9	3	3	5	20
Flushing	1	2	9	5	17
Thermal Treatment	5	2	3	4	14
Neutralization	0	1	3	4	8
Phytoremediation	2	0	3	1	6
Mechanical Soil Aeration	2	0	0	1	3
Vitrification	1	0	0	1	2
Electrical Separation	0	0	0	1	1
Total	**72**	**21**	**188**	**181**	**462**
Percentage of In Situ Technologies	16%	5%	41%	39%	—
Percentage of All Source Treatment Technologies	**7%**	**2%**	**19%**	**19%**	**47%**
Ex Situ					
Solidification/Stabilization	23	4	10	136	173
Incineration (off-site)	4	0	6	95	105
Thermal Desorption	10	1	4	56	71
Bioremediation	9	1	16	34	60
Incineration (on-site)	0	1	1	40	42
Physical Separation	3	2	6	10	21
Chemical Treatment	0	1	1	7	9
Neutralization	1	0	1	5	7
Soil Vapor Extraction	0	1	2	4	7
Soil Washing	2	0	1	3	6
Mechanical Soil Aeration	0	1	0	3	4
Open Burn/Open Detonation	2	1	0	1	4
Solvent Extraction	1	0	0	3	4
Phytoremediation	0	0	0	1	1
Vitrification	1	0	0	0	1
Total	**56**	**13**	**48**	**398**	**515**
Percentage of Ex Situ Technologies	11%	3%	9%	77%	—
Percentage of All Source Treatment Technologies	**6%**	**1%**	**5%**	**41%**	**53%**

** Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*

Sources: 3, 4, 7. Data sources are listed in Section 6.

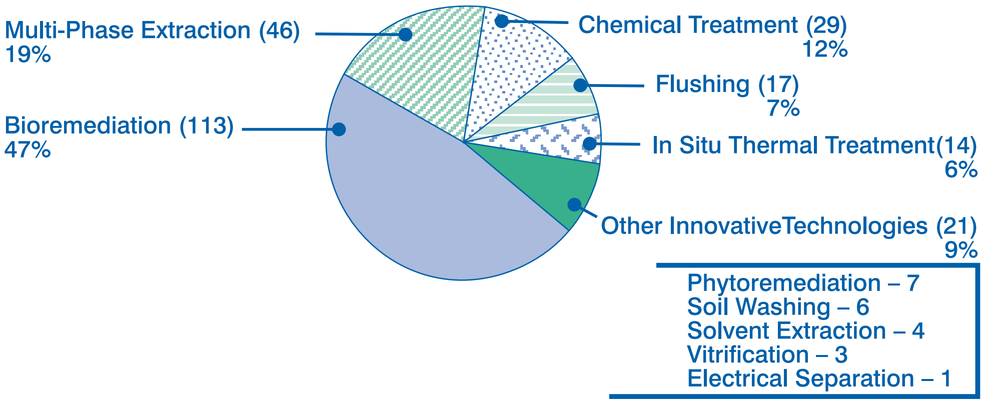
Download file containing source data for Table 3.

Please note that a comparison of the numbers in Figure 11 may not be consistent with the ASR Eleventh and Twelfth Editions because of projects that were reclassified during the collection and analysis of data for the most recent edition.

Table 3 provides a summary of project status for each technology type. Of the most commonly selected (20 or more selected projects), the highest percentage of completed projects of *in situ* technologies was for S/S, while the highest completion percentage for *ex situ* technologies involved incineration (on site). The completion percentages for these technologies, along with incineration (off site), S/S (*ex situ*), and thermal desorption, are high (above 75 percent) because they often can be completed within months, in contrast to *in situ* technologies such as SVE, which may require years to complete remediation. In general, *ex situ* projects, which can be implemented more quickly than *in situ* projects, represent a greater percentage of completed projects.

Figure 12: Innovative Applications of Source Treatment Technologies (FY 1982 - 2005)*

Total Number of Projects = 240



Bioremediation remains the most common innovative technology for source control treatment, making up nearly half of all innovative technologies. In recent years, multi-phase extraction and chemical treatment projects have been increasing (see Figure 9).

**Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

Innovative Applications

Innovative technologies are defined as alternative treatment technologies that have a limited number of applications and limited data on cost and performance. Innovative technologies have the potential for providing more cost-effective and reliable alternatives for cleanup, or may offer a solution to an environmental problem historically considered impossible to treat.

For example, DNAPLs historically have been difficult to treat because of their physical and chemical properties (relatively low solubility, high specific gravity, and tendency to remain sorbed to organic materials in an aquifer). They tend to sink in the subsurface and continue to release dissolved contaminants to surrounding media. In addition, DNAPLs may not contact soil vapor, and therefore are not effectively treated by technologies that extract and treat soil vapor, such as *in situ* SVE. However, innovative technologies such as *in situ* thermal treatment or *in situ* flushing have been found to effectively treat DNAPLs. In other cases, an innovative technology may be less expensive than an established technology. It may be expensive to treat soils deep below the ground surface by incineration because of the amount of excavation required to reach the soil. However, an *in situ* chemical oxidation process may work effectively at that depth, while avoiding the cost of excavation to reach the source zone. Other reasons for selecting innovative technologies can include a reduction in exposure of workers to contaminated media; and community concern about off-site releases of contaminants, noise, or odor.

Figure 12 depicts the number and types of innovative technologies used for source control treatment. Innovative treatment technologies currently account for 25 percent of all source treatment technologies compared with the Eleventh Edition of the ASR, where innovative technologies made up only 21 percent. As with the Eleventh Edition, bioremediation still contributes nearly one half of the innovative applications (113 projects, 47 percent). Multi-phase extraction accounts for nearly 20 percent of innovative technologies. This is a significant increase in applications compared with the Eleventh Edition, up from 8 applications to 46. However, of the 38 projects added since the Eleventh Edition, only 8 projects were newly selected between FY 2002 and 2005. The remaining 30 projects were selected prior to FY 2002 and were either reclassified because of a revision in the categorization of this technology or identified as a result of a more refined analysis conducted for this edition of the report.

As shown in Figure 12, some innovative technologies, such as solvent extraction, vitrification, and electrical separation, have been applied few times at NPL sites. A low number of applications of a technology does not necessarily indicate its lack of effectiveness. In some cases, the technology may have only recently become available and has not had time to become widely accepted and used at NPL sites. In other cases, the technology may be designed for specific types of applications, such as certain contaminants or media. For example, energy costs for vitrification typically are higher than for other technologies. However, vitrification is often capable of destroying hazardous chemicals in addition to immobilizing radioactive contaminants when radioactive contaminants are mixed with other hazardous chemicals. The contaminants treated for one of the three vitrification applications included a mixture of radioactive and other contaminants.

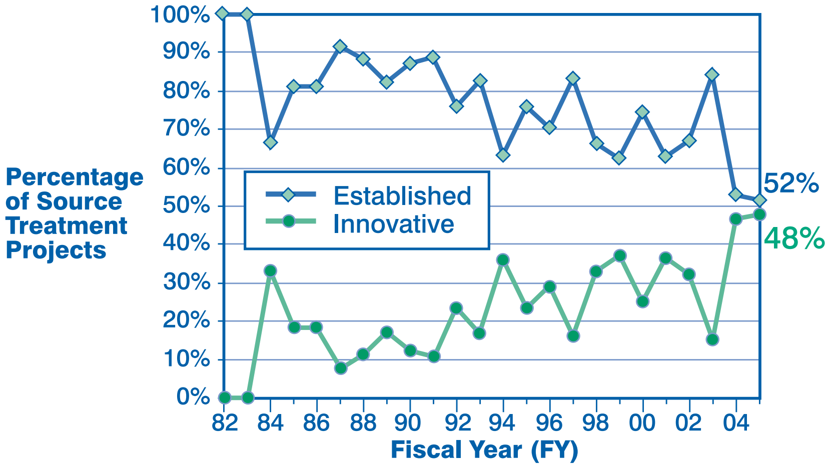
BOX 11. INNOVATIVE TECHNOLOGIES SELECTED FROM FY 2002 THROUGH 2005

- Bioremediation – 13 projects
- Chemical treatment – 13 projects
- Multi-phase extraction – 13 projects
- In situ thermal treatment – 5 projects
- Phytoremediation – 2 projects
- Flushing – 1 project

Figure 13 depicts the percentage of projects selected for innovative and established technologies for source control by fiscal year. The figure shows that although established technologies historically have been the most frequently used, the frequency of their use when compared with innovative technologies has been gradually decreasing since the early 1990s. The use of innovative technologies has generally increased during that time, with the percentage of projects that used innovative technologies becoming nearly equal to the percentage for established technologies for the first time in 2004. This trend has continued into FY 2005.

The FRTR case studies Web site *(http://www.frtr.gov/costperf.htm)* provides detailed information on the cost and performance of both innovative and established technologies applied at NPL sites. As of October 2006, the FRTR included 383 case studies covering a wide range of treatment technologies that are available for viewing on line or for downloading from the FRTR

Figure 13: Established and Innovative Source Treatment Projects (FY 1982 - 2005)*



Recently, the percentage of projects using innovative treatment has become nearly equal to those using more established treatment approaches.

**Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

Web site. The case studies were developed by EPA, the U.S. Department of Defense, the U.S. Department of Energy, the U.S. Department of the Interior, and the National Aeronautics and Space Administration for Superfund and non-Superfund sites. They present available cost and performance information for full-scale remediation efforts and large-scale demonstration projects. They also provide information about site background and setting, contaminants and media treated, technology, cost and performance, and points of contact for the technology application. Additional information on innovative technologies can be found at EPA's Hazardous Waste Cleanup Information (CLU-IN) Technology Focus area (*http://www.clu-in.org/techfocus/*), which bundles information for particular technologies that may be used in a variety of applications.

Contaminants Addressed

Nine major groups of contaminants targeted by specific technologies were analyzed for this report, as summarized in Table 4. Compounds were categorized (with the exceptions noted in Table 4) as:

- Volatile organic compounds (VOC) – either halogenated or non-halogenated
- Semivolatile organic compounds (SVOC) – either halogenated or non-halogenated
- Polycyclic aromatic hydrocarbons (PAH)
- Benzene, toluene, ethylbenzene, and xylene (BTEX)
- Polychlorinated biphenyls (PCB)
- Organic pesticides/herbicides
- Metals and metalloids

Table 4. Contaminants Treated by Source Treatment Projects (FY 1982 - 2005)*

Technology	Total number of projects[a]	Polycyclic aromatic hydrocarbons (PAHs)	Other nonhalogenated semivolatile organic compounds[b]	Benzene-toluene-ethylbenzene-xylene (BTEX)	Other nonhalogenated volatile organic compounds[c]	Organic pesticides and herbicides	Other halogenated semivolatile organic compounds[d]	Halogenated volatile organic compounds	Polychlorinated biphenyls	Metals and metalloids
Bioremediation	113	37	51	33	33	24	17	22	2	5
Chemical Treatment	29	1	2	3	4	1	4	12	4	13
Multi-Phase Extraction	46	9	3	11	6	4	8	18	1	1
Electrical Separation	1	0	0	0	0	0	0	1	0	0
Flushing	17	3	5	5	5	1	3	11	0	5
Incineration	147	27	41	33	23	36	34	52	36	6
Mechanical Soil Aeration	7	0	0	3	1	0	1	7	0	0
Neutralization	15	2	0	0	0	0	0	0	0	6
Open Burn/ Open Detonation	4	0	1	0	0	0	0	0	0	0
Physical Separation	21	4	2	1	0	3	0	0	4	5
Phytoremediation	7	1	2	2	2	1	1	4	0	4
Soil Vapor Extraction	255	15	31	107	51	3	33	217	1	0
Soil Washing	6	1	1	0	0	2	0	0	1	2
Solidification/ Stabilization	217	17	18	13	13	16	7	20	35	180
Solvent Extraction	4	2	1	0	1	1	0	2	2	1
Thermal Desorption	71	21	17	24	15	8	12	33	16	0
In Situ Thermal Treatment	14	5	0	2	0	3	3	8	0	0
Vitrification	3	0	0	1	1	0	1	3	2	1
Total Projects	**977**	**145**	**175**	**238**	**155**	**103**	**124**	**410**	**104**	**229**

The contaminants most often addressed by source control treatment are halogenated VOCs followed by BTEX and metals.

[a] *Each project may treat more than one contaminant group.*

[b] *Does not include PAHs.*

[c] *Does not include BTEX.*

[d] *Does not include organic pesticides and herbicides.*

* *Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*

Sources: 3, 4, 7. Data sources are listed in Section 6.

It should be noted that projects are listed in Table 4 multiple times, once for each contaminant type (resulting in a total number of projects that is greater than the actual number of projects). Overall, 42 percent of the source control treatment projects address halogenated VOCs; while 24 percent address BTEX; and 23 percent address metals and metalloids.

The selection of treatment technologies for a site often depends on the physical and chemical properties of the contaminants. For example, VOCs are amenable to treatment by certain technologies, such as SVE or thermal desporption, because of their volatility. Conversely, metals, which are not volatile and do not degrade, are not usually amenable to treatment by those technologies. S/S is most often used for treatment of these contaminants because metals form insoluble compounds when combined with appropriate additives, such as Portland cement. Some of the more common uses of technologies for contaminant groups are identified below.

- Halogenated VOCs, BTEX, and other non-halogenated VOCs are treated most often by SVE.
- Non-halogenated SVOCs and PAHs are treated most often by bioremediation.
- PCBs, organic pesticides and herbicides, and halogenated SVOCs are treated most often by incineration.
- Metals are treated almost exclusively by S/S. An interesting exception is the use of bioremediation in five projects to treat metals. Three of these projects are in the predesign or design phase. The other two are operational *ex situ* projects.

EPA has developed the CLU-IN Contaminant Focus area (*http://www.clu-in.org/contaminantfocus/*), which bundles information associated with cleanup of individual contaminants and contaminant groups. This information is presented in categories that include Overview, Policy and Guidance, Chemistry and Behavior, Environmental Occurrence, Toxicology, Detection and Site Characterization, Treatment Technologies, Conferences and Seminars, and Other Resources. Contaminant Focus will be continuously updated with information from federal cleanup programs, state sources, universities, nonprofit organizations, peer-reviewed publications, and public-private partnerships. New contaminants will be added on a periodic basis.

Remedy Changes

As discussed earlier, remedies selected at NPL sites are documented in a ROD, and changes to the original remedies can be either formally documented or executed through clauses in the original ROD. Remedies most often change during the pre-design or design phase of a project when new information about site characteristics is discovered or when treatability studies for the selected technologies are completed. Remedies also may change throughout the implementation and operation of the remedy. Source control treatment remedies have been changed to non-treatment remedies at approximately 130 sites. These remedies are most often changed to excavation with off-site disposal (and no treatment), containment, or institutional controls. The most commonly cited reason for changing source control treatment to another remedy was that further site investigation revealed that the concentration or extent of contamination was less than expected. Other frequently cited reasons included rising groundwater levels that made soil treatment impracticable, community concerns about on-site remedies, and high costs. The Superfund program allows EPA and state regulators the flexibility to modify remedies as site conditions change. The ASR tracks 977 source control treatment projects, not including the 130 that have been changed to non-treatment remedies. Based on a total of 1,107 source control treatment remedies (977 active plus 130 changed), 12 percent have been changed.

In 94 instances, one source control treatment technology was replaced with a different treatment technology. Table 5 provides information about the most frequently changed treatment technologies and the technologies that replaced them, as indicated by cumulative data from FY 1982 to 2005. The source control treatment technologies that were most frequently changed to another treatment technology were incineration, bioremediation, and thermal desorption. These technologies are the second, fourth, and third most frequently selected *ex situ* treatment technologies, respectively (see Figure 8). The most common technologies selected to replace incineration, bioremediation, and thermal desorption were thermal desorption (replacing incineration and bioremediation), S/S, SVE, and incineration (replacing bioremediation and thermal desorption).

Previous editions of the ASR included an appendix (Appendix D) that listed all the technology changes, additions, and deletions since the previous edition of the ASR. Because the appendix has expanded over time, it is now available online at *http://clu-in.org/asr*. For additional information about remedy updates, see *Updating Remedy Decisions at Superfund sites – Summary Report FY 2004 and FY 2005*, February 2007 (EPA 540-R-06-074).

Table 5. Most Commonly Changed Source Contol Technologies (FY 1982 - 2005)*

	Technology Initially Selected			
New Treatment Technology	Incineration	Bioremediation	Thermal Desorption	Total
Thermal Desorption	9	4	-	13
Solidification/Stabilization	7	3	1	11
Soil Vapor Extraction	3	2	5	10
Incineration	-	5	5	10
Bioremediation	5	-	0	5
Chemical Treatment	1	0	1	2
Pump and Treat	0	2	0	2
Solvent Extraction	1	0	0	1
Air Sparging	0	1	0	1
Soil Washing	0	0	1	1
Physical Separation	0	0	1	1
In Situ Thermal Treatment	0	1	0	1
Total Number of Remedy Revisions	**26**	**18**	**14**	**58**

The most commonly changed source control technologies are incineration, bioremediation, and thermal desorption. Thermal desorption also is the most frequently used "replacement" technology.

**Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

Conclusion

A total of 977 projects were initiated from the 1,104 source control treatment RODs. Those projects consist of a wide range of *in situ* and *ex situ* technologies at various stages in design and implementation, being used to address a broad spectrum of contaminants. Although annual fluctuations occur, some trends and general observations can be noted:

- The selection of *in situ* source control projects continues to increase. *In situ* source control treatment projects represented 60 percent of source treatment projects from FY 2002 to 2005. Cumulatively, from FY 1982 through 2005, *in situ* source control projects made up nearly 50 percent of the projects.
- From FY 2002 to 2005, *in situ* technologies of multi-phase extraction and chemical treatment are being selected at an increasing rate compared with SVE, which is not being selected as frequently as in previous years.
- Historically, incineration projects have represented a high percentage of *ex situ* source treatment projects (29 percent reported in the eleventh edition of the ASR for FY 1982 to 2002). During the period from FY 2002 to 2005, incineration represented only 6 percent of *ex situ* treatment projects.
- In FY 2004, the percentage of projects that selected innovative technologies reached 47 percent, nearly equaling the percentage for established technologies. This trend continued in FY 2005, with available data indicating 48 percent of projects selected innovative technologies.

Section 4: Treatment Technologies for Groundwater

Groundwater remedies are delineated by the type of remedy specified: (1) *in situ* treatment, (2) extraction of groundwater followed by aboveground treatment (P&T), (3) MNA, (4) containment using subsurface VEBs, or (5) other actions (such as alternative drinking water supplies or drilling prohibitions). Box 12 delineates groundwater remedies by type and provides a description for each category. Remedies for source media (such as soil, sediment, solids, and NAPL), discussed in a previous section, fall into similar categories.

Beyond categorization by remedy type, groundwater treatment projects may be classified as 1 of 17 specific technologies. Definitions for these remedies are presented in Appendix C. Specific key words in decision documents determine classification into 1 of the 17 technologies (9 *in situ* technologies and 8 P&T technologies). Key words used to classify groundwater treatment remedies are listed in Appendix F. Definitions are based on the Remediation Technologies Screening Matrix and Reference Guide, Version 4.0, which can be viewed at the FRTR Web site at *http://www.frtr.gov*.

This section focuses on updated information for *in situ* and *ex situ* (P&T) groundwater treatment by documenting the status, achievements, and trends associated with applications of these treatment technologies at NPL sites from 1982 to 2005. The following subsections provide information about (1) the selection of groundwater remedies, (2) the technologies and status of *in situ* groundwater treatment projects, and (3) the status of P&T projects and the most frequently treated contaminants.

Groundwater Remedy Decisions

Groundwater remedies have been implemented or are currently planned at 1,072 sites, nearly 70 percent of sites on the NPL. As shown in Table 6, P&T remedies have been implemented or are planned at 728 of the sites. More than one type of groundwater remedy has been implemented at many sites. These sites are counted in Table 6 once for each type of groundwater remedy. Approximately 900 sites with groundwater remedies also have source control remedies.

When different types of groundwater remedies are applied to the same contaminant plume, they may be used to treat different parts of the plume. For example, an *in situ* groundwater treatment technology may be used for areas that are difficult to treat using P&T, such as hot spots, NAPL source zones, tight clays, fractured rock, and areas with heterogeneous hydrogeology. P&T, in turn, may be used to control migration of the plume and

Box 12. GROUNDWATER REMEDY TYPES

***In Situ* Treatment**

- Treatment of groundwater in place without extracting it from an aquifer.
- Includes any of the *in situ* groundwater treatment technologies described in this report, such as air sparging and permeable reactive barriers.

Pump and Treat (P&T)

- Extraction of groundwater from an aquifer and treatment aboveground.
- Groundwater usually is extracted by pumping groundwater from a well or trench.
- Treatment can include any of the P&T technologies described in this report, such as air stripping and ion exchange.

Monitored Natural Attenuation (MNA)

- The reliance on natural attenuation processes (within the context of a carefully controlled and monitored approach to site cleanup) to achieve site-specific remediation objectives within a time frame that is reasonable compared to other alternatives.
- Natural attenuation includes a variety of physical, chemical, and biological processes.

Groundwater Containment

- Containment of groundwater through a vertical, engineered, subsurface, impermeable barrier, or;
- Containment of groundwater through a hydraulic barrier created by pumping.

Groundwater Other

- Groundwater remedies that do not fall into the categories above.
- Can include a variety of remedies, such as restrictions on water use.

Table 6. Actual Groundwater Remedy Types at NPL Sites (FY 1982 - 2005)*

Total Number of Sites with a Groundwater Remedy = 1,072

Remedy Type	Number of Sites
Groundwater Pump and Treat	728
In Situ Treatment of Groundwater	228
MNA of Groundwater	239
Other Groundwater	854

MNA = Monitored natural attenuation
**Includes final or deleted NPL sites as of September 2005. Also includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*
No hierarchy is used for this table; sites may be included in more than one category.
Other groundwater includes sites with groundwater containment using vertical engineered barriers, as well as other groundwater remedies.
Sources: 1, 2, 3, 4, 7. Data sources are listed in Section 6.

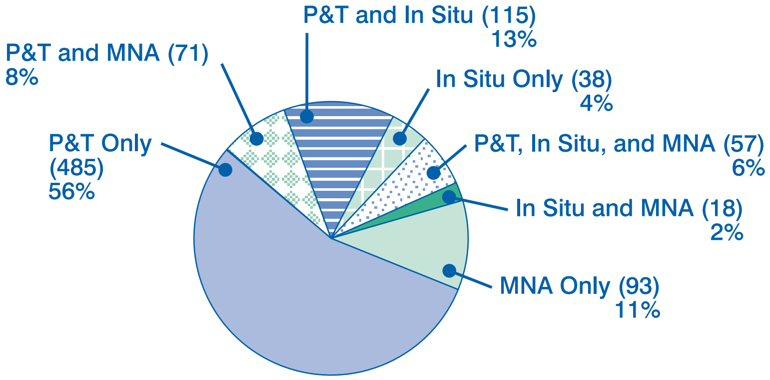
Download file containing source data for Table 6.

remediate other areas of the plume where contaminant concentrations are lower. Similarly, MNA may be used to treat areas of the plume where contaminant concentrations are relatively low but that still remain above remediation goals. However, remediation may not have occurred in the same aquifer or groundwater plume for sites where several types of groundwater remediation were used, such as a P&T system and *in situ* treatment.

An indication of possible multiple groundwater remedies working "jointly" can be seen in Figure 14, which shows the selection of P&T, *in situ* treatment, and MNA for groundwater, both alone and in combination with each other. (Note: groundwater containment using VEBs and other groundwater remedies are not included in this figure.) The most common combinations are P&T and *in situ* treatment (115 sites) and P&T with MNA (71 sites). Three types of groundwater remedies were used for 57 of the 877 sites. Some form of groundwater treatment was included at most sites where one of these remedies was selected. P&T or *in situ* treatment was included in the selected remedy at 89 percent (784) of the sites,

Figure 14: NPL Sites with P&T, In Situ Treatment, or MNA Selected as Part of a Groundwater Remedy (FY 1982 - 2005)*

Total Number of Sites= 877



Pump and treat is the sole groundwater treatment remedy at more than half of NPL sites, though many of these sites also have a source control remedy or non-treatment groundwater remedy (see Box 13).

MNA = Monitored natural attenuation
P&T = Pump and treat
**Includes final or deleted NPL sites as of September 2005. Also includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006. Sites are counted only once in this figure as appropriate.*
Sources: 1, 2, 3, 4, 7. Data sources are listed in Section 6.

while only MNA was selected for 11 percent (93) of the sites. The remedy at many of the sites shown in Figure 14 also includes source control treatment. For example, source control treatment is part of the remedy at 45 percent of the 485 sites with P&T only. Source control treatment is also part of the remedy at 41 percent of the 93 sites with MNA only, though this information is not displayed in Figure 14.

Although other groundwater remedies, such as monitoring and institutional controls, are not the focus of this report, analysis indicates they have been selected in about 95 percent of RODs in recent years at NPL sites. These remedies, although they are protective, typically do not directly reduce contaminant concentrations or decrease contaminant mobility and are therefore not considered treatment. Table 7 shows the number of sites where these other groundwater remedies have been selected. By far, the most common other groundwater remedy is monitoring, which has been selected at 727 sites (68 percent of sites with a groundwater remedy) followed by institutional controls, which has been selected at 437 sites (41 percent of sites with a groundwater remedy).

RODs That Select Groundwater Treatment

More than 1,500 RODs included at least one groundwater remedy. Table 8 shows the number of RODs that selected these remedies. P&T was selected most frequently (958 RODs), while containment using VEBs was selected the least (60 RODs). Each ROD may be counted in more than one category.

Table 7. Sites with Groundwater Other Remedies (FY 1982 - 2005)*

Total Number of Sites with Groundwater Other Remedies = 786

Remedy Type	Number of Sites
Engineering Control	45
Groundwater Monitoring	727
Institutional Control	437
Water Supply Remedies	106

**Includes final or deleted NPL sites as of September 2005. Also includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006.*
No hierarchy is used for this table; sites may be included in more than one category.
Sources: 1, 2, 7. Data sources are listed in Section 6.

Box 13. Sites with Both Pump and Treat and Source Control Treatment Remedies

At 45 percent of sites with P&T (and no *in situ* groundwater treatment or MNA), source control treatment has also been selected. One example is ABC One Hour Cleaners in North Carolina. This site is an active dry cleaning facility where chlorinated solvents have contaminated both soil and groundwater. RODs were signed for groundwater (OU 1) in 1993 and soils (OU 2) in 1994. Remediation currently is being conducted using P&T for groundwater and SVE for soils. In this case, although different media are being treated, both technologies are addressing the same contaminants at the same area of the site. At other sites with P&T and source control treatment, it is possible that these technologies are being used to address different contaminants or different areas of the site.

Table 8. RODs Selecting Groundwater Remedies (FY 1982 - 2005)*

Total Number of RODs with a Groundwater Remedy = 1,509

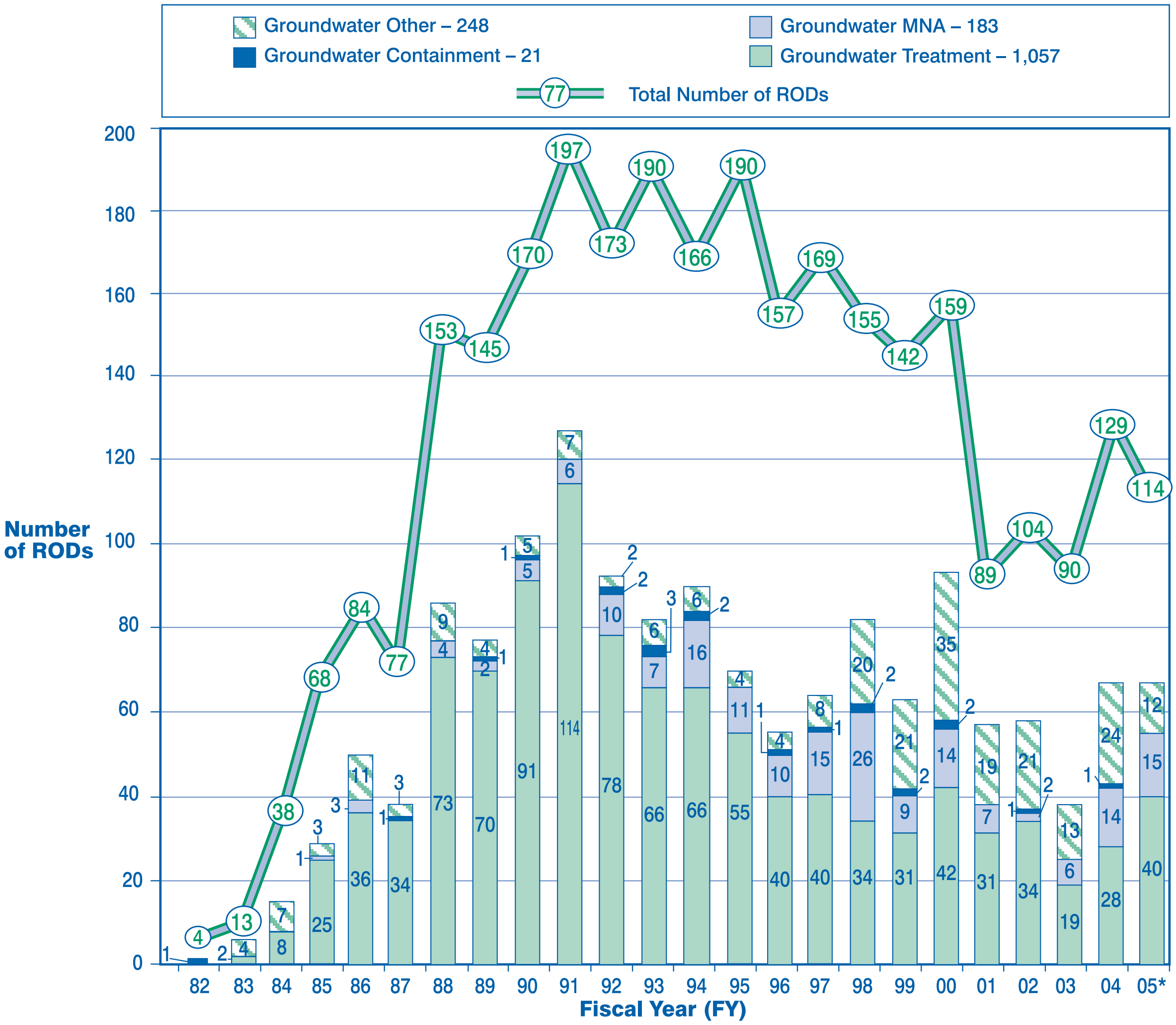
Remedy Type	Number of RODs
Groundwater Pump and Treat	958
In Situ Treatment of Groundwater	195
MNA of Groundwater	303
Groundwater Containment	60
Other Groundwater	579

MNA = Monitored natural attenuation
ROD = Record of Decision (Note: Data include ROD amendments)
**Includes information from an estimated 74 percent of FY 2005 RODs and amendments available as of October 2006.*
No hierarchy is used for this table; RODs may be counted in more than one category.
Sources: 3, 4, 7. Data sources are listed in Section 6.

Figure 15 shows the number of RODs for groundwater that have selected each groundwater remedy type. Each ROD, which may select multiple remedies, is assigned a single remedy type for the figure based on a hierarchy used in the ASR Eleventh Edition and previous editions. The hierarchy is groundwater treatment (including *in situ* and P&T), MNA, groundwater containment, and groundwater other. For example, RODs that select treatment are considered "groundwater treatment RODs" even though they may also have selected additional remedies, including MNA, groundwater containment using VEBs, or other remedies. "Groundwater MNA RODs" select MNA but may also have selected groundwater containment using VEBs or other remedies. RODs that selected groundwater containment using VEBs (counted as "Groundwater containment RODs")

Figure 15: RODs Selecting Groundwater Remedies (FY 1982 - 2005)*

Total Number of RODs = 1,509



The number of RODs selecting groundwater remedies peaked in 1991, 11 years after CERCLA was enacted. At that time, pump and treat was by far the most common groundwater remedy.

MNA = Monitored natural attenuation
ROD = Record of Decision (Note: Data include ROD amendment)
**Includes information from an estimated 74 percent of FY 2005 RODs available as of October 2006.*
RODs are counted only once in this figure using the following hierarchy: groundwater treatment (either pump and treat or in situ treatment), groundwater MNA with no treatment, groundwater containment with no treatment or MNA, then groundwater other remedies only.
Sources: 3, 4, 7. Data sources are listed in Section 6.

may also have selected other remedies. Other groundwater remedies (such as institutional controls, engineering controls, and others) are the only remedy type represented in the "Groundwater other" column. Figure 15 indicates that:

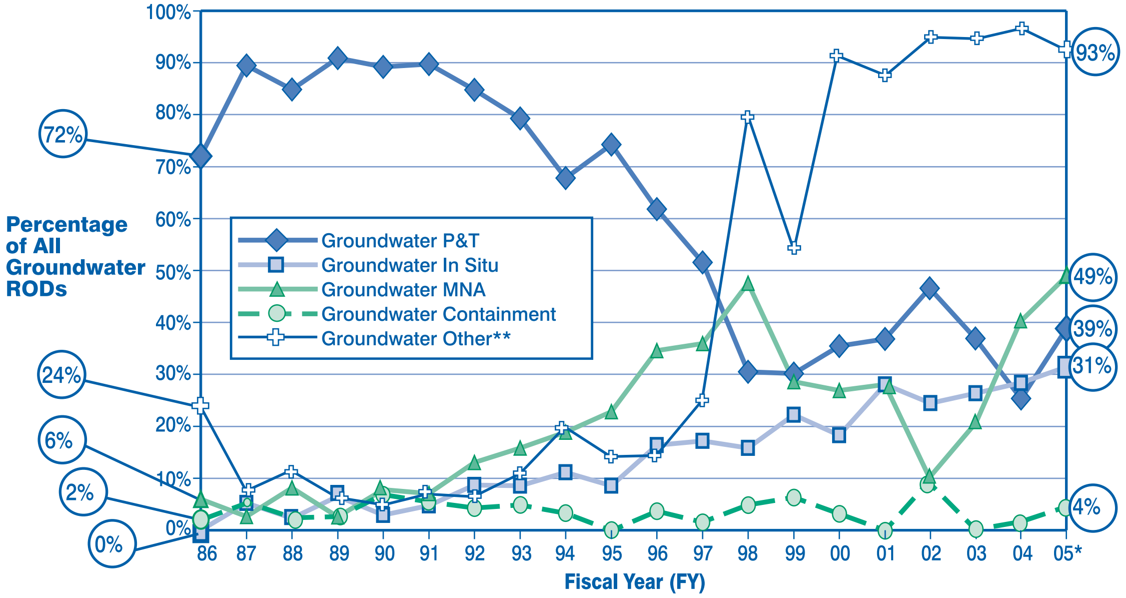
- The number of groundwater treatment RODs (including *in situ* and *ex situ* remedy types) peaked in FY 1991 at 114 and has been generally decreasing in line with the overall number of RODs. This peak matches the crest in the total number of RODs in FY 1991.
- From FY 1988 through 1995, the number of groundwater treatment RODs ranged from 55 to 114, while the number ranged from 19 to 42 from FY 1996 through 2005.

The relative percentages of remedies selected in RODs from FY 1986 through 2005 are presented in Figures 16, 17, and 18. These figures do not include FY 1982 through 1985 because of the small number of RODs that were signed during these years. Figure 16 shows the percentages of RODs that selected groundwater remedies. RODs are counted in each category as appropriate (for each remedy selected) in the figure. The combined percentages for all remedies in a given year total more than 100 percent because a ROD may select multiple remedies and may be counted in more than one category. Figure 16 shows:

- Nearly 90 percent of RODs selected P&T from FY 1987 through 1992. This percentage decreased to 30 percent in FY 1998 and has since averaged approximately 35 percent.
- MNA was selected in less than 10 percent of RODs from FY 1986 through 1991, but then increased every year until it peaked at 48 percent in FY 1998. After a decline to 10 percent in FY 2002, RODs that select MNA have increased steadily and reached 49 percent in FY 2005.

Figure 16: Trends in RODs Selecting Groundwater Remedies (FY 1986 - 2005)*

Total Number of Groundwater RODs = 1,458



Since 1991, the percentage of groundwater RODs selecting conventional pump and treat remedies has steadily declined while those selecting in situ or MNA remedies have increased.

MNA = Monitored natural attenuation
P&T = Pump and treat
ROD = Record of Decision (Note: Data include ROD amendments)
**Includes information from an estimated 74 percent of FY 2005 RODs available as of October 2006.*
No hierarchy is used in this figure; RODs may be counted in more than one category.
***Groundwater Other includes institutional controls and other remedies not classified as treatment, MNA, or containment. Note: Other remedies selected prior to 1998 may be under represented in figure.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

- RODs that select *in situ* groundwater treatment have been generally increasing, from none in FY 1986 to 31 percent in FY 2005.
- The percentage of RODs that select groundwater treatment using VEBs has remained consistent, less than 10 percent for all years.
- RODs that select other remedies were less than 25 percent from FY 1986 through 1997, but then increased rapidly. While some of this increase may be attributed to changes in program guidance, it should be noted that data reporting methods used prior to FY 1998 may have resulted in under reporting of other remedies in Figure 16 for those years. About 90 percent of RODs selected other groundwater remedies from FY 2000 through 2005.

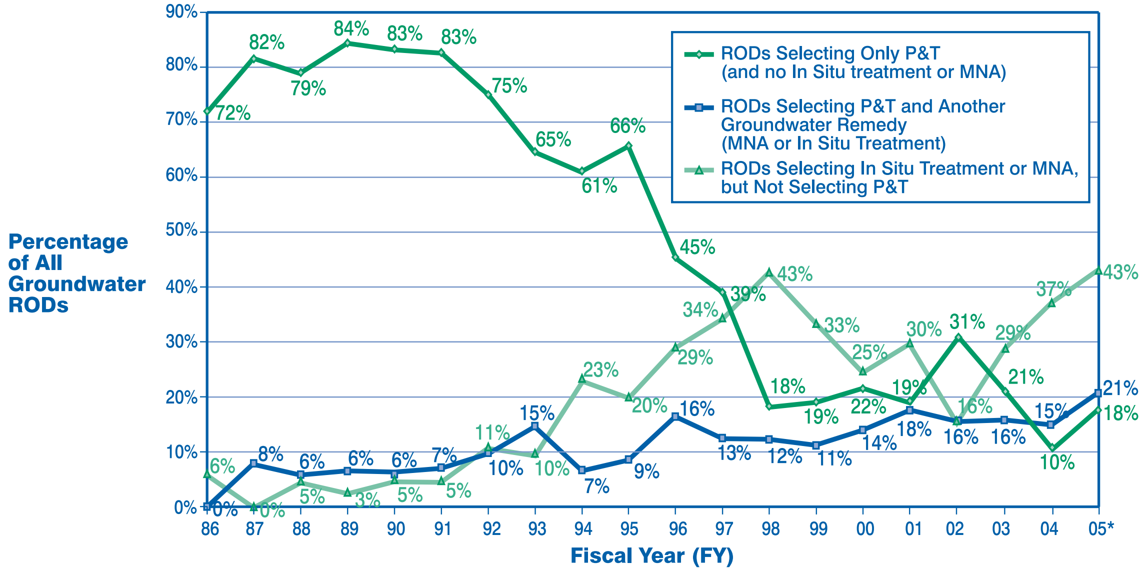
RODs that select P&T alone have decreased from about 80 percent before FY 1992 to an average of 20 percent over the last 5 years (FY 2001 through 2005), as shown in Figure 17. In contrast, P&T is being used increasingly with *in situ* treatment or MNA, or not at all. RODs that select P&T with another remedy generally ranged from 5 to 10 percent through FY 1995, but increased to an average of 17 percent from FY 2001 through 2005. Similarly, RODs that select *in situ* treatment or MNA and not P&T generally ranged from 5 to 10 percent through FY 1993. However, these RODs then increased to a peak of 43 percent in FY 1998 and again in 2005 after the percentage dipped to 16 percent in FY 2002.

The general decrease in the selection of P&T remedies may be a result of a variety of factors, including:

- More widespread acceptance of innovative *in situ* groundwater treatment remedies
- Reduced operation and maintenance costs from use of *in situ* treatment technologies
- Reduced time to address risk and quicker return of sites to beneficial uses by using active *in situ* treatment remedies
- Reduced costs by using MNA

Figure 17: Trends in Groundwater RODs Selecting Pump and Treat (FY 1986 - 2005)*

Total Number of Groundwater RODs = 1,458



Since 1995, RODs selecting pump and treat alone have dropped, while RODs selecting in situ treatment or MNA, with or without pump and treat, have increased.

MNA = Monitored natural attenuation
P&T = Pump and treat
ROD = Record of Decision (Note: Data include ROD amendments)
**Includes information from an estimated 74 percent of FY 2005 RODs available as of October 2006. RODs are counted only once in this figure as appropriate.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

The general increase in the selection of P&T with MNA or *in situ* treatment may in turn be a result of a variety of factors, including:

- More active *in situ* treatments can reduce P&T treatment times by remediating hot spots and contaminant sources
- MNA can reduce P&T treatment times by allowing P&T systems to be shut down when contaminants reach levels that can effectively be treated by MNA
- MNA can treat areas of a contaminant plume with low concentrations, reducing the amount of the contaminant plume treated by P&T

Figure 18 counts all RODs that selected *in situ* groundwater treatment (regardless of whether additional remedies were selected). The percentage of groundwater RODs that select *in situ* treatment peaked in FY 2005 at 31 percent. The gradual upward trend in selection of *in situ* treatment may be a result of several factors:

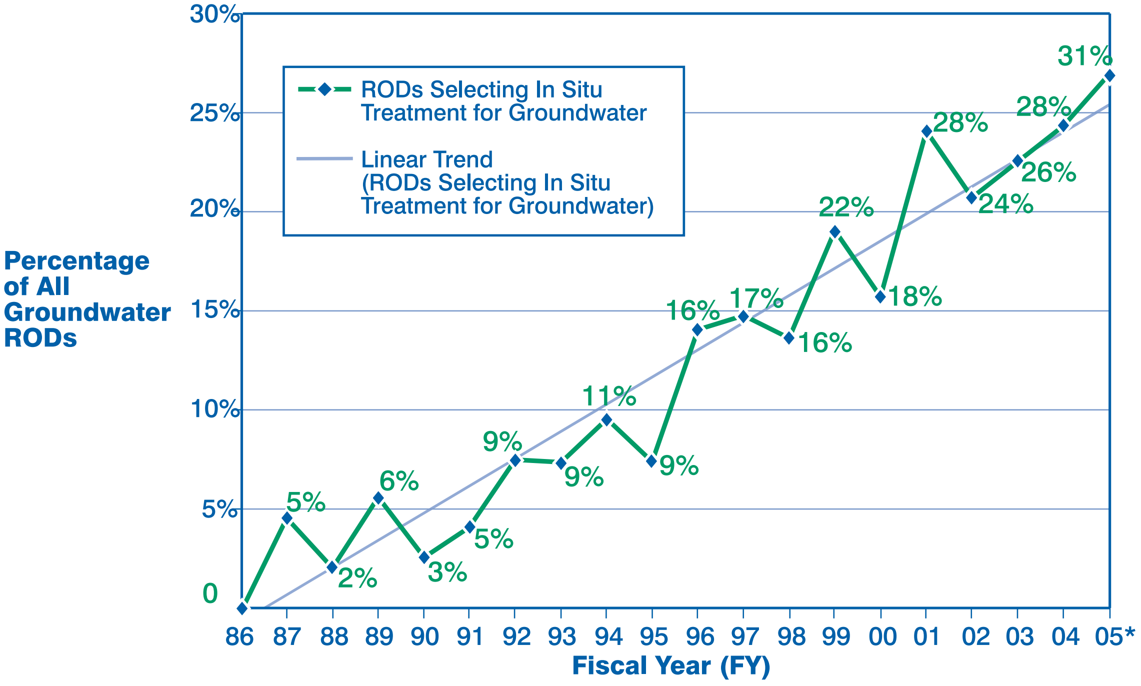
- Development of these technologies is growing rapidly
- They have been more frequently used in recent years to treat some media and contaminants, which are difficult to remediate, such as NAPL, chlorinated solvents, and fractured bedrock

BOX 14. GROUNDWATER MNA

Groundwater MNA includes a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. These *in situ* processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants.

Figure 18: Trends in Groundwater RODs Selecting In Situ Treatment (FY 1986 - 2005)*

Total Number of Groundwater RODs = 1,458



The selection of in situ treatment remedies has generally increased since 1986.

ROD = Record of Decision (Note: Data include ROD amendments)
**Includes information from an estimated 74 percent of FY 2005 RODs and amendments available as of October 2006.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

RODs That Select MNA

Groundwater MNA relies on natural attenuation processes (within the context of a carefully controlled and monitored approach to site cleanup) to achieve site-specific remediation objectives within a time frame that is reasonable, compared with other, more active methods.

Cumulatively, 303 RODs have selected MNA (see Appendix E for a list of these RODs); of those, 60 percent selected MNA without a groundwater treatment remedy. Figures 16 and 17 present information about RODs selecting MNA.

- Since FY 1986, the fraction of groundwater RODs that select MNA, both alone and in combination with P&T or *in situ* treatment, has increased.
- The selection of MNA, both alone and with groundwater treatment remedies, generally increased through FY 1998. In that year, MNA was selected in 48 percent of RODs.
- From FY 1999 through 2001, there was a general decline in the selection of MNA, with a significant reduction in FY 2002. RODs selecting MNA have generally increased since then, exceeding their previous high of 48 percent in FY 2005.

The decrease in the selection of MNA from FY 1999 through 2002 coincided with publication of EPA's guidance on the use of MNA in 1999. The directive was issued to clarify EPA's policy on use of MNA to remediate contaminated soil and groundwater at sites administered by EPA's Office of Solid Waste and Emergency Response and contained technical guidance for implementation of MNA. The guidance may have influenced remedy identification and selection by providing a more specific definition of MNA. The guidance described three "lines of evidence" that should be evaluated to support a MNA remedy, which include (1) data showing a decrease in contaminant mass or concentration, (2) hydrogeologic and geochemical data to indirectly demonstrate MNA processes, and (3) data from field or microcosm studies that directly demonstrate MNA processes. Some remedies that were previously identified as MNA no longer met the definition provided in the directive. RODs prepared following the issuance of the guidance may have classified some of those remedies as monitoring only or no action or no further action (NA/NFA).

In Situ Groundwater Treatment Projects

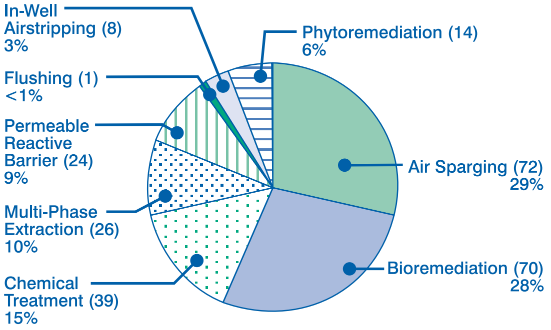
This section provides additional information about the innovative technologies used for *in situ* groundwater treatment, applications that treat the contaminated groundwater or eliminate the contaminants without extracting, pumping, or otherwise removing the groundwater from the aquifer.

In Situ Groundwater Treatment Remedy Trends

The most common *in situ* technologies are air sparging, bioremediation, chemical treatment, permeable reactive barriers (PRB), and multi-phase extraction. Figure 19 shows the total number of projects for each type of *in situ* groundwater treatment technology.

Figure 19: In Situ Groundwater Treatment Projects (FY 1982 - 2005)*

Total Number of Projects = 254



Bioremediation and air sparging account for more than half of all in situ groundwater treatment projects, but in recent years bioremediation and chemical treatment have become more common (see Table 9).

**Includes information from an estimated 74 percent of FY 2005 records of decision available as of October 2006 and project data available in CERCLIS as of October 2006.*

Sources: 3, 4, 7. Data sources are listed in Section 6.

The number of *in situ* groundwater treatment projects selected in RODs from FY 2002 to 2005 is presented in Table 9. The table shows that selection and use of bioremediation and chemical treatment for *in situ* groundwater continue to increase. Although air sparging represents the most projects cumulatively, its use is beginning to decrease. Bioremediation and chemical treatment have increased significantly, with approximately 70 and 80 percent of projects, selected in the past six years.

As shown in Figure 20, *in situ* groundwater technologies treat eight major groups of contaminants categorized for this report as follows, with the exceptions listed in the figure notes:

- VOCs – either halogenated or non-halogenated
- SVOCs – either halogenated or non-halogenated
- PAHs
- BTEX
- Organic pesticides/herbicides
- Metals and metalloids

Table 9. In Situ Groundwater Treatment Projects

Technology	ASR 11th Edition Number of New Projects Selected in FY 2000-2002*	ASR 12th Edition Number of New Projects Selected in FY 2002-2005**
Bioremediation	21	26
Chemical Treatment	15	17
Permeable Reactive Barrier	7	6
Air Sparging	10	6
Phytoremediation	3	5
Multi-Phase Extraction	4	5
In-Well Air Stripping	3	2
Flushing	2	0
Total	**65**	**67**

In situ groundwater treatment applications of bioremediation and chemical treatment are being selected more frequently than in prior years.

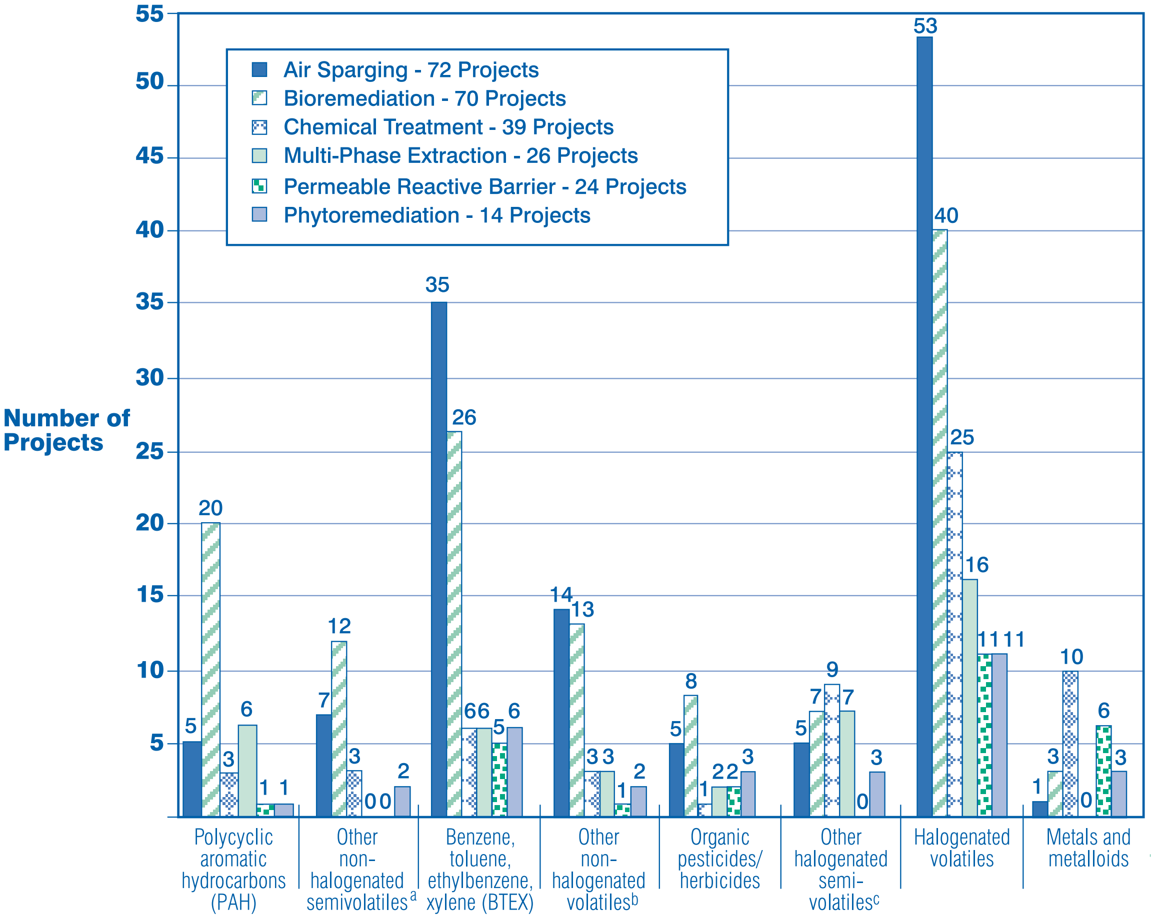
**Includes information from an estimated 70 percent of FY 2002 records of decision (ROD) and amendments available as of March 2003.*
***Includes information from an estimated 74 percent of FY 2005 RODs and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

Overall, VOCs — including BTEX and halogenated VOCs — are the contaminants most commonly treated in groundwater using *in situ* technologies. Halogenated SVOCs (including organic pesticides and herbicides) and metalloids and metals in groundwater are treated least frequently with *in situ* remedies. The number of projects in Figure 20 exceeds the total number of *in situ* groundwater projects because some projects involve more than one type of contaminant. These projects, therefore, are repeated in Figure 20 under each contaminant type treated by the remedy.

The selection of a treatment technology for a site depends on the physical and chemical properties of the contaminants. For example, VOCs are amenable to air sparging and in-well air stripping because of their volatility. Conversely, metals, which are not volatile and do not degrade, are not amenable to these technologies, and are most often treated using chemical treatment and PRBs. As Figure 20 shows, BTEX and halogenated VOCs are treated most frequently using air sparging. PAHs and other non-halogenated SVOCs, which are not as volatile as BTEX and halogenated VOCs but can be destroyed through microbial processes, are treated most frequently by bioremediation. Metalloids and metals are typically not amenable to bioremediation; one exception is the use of *in situ* bioremediation to reduce hexavalent chromium to its less toxic trivalent form. This technology, which uses biological activity to create conditions that result in chemical reduction of chromium, is being applied at one NPL site. Bioremediation to treat arsenic is currently planned at two additional sites. Metals and metalloids may undergo chemical reactions with certain substances to form compounds that are less toxic or mobile. The PRBs were used most often to treat halogenated VOCs, BTEX, and metals and metalloids.

The selection of groundwater treatment technologies may also depend on site-specific factors, such as soil type and hydrogeology. For example, air sparging may be an effective treatment for VOCs at a site with sandy soil but may not be effective at a site with tightly packed clay soil. In addition, chemical treatment may be ineffective at sites with low-permeability soils because of the resulting uneven or limited chemical distribution in the subsurface.

Figure 20: Contaminant Groups Treated by In Situ Groundwater Projects (FY 1982 - 2005)*



In situ treatment technologies are usually selected to address halogenated volatiles and BTEX. Fewer in situ methods are available for other types of contaminants.

[a] Does not include PAHs.

[b] Does not include BTEX.

[c] Does not include organic pesticides and herbicides.

**Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*

Data for in-well air stripping and flushing are not included.

Projects may treat more than one contaminant group.

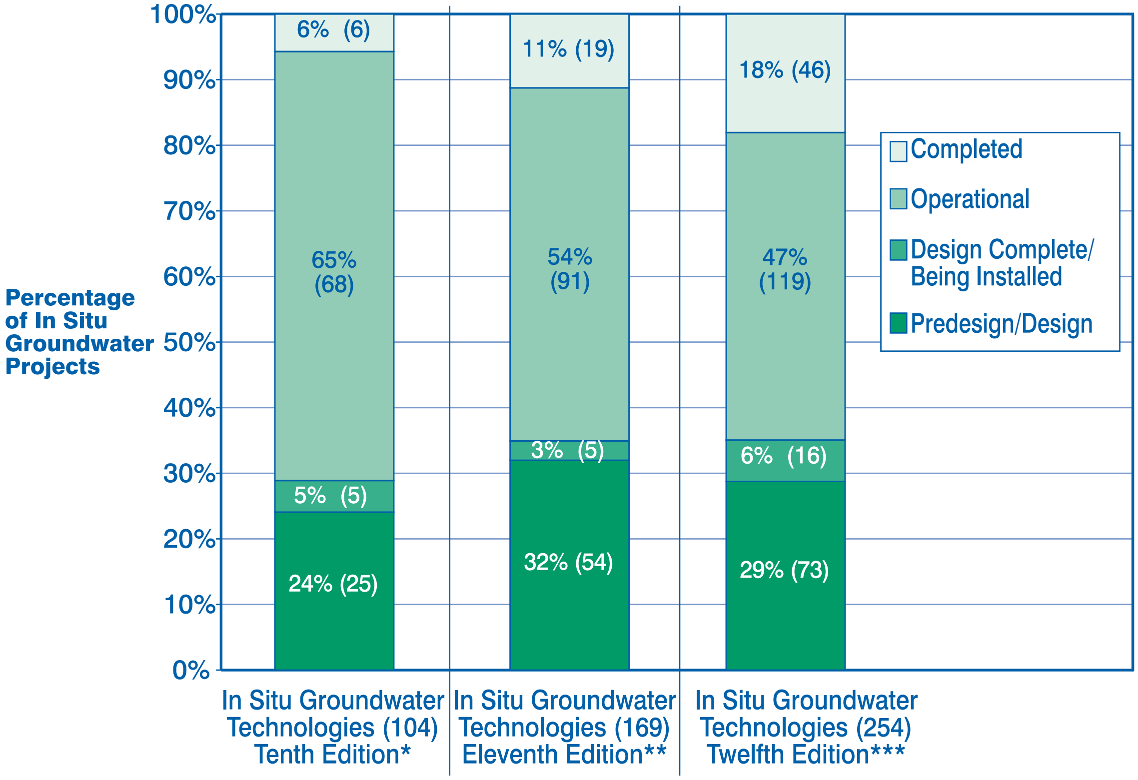
Sources: 3, 4, 7. Data sources are listed in Section 6.

Status of *In Situ* Groundwater Projects

A snapshot of the status of *in situ* groundwater treatment technologies is presented in Figure 21. The data in Figure 21 show:

- The total number of *in situ* groundwater treatment projects increased by 50 percent, from 169 to 254, between the Eleventh and Twelfth Editions.
- An additional 27 *in situ* groundwater projects were completed, increasing the percentage of completed *in situ* groundwater projects from 11 percent to 18 percent. These completed projects included 14 air sparging, 5 bioremediation, 4 chemical treatment, 2 multi-phase extraction, and 2 PRBs.
- Nearly half (47 percent) of *in situ* groundwater treatment projects are operational.
- Although the percentage of *in situ* groundwater projects that are operational decreased, the total number of operational projects increased from 91 to 119. The technologies that exhibited the largest increase in the number of operational projects were phytoremediation (6 projects), bioremediation (6 projects), multi-phase extraction (5 projects) and PRBs (5 projects).
- The number of *in situ* groundwater treatment projects in the design phase increased. The technologies with the largest increase in the number of projects in the design phase were bioremediation (11 projects) and chemical treatment (9 projects).

Figure 21: Status of In Situ Groundwater Treatment Projects - Comparison Between Tenth, Eleventh and Twelfth Editions of the ASR (FY 1982 - 2005)***



As with source control treatment projects (see Figure 11), projects addressing contaminated groundwater have progressed. The percentage of completed in situ groundwater treatment projects has increased by 13 percent since the ASR Tenth Edition.

**Includes information from records of decision (RODs) and amendments through FY 1999 available as of summer 2000.*
***Includes information from an estimated 70 percent of FY 2002 RODs and amendments available as of March 2003.*
****Includes information from an estimated 74 percent of FY 2005 RODs and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*
Sources: 3, 4, 10. Data sources are listed in Section 6.

Between FY 2002 and 2005, 82 *in situ* treatment technology projects for groundwater were selected. Of those, 67 have been added since the Eleventh Edition of the ASR (see Table 9). Technologies most frequently selected include bioremediation (26 projects), chemical treatment (17 projects), PRBs (6 projects), and air sparging (6 projects). The status of *in situ* groundwater treatment projects selected in FY 2002 through 2005 at NPL remedial action sites includes:

- One bioremediation project selected in the period has been completed
- Eighteen projects selected in the period became operational
- An additional five projects have progressed beyond the design phase, and the remedies are being installed

The specific types of *in situ* treatment technologies and their status are listed in Table 10. *In situ* treatment of groundwater has been selected 254 times at 190 sites. Among these technologies, air sparging and bioremediation have been the technologies most frequently selected; although recent trends indicate that bioremediation has been increasing while air sparging is decreasing. A large number of projects in the operational phase use these technologies. The treatment rate of these technologies is typically limited by site-specific factors. For example, air sparging may require long treatment times when continuing sources of contaminants, such as light nonaqueous phase liquids (LNAPL) and DNAPL, are present. Likewise, bioremediation may be limited by the rate the microbes can break down contaminants, which can depend on a variety of factors such as climate, soil conditions, contaminant concentrations, and solubility.

The third most frequently selected technology is chemical treatment. Chemical treatment is typically applied as an aggressive technology that requires a relatively short treatment time to achieve cleanup goals. It may also be effective in treating small amounts of DNAPL and LNAPL. The number of chemical treatment projects has nearly doubled from 21 to 39 since the ASR Eleventh Edition. PRBs are a passive technology that relies on natural groundwater flow to carry contaminants into a reactive zone, where they are treated; therefore, this technology does not treat contaminants upgradient of the reactive zone. Most PRBs (15 of 24) are in the operational phase, and two are completed.

Groundwater Pump and Treat Projects

This section presents information about P&T projects. P&T extracts groundwater from an aquifer and treats it aboveground. The extraction step usually is conducted by pumping groundwater from a well or trench. The treatment step can

Table 10. Status of In Situ Groundwater Treatment Projects by Technology (FY 1982 - 2005)*

Technology	Predesign/ Design	Design Complete/ Being Installed	Operational	Completed	Total
Air Sparging	9	5	38	20	72
Bioremediation	29	4	27	10	70
Chemical Treatment	19	2	9	9	39
Permeable Reactive Barrier	6	1	15	2	24
Multi-Phase Extraction	6	1	14	5	26
Phytoremediation	3	1	10	0	14
In-Well Air Stripping	1	1	6	0	8
Flushing	0	1	0	0	1
Total	**73**	**16**	**119**	**46**	**254**
Percentage of In Situ Groundwater Technologies	29%	6%	47%	18%	—

Almost half of in situ groundwater treatment projects are operational.

**Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*

Sources: 3, 4, 7. Data sources are listed in Section 6.

include a variety of technologies, with the most common being air stripping and carbon adsorption (refer to Appendix C for all technology descriptions).

Status of Pump and Treat Projects

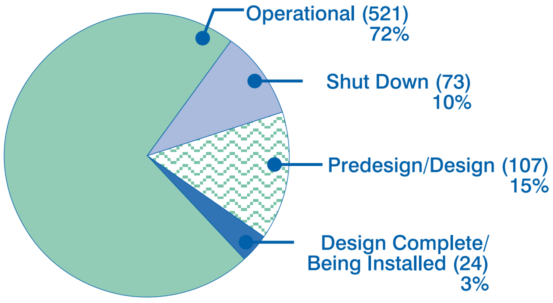
This report contains information about 725 P&T projects at NPL sites. Figure 22 shows the status of these projects and allows for the following conclusions:

- Most P&T projects (72 percent) are operational.
- Fifteen percent are in the predesign or design phase.
- 73 P&T projects (10 percent) have been shut down (no longer operational).

The status "shut down" does not indicate that goals were met for these projects. Although 38 percent (28 projects) had met the goal of either restoration or hydraulic containment of groundwater, others were shut down for various reasons: replaced with another remedy, such as *in situ* treatment or MNA; for monitoring to evaluate whether goals have been achieved; or because of technical issues, such as well fouling or limited pumping capacity. Appendix G lists 73 P&T projects along with their reasons for shutdown.

Figure 22: Status of Groundwater Pump and Treat Projects (FY 1982 - 2005)*

Total Number of Projects = 725



Nearly 75 percent of pump and treat projects are operational, presenting a continuing challenge and opportunity for optimization efforts (see Box 15).

**Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*

Sources: 3, 4, 7. Data sources are listed in Section 6.

Download file containing source data for Figure 22.

Contaminants Treated by Pump and Treat Projects

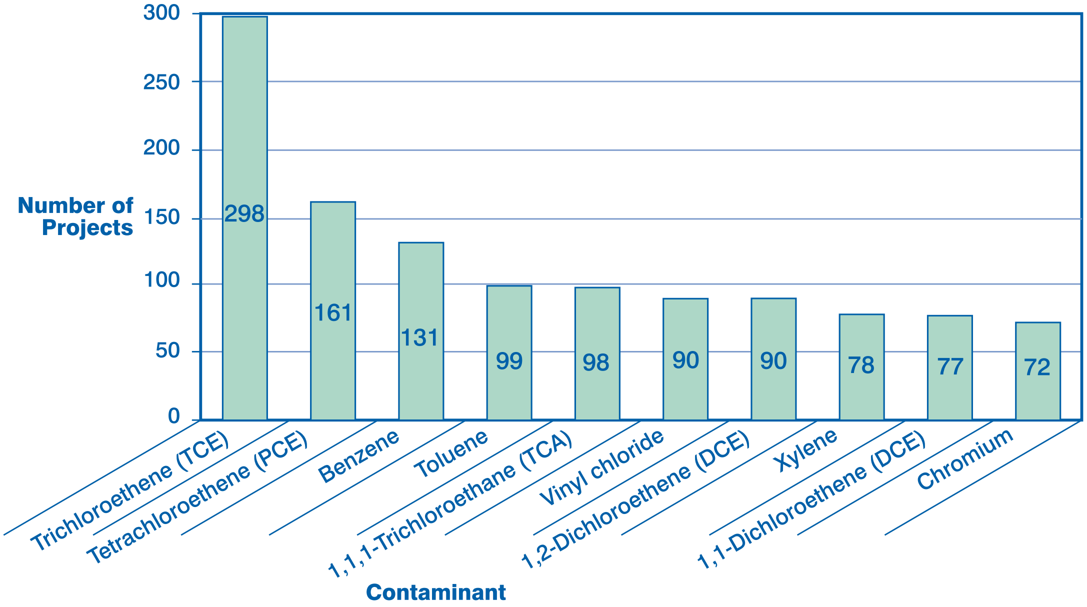
The contaminants treated by 514 P&T projects were identified, and the 10 most frequently treated contaminants are shown in Figure 23. (Note that contaminant information was available for 70 percent of projects.) Chlorinated VOCs are the most commonly treated group of contaminants. The contaminant treated most often is trichloroethene (TCE). Other frequently treated chlorinated VOCs include tetrachloroethene (PCE); 1,1,1-trichloroethane (TCA); vinyl chloride (VC); 1,2-dichloroethene (DCE); and 1,1-DCE. Frequently treated nonchlorinated VOCs include benzene, toluene, and xylene. P&T systems also are frequently used to treat metals and metalloids, including chromium. Projects that treat more than one contaminant are counted once for each contaminant listed in Figure 23.

Pump and Treat Remedy Changes

One goal of this report is to compile a current list of all P&T projects. As discussed earlier, remedies selected for remedial actions at NPL sites are documented through a ROD, and changes to the original remedies may be formally documented. Remedies often change during the pre-design or design phase of a project when new information about site characteristics is discovered or treatability studies for the selected technologies are completed.

EPA updated the status of 725 P&T projects, primarily by reviewing site documents, such as 5-year review reports and PCORs. In addition to these 725 P&T projects, nearly 100 additional P&T projects were changed to other groundwater remedies. These remedies were most often changed to *in situ* groundwater treatment or non-treatment remedies, such as institutional controls and MNA. The most commonly cited reason for changing a P&T remedy was that further site investigation revealed that the concentration or extent of contamination was less than expected. Other frequently cited reasons included problems in implementing the remedy because of site conditions such as hydrogeology, implementation of a more effective *in situ* treatment remedy, and high costs. For additional information about remedy updates, see *Updating Remedy Decisions at Superfund sites – Summary Report FY 2004 and FY 2005*, February 2007 (EPA 540-R-06-074).

Figure 23: Contaminants Most Commonly Treated by Pump and Treat Systems (FY 1982 - 2005)*



Volatile organic compounds, such as TCE and PCE, are the contaminants treated most commonly by pump and treat systems.

**Includes information from an estimated 74 percent of FY 2005 records of decision and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*
Only the most common contaminants have been included for the 514 projects with contaminant data.
Sources: 3, 4, 7. Data sources are listed in Section 6.

Box 15. P&T Optimization

Once remediation systems have been functioning for a period of time, opportunities may exist to optimize the system, particularly if they are long-term remedies. The purpose of optimization is to identify potential changes that will improve the effectiveness of a system and reduce operating costs without compromising the effectiveness of the remedy or the achievement of other cleanup objectives.

EPA recognizes that long-term remedial approaches should not remain static, that conditions change over time, and that better technologies, tools, and strategies evolve, which allow for continuous improvement of remedy performance. In *OSWER Directive No. 9200.0-33, Transmittal of Final FY00 - FY01 Superfund Reforms Strategy, dated July 7, 2000*, EPA outlined a commitment to optimize Superfund-lead P&T systems at Superfund sites. Superfund-lead P&T systems include systems that are either EPA-lead or state-lead that are funded from the Superfund Program.

Initially, EPA performed a Remediation System Evaluation (RSE) on 20 Superfund-lead groundwater P&T systems during 2000 and 2001. The results of this initiative are documented in two reports: (1) *Groundwater Pump and Treat Systems: Summary of Selected Cost and Performance Information at Superfund-Financed Sites* and (2) *Pilot Project to Optimize Superfund-financed Pump and Treat Systems: Summary Report and Lessons Learned*. Since the initial set of RSEs, EPA has prepared 17 RSEs for Superfund-lead P&T systems and 1 for a responsible-party site. EPA is also preparing additional RSEs for Superfund-financed sites. The summary reports, RSEs, and other reports are available at http://clu-in.org/rse. Additional information on RSE and optimization of remedies is available at http://www.frtr.gov/optimization. This site includes information on optimization tools and techniques, including checklists that can be used to identify optimization opportunities for specific groundwater treatment technologies.

Conclusion

Several conclusions can be drawn from the analysis of the latest data and historical trends associated with *in situ* and *ex situ* groundwater treatment projects. Of the RODs that select groundwater treatment, 18 percent (195) used *in situ* treatment remedies, whereas more than 90 percent (958) used P&T remedies. A total of 254 *in situ* treatment projects and 725 P&T projects were implemented or planned from those RODs. Those projects consist of a wide range of technologies used to address a broad spectrum of contaminants at various stages in design and implementation. Although annual fluctuations occur, some trends and general observations can be noted:

- RODs that select *in situ* groundwater treatment have been generally increasing, from none in 1986 to a high of 31 percent in FY 2005.
- RODs that select P&T alone have decreased from about 80 percent before FY 1992 to an average of 20 percent over the last 5 years (FY 2001 through 2005).
- RODs that select only MNA (with no groundwater treatment) experienced a decline from FY 1999 to 2002, coinciding with publication of EPA guidance on the use of MNA in 1999. Since FY 2002, RODs that select MNA have been increasing.
- The most common *in situ* technologies include air sparging, bioremediation, chemical treatment, PRBs, and multi-phase extraction.
- Cumulatively, air sparging represents almost 30 percent of all *in situ* groundwater treatment projects, with bioremediation representing 27 percent.
- *In situ* bioremediation and chemical treatment have increased significantly in recent years, with approximately 70 to 80 percent of these projects selected in the past 6 years.
- More than 70 percent of P&T projects selected are currently operational. Another 10 percent have been shut down. Eighteen percent of *in situ* groundwater projects have been completed, and nearly 50 percent continue to operate.

Selection and implementation of *in situ* groundwater treatment technologies have been increasing and may continue to do so as their applicability and performance are demonstrated at a larger number of sites and a wider variety of conditions. Site owners, remedial project managers, and other stakeholders may look more favorably to these options when they consider groundwater cleanup alternatives because these systems do not require extraction of contaminated groundwater. Additionally, they generally have shorter operating periods than P&T remedies.

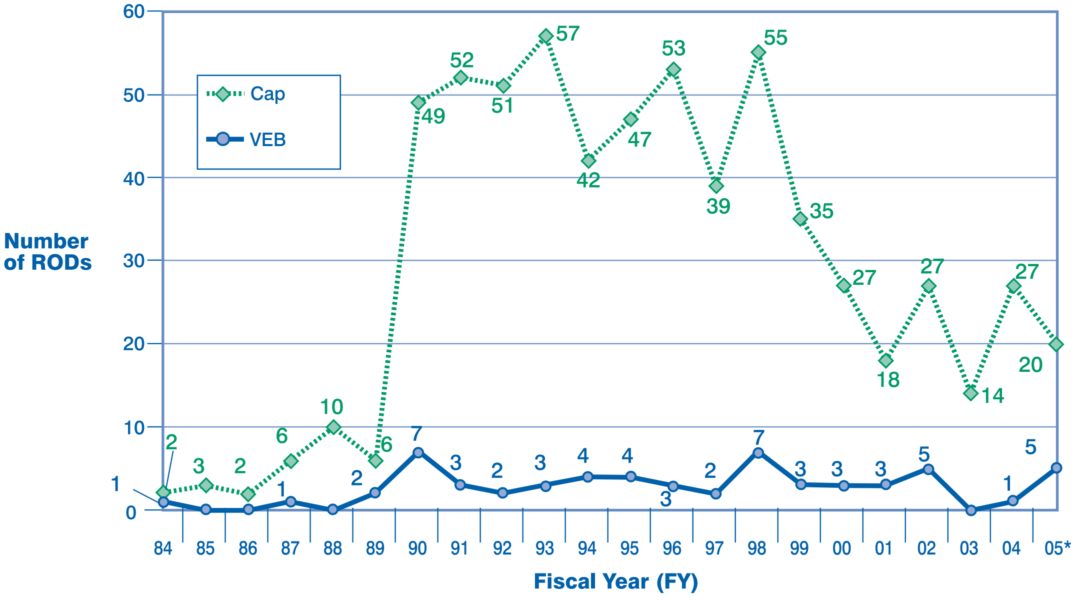
Section 5: Report Focus Area - On-Site Containment Remedies

The ASR focuses on the documentation and analysis of treatment technology applications for Superfund remedial action sites. Given the prevalence of on-site containment remedies, EPA expanded the scope of the report beyond treatment technologies to include information on groundwater containment remedies, specifically VEBs, in the Tenth Edition. With this Twelfth Edition, the scope was expanded further in an effort to understand the state of the practice of on-site containment remedies, such as final cover systems (commonly referred to as caps), to prevent the migration of contaminants or contaminated media. An initial analysis has been conducted for source control cover systems. These details are provided for a limited subset of cover systems at surface contamination sites, landfills, and disposal units. In total, information and analysis are presented for 112 cover system remedies at 89 NPL sites and 57 VEB remedies at 55 NPL sites. The information provided in this section, therefore, only suggests the state of the practice, and is not a "status report" on these remedies. This section provides an overview of the data collected about on-site containment remedies and presents the findings derived. Specific types of containment remedies are identified in Appendix F.

From FY 1982 to 2005, 17 percent (503) of RODs selected containment without treatment and an additional 16 percent (475) of RODs selected containment in conjunction with a treatment remedy. Trends associated with selection of on-site containment remedies are presented in Figure 24. Overwhelmingly, the most common type of on-site containment remedy is a cover system. Although RODs selecting other on-site containment remedies, such as VEBs, have remained constant over time — with less than 10 selected per year — RODs that select a cover system as a remedy surged in FY 1990 and reached a peak of 57 in FY 1993. Since then, the number of RODs that have selected cover systems has been steadily declining but still represents the majority of on-site containment remedies selected.

While other sections of the ASR focus on treatment remedies, information about containment remedies has also been included (see Figures 1, 2, 6, 7, 15, and 16 and Tables 1, 2, 6, 7, and 8). The remainder of this section focuses on the analysis performed on a limited sample of on-site containment remedies.

Figure 24: RODs Selecting On-Site Containment (FY 1984 - 2005)*



The number of RODs selecting capping generally tracked the total number of RODs since 1984 (see Figure 6).

**Includes information from an estimated 74 percent of FY 2005 records of decision (ROD) and amendments available as of October 2006 and project data available in CERCLIS as of October 2006.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

Collection of Data about On-Site Containment Projects

Detailed project-level information about on-site containment remedies was collected for a limited number of sites for this edition of the ASR. Sites identified for the survey included:

- Sites classified as "Fund-Lead," that is, funded and implemented by EPA, and
- Sites in the remedial action (RA) phase

These sites were selected because it was expected that implementation data would be more readily available. The application of these two criteria narrowed the list of prospective sites with on-site containment from 656 to 91 (based on CERCLIS data as of September 2006).

The breakdown of sites with RODs that select containment remedies and the relative proportion of cover systems are as follows:

- Of 656 sites with on-site containment remedies, 634 included a cover system
- Of 439 sites with on-site containment remedies in the RA phase, 417 included a cover system
- Of 228 sites with on-site containment remedies and EPA funding, 222 included a cover system
- Of 91 sites with on-site containment remedies in the RA phase and EPA funding, 89 included a cover system

As discussed in previous sections, more than one treatment remedy can be specified for a site. Similarly, more than one on-site containment remedy can be specified. The 91 sites included in this analysis yielded 128 on-site containment remedies, of which 112 were cover systems at 89 NPL sites. These cover systems are the focus of this section. Appendix H presents a list that includes each containment remedy and details of the projects that were identified during this update.

Data sources used to obtain information about on-site containment remedies included PCORs and 5-year reviews. These sources provided the most readily available and up-to-date information about the status of containment remedies and their effectiveness at sites. In addition, decision documents, site summaries, and fact sheets also were reviewed for background information. Decision documents, which contain pre-design information, were less reliable than PCORs and 5-year reviews, which often provide actual construction and "as-built" information. Based on these sources, a variety of data was collected on the remedies and associated sites.

Overview of Sites with On-Site Containment

Site types were identified based on activities conducted at the site, which are the likely sources of contamination. Applicable types for each site were established according to the data sources described above. (An NPL site could be classified as more than one site type if appropriate.) Table 11 shows the site types that were identified for the NPL sites with containment remedies. The Other Site Types category consists of site types with only a small number of NPL sites each and includes agricultural applications; chemical distributors; pesticide manufacturing, use, or storage; and textile dye manufacturing.

Each remedy also was categorized according to the source of contaminants contained by the barrier. (More than one source was selected if appropriate.) The 220 sources identified for all remedies and sites include:

- 72 (33 percent) contaminated soil
- 55 (25 percent) hazardous waste
- 30 (14 percent) municipal solid waste
- 16 (7 percent) other
- 12 (5 percent) NAPL
- 35 (16 percent) all other sources (each category represented less than 10 sources)

Table 11. Site Types for On-Site Containment Sites*

Total Number of Sites = 91

Site Types	Number of Sites
Municipal Landfills	25
Industrial Landfills	21
Wood Preserving	18
Metal Ore Mining and Smelting	16
Other Site Types**	64
Total	**144**

**Sites can have more than one type of classification.*
***Category includes such site types as agricultural applications, chemical distributors, pesticide manufacturing, and textile dye manufacturing.*

Data included for a limited sample of Fund-Lead, remedial action phase sites selected from CERCLIS as of October 2006. Includes information obtained from preliminary close-out reports, five-year reviews, and other site documents.
Sources: 3, 4, 7. Data sources are listed in Section 6.

The 91 sites with on-site containment were grouped into four general classifications based on the results of the site type and source of contamination analyses:

1. Landfills/Disposal units — Sites that are municipal or industrial landfills or where the contamination was caused by disposal of waste (44 sites).
2. Surface contamination sites — Sites where dumped waste contaminated the surface medium of the site or where an industrial process contaminated the site. Examples of surface contamination sites are chemical manufacturing facilities and wood treating and preserving facilities (37 sites).
3. Sediment sites — Sites where sediments are capped *in situ* (4 sites).
4. Mine sites — Sites where mining activities contaminated on-site media (11 sites).

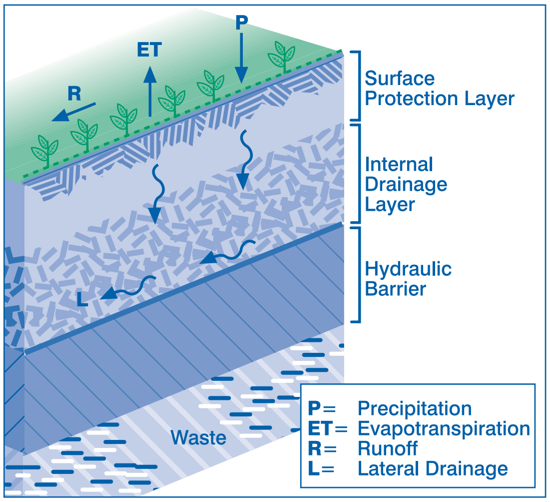
Because of the diverse nature of some NPL sites, a site could have multiple site classifications for the purpose of the review and be counted more than once, as appropriate. One example is Wyckoff Co./Eagle Harbor, which is classified as both a surface contamination site and a sediment site.

Subsequent analysis focuses on cover systems associated with landfills/disposal units and surface contamination sites. The majority of cover systems are associated with these site classifications: 89 cover systems at 77 sites. Data collected include details about the cover system, such as: type, layer components, and size; goals and status; and remedies used in conjunction with those cover systems.

Cover Designs and Layer Components

Most cover systems employ a hydraulic barrier layer to prevent infiltration of water into the contained material. Typical materials used for hydraulic barriers include compacted clay liners, geosynthetic clay liners, geomembranes, and combinations of these materials. A hydraulic barrier is generally used with additional components of the cover system, such as a surface protection layer, a biointrusion layer, a drainage layer, a gas collection layer, and a foundation layer. Cover systems may include some or all of these layers depending on factors such as site type, regulations, goal of the cover, and planned reuse of the site. Additional information about the design of cover systems can be found in the EPA report, *Design and construction of RCRA/CERCLA Final Covers.* This evaluation of on-site containment remedies classified cover systems according to the general type of cover design and layer components. The three cover system classifications are as follows:

Example of a Conventional Cap



1. Conventional caps — Cover systems that include a hydraulic barrier and a surface protection layer. Types of conventional caps include Resource Conservation and Recovery Act (RCRA) C and D (or similar type caps), Toxic Substances Control Act caps, clay caps, and other multilayer caps that include a hydraulic barrier. The graphic above illustrates a multilayer cap with a hydraulic barrier.
2. Soil caps — Cover systems with a single layer of soil covering the waste and no hydraulic barrier.
3. Asphalt/concrete caps — Cover systems with an asphalt or concrete surface layer but no hydraulic barrier underneath.

Soil and conventional caps constitute the most common cover system types (71 of 89 cover systems). Figure 25 shows the percentages of each cover system type for the landfills and disposal units and surface contamination sites, the two most common site classifications.

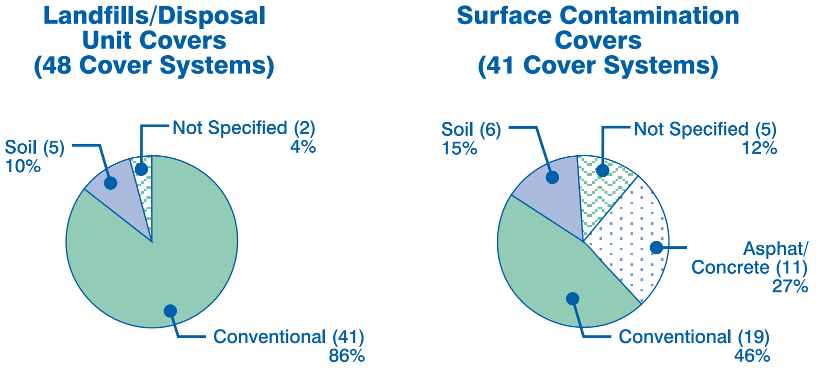
For the landfills/disposal units (48 cover systems):

- Conventional caps represented 86 percent of the cap remedies
- Soil caps represented 10 percent

For surface contamination sites (41 cover systems):

- Conventional caps represented 46 percent of the cap remedies
- Soil caps represented 15 percent
- Asphalt/concrete caps represented 27 percent

Figure 25: Cover System Types for Landfills/Disposal Units and Surface Contamination Sites*



Conventional covers are the most common cover type at both landfills/disposal units and surface contamination sites reviewed (see section on Cover Designs and Layer Components).

**Data included for a limited sample of Fund-Lead, remedial action phase sites selected from CERCLIS as of October 2006. Includes information obtained from preliminary close-out reports, five-year reviews, and other site documents. Sources: 3, 4, 7. Data sources are listed in Section 6.*

Whereas landfills/disposal units relied more frequently on conventional caps, surface contamination sites employed other cover designs, primarily asphalt/concrete as an alternative. A possible explanation for this condition might include the ongoing industrial use of surface contamination sites that requires the use of asphalt/concrete surfaces. Also, surface contamination sites may be more amenable to excavation and disposal. When less contamination remains, an asphalt/concrete cap, with no hydraulic barrier, may be appropriate.

Table 12 lists the numbers and types of hydraulic barriers at landfills/disposal units and surface contamination sites. The most frequently used hydraulic barrier at landfills/disposal units and surface contamination sites is a compact clay liner, which has been used for 17 of 60 cover systems (28 percent). Thirteen of 41 conventional caps (32 percent) at landfills/disposal units used compact clay liners, while 4 of 19 conventional caps (25 percent) at surface contamination sites used them.

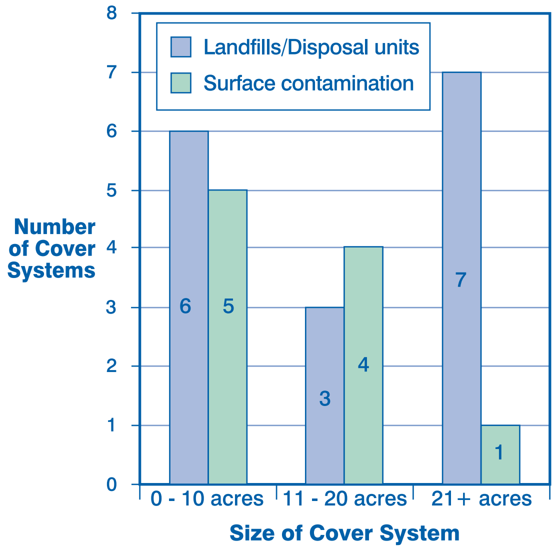
Table 12. Types of Hydraulic Barriers for Conventional Caps at Landfills/ Disposal Units and Surface Contamination Sites*

Type(s) of Hydraulic Barriers	Landfills/disposal Sites (41 projects)	Surface Contamination Sites (19 projects)
Compact Clay	13	4
Geomembrane	7	3
Composite	8	2
Geosynthetic Clay	3	3
Not Documented	10	7

**Composite barriers are hydraulic barriers with multiple types of components (e.g., compact clay and geomembrane).*
Data included for a limited sample of Fund-Lead, remedial action phase sites selected from CERCLIS as of October 2006. Includes information obtained from preliminary close-out reports, five-year reviews, and other site documents.
Sources: 3, 4, 7. Data sources are listed in Section 6.

Figure 26: Cover System Sizes by Site Type

Total Number of Caps = 26



For the sites evaluated, most cover systems at landfills/disposal units and surface contamination sites were less than 20 acres in size.

**Data included for a limited sample of Fund-Lead, remedial action phase sites selected from CERCLIS as of October 2006. Includes information obtained from preliminary close-out reports, five-year reviews, and other site documents.*
Sources: 3, 4, 7. Data sources are listed in Section 6.

Of the total 112 cover systems, information about the size of the cover system was obtained for 35 of the remedies. Based on this available information, the size of the cover systems ranged from as small as 1.2 acres to as large as 190 acres. Of the 35 cover systems, 26 were either conventional or soil caps at landfills/disposal units or surface contamination sites. Figure 26 shows the number of conventional and soil caps within the size ranges for both site types (landfills/disposal units and surface contamination). The number of conventional and soil caps at surface contamination sites decreased as the sizes of the cover systems increased: that is, there are fewer large cover systems. For conventional and soil caps at landfills/disposal unit sites, the least number of cover systems were in the "medium" size range of 11 to 20 acres.

Cover System Goals

Cover systems are used "to contain waste and any waste by-products (e.g., leachate or landfill gas), control moisture and air infiltration into the waste, and prevent the occurrence of odors, disease vectors, and other nuisances. Cover systems are also used to meet erosion, aesthetic, and other post-closure site end use criteria for waste management sites. These systems are intended to achieve their functional requirements for time periods of many decades to hundreds of years." To achieve these goals, most cover systems have a hydraulic barrier that limits (1) the downward migration of water into the contaminated media or waste, thereby minimizing leachate generation, or (2) the outward migration of gas (or volatile constituents) from the contaminated media or waste to the atmosphere.

The primary goals for cover systems evaluated in this report are to contain source or groundwater contamination. Of the 71 cover systems of interest (conventional or soil caps at landfills/disposal units or surface contamination sites), 52 (73 percent) are achieving the primary goal and are functioning as intended. The rest of the remedies have either not been constructed, have just been recently constructed and little performance information is available, or have been removed from the site.

For the landfills and disposal unit sites (46 conventional or soil caps):

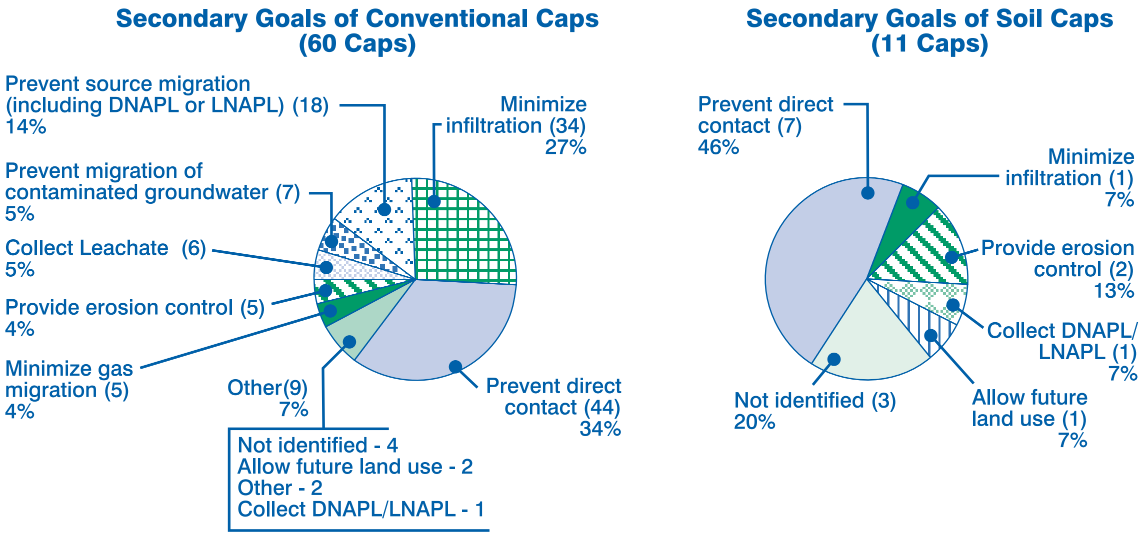
- The goal for 45 of the cover systems was to contain source contamination; the goal for one cover system was both source and groundwater containment.
- 39 of the cover systems (85 percent) were achieving their primary goal.

For the surface contamination sites (25 conventional or soil caps):

- The goal for 19 of the cover systems was to contain source contamination; the goal for 6 cover systems was both source and groundwater containment.
- 13 of the cover systems (52 percent) were achieving their primary goal.

In addition to the primary containment goals, secondary goals for cover systems range from preventing direct contact with the contained waste to allowing for future use of the site at landfills/disposal units and surface contamination sites.

Figure 27: Secondary Goals for Conventional and Soil Caps at Landfills/Disposal Units and Surface Contamination Sites*



For both conventional and soil caps reviewed, the most common secondary goal is preventing direct contact.

**Data included for a limited sample of Fund-Lead, remedial action phase sites selected from CERCLIS as of October 2006.*
Includes information obtained from preliminary closeout reports, five-year reviews, and other site documents.
Each cap may have more than one secondary goal.
Sources: 3, 4, 7. Data sources are listed in Section 6.

Figure 27 shows secondary goals for conventional and soil caps at landfills/disposal units and surface containment sites. The most common secondary goal for both types of cover system is to prevent direct contact with the contamination or waste contained. This is consistent with the primary purpose of a cover system to act as a barrier between contamination and human and ecological receptors.

Gas management and monitoring can be a critical aspect of cover design and performance and often depends on the age and type of waste or media being contained. Of the total 112 cover systems:

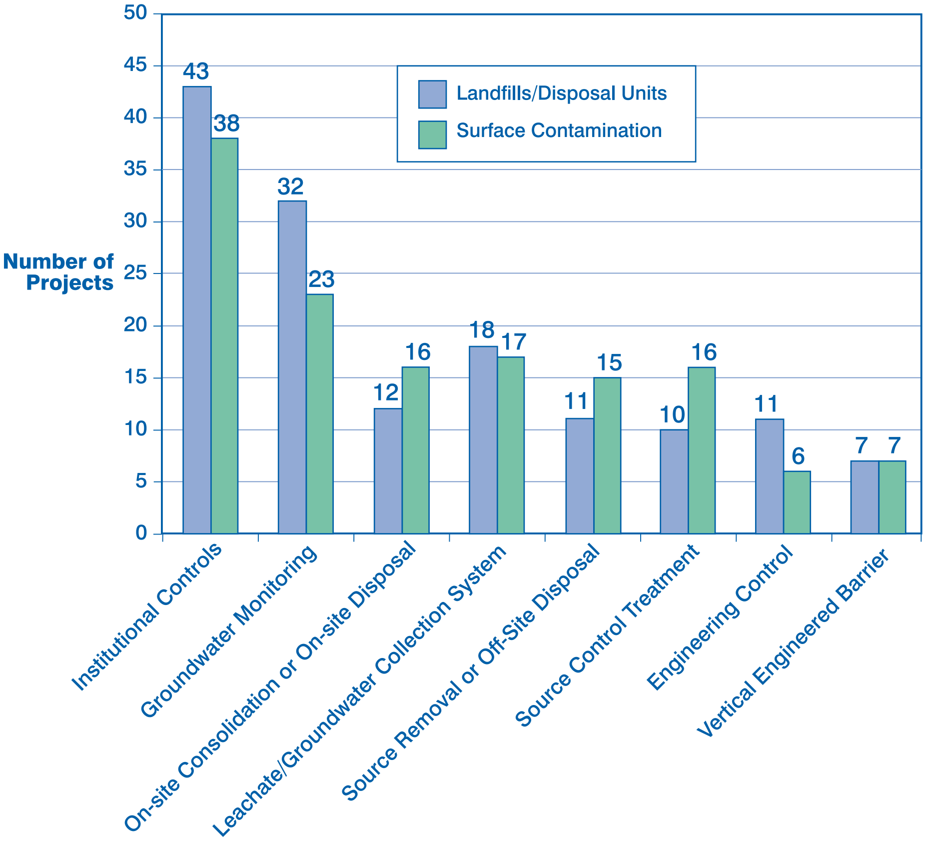
- Gas monitoring was confirmed at 24 sites
- Of the 24 sites, 16 can be classified as municipal solid waste (MSW) landfills.

In addition to monitoring, these remedies also employed gas management technologies. The two most common types of gas management at these sites were open vents and flares. Eight other sites in the study can also be classified as MSW landfills, but it is unclear if gas was being monitored. For these eight sites, there was either an open vent or no gas management.

Another goal of a cover system may be to allow for reuse and redevelopment of a site. Of the information available for all the cover systems, the most common planned reuse for a site was recreational at 14 sites (10 percent). Additional information about reuse of Superfund sites is available at *EPA's Superfund Redevelopment Web site (http://www.epa.gov/superfund/programs/recycle/).*

Rarely is on-site containment the only remedy selected for a site. Additional remedies also are implemented at these sites in conjunction with containment to provide additional protection or to expedite treatment of the contaminated media. The selection of other remedies in RODs is discussed in the introduction to this section. The two most common additional remedies for landfills/disposal units and surface contamination sites are institutional controls and groundwater monitoring (at 27 percent and 20 percent of landfills/disposal units and 24 percent and 15 percent of surface contamination sites, respectively). Figure 28 shows the additional remedies used with cover systems at landfills/ disposal units and surface contamination sites.

Figure 28: Additional Remedies Used with Cover Systems*



For landfills/disposal units and surface contamination sites reviewed, the remedies most commonly used with cover systems were institutional controls and groundwater monitoring.

**Data included for a limited sample of Fund-Lead, remedial action phase sites selected from CERCLIS as of October 2006. Includes information obtained from preliminary close-out reports, five-year reviews, and other site documents.*
A cover system can have multiple additional remedies.
Additional remedies are those remedies used in addition of the cover system to remediate the source material.
Sources: 3, 4, 7. Data sources are listed in Section 6.

Vertical Engineered Barriers

VEBs are subsurface barriers made of an impermeable material designed to contain or divert groundwater. VEBs can be used to contain groundwater, divert uncontaminated groundwater, or divert contaminated groundwater from reaching resources, such as surface water bodies or drinking water intakes. In addition, VEBs are an integral part of many PRBs. The following information presents updates and additions to information first reported in the ASR Tenth Edition. Four VEBs were selected in RODs from FY 2002 through 2005.

VEBs for groundwater containment were selected at 55 Superfund remedial action sites, for a total of 57 projects. (Some sites have more than one VEB.) Nearly 90 percent of the VEBs have been installed (50 of 57). Table 13 indicates the numbers and types of VEBs. The types of barriers are:

- Slurry wall — Consists of a vertical trench that is filled with a low-permeability slurry of bentonite, soil, or cement.
- Sheet pile — A series of overlapping sheets of impermeable material, such as metal.
- Geosynthetic wall — Constructed by placing a geosynthetic liner into a trench.

- Grout — Constructed by injecting a high-pressure grout mixture into the subsurface. The grout used is typically cement or a mixture of cement and bentonite.
- Deep soil mixing — Overlapping columns created by a series of large-diameter, counter-rotating augers that mix *in situ* soils with an additive, usually bentonite, cement, or grout, that is injected through the augers.

Slurry walls are the most frequently planned or initiated type of VEB. There are five or fewer applications at Superfund remedial action sites for each of the other types of VEBs. Some VEBs incorporate more than one type of barrier.

Additional information on VEBs is available in *Evaluation of Subsurface Engineered Barriers at Waste Sites* (EPA-542-R-98-005), which is available online at http://clu-in.org.

Table 13. Types of Vertical Engineered Barriers (FY 1982 - 2005)*

Total Number of Sites = 55

Vertical Engineered Barrier Type	Number of Barriers**
Slurry Wall	54
Sheet Pile	5
Grout	3
Geosynthetic Wall	2
Deep Soil Mixing	2
Other	1
TOTAL	**67**

**Includes information from an estimated 74 percent of FY 2005 records of decision and amendments.*
Sources: 3, 4, 7. Data sources are listed in Section 6.
***Some VEBs incorporate more than one type of barrier.*

Section 6: References and Sources of Additional Information

Listed below are references and sources of additional information. The references identify sources of data and other information presented in the ASR Twelfth Edition. Online resources also are identified to download ASR spreadsheets or search ASR databases.

References

1. List of Superfund National Priorities List (NPL) sites that are final. *www.epa.gov/superfund/sites/query/queryhtm/nplfina.txt*. September 2005.
2. List of Superfund NPL sites that have been deleted. *www.epa.gov/superfund/sites/query/queryhtm/npldela.txt*. September 2005.
3. Records of Decision (RODs), ROD Amendments, and Explanations of Significant Difference from FY 1982 - 2005.
4. Innovative Treatment Technologies: Annual Status Report (ASR) Eleventh Edition (EPA-542-R-03-009). EPA. Office of Solid Waste and Emergency Response (OSWER). February 2004.
5. Groundwater Remedies Selected at Superfund Sites (EPA-542-R-01-022). EPA. OSWER. January 2002.
6. Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. OSWER Directive 9200.4-17P. EPA. April 21, 1999.
7. Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS). *http://cfpub.epa.gov/supercpad/cursites/srchsites.cfm*.
8. The Role of Cost in the Superfund Remedy Selection Process (EPA 540-F-96-018). EPA. OSWER. September 1996.
9. Design and Construction of RCRA/CERCLA Final Covers (EPA/625/4-91/025). EPA. Office of Research and Development. May 1991.

Online ASR Resources

EPA maintains several resources online to allow users of the ASR access to additional information, including:

- ASR spreadsheets that can be downloaded from *http://clu-in.org/asr*:
  - o Table 1. Source Control Remedy Types at NPL Sites
  - o Table 3. Status of Source Treatment Projects by Technology
  - o Table 6. Groundwater Remedy Types at NPL Sites
  - o Table 10. Status of In Situ Groundwater Treatment Projects by Technology
  - o Figure 22. Status of Groundwater Pump and Treat Projects

  For these tables and figures, EPA prepared spreadsheets listing the specific sites names, locations, CERCLIS identification numbers, and types of remedies selected in RODs for the sites.
- Appendices available online at *http://clu-in.org/asr*:
  - o Appendix A. Treatment Technologies by Fiscal Year
  - o Appendix B. Treatment Technology Summary Matrix
  - o Appendix C. Definitions of Specific Treatment Technologies
  - o Appendix D. Treatment Technologies: Summary of Status Report Additions, Changes, and Deletions
  - o Appendix E. RODs Selecting Natural Attenuation
  - o Appendix F. Identification of Remedy and Record of Decision Types for Superfund Remedial Actions
  - o Appendix G. Reasons for Shut Down of 73 Groundwater Pump and Treat Systems
  - o Appendix H. On-Site Containment Remedies

  Some appendices (B, D, E, and H) have expanded over time and are not available in the printed version of this report.

ASR Search System — EPA created a searchable, online system to allow access to the data that form the basis for this report. See Box 16 for a list of the types of information available from the ASR Search System. This system is available at *http://cfpub.epa.gov/asr/*.

BOX 16. INFORMATION IN ASR SEARCH SYSTEM

Site Information

- Site name and location (city and state)
- CERCLIS ID
- Description

Project-Specific Information

- Operable unit name
- Cleanup type
- ROD date
- Lead agency and funding information

Contact Information

- Contact name and affiliation
- Address, phone number, and e-mail

Technology Information

- Technology and type (*in situ* or *ex situ*)
- Description of technology
- Treatment of residuals, if applicable
- Details (such as type of additives)
- Indicate whether part of a treatment train

Media and Quantity Information

- Media and quantity

Contaminant Information

- Contaminants treated
- Contaminants not treated

Status Information

- Status
- Date began operation
- Date completion is planned

Completed Project Information

- Cost
- Contaminant concentrations before and after treatment

Appendix A

Treatment Technologies by Fiscal Year

Treatment Technologies by Fiscal Year

Technology Type	Fiscal Year																				
Ex Situ Source Control Technologies	**82-85**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**TOTALS**
Bioremediation	1	1	0	3	5	2	1	8	3	4	6	6	0	5	6	1	0	1	1	6	0	60
Chemical Treatment	1	0	1	0	0	0	1	1	0	0	1	1	0	0	1	0	1	0	0	1	0	9
Incineration (on-site)	4	3	4	6	6	4	3	3	1	1	2	1	4	0	0	0	0	0	0	0	0	42
Incineration (off-site)	3	2	3	9	9	15	13	6	8	5	9	5	4	3	2	5	1	2	0	1	0	105
Mechanical Soil Aeration	0	0	0	1	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	4
Neutralization	0	0	0	1	0	0	0	3	0	0	2	0	0	0	0	0	0	1	0	0	0	7
Open Burn/Open Detonation	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4
Physical Separation	0	0	0	0	0	1	0	0	0	0	0	0	0	1	2	9	3	2	1	0	2	21
Phytoremediation	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Soil Vapor Extraction	0	0	0	0	0	0	0	0	2	1	0	2	0	1	1	0	0	0	0	0	0	7
Soil Washing	0	0	0	0	1	2	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	6
Solidification/Stabilization	3	4	6	7	8	14	20	23	13	13	3	7	4	13	8	5	2	6	1	10	3	173
Solvent Extraction	0	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	4
Thermal Desorption	2	1	4	4	3	6	8	2	4	4	5	1	5	4	2	4	3	6	1	1	1	71
Vitrification	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
TOTALS	**14**	**11**	**19**	**31**	**33**	**45**	**47**	**47**	**33**	**29**	**29**	**24**	**18**	**28**	**23**	**24**	**10**	**21**	**4**	**19**	**6**	**515**
In Situ Source Control Technologies	**82-85**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**TOTALS**
Bioremediation	0	0	1	2	1	3	1	4	4	5	4	6	0	6	4	4	3	2	1	2	0	53
Chemical Treatment	1	0	0	0	0	0	1	0	0	0	0	0	0	1	3	1	2	5	0	1	6	20
Multi-Phase Extraction	0	1	0	0	0	0	3	4	1	4	0	2	5	3	3	4	2	6	1	3	3	46
Electrical Separation	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Flushing	1	1	0	0	3	1	1	1	1	4	0	0	0	0	1	1	1	0	0	1	0	17
Thermal Treatment	0	0	0	0	0	1	1	0	0	1	0	2	1	1	1	1	0	0	0	1	4	14
Mechanical Soil Aeration	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3
Neutralization	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0	2	1	1	0	0	0	8
Phytoremediation	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	1	1	0	1	0	6
Soil Vapor Extraction	4	2	1	8	21	18	34	19	14	8	11	22	16	12	16	8	7	6	11	6	4	248
Solidification/Stabilization	0	1	3	2	4	2	1	3	5	0	2	4	2	3	3	1	0	3	2	0	3	44
Vitrification	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
TOTALS	**7**	**5**	**5**	**12**	**29**	**25**	**43**	**32**	**25**	**23**	**17**	**37**	**24**	**29**	**33**	**23**	**17**	**25**	**15**	**15**	**21**	**462**
In Situ Groundwater Technologies	**82-85**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**TOTALS**
Air Sparging	0	1	0	0	1	1	8	3	2	0	4	8	6	10	7	8	4	4	1	2	2	72
Bioremediation	0	0	0	0	4	3	2	2	3	2	2	1	2	3	1	3	12	5	5	5	15	70
Chemical Treatment	0	0	0	0	0	0	0	1	1	0	0	1	1	0	3	5	6	6	1	7	7	39
Multi-Phase Extraction	0	1	0	0	0	0	1	2	0	2	1	1	5	2	1	2	0	3	0	3	2	26
Flushing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
In-Well Air Stripping	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	2	1	0	1	1	0	8
Permeable Reactive Barrier	0	0	0	0	0	0	0	1	0	1	1	1	2	2	2	4	3	1	1	4	1	24
Phytoremediation	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	2	1	0	1	4	0	14
TOTALS	**0**	**2**	**0**	**0**	**5**	**4**	**11**	**9**	**6**	**5**	**9**	**12**	**18**	**19**	**18**	**26**	**28**	**19**	**10**	**26**	**27**	**254**
Ex Situ Groundwater Technologies	**1982-85**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**TOTALS**
Pump and Treat	11	16	7	26	36	26	48	59	56	70	47	48	64	51	43	41	19	23	11	13	10	725

Appendix B

Treatment Technology Summary Matrix

Source Control Treatment Technology Summary Matrix

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Durham Meadows - MMC Study Area (OU1)	1	CT	2005																							X				PD
Kellogg-Deering Well Field	1	CT	1989																							X				O
Solvents Recovery Service of New England - NAPL Area	1	CT	2005																									X		PD
Atlas Tack Corp - OU 1	1	MA	2000											X																O
Baird & McGuire - OU 2 (Soil)	1	MA	1986			X																								C
Baird & McGuire - OU 3 (Sediments)	1	MA	1989			X																								C
Cannon Engineering - Bridgewater OU	1	MA	1988													X														C
Devens Reserve Forces Training Area (RFTA) Area of Contamination 57 Areas 2 and 3	1	MA	2001													X														C
Fort Devens - OU8	1	MA	2004																							X				C
Groveland Wells	1	MA	1988																							X				C
Hanscom Field/Hanscom Air Force Base - OU1, Site 1 Source Area	1	MA	2001															X												C
Hanscom Field/Hanscom Air Force Base - OU1, Site 1 Source Area	1	MA	2001																X											O
Hanscom Field/Hanscom Air Force Base - OU3	1	MA	2002	X																										I
Hatheway & Patterson	1	MA	2005											X																PD
Hocomonco Pond	1	MA	1992															X												C
Hocomonco Pond	1	MA	1992																			X								O

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

Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	Region	State	FY	Technology Type																										Status
New Bedford Harbor - OU 1	1	MA	2001							X																				O
New Bedford Harbor OU2	1	MA	1999							X																				C
Nyanza Chemical Waste Dump	1	MA	1991																			X								PD
Otis Air National Guard (USAF) - Fuel Spill 12	1	MA	1995																							X				C
PSC Resources	1	MA	1992											X																C
Re-Solve, Inc.	1	MA	1987													X														C
Rose Disposal Pit	1	MA	1988			X																								C
Silresim Chemical	1	MA	1991																							X				C
Silresim Chemical - OU2	1	MA	1991											X																O
W.R. Grace (Acton Plant) & Co., Inc.	1	MA	1989			X																								C
W.R. Grace (Acton Plant) & Co., Inc.	1	MA	1989											X																C
Wells G&H - OU 1 (New England Plastics)	1	MA	1989																							X				O
Wells G&H - OU 1 (Wildwood Conservation Trust)	1	MA	1991			X																								C
Wells G&H - OU 1 (Wildwood Conservation Trust)	1	MA	1989																							X				O
Eastern Surplus Company - Entire Site	1	ME	2000																		X									O
Eastland Woolen Mill - OU1	1	ME	2002															X												D
Eastland Woolen Mill - OU1	1	ME	2002																X											O
Loring Air Force Base - OU 11, Fuels Tank Farm (FTF)	1	ME	1995															X												O

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Source Control Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Source Control																										Status
				Ex Situ														In Situ												
				Technology Type																										
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Loring Air Force Base - OU 8, Fire Training Area	1	ME	1996															X												C
Loring Air Force Base - OU 9, Auto Hobby Shop Area	1	ME	1999															X												O
Loring Air Force Base - OU 9, Power Plant Drainage Pipe (PDDP)/Former Vehicle Maintenance Motor Pool	1	ME	1995															X												C
McKin Co.	1	ME	1985													X														C
O'Connor - OU 2 Management of Migration	1	ME	2002																			X								O
Pinette's Salvage Yard	1	ME	1993			X																								C
Union Chemical - OU 1	1	ME	1994																							X				C
Beede Waste Oil - OU1	1	NH	2004																							X				PD
Fletchers Paint Works & Storage - OU 01	1	NH	1998													X														PD
Kearsarge Metallurgical Corp.	1	NH	1990			X																								C
Mottolo Pig Farm	1	NH	1991																							X				C
New Hampshire Plating Co. - OU 01	1	NH	1998																X											BI
Ottati & Goss/Kingston Steel Drum	1	NH	1987													X														C
Ottati & Goss/Kingston Steel Drum - OU 4	1	NH	1987													X														C
Pease Air Force Base - Site 45	1	NH	1995																							X				C
Pease Air Force Base - Site 8	1	NH	1994																							X				O
Pease Air Force Base - Zone 2	1	NH	1995																							X				O

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Savage Municipal Water Supply - OU 1, Ok Tool Source Area	1	NH	1997																							X				O
Sylvester Dump	1	NH	1983																							X				C
Tibbetts Road	1	NH	1992																							X				O
Tinkham Garage - OU 1	1	NH	1986																							X				C
Troy Mills Landfill - OU1	1	NH	2005																			X								O
Davis Liquid Waste	1	RI	1996													X														C
Davisville Naval Construction Battalion Center	1	RI	1993			X																								C
Naval Station Newport - OU4	1	RI	2000							X																				C
Peterson/Puritan Inc. - OU 1, CCL Area	1	RI	1993																							X				O
Picillo Farm Site	1	RI	1993																							X				O
Stamina Mills	1	RI	1990																							X				O
Burgess Brothers Landfill - OU 01	1	VT	1998																							X				O
A.O. Polymer	2	NJ	1991																							X				O
American Cyanamid Co. - Group I Impoundments (11, 13, 19, and 24)	2	NJ	1993																								X			O
American Cyanamid Co. - Group II Impoundments (15, 16, 17, and 18)	2	NJ	1996											X																PD
Asbestos Dump - New Vernon Road and White Bridge Road Cleanup	2	NJ	1991																								X			C
Bog Creek Farm - OU 1	2	NJ	1985			X																								C
Bog Creek Farm - OU 2	2	NJ	1989			X																								C
Bridgeport Rental & Oil Services	2	NJ	1985			X																								C
Caldwell Trucking	2	NJ	1995																								X			C

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Source Control Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Source Control																										Status
				Ex Situ														In Situ												
				Technology Type																										
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Caldwell Trucking - OU 1	2	NJ	1993			X																								C
Caldwell Trucking - OU 1	2	NJ	1995																							X				C
Chemical Control	2	NJ	1987																								X			C
Chemical Control	2	NJ	1998															X												C
Ciba-Geigy Chemical Corporation - OU 2	2	NJ	2000	X																										O
Ciba-Geigy Chemical Corporation - OU 2	2	NJ	2000													X														PD
Ciba-Geigy Chemical Corporation - OU 2	2	NJ	2000															X												BI
Cornell Dubilier Electronics Inc. - OU2	2	NJ	2004													X														D
Cosden Chemical Coatings (OU 3)	2	NJ	1992																							X				D/I
Curcio Scrap Metal, Inc.	2	NJ	1991			X																								C
Dayco Corp LE Carpenter Co	2	NJ	1994																			X								C
Dayco Corp./L.E. Carpenter Co.	2	NJ	1994															X												PD
D'Imperio Property	2	NJ	2003																							X				O
Dover Municipal Well 4	2	NJ	2005																X											PD
Ewan Property - OU 1	2	NJ	1988			X																								C
Ewan Property - OU 2	2	NJ	1994																		X									O
Ewan Property - OU 2	2	NJ	1989															X												C
FAA Technical Center - Area 20 A (Salvage Yard)	2	NJ	1990			X																								C
FAA Technical Center - OU 1, Area D - Jet Fuel Farm	2	NJ	1989																							X				O
FAA Technical Center (USDOT) - OU13	2	NJ	2003																			X								PD
Federal Creosote Site OU 1	2	NJ	1999			X																								O
Fried Industries	2	NJ	1994												X															C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
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				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Garden State Cleaners	2	NJ	1991																							X				C
Industrial Latex - OU 1	2	NJ	1992													X														C
Kaufman & Minteer Inc. - OU2	2	NJ	2002																X											PD
King of Prussia	2	NJ	1990										X																	C
Lipari Landfill	2	NJ	1985																			X								O
Lipari Landfill - OU 2	2	NJ	1985																		X									O
Lipari Landfill Marsh Sediment - OU 3	2	NJ	1988													X														C
Metaltec/Aerosystems - OU 1	2	NJ	1986													X														C
Nascolite Corp. - OU 2	2	NJ	2004											X																C
Naval Air Engineering Center - Areas A And B	2	NJ	1997																			X								O
Naval Air Engineering Center - OU 23	2	NJ	1993																							X				O
Naval Air Engineering Center - Site 16 under Area C	2	NJ	1996															X												O
Naval Air Engineering Center - Site 17 under Area C	2	NJ	1996																							X				O
Naval Air Engineering Station, Site 28	2	NJ	1997																							X				O
Naval Weapons Station Earle (Site A) - OU 03	2	NJ	1998																							X				O
NL Industries, Inc.	2	NJ	1991											X																C
NL Industries, Inc. - OU 1	2	NJ	1994											X																O
Pulverizing Services OU1	2	NJ	1999			X																								O
Pulverizing Services OU1	2	NJ	1999													X														O
Reich Farm	2	NJ	1988													X														C
Rockaway Township Wells - OU2	2	NJ	2003																							X				I

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																									
				Ex Situ														In Situ											
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	Region	State	FY	Technology Type																										Status
Sayreville Landfill	2	NJ	1990			X																								C
Scientific Chemical Processing - OU2	2	NJ	2002																				X							D
Scientific Chemical Processing - OU2	2	NJ	2002																								X			D
South Jersey Clothing Company	2	NJ	1991																							X				C
Swope Oil & Chemical	2	NJ	1985			X																								C
Swope Oil & Chemical - OU 2	2	NJ	1991																							X				C
Universal Oil Products	2	NJ	1993									X																		C
Vineland Chemical Co., Inc. - OUs 1, 3 & 4	2	NJ	1989										X																	O
Waldick Aerospace Devices, Inc.	2	NJ	1991											X																C
Waldick Aerospace Devices, Inc. - OU 1	2	NJ	1987													X														C
Williams Property	2	NJ	1987			X																								C
Woodland Route 532 Dump	2	NJ	1999																							X				BI
Woodland Routes 72 Dump	2	NJ	1999																							X				BI
American Thermostat Co. - Phase 1	2	NY	1990													X														C
American Thermostat Co. - Phase 2	2	NY	1997													X														C
Brewster Well Field - OU 2	2	NY	1988			X																								C
Brookhaven National Laboratory (US DOE) - OU 4	2	NY	1996																							X				C
Byron Barrel & Drum - OU 1/02	2	NY	1989																		X									O
Carroll & Dubies Sewage Disposal	2	NY	1995	X																										C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Carroll & Dubies Sewage Disposal	2	NY	1995											X																C
Carroll & Dubies Sewage Disposal	2	NY	1995																							X				C
Claremont Polychemical	2	NY	1990													X														C
Claremont Polychemical - OU2	2	NY	2003																							X				O
Facet Enterprises	2	NY	1992											X																C
FMC Corp. (Dublin Road)	2	NY	1993											X																C
Fulton Terminals	2	NY	1989													X														C
GCL Tie And Treating - OU 1	2	NY	1994													X														C
GCL Tie And Treating - OU 2	2	NY	1995													X														C
General Motors/Central Foundry Division - OU 1 & OU 2	2	NY	1992											X																C
Genzale Plating Company - OU 1	2	NY	1991																							X				C
Genzale Plating Company - OU1	2	NY	1991											X																C
Hooker - Hyde Park	2	NY	1986																			X								O
Hooker (102nd Street Landfill)	2	NY	1995			X																								C
Hooker (S Area)	2	NY	2001																			X								O
Hooker Chemical/Ruco Polymer	2	NY	1990			X																								C
Hooker Chemical/Ruco Polymer - OU 1	2	NY	1994																		X									O
Hudson River PCBs - OU2	2	NY	2002											X																PD
Jackson Steel - OU1	2	NY	2004																							X				O
Jones Chemicals, Inc	2	NY	2000																							X				BI
Jones Chemicals, Inc.	2	NY	2000																X											BI

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Kentucky Avenue Wellfield - OU 3	2	NY	1996																							X				D
Lehigh Valley Railroad Derailment OU2	2	NY	1999									X																		D/I
Li Tungsten Corporation - OU4	2	NY	2005							X																				D/I
Love Canal - 05	2	NY	1997			X																								C
Ludlow Sand & Gravel - OU2	2	NY	2003																								X			D
Mackenzie Chemical Works - OU1	2	NY	2003																							X				O
Marathon Battery Corp. - Areas I, II, And III	2	NY	1986											X																C
Mattiace Petrochemicals - OU 2	2	NY	1990			X																								C
Mattiace Petrochemicals - OU 3 and 4	2	NY	1991																							X				O
Pasley Solvents and Chemicals, Inc.	2	NY	1992																							X				C
Preferred Plating Corp. - OU 2	2	NY	1992											X																C
Reynolds Metals Company Study Area, (RMC)	2	NY	1993											X																C
Robintech, Inc./National Pipe Company	2	NY	1997													X														C
Sarney Farm	2	NY	1990													X														C
Sealand Restoration, Inc.	2	NY	1990			X																								C
Seneca Army Depot Activity (SEDA) Open Burning Grounds OU2	2	NY	1999											X																O
Shore Realty (Formerly Applied Environmental Services) - Groundwater OU	2	NY	1991															X												O

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Source Control Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Source Control																										Status
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
				Technology Type																										
Shore Realty (Formerly Applied Environmental Services) - OU 1	2	NY	1991																							X				O
Sinclair Refinery - OU 2	2	NY	1991																							X				C
SMS Instrument	2	NY	1989																							X				C
Solvent Savers	2	NY	1990																							X				O
Stanton Cleaners Area Groundwater Contamination OU1	2	NY	1999																							X				O
Vestal Water Supply - Area 4	2	NY	1990																							X				O
Vestal Water Supply Area 2	2	NY	1990																							X				C
Wide Beach Development	2	NY	1985		X																									C
Wide Beach Development Site	2	NY	1985													X														C
York Oil Co. - OU 02	2	NY	1998											X																C
York Oil Co. - OU 1	2	NY	1988											X																C
GE Wiring Devices	2	PR	1988			X																								C
Janssen Inc.	2	PR	1993																							X				C
Upjohn Manufacturing Co.	2	PR	1988																							X				C
Vega Alta Public Supply Wells - OU 2, PRIDCO Industrial Park	2	PR	1997																							X				O
Island Chemical Corp/Virgin Islands Chemical Corp. - OU1	2	VI	2002																							X				O
Tutu Well Field - Department of Education	2	VI	1996																							X				O
Tutu Well Field - Dept Of Education	2	VI	1996									X																		O
Tutu Well Field - Esso	2	VI	1996																							X				C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
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				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Tutu Well Field - O' Henry	2	VI	1996																							X				O
Tutu Well Field - Texaco	2	VI	1996																							X				O
Bolling Air Force Base - OU1 (SW Corner Landfill)	3	DC	2002													X														PD
Delaware Sand & Gravel Landfill	3	DE	1993									X																		O
Delaware Sand & Gravel Landfill - OU 4 And OU 5	3	DE	1993															X												O
Dover Air Force Base - Lindane Source Area Within Area 6	3	DE	1995			X																								C
Dover Air Force Base - OU 14	3	DE	1998													X														C
Dover Air Force Base - Target Area 3 Of Area 6	3	DE	1995															X												O
Dover Gas Light Co.	3	DE	1994			X																								C
Dover Gas Light Co. - OU 01	3	DE	1998			X																								O
Dover Gas Light Co. - OU	3	DE	1998																							X				C
Halby Chemical Co. - OU 1, Process Plant Area	3	DE	1991																X											C
NCR Corp.	3	DE	1991																							X				C
Standard Chlorine of Delaware, Inc. - OU1	3	DE	2004			X																								O
Wildcat Landfill - OU 1, Landfill Proper And Adjacent Areas	3	DE	1988			X																								C
Aberdeen Proving Ground (Edgewood Area) J-Field Soil OU	3	MD	2001																						X					O
Patuxent River Naval Air Station - OU 1 (Pesticide Shop, Site 17)	3	MD	2001			X																								C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																									
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Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Patuxent River Naval Air Station - OU 30 (Sites 1 and 12)	3	MD	2005											X																PD
Sand, Gravel, and Stone - OU3	3	MD	2003													X														PD
Southern Maryland Wood Treating	3	MD	1995													X														C
Spectron, Inc. - OU1	3	MD	2004	X																										PD
Spectron, Inc. - OU1	3	MD	2004															X												PD
Spectron, Inc. - OU1	3	MD	2004																		X									PD
Bendix Flight Systems Division	3	PA	1988				X																							C
Boarhead Farm	3	PA	1999				X																							D/I
Boarhead Farm	3	PA	1999																						X					O
Brodhead Creek	3	PA	1991			X																								C
Brodhead Creek - OU 1	3	PA	1991																									X		C
Bruin Lagoon	3	PA	1982											X																C
C&D Recycling	3	PA	1992											X																C
Centre County Kepone	3	PA	2001																			X								O
Craig Farm Drum	3	PA	1989											X																C
Douglassville Disposal	3	PA	1988			X																								C
Douglassville Disposal	3	PA	1989											X																C
Drake Chemical - Phase III, OU 3	3	PA	1988			X																								C
Dublin TCE Site Remediation OU-2	3	PA	2002																X											PD
Eastern Diversified Metals	3	PA	1991			X																								C
Hebelka Auto Salvage Yard	3	PA	1989											X																C
Hunterstown Road	3	PA	1993			X																								C
Hunterstown Road	3	PA	1993											X																C
Jacks Creek/Sitkin Smelting and Refining	3	PA	1997											X																C

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				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Letterkenny Army Depot (SE Area) - Former Solvent Disposal Lagoon/Earthen	3	PA	1991											X																C
Letterkenny Army Depot (SE Area) - OU 1, K-Area	3	PA	1991													X														C
Lord-Shope Landfill	3	PA	1990																							X				O
M.W. Manuafacturing - Carbon Waste Pile	3	PA	1998			X																								C
M.W. Manufacturing	3	PA	1998											X																C
Malvern TCE	3	PA	2005																							X				PD
Palmerton Zinc Pile - OU3	3	PA	2002							X																				C
Palmerton Zinc Pile - OU3	3	PA	2002																								X			D
Paoli Rail Yard	3	PA	1992											X																C
Publicker Industries, Inc. - OU 3	3	PA	1996			X																								C
Raymark	3	PA	1992																							X				C
Revere Chemical Co. - OU 1	3	PA	1994									X																		C
Saegertown Industrial Area - Former Gatx Property	3	PA	1995			X																								C
Tonolli Corp.	3	PA	1992											X																C
Tyson's Dump	3	PA	1988																							X				C
Westline	3	PA	1986			X																								C
Whitmoyer Laboratories - OU 04 and OU 5	3	PA	1998											X																C
Whitmoyer Laboratories - OU 1	3	PA	1989			X																								C
Whitmoyer Laboratories - OU 2 (Bldg Structures)	3	PA	1991											X																C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Whitmoyer Laboratories - OU 2 (Bldg Structures, Vault OU 4 UVW and Lagoon Sludges OU 5)	3	PA	1995			X																								C
Whitmoyer Laboratories - OU 3	3	PA	1991											X																C
Whitmoyer Laboratories - OU 3	3	PA	1991													X														C
William Dick Lagoons - OU 3 (Soil Remediation)	3	PA	1993													X														BI
Abex Corporation OU 1 - Inner Focus Area	3	VA	1994											X																C
Arrowhead Associates/Scovillcorp. - OU 1	3	VA	1991																							X				O
Atlantic Wood Industry - OU 1	3	VA	1995	X																										PD
Avtex Fibers Inc., - OU10	3	VA	2004											X																PD
C&R Battery Co., Inc.	3	VA	1990											X																C
Defense General Supply Center (DLA) - OU 5	3	VA	1992																							X				C
Defense General Supply Center (DLA) - OU8 Acid Neutralization Pits Area	3	VA	1992																			X								O
Dixie Cavern County Landfill	3	VA	1991			X																								C
First Piedmont Rock Quarry (Route 719)	3	VA	1991											X																C
Fort Eustis Directorate of Logistics Storage Yard OU 5	3	VA	2001							X																				PD
Greenwood Chemical Co. - OU 1	3	VA	1990			X																								C
H & H Burn Pit	3	VA	1999																			X								O

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
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Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Naval Surface Warfare - Dahlgren - OU 03	3	VA	1998											X																C
Naval Surface Warfare Center, Dahlgren, Site 12 - Chemical Burn Area	3	VA	1997																							X				O
Naval Weapons Station - Yorktown - OU 03	3	VA	1998	X																										C
Naval Weapons Station OU2	3	VA	1999	X																										C
Rhinehart Tire Fire Dump	3	VA	1999		X																									C
Rhinehart Tire Fire Dump	3	VA	1992											X																C
Saunders Supply Co.	3	VA	1996			X																								C
US Titanium	3	VA	2002																					X						O
Fike Chemical, Inc. - OU 3 - Drum Removal	3	WV	1992			X																								C
Ordnance Works Disposal Areas OU 1	3	WV	1999							X																				C
Vienna Tetrachloroethene	3	WV	2002																							X				O
West Virginia Ordnance (US Army)	3	WV	1987						X																					C
Alabama Army Ammunition Plant, Area A, Study Area 12 And D - OU 3	4	AL	1994			X																								C
Alabama Army Ammunition Plant, Area B, Stockpile Soil - OU 1	4	AL	1992			X																								C
Alabama Army Ammunition Plant, Area B, Study Area 6, 7, 10, 21 - OU 2	4	AL	1995			X																								C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
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Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Alabama Army Ammunition Plant, Area B, Study Areas 5, 10, 16, 19, OU 6	4	AL	1997			X																								C
Alabama Army Ammunition Plant, Area B, Study Areas 5, 10, 16, 19, OU 6	4	AL	1992											X																C
Alabama Army Ammunition Plant, OU 5	4	AL	1997			X																								C
Alabama Army Ammunition Plant, OU 5	4	AL	1997											X																C
Ciba Geigy (McIntosh Plant) - OU 2	4	AL	1991			X																								C
Ciba Geigy (McIntosh Plant) - OU 4	4	AL	1992			X																								C
Interstate Lead Co.	4	AL	1991											X																O
Mowbray Engineering	4	AL	1986																								X			C
Redwing Carriers, Inc.	4	AL	2000			X																								PD
Redwing Carriers, Inc.	4	AL	2000							X																				D/I
Stauffer Chemical (Cold Creek Plant) - OU2	4	AL	1995	X																										O
Stauffer Chemical LeMoyne Plant OU 2	4	AL	1999																		X									D/I
TH Agriculture & Nutrition (Montgomery Plant) - OU 2	4	AL	1998	X																										O
62nd Street Dump	4	FL	1990																								X			C
Agrico Chemical	4	FL	1992											X																C
Airco Plating Company, OU 1	4	FL	1994																							X				C
Alaric Inc OU-1	4	FL	2002																X											O
American Creosote Works OU2-Phase 1	4	FL	1994																			X								O
Bay Drum - OU 3	4	FL	1993											X																C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
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				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Brown Wood Preserving	4	FL	1988	X																										C
Cabot/Koppers - Koppers OU	4	FL	1990	X																										PD
Cabot/Koppers - Koppers OU	4	FL	1990										X																	PD
Cabot/Koppers - Koppers OU	4	FL	1990											X																PD
Cabot/Koppers - Koppers OU	4	FL	1990															X												PD
Cecil Field Naval Air Station - OU 2, Site 17	4	FL	1994													X														C
Cecil Field Naval Air Station - OU7, Site 16	4	FL	1999																							X				C
Coleman-Evans Wood Preserving	4	FL	1997													X														O
Davie Landfill	4	FL	1985											X																C
Dubose Oil Products Co.	4	FL	1990	X																										C
Florida Steel Corp. - OU 2	4	FL	1994											X																C
Helena Chemical Company (Tampa Plant)	4	FL	1996	X																										C
Helena Chemical Company (Tampa Plant)	4	FL	1996																					X						C
Hollingsworth Solderless	4	FL	1986																							X				C
Jacksonville Naval Air Station - OU 2 PSC 42	4	FL	1995																								X			C
Jacksonville Naval Air Station - OU 2 PSCs 2,41,and 43	4	FL	1994											X																C
Jacksonville Naval Air Station - OU3	4	FL	2000																							X				O
Jacksonville Naval Air Station - PSC-2	4	FL	1994													X														C
Kassauf-Kimerling Battery - Wetlands Soils	4	FL	1990											X																C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
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				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Kassauf-Kimerling Battery Disposal - OU 1 (Landfill Wastes)	4	FL	1989											X																C
MRI Corporation NPL Site - OU1	4	FL	2000											X																D
Normandy Park Apartments	4	FL	2000											X																C
Peak Oil - OU 1	4	FL	1993											X																C
Peak Oil/Bay Drum - OU 1	4	FL	1993																								X			I
Pepper Steel & Alloys, Inc.	4	FL	1986											X																C
Sanford Gasification Plant Site - OU 5	4	FL	2000			X																								PD
Sapp Battery Salvage	4	FL	1986											X																C
Schuylkill Metal	4	FL	1990											X																C
Southern Solvents OU 1	4	FL	1999																X											D/I
Stauffer Chemical Co. (Tarpon Springs) - OU 01	4	FL	1998																								X			D
Stauffer Chemical Company - OU1	4	FL	1996	X																										C
Whitehouse Oil Pits	4	FL	1998																								X			C
Yellow Water Road Dump	4	FL	1990											X																C
Zellwood Soil Contamination - OU 1	4	FL	1990											X																C
Brunswick Wood Preserving Site - OU 1	4	GA	2002																								X			PD
Cedartown Industries, Inc.	4	GA	1993											X																C
Diamond Shamrock Corp. - Liquid Wastes	4	GA	1994			X																								C
Hercules 009 Landfill	4	GA	1993											X																C
Hercules 009 Landfill	4	GA	1993																								X			C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
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				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Mathis Brothers Landfill - South Marble Top Road	4	GA	1996			X																								C
Robins Air Force Base - OU 1, Landfill and Sludge Lagoon	4	GA	1991																							X				C
Robins Air Force Base - Sludge Lagoon	4	GA	1991											X																C
Woolfolk Chemical Works, Inc. - OU 03	4	GA	1998											X																PD
Howe Valley Landfill	4	KY	1990				X																							C
Maxey Flats Nuclear Disposal	4	KY	1991											X																O
Paducah Gaseous Diffusion Plant (USDOE)	4	KY	1998																	X										C
Paducah Gaseous Diffusion Plant (USDOE) - OU 19	4	KY	2005																									X		PD
Smith's Farm - OU 1	4	KY	1991		X																									C
Smith's Farm - OU 1	4	KY	1991													X														C
Smith's Farm OU2	4	KY	1993	X																										O
Flowood Site	4	MS	1988											X																C
Newsom Brothers/Old Reichold Chemicals	4	MS	1989			X																								C
ABC One Hour Cleaners OU2	4	NC	1994																							X				O
Aberdeen Pesticide Dumps, OU 1 & OU 4	4	NC	1991													X														C
Barber Orchard - OU1	4	NC	2004											X																D/I
Battery Tech Duracell Lexington OU 1	4	NC	1999											X																C
Battery Tech Duracell Lexington OU 1	4	NC	1999																X											C
Benfield Industries	4	NC	1995	X																										C
Blue Ridge Plating Company - OU1	4	NC	2004											X																PD

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
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Project Name	Region	State	FY	Technology Type																										Status
Bypass 601 Groundwater Contamination	4	NC	1993											X																C
Camp Lejeune Military Base (US Navy) - OU 2, Site 82	4	NC	1993																							X				C
Cape Fear Wood Preserving	4	NC	1989													X														C
Carolina Transformer Co.	4	NC	1991												X															C
Celanese - OU 2	4	NC	1989			X																								C
Celanese - OU 2	4	NC	1989											X																C
Charles Macon Lagoon & Drum Storage - OU 1, Lagoon No. 7	4	NC	1991																							X				C
Cherry Point Marine Corps Air Station - OU 1	4	NC	1998																							X				O
Cherry Point Marine Corps Air Station - OU 2	4	NC	1999																							X				C
Cherry Point Marine Corps Air Station OU 3	4	NC	2001															X												O
FCX - Statesville - OU 2	4	NC	1995		X																									C
FCX - Statesville - OU 2	4	NC	1995													X														C
FCX - Statesville - OU 3	4	NC	1996																							X				O
Jadco-Hughes Facility	4	NC	1990																		X									O
Jadco-Hughes Facility	4	NC	1990																							X				C
JFD Electronics/Channel Master	4	NC	1992		X																									C
JFD Electronics/Channel Master	4	NC	1992											X																C
Koppers Co., Inc. (Morrisville Plant)	4	NC	1993			X																								C
Martin-Marietta, Sodyeco, Inc., Area D	4	NC	1987			X																								C
North Carolina State University - Lot 86, Farm Unit #1	4	NC	1996																								X			C

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Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Potters Septic Tank Service Pits	4	NC	1992													X														C
Aqua-Tech Environmental Inc (Groce Labs)	4	SC	2003																							X				PD
Calhoun Park Area - OU 2	4	SC	2002																X											C
Geiger (C&M Oil)	4	SC	1993																								X			C
Golden Strip Septic Tank Service	4	SC	1991											X																C
Helena Chemical Company Landfill	4	SC	1995			X																								C
Independent Nail Co.	4	SC	1987											X																C
Koppers Co Inc (Charleston Plant) Former Treatment and Old Impoundment Areas	4	SC	1998																			X								O
Koppers Co., Inc. (Charleston Plant) - Northwest Corner	4	SC	2003																								X			PD
Koppers Co., Inc. (Charleston Plant) - OU 01	4	SC	1998															X												C
Leonard Chemical Company	4	SC	2001																							X				PD
Macalloy Corporaiton - OU1	4	SC	2002											X																BI
Medley Farm - OU 1	4	SC	1991																							X				O
Palmetto Wood Preserving	4	SC	1987		X																									C
Palmetto Wood Preserving	4	SC	1987											X																C
Para-Chem Southern, Inc OU H400	4	SC	2000																							X				C

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Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Sangamo/Twelve-Mile/Hartwell PCB - OU 1	4	SC	1991													X														C
Savannah River (USDOE) - L-Area Oil And Chemical Basin And L-Area Acid/Caustic Basin (OU 17)	4	SC	1997																								X			C
Savannah River (USDOE) - Old F-Area Seepage Basin, Srs Building Number 904-49g	4	SC	1997																								X			C
Savannah River Site (USDOE) - CMP (OU 24)	4	SC	2002																							X				I
Savannah River Site (USDOE) - OU 28	4	SC	2000																							X				I
Savannah River Site (USDOE) - OU 60	4	SC	1999																								X			C
Savannah River Site (USDOE) - OU21	4	SC	2004																							X				PD
Savannah River Site (USDOE) - OU24 (Ballast Area)	4	SC	2003	X																										O
Savannah River Site (USDOE) - OU24 (Field A)	4	SC	2005																									X		PD
Savannah River Site (USDOE) - OU30	4	SC	2003																							X				PD
Savannah River Site (USDOE) - OU59	4	SC	2003																							X				PD
Savannah River Site (USDOE) - OU82	4	SC	2004																									X		PD
Savannah River Site (USDOE) - OU82	4	SC	2004																							X				PD

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Project Name	Region	State	FY	Technology Type																										Status
Savannah River Site (USDOE) C Area Burning/Rubble Pit - SVE	4	SC	1999																							X				O
Savannah River Site (USDOE) OU 55,65	4	SC	1999																								X			C
Savannah River Site (USDOE) OU 66	4	SC	1999																								X			D/I
SCRDI Bluff Road	4	SC	1990																							X				C
Wamchem, Inc.	4	SC	1988													X														C
Arlington Blending And Packaging Co. - OU 1	4	TN	1991													X														C
Carrier Air Conditioning - Main Plant Area	4	TN	1992																							X				C
Carrier Air Conditioning - North Remediation System	4	TN	1992																							X				O
Memphis Defense Depot (DLA) - OU1	4	TN	2004																							X				D
Milan Army Ammunition Plant - OU5	4	TN	2004	X																										O
Milan Army Ammunition Plant - OU5	4	TN	2004															X												O
Milan Army Ammunition Plant - OU 3 & 4, Industrial Soil	4	TN	1996	X																										O
Oak Ridge Reservation (USDOE) - OU 14, Surface Impoundments	4	TN	1997											X																C
Oak Ridge Reservation (USDOE) - OU 29, Melton Valley Watershed	4	TN	2000																								X			PD
Oak Ridge Reservation (USDOE) - OU 29, Melton Valley Watershed	4	TN	2000																										X	PD

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Source Control Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Source Control																										Status
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
				Technology Type																										
Oak Ridge Reservation (USDOE) - OU 3, Pond Waste Management Project	4	TN	1991											X																C
Oak Ridge Reservation (USDOE) - OU 40, Burial Complex 4	4	TN	1996																								X			C
Oak Ridge Reservation (USDOE) OU-28	4	TN	2002											X																PD
Oak Ridge Reservation (USDOE) OU-28	4	TN	2002													X														PD
Ross Metals Inc - OU 1	4	TN	1999											X																O
Acme Solvent Reclaiming, Inc.	5	IL	1991											X																C
Acme Solvent Reclaiming, Inc., OU 3	5	IL	1991													X														C
Acme Solvent Reclaiming, Inc., OU 6	5	IL	1991																							X				C
Beloit Corp. - OU1	5	IL	2004																X											PD
Cross Brothers Pail Recycling	5	IL	1989			X																								C
Cross Brothers Pail Recycling	5	IL	1989																		X									C
Depue/New Jersey Zinc/Mobil Chemical Corp. - OU1	5	IL	2004											X																PD
Galesburg/Koppers	5	IL	1989	X																										C
Jennison Wright Corporation Inc	5	IL	1999	X																										D/I
Jennison Wright Corporation Inc	5	IL	1999																									X		D/I
Joliet Army Ammunition Plant (Load-Assembly-Packing Area) - OU1	5	IL	2004	X																										O

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Joliet Army Ammunition Plant (Manufacturing Area) - OU1	5	IL	2004	X																										PD
Joliet Army Ammunition Plant, Soil and groundwater (LAP) OU	5	IL	1999	X																										O
Joliet Army Ammunition Plant, Soil and Groundwater-MFG OU	5	IL	1999	X																										O
Kerr-McGee (Kress Creek) - OU 1	5	IL	2005											X																PD
LaSalle Electric Utilities - OU2 (Laboratory Area)	5	IL	2004																			X								O
LaSalle Electric Utilities - OU2 (NW Corner)	5	IL	2004																						X					O
LaSalle Electric Utilities OU2 Thinner Shed	5	IL	2004																			X								O
Lasalle Electrical Utilities	5	IL	1986			X																								C
Lasalle Electrical Utilities	5	IL	1988			X																								C
Lenz Oil Service, Inc OU1	5	IL	1999											X																PD
Outboard Marine Waukegan Coke Plant OU2	5	IL	1999											X																C
Outboard Marine/Waukegan Harbor	5	IL	1989			X																								C
Outboard Marine/Waukegan Harbor - OU 3	5	IL	1989													X														C
Sangamo Electric Dump/Crab Orchard National Wildlife Refuge - Explosives/Munitions Manufacturing Area OU	5	IL	1997			X																								C

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Source Control Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Source Control																										Status
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
				Technology Type																										
Sangamo Electric Dump/Crab Orchard National Wildlife Refuge - Metals Areas OU	5	IL	1990											X																C
Sangamo Electric Dump/Crab Orchard National Wildlife Refuge - PCB Areas OU	5	IL	1990			X																								C
Sangamo Electric Dump/Crab Orchard National Wildlife Refuge - PCB Areas OU	5	IL	1990											X																C
Savanna Army Depot Activity - TNT Washout Lagoon Area	5	IL	1992			X																								C
Southeast Rockford Groundwater Contamination- OU 3	5	IL	2002													X														D
Southeast Rockford Groundwater Contamination- OU 3	5	IL	2002																			X								D
Southeast Rockford Groundwater Contamination- OU 3	5	IL	2002																							X				D
Velsicol Chemical	5	IL	1988											X																C
American Chemical Services, Inc - offsite	5	IN	1999																							X				O
American Chemical Services, Inc. - onsite	5	IN	1992																							X				O
Bennetts Dump-Stone Quarry	5	IN	2000			X																								C
Continental Steel Corp. - OU 02	5	IN	1998											X																D/I
Enviro. Conservation and Chemical	5	IN	1991																							X				C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Fisher-Calo	5	IN	1990															X												C
Fisher-Calo	5	IN	1990																							X				C
Fort Wayne Reduction Dump	5	IN	1988			X																								C
Lakeland Disposal Services, Inc.	5	IN	1999													X														C
Lemon Lane Landfill	5	IN	2000			X																								C
Main Street Well Field	5	IN	1991																							X				C
Midco I	5	IN	1989																							X				PD
Midco I	5	IN	1989																								X			PD
Midco II	5	IN	1989																							X				D
Midco II	5	IN	1989																								X			PD
Neals Dump-Owen County	5	IN	2000			X																								C
Ninth Avenue Dump	5	IN	1989																		X									C
Ninth Avenue Dump	5	IN	1994																							X				O
Reilly Tar & Chemical (Indianapolis Plant)	5	IN	1993													X														C
Reilly Tar & Chemical (Indianapolis Plant) - OU 2, Fire Pond at South Landfill	5	IN	1993																								X			C
Reilly Tar & Chemical (Indianapolis Plant) - OU 4, Hot Spot A	5	IN	1996																							X				O
Reilly Tar & Chemical (Indianapolis Plant) - OU 4, Hot Spot B	5	IN	1996																							X				C
Seymour Recycling Corp.	5	IN	1987															X												C
Seymour Recycling Corp.	5	IN	1987																							X				O
Wayne Waste Oil	5	IN	1990																							X				O
Anderson Development Co.	5	MI	1991													X														C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																									
				Ex Situ														In Situ											
				Technology Type																									
Project Name	Region	State	FY	Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	Status
Auto Ion Chemicals	5	MI	1989											X																C
Bendix Site, St. Joseph	5	MI	1997																							X				O
Bofors Nobel OU1	5	MI	1999																						X					D
Carter Industrials, Inc.	5	MI	1991											X																C
Chem Central	5	MI	1991																							X				O
Clare Water Supply	5	MI	1997																			X								O
Electrovoice - OU 1	5	MI	1992																							X				C
Forest Waste Products	5	MI	1986											X																C
Kysor Industrial Corp.	5	MI	1989																							X				O
Liquid Disposal, Inc.	5	MI	1987																								X			C
Metamora Landfill	5	MI	1986			X																								C
Peerless Plating	5	MI	1992											X																C
Peerless Plating	5	MI	1992																							X				C
Petoskey Municipal Well Field - OU 01	5	MI	1998									X																		C
Rockwell International OU-2	5	MI	2002													X														PD
Rose Township Dump	5	MI	1987			X																								C
Rose Township Dump	5	MI	1995																							X				O
Spartan Chemical Co. - OU 01	5	MI	1998																							X				O
Springfield Township Dump	5	MI	1998										X																	C
Springfield Township Dump	5	MI	1990																							X				C
Sturgis Municipal Well Field	5	MI	1991																							X				C
Tar Lake	5	MI	1992			X																								C
Thermo-Chem, Inc OU1	5	MI	1991																							X				O
Verona Well Field - OU 1 (Thomas Solvent Raymond Road)	5	MI	1985																							X				C
Verona Well Field - OU 2 (Grand Truck Railroad Paint Shop Area)	5	MI	1991																							X				C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Verona Well Field - OU 2 (Thomas Solvent Annex Area)	5	MI	1991																							X				C
Arrowhead Refinery Co.	5	MN	1994												X															C
Burlington Northern Railroad Tie Treating Plant	5	MN	1986	X																										C
Joslyn Manufacturing and Supply Co.	5	MN	1989	X																										C
Kummer Sanitary Landfill - Soil Phase	5	MN	1988																							X				C
Long Prairie Groundwater Contamination	5	MN	1988																							X				C
MacGillis and Gibbs/Bell Lumber and Pole - OU 2	5	MN	1991																			X								O
MacGillis And Gibbs/Bell Lumber and Pole - OU 2	5	MN	1991			X																								C
MacGillis And Gibbs/Bell Lumber and Pole - OU 3	5	MN	1994											X																C
MacGillis and Gibbs/Bell Lumber and Pole - OU-1	5	MN	1999	X																										C
New Brighton/Arden Hills - PCB Burn OU	5	MN	1989			X																								C
New Brighton/Arden Hills/TCAAP (US Army) - OU 07	5	MN	1998			X																								C
New Brighton/Arden Hills/TCAAP (US Army) - OU 07	5	MN	1998											X																C
New Brighton/Arden Hills/TCAAP (US Army) - OU 07	5	MN	1998																							X				C
Ritari Post and Pole - OU 1	5	MN	1994	X																										D

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																									
				Ex Situ														In Situ											
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
South Andover Salvage Yards - OU 2	5	MN	1994													X														C
St. Louis River/Interlake/Duluth Tar Site - Soils OU	5	MN	1990													X														C
St. Louis River/Interlake/Duluth Tar Site - Tar Seep	5	MN	1990			X																								C
St. Louis River/Intertake/Duluth Tar Site - Wire Mill Pond and OU J	5	MN	1990																								X			C
University Of Minnesota	5	MN	1991			X																								C
Waite Park Wells - OUs 1, 2, & 3	5	MN	1994											X																C
Waite Park Wells (Electric Machinery)	5	MN	1999																							X				C
Alsco Anaconda	5	OH	1989			X																								C
Big D Campground	5	OH	1989			X																								C
Fernald Environmental Management Project, Formerly The Feed Materials Production Center (USDOE) - OU 4 Silo 3	5	OH	1998											X																C
Fernald Environmental Management Project, Formerly The Feed Materials Production Center (USDOE) - OU 4 Silo 3	5	OH	1998							X																				C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Fernald Environmental Management Project, Formerly The Feed Materials Production Center (USDOE) - OU 5	5	OH	1996											X																C
Fernald Environmental Management Project, Formerly The Feed Materials Production Center (USDOE) OU 4 Silos 1 and 2	5	OH	2000							X																				C
Fernald Environmental Management Project, Formerly The Feed Materials Production Center (USDOE) OU 4 Silos 1 and 2	5	OH	2000											X																C
Fields Brook	5	OH	1997			X																								O
Fields Brook - Sediment and Floodplain/Wetland OU	5	OH	2001													X														O
Fields Brook - Source Control OU	5	OH	1997																							X				O
Laskin/Poplar Oil (FY87)	5	OH	1987			X																								C
Laskin/Poplar Oil (FY89)	5	OH	1989			X																								C
Miami County Incinerator	5	OH	1989																							X				C
Mound Plant (USDOE)	5	OH	1995																							X				O
Nease Chemical - OU2	5	OH	2005																				X							PD
Nease Chemical - OU2	5	OH	2005																								X			PD
Ormet Corporation	5	OH	1994											X																C
Ormet Corporation	5	OH	1994																		X									O
Pristine, Inc.	5	OH	1990													X														C
Pristine, Inc.	5	OH	1990																							X				O
Reilly Tar & Chemical (Dover Plant)	5	OH	1997			X																								C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	Region	State	FY	Technology Type																										Status
Summit National Liquid Disposal Service	5	OH	1988			X																								C
United Scrap Lead Company	5	OH	1997											X																C
Zanesville Well Field	5	OH	1991																							X				O
Better Brite Chrome and Zinc Shops - Chrome Shop	5	WI	1996											X																C
Delavan Municipal Well #4 - CSES	5	WI	2000																							X				C
Delavan Municipal Well #4 - Plant No. 2	5	WI	2000																							X				C
Delavan Municipal Well #4 - SES	5	WI	2000																							X				C
Hagen Farm - Source Control OU	5	WI	1990																							X				O
Moss-American (Kerr-Mcgee Oil Co.) - OU 01	5	WI	1998													X														C
Muskego Sanitary Landfill - Interim Action OU 1	5	WI	1992																							X				C
N.W. Mauthe Site	5	WI	1994											X																C
National Presto Industries - Melby Road Disposal Site	5	WI	1996																							X				O
Northern Engraving Corporation - Sludge Lagoon	5	WI	1987											X																C
Oconomowoc Electroplating	5	WI	1990											X																C
Onalaska Municipal Landfill	5	WI	1990															X												C
Penta Wood Products - OU 01	5	WI	1998											X																C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	Region	State	FY	Technology Type																										Status
Penta Wood Products - OU 01	5	WI	1998															X												O
Wausau Groundwater Contamination	5	WI	1989																							X				C
Arkwood Inc.	6	AR	1990							X																				C
Arkwood Inc.	6	AR	1995			X																								C
Gurley Pit	6	AR	1987											X																C
Industrial Waste Control	6	AR	1988																								X			C
Jacksonville Municipal Landfill	6	AR	1990			X																								C
Jacksonville Municipal Landfill	6	AR	1990											X																C
Mid-South Wood Products	6	AR	1987											X																C
Monroe Auto Pit (Finch Road Landfill) - Entire Site	6	AR	2001											X																C
Mountain Pine Pressure Treating - OU1	6	AR	2004											X																PD
Old Midland Products	6	AR	1988			X																								C
Ouachita-Nevada Wood Treaters - OU1	6	AR	2005																			X								BI
Rogers Road Municipal Landfill	6	AR	1990			X																								C
Rogers Road Municipal Landfill	6	AR	1990											X																C
South 8th Street Landfill - OU 1	6	AR	1998																								X			C
Vertac, Inc.	6	AR	1990			X																								C
Vertac, Inc. - Onsite OU 1	6	AR	1995			X																								C
Vertac, Inc. - OU 2, Tetrachlorobenzene Soils	6	AR	1996			X																								C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
American Creosote Works, Inc. - Winnfield Plant	6	LA	1993															X												O
American Creosote Works, Inc. (Winnfield Plant)	6	LA	1993			X																								C
Bayou Bonfouca	6	LA	1987			X																								C
Central Wood Preserving - Entire Site	6	LA	2001													X														C
Cleve Reber	6	LA	1987			X																								C
Cleve Reber	6	LA	1987											X																C
Delatte Metals	6	LA	2000											X																BI
Delatte Metals	6	LA	2000																					X						BI
Gulf Coast Vacuum Services - OU 1	6	LA	1995	X																										C
Gulf Coast Vacuum Services - OU 1	6	LA	1992											X																C
Highway 71/72 Refinery Site - Entire Site	6	LA	2000																			X								PD
Madisonville Creosote Works - OU 01	6	LA	1998													X														C
Mallard Bay Landing Bulk Plant - OU1	6	LA	2003							X																				C
Marion Pressure Treating Company	6	LA	2002													X														C
Marion Pressure Treating Company	6	LA	2002																			X								PD
Old Inger Oil Refinery	6	LA	1984	X																										C
Pab Oil & Chemical Services, Inc.	6	LA	1993											X																C
Petro-Processors of Louisiana, Inc.	6	LA	1984			X																								C
Petro-Processors of Louisiana, Inc.	6	LA	1989			X																								O

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Ruston Foundry OU 1 Soils	6	LA	2002											X																PD
Southern Shipbuilding Corporation	6	LA	1995			X																								C
AT & SF Albuquerque	6	NM	2002			X																								PD
AT & SF Albuquerque	6	NM	2002											X																PD
AT & SF Albuquerque	6	NM	2002																						X					PD
AT & SF Clovis/Santa Fe Lake	6	NM	1988															X												C
AT & SF Clovis/Santa Fe Lake - TPH Lake Sediments	6	NM	1988	X																										C
Cal West Metals	6	NM	1992											X																C
Cimarron Mining Corporation, Sierra Blanca OU	6	NM	1991											X																C
Fruit Avenue Plume Site	6	NM	2001																							X				D
North Railroad Avenue Plume	6	NM	2001																		X									BI
North Railroad Avenue Plume	6	NM	2001																							X				BI
Prewitt Abandoned Refinery	6	NM	1992	X																										C
Prewitt Abandoned Refinery	6	NM	1992																							X				O
Double Eagle Refinery Co.	6	OK	1992					X																						C
Double Eagle Refinery Co.	6	OK	1992											X																C
Fourth Street Abandoned Refinery	6	OK	1992					X																						C
Fourth Street Abandoned Refinery	6	OK	1992											X																C
Fourth Street Abandoned Refinery	6	OK	1992																								X			C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	Region	State	FY	Technology Type																										Status
Hardage/Criner	6	OK	1990			X																								C
Okalahoma Refining Co.	6	OK	1992					X																						C
Oklahoma Refining Co.	6	OK	1992																								X			C
Oklahoma Refining Co.	6	OK	1992																					X						C
Oklahoma Refining Co. - Hazardous Landfill	6	OK	1992	X																										C
Oklahoma Refining Co. - Nonhazardous Landfill	6	OK	1992	X																										C
Sand Springs Petrochemical Complex	6	OK	1987																								X			C
Sand Springs Petrochemical Complex - Glenn Wynn Facility	6	OK	1987			X																								C
Air Force Plant 4 - Building 181	6	TX	1996																			X								C
Air Force Plant 4 - Building 181	6	TX	1996																							X				O
Air Force Plant 4 - East Parking Lot Groundwater Plume	6	TX	1996																									X		O
Bio-Ecology Systems, Inc.	6	TX	1984											X																C
Brio Refining	6	TX	1997																			X								O
French Limited	6	TX	1988															X												C
French Limited	6	TX	1988																								X			C
Koppers Co Inc - Texarkana Plant	6	TX	2002																			X								O
Longhorn Army Ammunition Plant - Burning Ground No. 3	6	TX	1995													X														C
Many Diversified Interests, Inc. - OU1	6	TX	2004											X																PD
Motco	6	TX	1985			X																								C
Motco, Inc. - OU 1	6	TX	1993			X																								C
North Cavalcade Street	6	TX	1988	X																										C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Pesses Chemical Co.	6	TX	1989																							X				C
Petro-Chemical Systems, Inc. - OU 2	6	TX	1998															X												O
Petro-Chemical Systems, Inc. - OU 2	6	TX	1998																									X		O
Petro-Chemical Systems, Inc. - OU 2	6	TX	1991																							X				O
Sheridan Disposal Services - Source Lagoon OU	6	TX	1989																								X			C
Sikes Disposal Pits	6	TX	1986			X																								C
Texarkana Wood Preserving	6	TX	1990			X																								D/I
Tex-Tin OU 1	6	TX	1999																X											C
Tex-Tin OU 1	6	TX	1999											X																C
Tex-Tin OU 1	6	TX	2000							X																				C
Tex-Tin OU 1	6	TX	2000							X																				C
Tex-Tin OU 1	6	TX	2000																					X						C
Triangle Chemical Co.	6	TX	1985			X																								C
Triangle Chemical Co.	6	TX	1985																				X							C
United Creosoting Co.	6	TX	1989			X																								C
United Creosoting Co.	6	TX	1989												X															C
Chemplex - OU 2	7	IA	1993																							X				O
EI Dupont De Nemours & Co. Inc.	7	IA	1991											X																C
Fairfield Coal Gasification Plant	7	IA	1990			X																								C
General Motors Corporation Former AC Rochester Facility Site	7	IA	2001															X												PD
Iowa Army Ammunition Plant	7	IA	1998	X																										PD
Iowa Army Ammunition Plant - OU 01	7	IA	1998											X																O
McGraw Edison	7	IA	1993																							X				BI

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	Region	State	FY	Technology Type																										Status
Mid-America Tanning	7	IA	1991											X																C
Peoples Natural Gas	7	IA	1991			X																								C
Shaw Avenue Dump	7	IA	1991											X																C
Vogel Paint & Wax	7	IA	1989	X																										C
Vogel Paint & Wax	7	IA	1989											X																C
29th and Mead Ground Water Contamination, Coleman OU	7	KS	1992																							X				O
57th and North Broadway Streets OU 1 - Former Wilko Paint facility	7	KS	1999																							X				O
Arkansas City Dump	7	KS	1988					X																						C
Chemical Commodities - OU1 Soil	7	KS	2005																X											PD
Pester Refinery Co. - OU 1	7	KS	1992																		X									C
Pester Refinery Co. - OU 1	7	KS	2005																								X			PD
Pester Refinery Co. - OU 1, Burn Pond Site	7	KS	1992															X												C
Annapolis Lead Mine - Sutton Branch Creek Floodplain (OU1)	7	MO	2005																								X			PD
Ellisville Site	7	MO	1991			X																								C
Former Weldon Spring Ordnance Works - OU 1, Soils and Pipeline	7	MO	1996			X																								C
Former Weldon Spring Ordnance Works - OU 1, Soils and Pipeline	7	MO	1996											X																C
Kem-Pest Laboratories	7	MO	1991			X																								C
Lee Chemical	7	MO	1991																		X									C
Minker/Stout/Romaine Creek (R&S)	7	MO	1988			X																								C
Missouri Electric Works	7	MO	1990													X														C

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Source Control Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Source Control																										Status
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
				Technology Type																										
Oronogo - Duenweg Mining Belt Site - OU 2 and 3	7	MO	1996																								X			C
Oronogo - Duenweg Mining Belt Site - OU1	7	MO	2004	X																										PD
Riverfront - OU1	7	MO	2003																							X				O
Shenandoah Stables	7	MO	1990			X																								C
Syntex Facility	7	MO	1988			X																								C
Times Beach Site	7	MO	1988			X																								C
Valley Park TCE Site - OU2	7	MO	2001																							X				D
Valley Park TCE Site - Wainwright OU1	7	MO	1996																							X				O
Valley Park TCE Wainwright OU1	7	MO	1996									X																		C
Weldon Spring Quarry/Plant/Pits (USDOE)	7	MO	1993											X																C
10th Street Site - OU 2	7	NE	2001																							X				O
Cleburn Street Well	7	NE	1996																							X				O
Cleburn Street Well - OU5	7	NE	2001																							X				BI
Former Nebraska Ordnance Plant - OU 1	7	NE	1995			X																								C
Former Nebraska Ordnance Plant - OU 2	7	NE	1997			X																								C
Hastings Groundwater Contamination - Colorado Ave, OU 9	7	NE	1988																							X				O
Hastings Groundwater Contamination - Far-Mar Co. Subsite, OU 3	7	NE	1988																							X				C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Hastings Groundwater Contamination - Hastings East Industrial Park Surface Soils, Former Naval Ammunition Depot	7	NE	1995			X																								C
Hastings Groundwater Contamination - Hastings East Industrial Park Surface Soils, Former Naval Ammunition Depot	7	NE	1990											X																C
Hastings Groundwater Contamination - OU 4 Surface Soil Contamination at the HEIP	7	NE	2002			X																								PD
Hastings Groundwater Contamination - Well No. 3 Plume 1	7	NE	1989																							X				C
Lindsay Manufacturing	7	NE	1990																							X				C
Sherwood Medical Co.	7	NE	1995				X																							C
Waverly Groundwater Contamination	7	NE	1990																							X				C
Broderick Wood Products	8	CO	1992																			X								O
Broderick Wood Products - OU 1 (Impoundment Sludges)	8	CO	1992											X																C
Broderick Wood Products - OU 2 (Groundwater)	8	CO	1992															X												C
Broderick Wood Products - OU 2 (Soils)	8	CO	1992	X																										C
California Gulch - Fluvial Mine Waste (OU 11)	8	CO	2005																X											PD

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
Project Name	Region	State	FY	Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	Status
				Technology Type																										
California Gulch - Irrigated Meadows Area A (OU 11)	8	CO	2005																X											PD
California Gulch - Irrigated Meadows Area B (OU 11)	8	CO	2005																X											PD
Central City, Clear Creek - OU4	8	CO	2004	X																										PD
Central City, Clear Creek - OU4	8	CO	2004											X																PD
Chemical Sales Company - OU 1	8	CO	1991																							X				O
Denver Radium Site - OU 8	8	CO	1992											X																C
Lockheed/Martin (Denver Aerospace)	8	CO	1990			X																								C
Lockheed/Martin (Denver Aerospace)	8	CO	1990											X																C
Rocky Flats Plant (USDOE) - OU 4, Industrial Areas	8	CO	1992											X																C
Rocky Mountain Arsenal - Onpost OU	8	CO	1996										X																	PD
Rocky Mountain Arsenal - Onpost OU, Buried M-1 Pits	8	CO	1996											X																C
Rocky Mountain Arsenal - Onpost OU, Former Basin F	8	CO	1996																								X			D
Rocky Mountain Arsenal - Onpost OU, Hex Pits	8	CO	1996																									X		C
Rocky Mountain Arsenal - OU 18, Motor Pool Area	8	CO	1990																							X				C
Rocky Mountain Arsenal - OU 25, Basin F Liquids	8	CO	1997			X																								C

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Source Control Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Source Control																										Status
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
				Technology Type																										
Sand Creek Industrial - OU 1	8	CO	1989																							X				C
Sand Creek Industrial - OU 4	8	CO	1994																							X				C
Sand Creek Industrial - OU 5	8	CO	1993													X														C
Summitville Mine - OU 0	8	CO	1995					X																						O
Summitville Mine - OU 2	8	CO	1995					X																						C
Summitville Mine - OU 5	8	CO	2001		X																									D/I
Woodbury Chemical - OU1	8	CO	1985			X																								C
Woodbury Chemical - OU2	8	CO	1989			X																								C
Anaconda Co. Smelter - Flue Dust (OU 11)	8	MT	1991											X																C
Anaconda Co. Smelter - OU 04	8	MT	1998																					X						O
Anaconda Co. Smelter - OU 7	8	MT	1994																					X						C
Burlington Northern (Somers Plant)	8	MT	1989	X																										C
Idaho Pole Company	8	MT	1996	X																										C
Libby Groundwater Contamination	8	MT	1989	X																										O
Lockwood Solvent Groundwater Plume - OU1 Beall Source Area	8	MT	2005																							X				PD
Lockwood Solvent Groundwater Plume - OU1 Brenntag Source Area	8	MT	2005													X														PD
Lockwood Solvent Groundwater Plume - OU1 Brenntag Source Area	8	MT	2005																X											PD

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Source Control Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Source Control																										Status
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
				Technology Type																										
Lockwood Solvent Groundwater Plume - OU1 Brenntag Source Area	8	MT	2005																							X				PD
Montana Pole and Treating Plant	8	MT	1993	X																										O
Montana Pole and Treating Plant	8	MT	1993			X																								C
Montana Pole and Treating Plant - Area under Interstate 15/90	8	MT	1993																		X									O
Silver Bow Creek/Butte Area	8	MT	1996		X																									C
Upper Tenmile Creek Mining Area	8	MT	2002															X												PD
Ellsworth Air Force Base - OU 1	8	SD	1995																							X				O
Gilt Edge Mine Interim Water Treatment Operations - OU 2	8	SD	2002					X																						PD
Davenport and Flagstaff Smelters - OU 1	8	UT	2002											X																PD
Hill Air Force Base - OU 2	8	UT	1991			X																								O
Hill Air Force Base - OU 2	8	UT	1996																							X				I
Hill Air Force Base - OU 3	8	UT	1995																							X				C
Hill Air Force Base OU2 SRS	8	UT	1991																			X								O
Intermountain Waste Oil Refinery - OU2	8	UT	2004																			X								PD
Jacobs Smelter OU 1	8	UT	1999											X																C
Ogden Defense Depot (DLA)	8	UT	1990			X																								C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
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				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Ogden Defense Depot (DLA) - OU 3	8	UT	1992			X																								C
Ogden Defense Depot (DLA), OU 4	8	UT	2000															X												C
Portland Cement (Kiln Dust #2 & #3) - OU 2, Chromium Bearing Bricks and Contaminated Soils	8	UT	1992											X																C
Tooele Army Depot - North Area - OUs 5, 6 ,7, And 10	8	UT	1994			X																								C
Tooele Army Depot (North Area) - OU8	8	UT	2004											X																PD
Utah Power & Light/American Barrel	8	UT	1993											X																C
Utah Power & Light/American Barrel	8	UT	1993																							X				O
Wasatch Chemical	8	UT	1991	X																										C
Wasatch Chemical	8	UT	1991																										X	C
Apache Powder Co.	9	AZ	1994			X																								C
Apache Powder Co.	9	AZ	1994											X																C
Hassayampa Landfill	9	AZ	1992																							X				C
Indian Bend Wash Area - North Area (Area 12)	9	AZ	1991																							X				C
Indian Bend Wash Area - North Area (Area 6)	9	AZ	1991																							X				C
Indian Bend Wash Area - North Area (Area 7)	9	AZ	1991																							X				O
Indian Bend Wash Area - North Area (Area 8)	9	AZ	1991																							X				C
Indian Bend Wash Area - South Area (DCE Circuits)	9	AZ	1993																							X				O

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				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Luke Air Force Base - OU 2/Dp23	9	AZ	1994	X																										C
Luke Air Force Base OU 1	9	AZ	1999																							X				C
Marine Corps Air Station Yuma OU 1	9	AZ	2000																							X				O
Motorola 52nd Street - OU 1	9	AZ	1988																							X				C
Phoenix-Goodyear Airport Area (North Facility)	9	AZ	1989																							X				O
Phoenix-Goodyear Airport Area (South Facility)	9	AZ	1989																							X				C
Phoenix-Goodyear Airport Area-Infield Area	9	AZ	1996																							X				C
Tucson International Airport - Sites 1, 2, 3	9	AZ	1997																							X				O
Tucson International Airport Area - OU 03 - Soil West of Site 5	9	AZ	1998																			X								O
Tucson International Airport Area - Site 4, 5, 6	9	AZ	1998											X																C
Williams Air Force Base - OU 2	9	AZ	1993																							X				O
Williams Air Force Base - OU 2	9	AZ	1996																							X				O
Williams Air Force Base - OU 3	9	AZ	1996															X												O
Advanced Micro Devices - Arques (Formerly Monolithic Memories) and National Semiconductor area (OU1)	9	CA	1991																							X				C

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Source Control Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Technology Type																										Status
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				Ex Situ														In Situ											
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Advanced Micro Devices Inc. - 901/902	9	CA	1991			X																								C
Barstow Marine Corps Logistics Base - OU 01 (CAOC 16)	9	CA	1998																							X				O
Barstow Marine Corps Logistics Base - OU 01 (CAOC 26)	9	CA	1998																							X				C
Barstow Marine Corps Logistics Base - OU 02 Nebo North	9	CA	1998																							X				PD
Barstow Marine Corps Logistics Base - OU 02 Nebo South	9	CA	1998																							X				PD
Brewster Well Field - OU 2	9	CA	1988			X																								C
Castle Air Force Base (6 Areas) - OU4	9	CA	2003															X												PD
Castle Air Force Base (6 Areas) - OU4	9	CA	2003																							X				PD
Cooper Drum Company	9	CA	2002																			X								D
Del Amo Facility	9	CA	1997																							X				D
El Toro Marine Corps Air Station - Hangar Area, Interim Rod	9	CA	1997																							X				O
Fairchild Semiconductor (Mt. View) - Bldg 19 (369 N. Whisman Rd)	9	CA	1989																							X				C
Fairchild Semiconductor (Mt. View) - Bldg 9 (401 National Ave.)	9	CA	1989																							X				C
Fairchild Semiconductor (Mt. View) - General Instrument Corp./Siltec Corp (405 National Ave.)	9	CA	1989																							X				C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Fairchild Semiconductor (Mt. View) - Siemens/Sobrato (455 & 487 Middlefield Rd)	9	CA	1989																							X				C
Fairchild Semiconductor (South San Jose)	9	CA	1989																							X				C
Fort Ord - Fort Ord Soil Treatment Area (FDSTA) - OU 4	9	CA	1994	X																										C
Fort Ord - OU10	9	CA	2002						X																					BI
George Air Force Base - OU 3 WP-17	9	CA	1999															X												C
George Air Force Base OU 3 FT19a	9	CA	1999															X												O
George Air Force Base OU 3 OT51	9	CA	1999																							X				O
George Air Force Base Site FT 19c	9	CA	1999																							X				C
Hewlett-Packard (620-640 Page Mill Road)	9	CA	1995																							X				C
IBM (San Jose)	9	CA	1989																							X				O
Intersil/Siemens - Intersil OU	9	CA	1990																							X				C
Intersil/Siemens - Siemins OU	9	CA	1990																							X				C
J.H. Baxter	9	CA	1998	X																										C
J.H. Baxter	9	CA	1998											X																C
J.H. Baxter - Area B	9	CA	1998															X												C
Jasco Chemical Co.	9	CA	1992	X																										C
Jasco Chemical Co. - OU1	9	CA	2002																							X				C
Jet Propulsion Laboratory (NASA) - OU2	9	CA	2002																							X				BI

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Source Control Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Source Control																										Status
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
				Technology Type																										
Lawrence Livermore National Laboratory - Site 300 (USDOE) - Bld 834 (OU2)	9	CA	2001																							X				O
Lawrence Livermore National Laboratory - Site 300 (USDOE) - GSA, Bldg 875 (OU1)	9	CA	1997																							X				O
Lawrence Livermore National Laboratory (USDOE)	9	CA	1992																							X				O
Lawrence Livermore National Laboratory (USDOE) - TFF	9	CA	1992																							X				C
Lorentz Barrel and Drum - OU 1	9	CA	1993																							X				O
March Air Force Base - OU 1, Area 5, Sites 31a and 31b	9	CA	1996																							X				C
March Air Force Base - OU 1, Sites 10 and 15	9	CA	1996	X																										C
March Air Force Base - OU 2, Site 27	9	CA	2003																							X				I
Mather Air Force Base - OU 04	9	CA	1998	X																										O
Mather Air Force Base - OU 04	9	CA	1998																							X				O
Mather Air Force Base - OU 04 (86&87)	9	CA	1998											X																C
Mather Air Force Base - OU 04 (site 18,23 & 59)	9	CA	1998															X												O
Mather Air Force Base - Soil And Groundwater OU, Mather Soils Biofarm	9	CA	1996	X																										O

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Technology Type																										
Project Name	Region	State	FY	Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	Status
Mather Air Force Base - Soil And Groundwater OU, Site 57	9	CA	1996																							X				O
McCormick & Baxter Creosoting Company	9	CA	1999																			X								PD
Modesto Groundwater Contamination	9	CA	1997																							X				O
Norton Air Force Base - CBA OU	9	CA	1994																							X				C
Pacific Coast Pipelines	9	CA	1992																							X				C
Pemaco - OU1	9	CA	2005																			X								BI
Pemaco - OU1	9	CA	2005																									X		D
Purity Oil Sales, Inc. - OU 2	9	CA	1992																							X				BI
Raytheon, Mountain View (350 Ellis Street/415 Middlefield Rd)	9	CA	1989																							X				C
Rhone-Poulenc/Zoecon	9	CA	1992											X																C
Rhone-Poulenc/Zoecon	9	CA	1992																								X			C
Sacramento Army Depot	9	CA	1993											X																C
Sacramento Army Depot - Burn Pits OU	9	CA	1993																							X				C
Sacramento Army Depot - OU 3, Tank 2	9	CA	1992																							X				C
Selma Pressure Treating	9	CA	1988											X																C
Sharpe Army Depot - Defense Distribution Region West (DDRW)-Sharpe Site - OU 2	9	CA	1996																							X				C
Signetics Inc	9	CA	1991																							X				O
Southern California Edison, Visalia Pole Yard	9	CA	1994															X												I

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Southern California Edison, Visalia Pole Yard	9	CA	1994																									X		C
Spectra-Physics, Inc. - OU 1, System No. 1	9	CA	1991																							X				C
Spectra-Physics, Inc. - OU 1, System No. 2	9	CA	1991																							X				C
Tracy Defense Depot (DLA) - OU 01	9	CA	1998																							X				O
Travis Air Force Base - OU4	9	CA	2003											X																PD
Travis Air Force Base OU 1	9	CA	1998																			X								O
Watkins-Johnson Co. (Stewart Division)	9	CA	1990																							X				O
Western Pacific Railroad Co.	9	CA	1997																			X								C
Westinghouse Electric (Sunnyvale Plant)	9	CA	1992			X																								C
Del Monte Corp. (Oahu Plantation) - OU1	9	HI	2003																							X				PD
Adak Naval Air Station - OU 2	10	AK	2000													X														O
Adak Naval Air Station - OU3	10	AK	2002						X																					PD
Arctic Surplus	10	AK	1995											X																PD
Eielson Air Force Base - OU 1 (Power Plant)	10	AK	1994															X												C
Eielson Air Force Base - OU 1 (Refueling Loop)	10	AK	1992															X												O
Eielson Air Force Base - OU 2 (Fuel Area)	10	AK	1994															X												O
Eielson Air Force Base - OU 2 (POL Storage Area)	10	AK	1994															X												O

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Eielson Air Force Base - OU1 (Blair Lakes)	10	AK	1994																			X								O
Eielson Air Force Base - OU2 (Fuel Area)	10	AK	1994																			X								O
Eielson Air Force Base - OU2 (POL Storage Area)	10	AK	1994																							X				O
Elmendorf Air Force Base - OU 2	10	AK	1995													X														C
Elmendorf Air Force Base - OU 4	10	AK	1995															X												O
Elmendorf Air Force Base - OU 5	10	AK	1995	X																										O
Elmendorf Air Force Base - OU 6 and Source Area SS19	10	AK	1997													X														C
Elmendorf Air Force Base - OU 6 and Source Area SS19	10	AK	1997																							X				C
Elmendorf Air Force Base - OU2	10	AK	1992																			X								C
Fort Richardson - OU B	10	AK	1997													X														C
Fort Richardson - OU B	10	AK	1997																			X								C
Fort Richardson - OU B	10	AK	1997																									X		C
Fort Richardson - OU B	10	AK	1997																							X				C
Fort Wainwright	10	AK	1997								X																			C
Fort Wainwright - OU 2 - Building 1168 Leach Well	10	AK	1997																							X				C
Fort Wainwright - OU 2 - Drmo Yard	10	AK	1997																							X				O
Fort Wainwright - OU 3	10	AK	1996																							X				O
Fort Wainwright - OU 3	10	AK	2002																			X								O
Fort Wainwright - OU 4	10	AK	1996																							X				O
Fort Wainwright OU 5 WQFS1	10	AK	1999																							X				O

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Fort Wainwright OU 5 WQFS2	10	AK	1999																							X				O
Fort Wainwright OU 5 WQFS3	10	AK	1999																							X				O
Standard Steel And Metal Salvage Yard, (USDOT)	10	AK	1996											X																C
Bunker Hill Mining and Metallurgical Complex	10	ID	1992											X																C
Bunker Hill Mining and Metallurgical Complex - OU2	10	ID	2002							X																				O
Idaho National Engineering Laboratory (USDOE) - (V-Tanks) OU3, OU1-10	10	ID	2004		X																									O
Idaho National Engineering Laboratory (USDOE) - (V-Tanks) OU3, OU1-10	10	ID	2004											X																O
Idaho National Engineering Laboratory (USDOE) - OU 11 Power Burst Facility and Auxiliary Reactor Area	10	ID	2000							X																				O
Idaho National Engineering Laboratory (USDOE) - OU 11 Power Burst Facility and Auxiliary Reactor Area	10	ID	2000							X																				O
Idaho National Engineering Laboratory (USDOE) - OU 21	10	ID	1998																						X					C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Idaho National Engineering Laboratory (USDOE) - OU 23	10	ID	1992			X																								C
Idaho National Engineering Laboratory (USDOE) - OU 3	10	ID	2000							X																				O
Idaho National Engineering Laboratory (USDOE) - OU25	10	ID	2002						X																					PD
Idaho National Engineering Laboratory (USDOE) - OU25	10	ID	2002													X														PD
Idaho National Engineering Laboratory (USDOE) - Pit 9, OU 7-10	10	ID	1993												X															D
Idaho National Engineering Laboratory (USDOE) - Pit 9, OU 7-10	10	ID	1993														X													D
Idaho National Engineering Laboratory (USDOE) - Power Burst Facility, OU 13	10	ID	1995											X																C
Idaho National Engineering Laboratory (USDOE) - Wag 7, OU 7 - 8	10	ID	1995																							X				O
Idaho National Engineering Laboratory (USDOE) OU 3-13 (OU7)	10	ID	1999											X																D
Pacific Hide & Fur Recycling	10	ID	1988											X																C
Pacific Hide & Fur Recycling	10	ID	1992			X																								C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
East Multnomah County Groundwater Contamination - Cascade Corporation, Troutdale Gravel Aquifer	10	OR	1997																							X				C
Gould, Inc.	10	OR	1988											X																C
Northwest Pipe and Casing Company/Hall Process Company OU 1	10	OR	2000													X														C
Teledyne Wah Chang	10	OR	1990											X																C
Umatilla Army Depot (Lagoons) - OU 1	10	OR	1993											X																C
Umatilla Army Depot (Lagoons) - OU 3	10	OR	1994																		X									C
Umatilla Army Depot (Lagoons) - OU 4	10	OR	1994											X																C
Umatilla Army Depot (Lagoons) - OU 6	10	OR	1994											X																C
Umatilla Army Depot (Lagoons) - OU 9 (Site 39)	10	OR	2005							X																				PD
Umatilla Army Depot (Lagoons) - Soil OU	10	OR	1992	X																										C
Umatilla Army Depot Activity	10	OR	1992	X																										C
Union Pacific Railroad Tie Treatment - DNAPL	10	OR	1996																			X								O
Union Pacific Railroad Tie Treatment - Vadose Zone Soils	10	OR	1996															X												O
United Chrome Products, Inc.	10	OR	1986																		X									O
White King/Lucky Lass	10	OR	2001																					X						O
Bonneville Power Administration - OU A	10	WA	1993	X																										C

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Coal Creek	10	WA	1991			X																								C
Commencement Bay, Nearshore/Tideflats - Asarco Tacoma Smelter	10	WA	1991			X																								C
Commencement Bay, Nearshore/Tideflats - OU 3, Tacoma Tar Pits	10	WA	1988											X																C
Commencement Bay, South Tacoma Channel - (Well 12a)	10	WA	1985																							X				C
Commencement Bay, South Tacoma Channel (Well 12a)	10	WA	1985																							X				C
Commencement Bay, South Tacoma Field	10	WA	1994			X																								C
Commencement Bay, South Tacoma Field	10	WA	1994											X																C
Fairchild Air Force Base - Priority 1 OUs (OU 2) Ft-1	10	WA	1993															X												O
Fairchild Air Force Base - Priority 2 Sites - Fuel Truck Maintenance Facility, Building 1060 (Ps-10)	10	WA	1996			X																								C
Fairchild Air Force Base - Priority 2 Sites, OU 3, Sub Area Ps-1	10	WA	1996															X												O
FMC Corp. (Yakima Pit)	10	WA	1990			X																								C
Fort Lewis Logistics Center	10	WA	1990																									X		BI
Fort Lewis Military Reservation - Landfill 4	10	WA	1993																							X				C

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Source Control Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Technology Type																										Status
				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Fort Lewis Military Reservation - Solvent Refined Coal Plant	10	WA	1993													X														C
Frontier Hard Chrome Inc - OU 1 and 2	10	WA	2001																X											C
Hanford 1100-Area (USDOE)	10	WA	1993			X																								C
Hanford 300 Area (USDOE) 300-FF-2 OU	10	WA	2001							X																				O
Hanford 300 Area (USDOE) 300-FF-2 OU	10	WA	2001											X																O
Hanford Site - 100 Area (USDOE)	10	WA	1999	X																										PD
Hanford Site - 100 Area (USDOE)	10	WA	1999															X												PD
Harbor Island - Soil and Groundwater OU	10	WA	1993															X												O
Harbor Island - Soil and Groundwater OU	10	WA	1993																			X								O
Harbor Island - Soil and Groundwater OU	10	WA	1993																							X				O
Harbor Island Tank Farms OU2 (BP Facility)	10	WA	2000																			X								O
Harbor Island Tank Farms OU2 (KM Facility)	10	WA	2000																			X								O
Harbor Island Tank Farms OU2 (Shell Facility)	10	WA	1999																			X								O
Harbor Island Tank Farms OU2 (Shell Facility)	10	WA	1999																							X				O
Jackson Park Housing Complex/Naval Hospital Bremerton - OU 1	10	WA	2000							X																				PD

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Source Control Treatment Technology Summary Matrix (continued)

				Source Control																										
				Ex Situ														In Situ												
				Bioremediation	Chemical Treatment	Incineration	Mechanical Soil Aeration	Neutralization	Open Burn/Open Detonation	Physical Separation	Phytoremediation	Soil Vapor Extraction	Soil Washing	Solidification/Stabilization	Solvent Extraction	Thermal Desorption	Vitrification	Bioremediation	Chemical Treatment	Electrical Separation	Flushing	Multi-Phase Extraction	Mechanical Soil Aeration	Neutralization	Phytoremediation	Soil Vapor Extraction	Solidification/Stabilization	Thermal Treatment	Vitrification	
Project Name	**Region**	**State**	**FY**	**Technology Type**																										**Status**
Jackson Park Housing Complex/Naval Hospital Bremerton - OU 1	10	WA	2000															X												O
Naval Air Station, Whidbey Island - Ault Field, OU 5, Areas 1, 31, and 52	10	WA	1996															X												C
North Market Street	10	WA	2000													X														C
North Market Street	10	WA	2000															X												O
Northwest Transformer - Mission Pole	10	WA	1991			X																								C
Pacific Car and Foundry	10	WA	1992	X																										C
Pacific Car and Foundry	10	WA	1992											X																C
US Naval Submarine Base - OU 1, Bangor Site A	10	WA	1992										X																	C
US Naval Submarine Base - OU 6 Site D & OU 2 Site F	10	WA	1994	X																										C
US Naval Submarine Base - OU 8	10	WA	2000																			X								C
Wyckoff/Eagle Harbor - West Harbor OU	10	WA	1996											X																C
Wycoff/Eagle Harbor - Soil	10	WA	2000																									X		I

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Groundwater Treatment Technology Summary Matrix

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Durham Meadows - OU1 Groundwater	1	CT	2005									X	PD
Kellogg-Deering Well Field	1	CT	1996									X	O
Laurel Park	1	CT	1988									X	O
Solvents Recovery Service of New England	1	CT	1983									X	O
Atlas Tack Corp. - OU 1	1	MA	2000								X		D
Baird & McGuire	1	MA	1990									X	O
Charles George Reclamation Trust Landfill	1	MA	1988									X	O
Fort Devens - OU8	1	MA	2004			X							PD
Fort Devens - OU8	1	MA	2004			X							PD
Fort Devens - OU8	1	MA	2004		X								O
Fort Devens - OU8	1	MA	2004					X					O
Groveland Wells	1	MA	1991									X	O
Hanscom Field/Hanscom Air Force Base - OU1 Airfield VOC Plume	1	MA	2001									X	O
Hanscom Field/Hanscom Air Force Base - OU1, Site 1 Source Area	1	MA	2001		X								C
Hanscom Field/Hanscom Air Force Base - OU1, Site 1 Source Area	1	MA	2001			X							O
Hanscom Field/Hanscom Air Force Base - OU3	1	MA	2002									X	PD
Hocomonco Pond	1	MA	1992		X								C
Hocomonco Pond	1	MA	1999									X	C

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Natick Laboratory Army Research, Development, and Engineering Center	1	MA	2001									X	O
Norwood PCBs	1	MA	1999									X	C
Nyanza Chemical Waste Dump	1	MA	1991						X				PD
Otis Air Natioinal Guard - Fuel Spill 12	1	MA	1995	X									C
Otis Air National Guard	1	MA	1995									X	O
Re-Solve Inc	1	MA	1998									X	O
Rose Disposal Pit	1	MA	1994									X	O
Silresim Chemical	1	MA	1991									X	O
Sullivan's Ledge	1	MA	2000									X	O
W.R. Grace (Acton Plant) - OU3	1	MA	2005									X	PD
Wells G&H	1	MA	1989									X	O
Wells G&H - OU 1 (Wildwood Conservation Trust)	1	MA	1998	X									O
Brunswick Naval Air Station	1	ME	2001									X	O
Eastern Surplus Company	1	ME	2000									X	O
Eastern Surplus Company - Entire Site	1	ME	2000			X							O
Eastland Woolen Mill - OU1	1	ME	2002		X								D
Eastland Woolen Mill - OU1	1	ME	2002			X							O
McKin Co.	1	ME	1992									X	C
O'Connor - OU 2 Management of Migration	1	ME	2002						X				O
Pinette's Salvage Yard	1	ME	1997									X	C
Union Chemical - OU 1	1	ME	2001		X								C
Union Chemical - OU 1	1	ME	2001			X							C
Union Chemical Co Inc	1	ME	1997									X	C

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
West Site/Hows Corner	1	ME	2002									X	PD
Winthrop Landfill	1	ME	1998									X	C
Beede Waste Oil - OU1	1	NH	2004									X	PD
Dover Municipal Landfill	1	NH	2004									X	D
Kearsarge Metallurgical Corp.	1	NH	1993									X	O
Keefe Environmental Services	1	NH	1988									X	O
Ottati & Goss/Kingston Steel Drum	1	NH	1987									X	D
Pease Air Force Base	1	NH	2004									X	O
Pease Air Force Base - Site 45	1	NH	1995	X									O
Pease Air Force Base - Zone 2	1	NH	1995	X									O
Savage Municipal Water Supply	1	NH	1997									X	O
Savage Municipal Water Supply - OU 1, Ok Tool Source Area	1	NH	1997	X									O
Somersworth Sanitary Landfill	1	NH	1994							X			O
Somersworth Sanitary Landfill	1	NH	1994									X	O
South Municipal Water Supply Well	1	NH	1995									X	O
Sylvester Dump	1	NH	1992									X	C
Tibbetts Road - OU 01	1	NH	1998								X		O
Tinkham Garage	1	NH	1989									X	C
Central Landfill - OU1	1	RI	1994									X	O
Davis Liquid Waste	1	RI	1987									X	PD
Naval Station Newport	1	RI	1992									X	C
Peterson/Puritan Inc.	1	RI	1993									X	O
Peterson/Puritan Inc. - OU 1, PAC Area	1	RI	1993			X							C

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Picillo Farm Site	1	RI	1993									X	O
Stamina Mills	1	RI	2000									X	O
Burgess Brothers Landfill - OU 01	1	VT	1998	X									O
Old Springfield Landfill	1	VT	1994									X	O
Parker Landfill Site - OU1	1	VT	2004		X								O
Parker Landfill Site - OU1	1	VT	2004							X			O
Parker Sanitary Landfill	1	VT	1995									X	PD
A.O. Polymer Ground Water Treatment	2	NJ	1991									X	O
Bog Creek Farm	2	NJ	1994									X	O
Brook Industrial Park	2	NJ	1994									X	D
Caldwell Trucking	2	NJ	1989									X	O
Chemical Control	2	NJ	1998		X								C
Chemical Leaman Tank Lines, Inc.	2	NJ	1990									X	D
Chemsol, Inc.	2	NJ	1991									X	O
Ciba-Geigy Corp.	2	NJ	1989									X	O
Cinnaminson Township (Block 702) Ground Water Contamination	2	NJ	1990									X	O
Combe Fill South Landfill	2	NJ	1986									X	O
Cosden Chemical Coatings (OU 3)	2	NJ	1992									X	D/I
Dayco Corp./L.E. Carpenter Co.	2	NJ	1994									X	PD
De Rewal Chemical	2	NJ	1989									X	O
Diamond Alkali	2	NJ	1987									X	O
D'Imperio Property	2	NJ	1985									X	O
Ellis Property - Groundwater	2	NJ	1992									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Emmell's Septic Landfill - OU1	2	NJ	2003									X	PD
Evor Phillips Leasing	2	NJ	1992									X	O
Ewan Property	2	NJ	1989									X	O
Ewan Property - OU 2	2	NJ	1989		X								C
FAA Technical Center - Area B Navy Fire Testing Facility	2	NJ	1996									X	BI
FAA Technical Center - OU 1, Area D - Jet Fuel Farm	2	NJ	1989		X								I
FAA Technical Center (USDOT) - OU13	2	NJ	2003									X	PD
Florence Landfill	2	NJ	1986									X	O
Fried Industries	2	NJ	1994									X	PD
Garden State Cleaners	2	NJ	1999									X	O
Gems Landfill	2	NJ	1999									X	O
Goose Farm	2	NJ	1993									X	O
Helen Kramer Landfill	2	NJ	1993									X	O
Higgins Disposal Site	2	NJ	1997									X	PD
Higgins Farm	2	NJ	1998									X	O
Imperial Oil Co., Inc./Champion Chemicals	2	NJ	1992									X	PD
JIS Landfill	2	NJ	1995									X	D
Kauffman & Minteer, Inc. - OU2	2	NJ	2002			X							PD
Kauffman & Minteer, Inc. - OU2	2	NJ	2002									X	PD
Kin-Buc Landfill	2	NJ	1988									X	O
King of Prussia	2	NJ	1995									X	O
Lang Property	2	NJ	1995									X	O
Lone Pine Landfill	2	NJ	1994									X	O
Mannheim Avenue Dump	2	NJ	1994									X	C
Martin Aaron Inc - OU1	2	NJ	2005									X	PD

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Metaltec/Aerosystems	2	NJ	1990									X	PD
Monitor Devices/Intercircuits Inc - OU1	2	NJ	2005		X								PD
Montgomery Township Housing Development	2	NJ	1988									X	O
Myers Property	2	NJ	1990									X	PD
Nascolite Corp.	2	NJ	1988									X	O
Naval Air Engineering Center	2	NJ	1997									X	O
Naval Air Engineering Center Areas I and J Groundwater OU 26	2	NJ	1999			X							O
Naval Air Engineering Center Site 28 - Soil and Groundwater OU	2	NJ	1997	X									O
Naval Weapons Station Earle (Site A) - OU 03	2	NJ	1998	X									O
NL Industries, Inc.	2	NJ	1994									X	D
Picatinny Arsenal (US Army)	2	NJ	1989									X	O
Price Landfill #1	2	NJ	1986									X	D
Radiation Technology, Inc.	2	NJ	1994									X	PD
Reich Farms	2	NJ	1998									X	O
Rockaway Borough Well Field	2	NJ	1991									X	O
Rockaway Borough Well Field	2	NJ	1991									X	BI
Rockaway Township Wells	2	NJ	1994									X	I
Rocky Hill Municipal Well	2	NJ	1988									X	O
Scientific Chemical Processing	2	NJ	1990									X	O
Sharkey Landfill	2	NJ	1986									X	I
Shieldalloy Corp	2	NJ	1996									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Technology Type									Status
				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
South Jersey Clothing Company	2	NJ	1999									X	O
Syncon Resins	2	NJ	1986									X	O
Tabernacle Drum Dump	2	NJ	1993									X	C
Universal Oil Products	2	NJ	1993									X	C
Vineland Chemical Co., Inc.	2	NJ	1997									X	O
Waldick Aerospace Devices, Inc.	2	NJ	1991									X	PD
Williams Property	2	NJ	1995									X	O
Woodland Route 532 Dump	2	NJ	1999	X									BI
Woodland Routes 72 Dump	2	NJ	1999	X									BI
American Thermostat Co.	2	NY	1998									X	O
Brewster Well Field	2	NY	1986									X	O
Brookhaven National Laboratory (USDOE)	2	NY	2001									X	O
Brookhaven National Laboratory (USDOE) - OU 4	2	NY	1996	X									C
Byron Barrel & Drum	2	NY	1989									X	O
Circuitron Corp.	2	NY	2000									X	O
Claremont Polychemical	2	NY	1990									X	O
Colesville Municipal Landfill	2	NY	1991		X								O
Colesville Municipal Landfill	2	NY	1991									X	O
Cortese Landfill	2	NY	1994									X	PD
Endicott Village Well Field	2	NY	1997									X	O
Facet Enterprises	2	NY	1992									X	O
FMC Corp. (Dublin Road Landfill)	2	NY	1997									X	O
Forest Glen Mobile Home Subdivision	2	NY	1999									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Fulton Terminals	2	NY	1999									X	C
GCL Tie and Treating	2	NY	1995									X	O
General Motors/Central Foundry Division	2	NY	1992									X	O
Genzale Plating Company	2	NY	1991									X	O
Griffiss Air Force Base Landfill 1, OU 5	2	NY	2000									X	PD
Hooker - Hyde Park NAPL Plume Treatment	2	NY	1986						X				O
Hooker (Hyde Park)	2	NY	1986									X	O
Hooker (S Area)	2	NY	1990									X	O
Hooker Chemical/Ruco Polymer - OU 3	2	NY	2000		X								BI
Islip Municipal Sanitary Landfill	2	NY	1992									X	O
Jackson Steel - OU1	2	NY	2004									X	PD
Johnstown City Landfill	2	NY	1993									X	PD
Jones Chemicals, Inc.	2	NY	2000									X	BI
Katonah Municipal Well	2	NY	1992									X	O
Kentucky Avenue Wellfield	2	NY	1990									X	O
Kentucky Avenue Wellfield - OU 3	2	NY	1996	X									O
Liberty Industrial Finishing	2	NY	2002									X	O
Mackenzie Chemical Works - OU1	2	NY	2003	X									BI
Mattiace Petrochemicals	2	NY	1991									X	O
Mohonk Road Industrial Plant	2	NY	2000									X	O
Niagara Mohawk Power Corp. (Saratoga Springs Plant)	2	NY	1995									X	O
Old Bethpage Landfill	2	NY	1994									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Olean Well Field	2	NY	1996									X	I
Onondaga Lake - OU5	2	NY	2000									X	BI
Onondaga Lake - OU6	2	NY	2002									X	D
Pasley Solvents and Chemicals, Inc.	2	NY	1992	X									C
Plattsburgh Air Force Base - OU6	2	NY	2003							X			PD
Plattsburgh Air Force Base - OU6	2	NY	2003									X	O
Pollution Abatement Services	2	NY	1993									X	O
Port Washington Landfill	2	NY	1989									X	O
Ramapo Landfill	2	NY	1992									X	O
Richardson Hill Road Landfill/Pond	2	NY	1997									X	O
Robintech, Inc./National Pipe Company	2	NY	1992									X	O
Rowe Industries Ground Water Contamination	2	NY	2002									X	O
Sealand Restoration. Inc.	2	NY	1995							X			O
Shore Realty (Formerly Applied Environmental Services)	2	NY	1991									X	O
Shore Realty (Formerly Applied Environmental Services) - Groundwater OU	2	NY	1991		X								O
Shore Realty (Formerly Applied Environmental Services) - OU 1	2	NY	1991	X									O
Sinclair Refinery	2	NY	1991									X	O
Sinclair Refinery - OU 2	2	NY	1991	X									C
SMS Instruments	2	NY	1989									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Solvent Savers	2	NY	1990									X	PD
Stanton Cleaners Area Groundwater Contamination Site	2	NY	1999									X	O
Tri-Cities Barrel Site	2	NY	2000									X	PD
Vestal Water Supply - Well 1-1A	2	NY	1990									X	O
Vestal Water Supply Well 4-2	2	NY	1998									X	O
Volney Municipal Landfill	2	NY	2002									X	O
York Oil Co.	2	NY	1988									X	O
Fibers Public Supply Wells	2	PR	1991									X	O
Janssen Inc.	2	PR	1997									X	O
Upjohn Facility	2	PR	1998									X	O
Vega Alta Public Supply Wells	2	PR	1987									X	O
Island Chemical Corp/Virgin Islands Chemical Corp. - OU1	2	VI	2002	X									O
Tutu Well Field	2	VI	1996									X	O
Washington Gas Light	3	DC	1999									X	PD
Army Creek Landfill	3	DE	1994									X	O
Chem-Solv, Inc.	3	DE	1998									X	O
Delaware City PVC	3	DE	1986									X	O
Delaware Sand & Gravel Landfill	3	DE	1988									X	O
Dover Air Force Base - Target Area 2 Of Area 6	3	DE	1995		X								O
Dover Gas Light Co.	3	DE	1994									X	PD
E.I. DuPont Newport South Landfill	3	DE	2001							X			I

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Koppers Co Inc (Newport Plant) - OU1	3	DE	2005						X				PD
Koppers Co Inc (Newport Plant) - OU1	3	DE	2005									X	PD
NCR Corp.	3	DE	1991	X									C
NCR Corp.	3	DE	1991									X	O
Standard Chlorine of Delaware, Inc,.	3	DE	1995									X	D/I
Tybouts Corner Landfill	3	DE	1986									X	O
Aberdeen Proving Ground (Edgewood Area) J-Field Soil OU	3	MD	2001								X		O
Aberdeen Proving Ground (Edgewood Area) OU21	3	MD	2004		X								PD
Aberdeen Proving Ground (Michaelsville Landfill)	3	MD	2000									X	O
Aberdeen Proving Ground (O-Field)	3	MD	1991									X	O
Aberdeen Proving Ground (Old Nike)	3	MD	1996									X	O
Andrews Air Force Base - OU7	3	MD	2005		X								C
Kane & Lombard Street Drums - OU2	3	MD	2003		X								PD
Patuxent River Naval Air Station (Site 11)	3	MD	1996									X	PD
Sand, Gravel and Stone	3	MD	1985									X	O
Sand, Gravel, and Stone - OU3	3	MD	2003		X								PD
Sand, Gravel, and Stone - OU3	3	MD	2003									X	PD

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Southern Maryland Wood Treating	3	MD	1995									X	C
Spectron Inc., - OU1	3	MD	2004		X								PD
Spectron Inc., - OU1	3	MD	2004									X	PD
A.I.W. Frank/Mid-County Mustang	3	PA	2001									X	O
AMP, Inc. (Glen Rock Facility)	3	PA	1996									X	O
Avco Lycoming	3	PA	1997		X								C
Avco Lycoming	3	PA	2000									X	O
Bally Ground Water Contamination	3	PA	1989									X	O
Bendix Flight Systems Division	3	PA	1988									X	O
Berks Sand Pit	3	PA	1994									X	O
Blosenski Landfill	3	PA	1998									X	O
Boarhead Farm	3	PA	1999								X		O
Boarhead Farm	3	PA	1999									X	O
Brown's Battery Breaking Site - OU 2	3	PA	1992			X							O
Butz Landfill	3	PA	1992									X	O
Centre County Kepone	3	PA	1995									X	O
Commodore Semiconductor Group	3	PA	2000									X	O
Crossley Farm	3	PA	2001									X	D/I
Croydon TCE	3	PA	1997									X	O
Cryochem, Inc.	3	PA	1998									X	O
Delta Quarries & Disp./Stotler Landfill	3	PA	1997									X	O
Drake Chemical	3	PA	2000									X	O
Dublin TCE Site	3	PA	2002									X	PD

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Eastern Diversified Metals	3	PA	1991									X	O
Elizabethtown Landfill	3	PA	1998									X	PD
Fischer and Porter Co	3	PA	1984									X	O
Havertown PCP	3	PA	1991									X	O
Heleva Landfill	3	PA	1999									X	O
Hellertown Manufacturing Co.	3	PA	1996									X	O
Henderson Road	3	PA	1988									X	O
Hunterstown Road	3	PA	1993									X	O
Industrial Lane	3	PA	1991									X	O
Keystone Sanitation Landfill	3	PA	1990									X	O
Kimberton Site	3	PA	1993									X	O
Lindane Dump	3	PA	1999									X	O
Lord-Shope Landfill	3	PA	1996									X	O
M.W. Manufacturing	3	PA	1992									X	O
Malvern TCE	3	PA	1998									X	D
Metal Banks	3	PA	2001									X	PD
Middletown Air Field	3	PA	1996									X	O
Mill Creek Dump	3	PA	1986									X	O
Modern Sanitation Landfill	3	PA	2001									X	O
Naval Support Activity - OU4 (Site 3)	3	PA	2005			X							PD
North Penn - Area 1	3	PA	1998									X	O
North Penn - Area 12	3	PA	2000									X	O
North Penn - Area 5 - OU1	3	PA	2004			X							PD
North Penn - Area 5 - OU1	3	PA	2004									X	PD
North Penn Area 6	3	PA	2000									X	D
Occidental Chemical Corp./Firestone Tire & Rubber Co.	3	PA	1993									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Old City of York Landfill	3	PA	1991									X	C
Osborne Landfill	3	PA	1990									X	O
Palmerton Zinc Pile OU2 & OU4	3	PA	1988									X	PD
Paoli Rail Yard	3	PA	1992									X	O
Raymark	3	PA	1995									X	O
Recticon/Allied Steel Corp.	3	PA	2000									X	O
Resin Disposal	3	PA	1991									X	O
Rodale Manufacturing Co. Inc. Site OU 1	3	PA	1999									X	O
Saegertown Industrial Area	3	PA	1993		X								O
Shriver's Corner	3	PA	1995									X	O
Stanley Kessler	3	PA	1999									X	O
The Crater Resources	3	PA	2000									X	PD
Tonolli Corp.	3	PA	1992							X			O
Tyson's Dump	3	PA	1998									X	O
Westinghouse Elevator Co. Plant	3	PA	1998									X	O
Whitmoyer Laboratories	3	PA	1991									X	O
William Dick Lagoons - OU 2	3	PA	1991									X	BI
Willow Grove Air Reserve Station (Naval Air Development Center) (8 Areas)	3	PA	2000									X	O
York County Solid Waste/Refuse Landfill	3	PA	1995									X	O
Arrowhead Associates/Scovill Corp	3	VA	2001							X			C
Chisman Creek	3	VA	1991									X	O
Defense General Supply Center (DLA)	3	VA	1993									X	O

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				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Greenwood Chemical Co.	3	VA	1991									X	O
H & H Burn Pit	3	VA	2000									X	O
H & H Burn Pit	3	VA	1999						X				O
Langley Air Force Base OU3	3	VA	1998									X	PD
Naval Amphibious Base Little Creek - OU 6	3	VA	2005			X							PD
Naval Amphibious Base Little Creek - OU6	3	VA	2005		X								PD
Naval Surface Warfare Center, Dahlgren, Site 12 - Chemical Burn Area	3	VA	1997	X									O
Rentokil Virginia Wood Preserving	3	VA	1996									X	O
Saltville Waste Disposal Ponds	3	VA	1995									X	O
Saunders Supply Co.	3	VA	1996									X	O
US Titanium	3	VA	1995									X	O
Allegany Ballistics Laboratory (US Navy) - Site 1 (OU 3)	3	WV	1997									X	O
Allegany Ballistics Laboratory (US Navy) - Site 10 (OU 5)	3	WV	1998									X	O
Fike/Artel	3	WV	2001									X	PD
Vienna Tetrachloroethene	3	WV	2002	X									O
West Virginia Ordnance (US Army)	3	WV	1988									X	O
Anniston Army Depot (Southeast Industrial Area)	4	AL	1991									X	O
Ciba Geigy (McIntosh Plant)	4	AL	1989									X	O
Interstate Lead Co.	4	AL	1995									X	PD
Olin Corp. (McIntosh Plant)	4	AL	1995									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Technology Type									Status
				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Perdido Ground Water Contamination	4	AL	1988									X	O
Redwing Carriers, Inc. (Saraland) Site	4	AL	1993									X	D/I
Stauffer Chemical Cold Creek Plant (OU1)	4	AL	1989									X	O
Stauffer Chemical LeMoyne Plant - Groundwater Intercept System (OU1)	4	AL	1989									X	O
Stauffer Chemical LeMoyne Plant - Halby Pond (OU1)	4	AL	1989									X	O
TH Agriculture & Nutrition (Montgomery Plant)	4	AL	1993									X	O
Airco Plating Co	4	FL	1999									X	O
Alaric Inc.	4	FL	2002									X	O
American Creosote Works, Inc. (Pensacola Pit)	4	FL	1994									X	PD
American Creosote Works, Inc. OU 2 - Phase 2	4	FL	1994		X								PD
American Creosote Works, Inc. OU2 - Phase 1	4	FL	1994						X				O
Anodyne, Inc.	4	FL	1993									X	PD
Cabot/Koppers	4	FL	1990									X	O
Cecil Field Naval Air Station - OU 08	4	FL	1998	X									C
Cecil Field Naval Air Station - OU 7, Site 16	4	FL	1999	X									C
Cecil Field Naval Air Station - OU10	4	FL	2005									X	PD

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Cecil Field Naval Air Station - OU9	4	FL	2005		X								PD
Cecil Field Naval Air Station - OU9	4	FL	2005									X	PD
Chevron Chemical Company	4	FL	1996	X									PD
Chevron Chemical Company	4	FL	1996							X			PD
City Industries, Inc.	4	FL	1994									X	O
Coleman-Evans Wood Preserving	4	FL	1997									X	O
Florida Petroleum Reprocessors	4	FL	2001									X	O
Florida Steel Corp.	4	FL	1997									X	O
Gold Coast Oil Corp.	4	FL	1992									X	C
Harris Corp. (Palm Bay Plant)	4	FL	1998									X	C
Harris Corp. (Palm Bay Plant) (OU 2)	4	FL	1995									X	C
Helena Chemical Company (Tampa Plant)	4	FL	1996									X	PD
Hipps Road Landfill	4	FL	1994									X	C
Hollingsworth Solderless	4	FL	1993									X	C
Jacksonville Naval Air Station - OU3	4	FL	2000	X									O
Jacksonville Naval Air Station - OU3	4	FL	2000		X								PD
Jacksonville Naval Air Station - OU3	4	FL	2000			X							PD
Madison County Sanitary Landfill	4	FL	1997									X	O
Miami Drum Services - Hialeah	4	FL	1985									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Miami Drum Services - Preston	4	FL	1985									X	O
Peak Oil/Bay Drum OU2	4	FL	2005		X								BI
Peak Oil/Bay Drum OU2 (MW B7)	4	FL	2005	X									BI
Pensacola Naval Air Station (OU 1)	4	FL	1998									X	O
Piper Aircraft/Vero Beach Water & Sewer	4	FL	1994									X	O
Sapp Battery Salvage	4	FL	1986									X	O
Sherwood Medical Industries - Floridan Aquifer	4	FL	1997									X	O
Sherwood Medical Industries - Surficial Aquifer	4	FL	1997									X	O
Southern Solvents OU 1	4	FL	1999			X							D/I
Southern Solvents, Inc.	4	FL	1999									X	PD
Stauffer Chemical Company - OU1	4	FL	1996									X	O
Sydney Mine Sludge Pond	4	FL	1989									X	C
Trans Circuits Site	4	FL	2001			X							D
Brunswick Wood Preserving Site - OU 1	4	GA	2002			X							PD
Firestone Tire & Rubber Co. (Albany Plant)	4	GA	1993									X	O
Marine Corps Logistics Base, OU 6	4	GA	2001		X								D
Marzone Inc/Chevron Chemical Company Site - OU 1	4	GA	2000							X			O
Monsanto Corp. (Augusta Plant)	4	GA	1993									X	O
Robins Air Force Base	4	GA	1995									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Robins Air Force Base (Landfill #4/Sludge Lagoon) - OU3	4	GA	2004									X	O
TH Agriculture & Nutrition Co. (Albany Plant)	4	GA	1993									X	O
Woolfolk Chemical Works, Inc.	4	GA	1994									X	O
Airco	4	KY	1997									X	O
BF Goodrich	4	KY	1997									X	O
Distler Brickyard	4	KY	1995		X								O
Distler Brickyard	4	KY	1995									X	O
Distler Farm	4	KY	1992									X	O
Fort Hartford Coal Co. Stone Quarry	4	KY	1999									X	O
National Electric Coil/Cooper Industries	4	KY	1998									X	O
National Southwire Aluminum Co.	4	KY	1993									X	O
Paducah Gaseous Diffusion Plant (USDOE) - NE Plume OU	4	KY	1995									X	O
Paducah Gaseous Diffusion Plant (USDOE) - NW Plume OU	4	KY	1993									X	O
Tri-City Disposal Co.	4	KY	1991									X	O
American Creosote Works, Inc.	4	LA	1993		X								O
ABC One Hour Cleaners	4	NC	1993									X	O
Aberdeen Pesticide Dumps OU 5	4	NC	1999								X		O
Aberdeen Pesticide Dumps OU5 and Route 211 Area	4	NC	1999									X	O
Aberdeen Pesticide Dumps, GW Remediation OU3	4	NC	1997								X		O

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Groundwater Treatment Technology Summary Matrix (continued)

Project Name	Region	State	FY	Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	Status
				Groundwater Technologies									
				Technology Type									
Benfield Industries	4	NC	1992									X	O
Blue Ridge Plating Company - OU1	4	NC	2004			X							PD
Camp Lejeune Military Base (US Navy)	4	NC	1995									X	PD
Camp Lejeune Military Base (US Navy) - OU 10, Site 35	4	NC	1995					X					O
Cape Fear Wood Preserving	4	NC	2001		X								O
Cape Fear Wood Preserving	4	NC	2001		X								O
Cape Fear Wood Preserving	4	NC	1989									X	O
Celanese Fiber Corp.	4	NC	2004									X	C
Charles Macon Lagoon and Drum Storage	4	NC	1997									X	O
Chemtronics, Inc. - Back Valley	4	NC	1989									X	O
Chemtronics, Inc. - Front Valley	4	NC	1989									X	O
Cherry Point Marine Corps Air Station - OU 1	4	NC	1998	X									O
Cherry Point Marine Corps Air Station - OU 1	4	NC	1997									X	O
FCX - Statesville - OU 3	4	NC	1996	X									O
FCX - Statesville OU1	4	NC	1993									X	O
Geigy Chemical Corp. (Aberdeen Plant)	4	NC	1998									X	O
General Electric Co./Shepherd Farm	4	NC	2000									X	O
Jadco-Hughes Facility	4	NC	1997									X	O
JFD Electronics/Channel Master	4	NC	1992									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	Region	State	FY	Technology Type									Status
Koppers Co., Inc. (Morrisville Plant)	4	NC	1997									X	O
Martin-Marietta, Sodeyco, Inc.	4	NC	1999									X	O
National Starch & Chemical Company OU1	4	NC	1994									X	O
National Starch & Chemical Company OU3	4	NC	1994									X	O
New Hanover County Airport Burn Pit	4	NC	2000	X									O
North Belmont PCE	4	NC	1997					X					I
North Carolina State University	4	NC	1996									X	D
Ram Leather Care Site - OU1	4	NC	2004									X	PD
Reasor Chemical Company Site	4	NC	2002									X	D
Aqua-Tech Environmental Inc. (Groce Labs)	4	SC	2003			X							PD
Arkwright Dump Site	4	SC	2002		X								PD
Calhoun Park Area - OU 2	4	SC	2002			X							C
Carolawn	4	SC	1998									X	O
Elmore Waste Disposal	4	SC	1998									X	O
Helena Chemical Company	4	SC	1993									X	O
Kalama Specialty Chemicals	4	SC	1999									X	O
Koppers Co Inc (Charleston Plant) Former Treatment and Old Impoundment Areas	4	SC	1998						X				O
Koppers Co., Inc. (Charleston Plant)	4	SC	1995									X	O
Leonard Chemical Company	4	SC	2001	X									PD
Leonard Chemical Company	4	SC	2001	X									PD

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Leonard Chemical Company	4	SC	2001		X								PD
Lexington County Landfill Area	4	SC	1994									X	O
Macalloy Corporation - OU1	4	SC	2002			X							BI
Macalloy Corporation - OU1	4	SC	2002									X	PD
Medley Farm Drum Dump	4	SC	1995									X	O
Palmetto Wood Preserving	4	SC	1997									X	C
Para-Chem Southern, Inc.	4	SC	2000									X	O
Rochester Property	4	SC	2002	X									C
Rock Hill Chemical Co.	4	SC	1997									X	O
Sangamo/Twelve-Mile/Hartwell PCB	4	SC	1999									X	O
Savannah River Site (US DOE) - OU 28	4	SC	2000					X					I
Savannah River Site (US DOE) - OU 3	4	SC	1992									X	O
Savannah River Site (US DOE) C Area Rubble Pit	4	SC	1999	X									O
Savannah River Site (USDOE) - OU29	4	SC	2004									X	O
SCRDI Bluff Road	4	SC	1998									X	O
SCRDI Dixiana	4	SC	1992									X	O
Shuron Inc.	4	SC	1998									X	PD
Shuron Inc. - OU 01	4	SC	1998	X									D
Townsend Chainsaw Company, Inc.	4	SC	1997			X							C
Townsend Chainsaw Company, Inc.	4	SC	1997									X	C
Wamchem Inc	4	SC	1997									X	O
Carrier Air Conditioning	4	TN	1996									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Mallory Capacitor Co.	4	TN	1996									X	O
Memphis Defense Depot (DLA) - OU1	4	TN	2004			X							O
Memphis Defense Depot (DLA) - OU1	4	TN	2004							X			D
Memphis Defense Depot (DLA) - OU1	4	TN	1996									X	O
Memphis Defense Depot, Main Installation Functional Unit 7	4	TN	2001		X								D
Milan Army Ammunition Plant - OU4	4	TN	2000									X	O
Milan Army Ammunition Plant OU1	4	TN	1992									X	O
Milan Army Ammunition Plant OU3	4	TN	1993									X	O
Murray-Ohio Dump	4	TN	1994									X	PD
Oak Ridge Reservation - OU 28	4	TN	2002									X	O
Oak Ridge Reservation OU-30	4	TN	2002		X								PD
Velsicol Chemical (Hardeman County)	4	TN	1998									X	O
Wrigley Charcoal Plant	4	TN	2003		X								PD
Acme Solvent Reclaiming Inc	5	IL	1998									X	O
Beloit Corp. - OU1	5	IL	2004			X							PD
Beloit Corp. - OU1	5	IL	2004									X	O
Belvidere Municipal Landfill	5	IL	1998									X	C
Central Illinois Public Service Co.	5	IL	1992									X	O
Cross Brothers Pail Recycling (Pembroke)	5	IL	1985									X	C

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Galesburg/Koppers - Deep aquifer	5	IL	2001		X								O
Galesburg/Koppers - Shallow Aquifer	5	IL	2001		X								O
LaSalle Electric Utilities - OU2 (GTU)	5	IL	2004								X		O
LaSalle Electric Utilities - OU2 (Laboratory Area)	5	IL	2004						X				O
LaSalle Electric Utilities - OU2 (NW Corner)	5	IL	2004								X		O
LaSalle Electric Utilities OU2 Thinner Shed	5	IL	2004						X				O
Lasalle Electrical Utilities	5	IL	1994									X	O
Lenz Oil Services, Inc. OU1	5	IL	1999									X	PD
Ottawa Radiation Areas - OU2	5	IL	2003									X	PD
Outboard Marine Company/Waukegan Coke Plant	5	IL	1999									X	D/I
Parsons Casket Hardware Co - OU2	5	IL	2005									X	PD
Parsons Casket Hardware Co. - OU2 (Alluvial)	5	IL	2005		X								PD
Parsons Casket Hardware Co. - OU2 (Bedrock)	5	IL	2005		X								PD
Sangamo Electric Dump/Crab Orchard National Wildlife Refuge - PCB Areas OU	5	IL	2000						X				PD

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Sangamo Electric Dump/Crab Orchard National Wildlife Refuge - PCB Areas OU	5	IL	2000								X		BI
Sauget Area 2	5	IL	2002									X	BI
Southeast Rockford, Groundwater Contamination OU3	5	IL	2002	X									D
Velsicol Chemical Corp.	5	IL	1994									X	O
Velsicol Chemical Corp.	5	IL	1982									X	O
American Chemical Services, Inc.	5	IN	1992									X	O
American Chemical Services, Inc. - southern plume	5	IN	2004			X							O
Conrail Rail Yard	5	IN	1994									X	O
Continental Steel Corp.	5	IN	1998									X	D/I
Douglas Road Uniroyal Inc. Landfill	5	IN	1996									X	O
Fisher Calo	5	IN	1998									X	O
Fisher-Calo	5	IN	1990		X								C
Fort Wayne Reduction Dump	5	IN	1995									X	O
Lakeland Disposal Service, Inc.	5	IN	1993									X	O
Main Street Well Field	5	IN	1985									X	O
Midco I	5	IN	1989									X	O
Midco II	5	IN	1992									X	O
Midco II - OU1	5	IN	2004	X									D
Northside Sanitary Landfill	5	IN	1991									X	O
Reilly Tar & Chemical (Indianapolis Plant)	5	IN	2000									X	O
Seymour Recycling Corp.	5	IN	1993									X	C

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Tri-State Plating	5	IN	1992									X	C
Waste Inc. Landfill	5	IN	1994									X	O
Wayne Waste Oil	5	IN	1990		X								O
Wayne Waste Oil	5	IN	1995									X	O
Aircraft Components Inc Site, Chemical OU-2	5	MI	2002		X								O
Avenue "E" Groundwater Contamination	5	MI	2000									X	C
Bendix Site, St. Joseph	5	MI	1997									X	PD
Bofors Nobel	5	MI	1999									X	O
Bofors Nobel OU1	5	MI	1999								X		D
Burrows Sanitation	5	MI	1993									X	C
Chem Central	5	MI	1995									X	O
Clare Water Supply	5	MI	1997						X				O
Clare Water Supply	5	MI	1992									X	O
Clare Water Supply - Groundwater	5	MI	2004							X			O
Duell & Gardner Landfill	5	MI	1993									X	O
Electrovoice - OU 1	5	MI	1992	X									C
Forest Waste Products - OU 2	5	MI	2005	X									PD
Forest Waste Products - OU 2	5	MI	2005			X							PD
G & H Industrial Landfill	5	MI	1999									X	O
Hedblum Industries	5	MI	1993									X	O
Ionia City Landfill	5	MI	2000									X	O
Kentwood Landfill	5	MI	1995									X	O
Kysor Industrial Corp.	5	MI	1996									X	O
Liquid Disposal, Inc.	5	MI	1997									X	O
McGraw Edison Corporation	5	MI	1998									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Michigan Disposal Service (Cork Street Landfill)	5	MI	1991									X	PD
Motor Wheel Disposal Site	5	MI	1998									X	O
Muskegon Chemical Co.	5	MI	1997									X	O
North Bronson Industrial Area	5	MI	1998									X	PD
Northernaire Plating	5	MI	1996									X	O
Ott/Story/Cordova Chemical Co.	5	MI	1989									X	O
Peerless Plating	5	MI	1992									X	O
Rasmussen's Dump	5	MI	2001			X							O
Rasmussen's Dump	5	MI	1991									X	C
Rockwell International	5	MI	2002									X	PD
Rockwell International OU 2	5	MI	2002							X			PD
Rose Township Dump	5	MI	1996									X	O
Roto-Finish Co, Inc.	5	MI	1997									X	C
South Macomb Disposal Authority	5	MI	1991									X	O
South Macomb Disposal Authority (Landfills #9 and #9A) - OU1	5	MI	2002									X	PD
Southwest Ottawa County Landfill	5	MI	1994									X	O
Spartan Chemical Co.	5	MI	1993									X	PD
Spiegelberg Landfill	5	MI	1990									X	C
Springfield Township Dump	5	MI	1990	X									O
Springfield Township Dump	5	MI	2000									X	O
Sturgis Municipal Wells	5	MI	1997									X	O
Tar Lake	5	MI	1992									X	O
Tar Lake - OU2	5	MI	2002		X								O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Thermo-Chem, Inc.	5	MI	1991									X	O
Thermo-Chem, Inc. - OU 1	5	MI	1991	X									O
U.S. Aviex	5	MI	2004	X									O
US Aviex	5	MI	1993									X	C
Verona Well Field - Paint Shop	5	MI	2000	X									O
Verona Well Field - Thomas Solvent facility	5	MI	2000	X									O
Verona Well Field (Thomas Solvent/Raymond Road), OU 1	5	MI	1985									X	O
Verona Well Fields (Dual Blocking Well/ Annex/ Paint Shop)	5	MI	1991									X	O
Wash King Laundry	5	MI	1993									X	O
Arrowhead Refinery Co.	5	MN	1997									X	O
East Bethel Township	5	MN	1993									X	O
FMC Corp.	5	MN	1992									X	O
Koppers Coke - Groundwater OU	5	MN	1994		X								C
Kummer Sanitary Landfill - OU 3	5	MN	1996		X								C
Lehillier/Mankato Site	5	MN	1992									X	C
Long Prairie Groundwater Contamination	5	MN	1997									X	O
MacGillis and Gibbs/Bell Lumber and Pole - OU 3	5	MN	1994									X	O
Naval Industrial Reserve Ordnance Plant	5	MN	1990									X	O
New Brighton/Arden Hills	5	MN	1998									X	PD
New Brighton/Arden Hills - OU 2 (Deep GW)	5	MN	1998									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
New Brighton/Arden Hills - OU 2 (Site A)	5	MN	1998									X	O
New Brighton/Arden Hills - OU 2 (Site K)	5	MN	1998									X	O
New Brighton/Arden Hills (OU 1)	5	MN	1993									X	O
New Brighton/Arden Hills (OU 3)	5	MN	1992									X	C
Nutting Truck & Caster Co.	5	MN	1992									X	O
Oakdale Dump Sites	5	MN	1995									X	O
Perham Arsenic	5	MN	1998									X	O
Reilly Tar & Chemical (St Louis Park) - OU2	5	MN	1986									X	O
Reilly Tar & Chemical (St Louis Park) - OU3	5	MN	1992									X	O
Reilly Tar & Chemical (St Louis Park) - OU4	5	MN	1990									X	O
Reilly Tar & Chemical (St Louis Park) - OU5	5	MN	1995									X	O
University of Minnesota (Rosemount Research Center)	5	MN	1994									X	C
Waite Park Wells - EM Site	5	MN	1989									X	C
Washington County Landfill	5	MN	1991									X	O
Waste Disposal Engineering Inc.	5	MN	1995									X	O
Whittaker Corp	5	MN	1992									X	C
Windom Dump	5	MN	1992									X	C
Allied Chemical & Ironton Coke	5	OH	1991									X	O
Big D Campground	5	OH	1995									X	C

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	Region	State	FY	Technology Type									Status
Chem-Dyne Corp	5	OH	1992									X	O
Fernald Environmental Management Project, Formerly The Feed Materials Production Center (USDOE)	5	OH	1996									X	O
Fields Brook	5	OH	1997									X	PD
Miami County Incinerator	5	OH	1997									X	O
Mound Plant (USDOE)	5	OH	1995	X									C
Mound Plant (USDOE)	5	OH	1995									X	O
Nease Chemical - OU2	5	OH	2005		X								PD
Nease Chemical - OU2	5	OH	2005			X							PD
Nease Chemical - OU2	5	OH	2005									X	PD
New Lyme Landfill	5	OH	1993									X	C
Old Mill	5	OH	1991									X	O
Ormet Corp	5	OH	1998									X	O
Pristine, Inc.	5	OH	1988									X	O
Reilly Tar & Chemical Corp (Dover Plant)	5	OH	1997									X	O
Rickenbacker Air National Guard Base	5	OH	2000									X	PD
Rickenbacker Air National Guard Base - Site 2	5	OH	2000							X			PD
Skinner Landfill	5	OH	1993									X	O
Summit National Liquid Disposal Service	5	OH	1995									X	O
TRW, Inc (Minerva Plant)	5	OH	1994									X	O
Wright-Patterson Air Force Base	5	OH	1999									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Wright-Patterson Air Force Base Groundwater OU12	5	OH	1999			X							C
Zanesville Well Field	5	OH	1991	X									O
Zanesville Well Field	5	OH	1996									X	O
Better Brite Chrome and Zinc Shops	5	WI	2000									X	O
City Disposal Corp. Landfill	5	WI	2000									X	O
Delavan Municipal Well #4	5	WI	2000									X	O
Delavan Municipal Well #4 - CSES	5	WI	2000									X	C
Delavan Municipal Well #4 - SES	5	WI	2000									X	C
Eau Claire Municipal Well Field	5	WI	1985									X	O
Hagen Farm	5	WI	1996									X	C
Hunts Disposal Landfill Site	5	WI	1997									X	O
Kohler Co. Landfill	5	WI	1996									X	O
Lauer 1 Sanitary Landfill, (Boundary Road)	5	WI	1996									X	O
Lemberger Landfill, Inc.	5	WI	1996									X	O
Lemberger Transport & Recycling Inc.	5	WI	1997									X	C
Master Disposal Service Landfill	5	WI	1997									X	O
Moss-American Groundwater	5	WI	1997		X								O
Muskego Sanitary Landfill	5	WI	1997									X	O
N.W. Mauthe Site	5	WI	1997									X	O
National Presto Industries	5	WI	1999									X	O
National Presto Industries - 2nd Unit	5	WI	1999									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Oconomowoc Electroplating	5	WI	1996									X	C
Onalaska Muncipal Landfill	5	WI	2002									X	C
Penta Wood Products	5	WI	2000									X	O
Wausau Groundwater Contamination	5	WI	1994									X	O
Arkwood Inc.	6	AR	1990									X	O
Midland Products	6	AR	1988									X	O
Mid-South Wood Products	6	AR	1987									X	O
Ouachita-Nevada Wood Treaters - OU1	6	AR	2005		X								D/I
Vertac, Inc.	6	AR	1996									X	O
American Creosote Works, Inc. (Winnfield Plant)	6	LA	1993									X	O
Bayou Bonfouca	6	LA	1997									X	O
Combustion, Inc. - OU1	6	LA	2004								X		PD
Delatte Metals	6	LA	2000							X			BI
Highway 71/72 Refinery Site - Entire Site	6	LA	2000						X				PD
AT & SF Albuquerque	6	NM	2002									X	PD
Cimarron Mining Corporation	6	NM	1992									X	C
Fruit Avenue Plume Site	6	NM	2001			X							D
Fruit Avenue Plume Site	6	NM	2001									X	O
North Railroad Avenue Plume	6	NM	2001		X								D
North Railroad Avenue Plume	6	NM	2001				X						BI
Prewitt Abandoned Refinery	6	NM	1992	X									O
Prewitt Abandoned Refinery	6	NM	1996									X	O
South Valley - OU 3	6	NM	1996									X	O
South Valley - OU 5	6	NM	1996									X	O
South Valley - OU 6	6	NM	1996									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
United Nuclear Corp	6	NM	1998									X	O
Hardage/Criner	6	OK	1997									X	O
Oklahoma Refining Co.	6	OK	1992									X	PD
Tinker Air Force Base	6	OK	1990									X	O
Tinker Air Force Base - Soldier Creek And Building 3001	6	OK	1990		X								O
Air Force Plant 4	6	TX	2004							X			O
Air Force Plant 4	6	TX	2004								X		O
Air Force Plant 4	6	TX	1996									X	O
Air Force Plant 4 - Building 181	6	TX	1996						X				C
Alcoa (Point Comfort)/Lavaca Bay Site	6	TX	2002									X	BI
Brio Refining	6	TX	1997						X				O
City of Perryton Well #2	6	TX	1999									X	O
Crystal Chemical Co.	6	TX	1997									X	O
French Limited	6	TX	1994									X	C
Geneva Industries/Fuhrmann Energy	6	TX	1993									X	C
Koppers Co Inc - Texarkana Plant	6	TX	2002						X				O
Longhorn Army Ammunition Plant	6	TX	1995									X	O
Motco	6	TX	1989									X	O
North Cavalcade Street	6	TX	1988									X	O
Odessa Chromium I	6	TX	1994									X	O
Odessa Chromium I	6	TX	1988									X	C
Odessa Chromium II	6	TX	2000			X							C
Odessa Chromium II	6	TX	1988									X	C

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Odessa Chromium II (Andrews Highway)	6	TX	1994									X	C
Petro-Chemical Systems, Inc.	6	TX	1998									X	O
Petro-Chemical Systems, Inc. - OU 2	6	TX	1998		X								O
Sol Lynn/Industrial Transformers	6	TX	2004		X								D/I
Sol Lynn/Industrial Transformers	6	TX	1988									X	C
South Calvacade Street	6	TX	2000									X	O
Sprague Road Ground Water Plume	6	TX	2000									X	O
Texarkana Wood Preserving	6	TX	1993									X	PD
Des Moines TCE	7	IA	1986									X	O
Electro-Coatings, Inc.	7	IA	1994									X	O
Fairfield Coal Gasification Plant	7	IA	1995									X	C
General Motors Corporation, Former AC Rochester Facility Site	7	IA	2001		X								PD
John Deere	7	IA	1988									X	O
Lehigh Portland Cement	7	IA	1991									X	O
McGraw Edison	7	IA	1993									X	PD
Northwestern States Portland Cement Co.	7	IA	1990									X	O
Peoples Natural Gas	7	IA	1991	X									C
Railroad Avenue Groundwater Contamination Site - OU1	7	IA	2003		X								PD
Railroad Avenue Groundwater Contamination Site - OU1	7	IA	2003									X	PD

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Vogel Paint & Wax	7	IA	1994									X	O
29th and Mead Ground Water Contamination	7	KS	1992									X	O
57th and North Broadway Streets Site	7	KS	1998									X	PD
57th and North Broadway Streets Site - OU 01	7	KS	1999					X					O
Ace Services	7	KS	1999									X	O
Chemical Commodities - OU1 Groundwater	7	KS	2005			X							PD
Obee Road	7	KS	1994									X	O
Strother Field Industrial Park	7	KS	1994									X	I
Conservation Chemical Co.	7	MO	1991									X	O
Findett	7	MO	1989									X	O
Lake City Army Ammunition Plant (Area 18)	7	MO	1999									X	O
Lake City Army Ammunition Plant (NW Lagoon) - OU 03	7	MO	1998							X			O
Lee Chemical	7	MO	1994									X	O
Missouri Electric Works - OU2	7	MO	2005		X								PD
Riverfront - OU1	7	MO	2003									X	O
Solid State Circuits, Inc.	7	MO	1994									X	O
Valley Park TCE Site - OU2	7	MO	2001									X	D
Valley Park TCE Site Wainwright OU1	7	MO	1994									X	O
Weldon Spring Chemical Plant - OU 2	7	MO	2000			X							C
10th Street Site	7	NE	2001									X	O
10th Street Site - OU 2	7	NE	2001	X									O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
10th Street Site - OU 2	7	NE	2005			X							PD
Bruno Co-Op Association/Associated Properties	7	NE	1998									X	O
Cleburn Street Well	7	NE	1996									X	O
Cleburn Street Well - OU5	7	NE	2001	X									BI
Cornhusker Army Ammunition Plant	7	NE	1994									X	O
Former Nebraska Ordnance Plant	7	NE	1997									X	O
Hastings Groundwater Contamination - OU20	7	NE	2003		X								O
Hastings Groundwater Contamination - OU20	7	NE	2003					X					PD
Hastings Groundwater Contamination - OU20	7	NE	2003									X	PD
Hastings Groundwater Contamination - Well Number 3 Subsite	7	NE	2001									X	O
Hastings Groundwater Contamination- Colorodo Ave, OU 1	7	NE	1991	X									O
Lindsay Manufacturing	7	NE	1995									X	O
Ogallala Groundwater Contamination - OU1	7	NE	1999									X	O
Sherwood Medical Co.	7	NE	1999									X	O
Waverly Groundwater Contamination	7	NE	1994									X	O
Broderick Wood Products	8	CO	1992						X				O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
California Gulch - OU1	8	CO	1988									X	O
California Gulch - OU6	8	CO	2003									X	D
Central City/Clear Creek - Argo Tunnel	8	CO	1991									X	O
Central City/Clear Creek - OU4 (Gregory Incline and Gregory Gulch GW)	8	CO	2004									X	PD
Chemical Sales Company - OU 1	8	CO	1991	X									O
Eagle Mine	8	CO	1993									X	O
Lockheed/Martin (Denver Aerospace)	8	CO	1990									X	PD
Lowry Landfill	8	CO	1994									X	O
Marshall Landfill	8	CO	1986									X	C
Rocky Flats Plant (USDOE) - 881 Hillside (OU1)	8	CO	1990									X	C
Rocky Flats Plant (USDOE) - East Trenches	8	CO	1999							X			O
Rocky Flats Plant (USDOE) - Mound Site	8	CO	1997							X			O
Rocky Flats Plant (USDOE) - Solar Pond	8	CO	1999							X			O
Rocky Mountain Arsenal	8	CO	1996									X	O
Sand Creek Industrial - OU 4	8	CO	1994						X				C
Summitville Mine	8	CO	2001									X	O
Uravan Uranium Project (Union Carbide Corp.)	8	CO	1987									X	O
Burlington Northern (Somers Plant)	8	MT	1989									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Burlington Northern (Somers Plant) - Groundwater	8	MT	1989		X								O
Idaho Pole Company	8	MT	1992		X								O
Idaho Pole Company	8	MT	1998									X	O
Libby Groundwater Contamination	8	MT	1993									X	O
Libby Groundwater Contamination	8	MT	1989		X								O
Lockwood Solvent Groundwater Plume - OU1 (outside source areas)	8	MT	2005		X								PD
Lockwood Solvent Groundwater Plume - OU1 Beall Source Area	8	MT	2005		X								PD
Lockwood Solvent Groundwater Plume - OU1 Brenntag Source Area	8	MT	2005							X			PD
Lockwood Solvent Groundwater Plume - OU1 Brenntag Source Area (downgradient of PRB)	8	MT	2005		X								PD
Lockwood Solvent Groundwater Plume - OU1 Brenntag Source Area (upgradient of PRB)	8	MT	2005		X								PD
Montana Pole and Treating Plant	8	MT	1993									X	O
Montana Pole And Treating Plant - Groundwater OU	8	MT	1993		X								O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Silver Bow Creek/Butte Area	8	MT	1996									X	PD
Silver Bow Creek/Butte Area - Rocker Timber Framing And Treatment Plant OU	8	MT	1996			X							C
Ellsworth Air Force Base - OU 1	8	SD	1995						X				O
Ellsworth Air Force Base - OU 11	8	SD	1997									X	O
Hill Air Force Base - OU 8 (Off-Base)	8	UT	2005									X	PD
Hill Air Force Base - OU2	8	UT	1991									X	O
Hill Air Force Base - OU6	8	UT	1997									X	O
Intermountain Waste Oil Refinery - OU2	8	UT	2004						X				PD
Intermountain Waste Oil Refinery - OU2	8	UT	2004									X	C
Kennecott South Zone Site	8	UT	2002									X	BI
Monticello Mill Tailings (USDOE) - OU 03	8	UT	1998							X			O
Ogden Defense Depot (DLA) - OU2	8	UT	1995									X	C
Sharon Steel Corp. (Midvale Tailings)	8	UT	1994									X	O
Utah Power & Light/American Barrel	8	UT	1993									X	O
Wasatch Chemical (Lot 6)	8	UT	1997									X	O
Baxter/Union Pacific Tie Treating	8	WY	1986									X	O
FE Warren Air Force Base - OU 8	8	WY	2001									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
FE Warren Air Force Base - OU11	8	WY	2005			X							PD
FE Warren Air Force Base - OU2	8	WY	1997							X			O
Mystery Bridge Road/Highway 20 - DOW/DSI	8	WY	1990									X	C
Mystery Bridge Road/Highway 20 - Kinder/Morgan	8	WY	1990									X	C
Apache Powder Co	9	AZ	1994									X	O
Hassayampa Landfill	9	AZ	1992									X	O
Indian Bend Wash Area	9	AZ	2001									X	O
Marine Corps Air Station Yuma OU 1	9	AZ	2000	X									O
Motorola 52nd Street - OU 1	9	AZ	1988									X	O
Motorola 52nd Street - OU 2	9	AZ	1994									X	O
Phoenix Goodyear Airport - Infield Area	9	AZ	1996	X									C
Phoenix Goodyear Airport Area-South Facility	9	AZ	1996	X									C
Phoenix Goodyear Airport Area-South Facility-Groundwater Unit A	9	AZ	1989									X	O
Phoenix-Goodyear Airport Area - North Facility - Groundwater B/C Unit	9	AZ	1989									X	O
Phoenix-Goodyear Airport Area-South Facility-Groundwater B/C Unit	9	AZ	1989									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Tucson International Airport Property	9	AZ	1997									X	O
Advanced Micro Devices - Arques (Formerly Monolithic Memories) and National Semiconductor GW (OU1)	9	CA	1994									X	O
Advanced Micro Devices - Offsite OU (commingled GW plume from AMD, TRW, and Signetics sites)	9	CA	1991									X	O
Advanced Micro Devices, Inc - 901/902	9	CA	1991									X	O
Advanced Micro Devices, Inc. (Bldg. 915)	9	CA	1991									X	O
Aerojet General Corporation	9	CA	2001									X	O
Applied Materials	9	CA	1993									X	O
Barstow Marine Corps Logistics Base - OU 01 (CAOC 16)	9	CA	1998	X									O
Barstow Marine Corps Logistics Base - OU 01 (CAOC 26)	9	CA	1998	X									C
Barstow Marine Corps Logistics Base - OU 02 Nebo North	9	CA	1998	X									PD
Barstow Marine Corps Logistics Base - OU 02 Nebo North	9	CA	1998									X	C
Barstow Marine Corps Logistics Base - OU 02 Nebo South	9	CA	1998	X									PD
Barstow Marine Corps Logistics Base (Yermo Annex)	9	CA	1998									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Beckman Instruments (Porterville Plant)	9	CA	1993									X	O
Brown & Bryant	9	CA	1994									X	PD
Castle Air Force Base - Castle Vista Plume	9	CA	1997									X	O
Castle Air Force Base - OU1	9	CA	1997									X	O
Castle Air Force Base - OU2	9	CA	1997									X	O
Castle Air Force Base - Phase 2	9	CA	1997									X	O
Coast Wood Preserving	9	CA	1989									X	C
Cooper Drum Company	9	CA	2002			X							D
Cooper Drum Company	9	CA	2002						X				D
Cooper Drum Company	9	CA	2002									X	PD
CTS Printex, Inc.	9	CA	1992									X	O
Del Amo	9	CA	1999									X	PD
Del Norte County Pesticide Storage Area	9	CA	1986	X									C
Del Norte County Pesticide Storage Area	9	CA	1992									X	C
El Toro Marine Corps Air Station	9	CA	2002									X	D
El Toro Marine Corps Air Station - OU9	9	CA	2003									X	I
Fairchild Semiconductor (Mt. View)	9	CA	1999									X	O
Fairchild Semiconductor (Mt. View) - Siemens/Sobrato (455 & 487 Middlefield Road)	9	CA	1989	X									C

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Fairchild Semiconductor (South San Jose)	9	CA	1992									X	C
Firestone Tire & Rubber Co. (Salinas Plant)	9	CA	1989									X	C
FMC AG CHEMICAL (Fresno Plant)	9	CA	1991									X	O
Fort Ord	9	CA	1997									X	BI
Fort Ord - Basewide Sites 2/12	9	CA	1997									X	BI
Fort Ord - OU 1 Fire Drill Area	9	CA	1995									X	BI
Fort Ord - OU 2 Landfill	9	CA	1994									X	BI
Fresno Municipal Sanitary Landfill	9	CA	1996									X	O
George Air Force Base - OU1	9	CA	1994									X	O
Hewlett-Packard (620-640 Page Mill Road)	9	CA	1995									X	O
IBM (San Jose)	9	CA	1989									X	PD
Intel Corp. (Mountain View Plant)	9	CA	1989									X	O
Intel Corp. (Santa Clara III)	9	CA	1992									X	O
Intersil/Siemens	9	CA	1992									X	O
Iron Mountain Mine	9	CA	1997									X	O
J.H. Baxter	9	CA	1998									X	O
Jasco Chemical Corp.	9	CA	1992									X	O
Jasco Chemical Corp.	9	CA	1992									X	O
Koppers - Oroville Plant	9	CA	1999		X								O
Koppers Company Inc. Site	9	CA	1989									X	O
Lawrence Livermore National Laboratory - Site 300 (USDOE) - Bldg 834 (OU2)	9	CA	2001									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Lawrence Livermore National Laboratory - Site 300 (USDOE) - eastern GSA (OU1)	9	CA	1997									X	O
Lawrence Livermore National Laboratory - Site 300 (USDOE) - GSA, Bldg 875 (OU1)	9	CA	1997									X	O
Lawrence Livermore National Laboratory (USDOE)	9	CA	1992									X	O
Lawrence Livermore National Laboratory (USDOE) - TF5475 area	9	CA	2000			X							O
Lawrence Livermore National Laboratory (USDOE) - TFF	9	CA	1992									X	C
Lorentz Barrel and Drum	9	CA	1998									X	O
March Air Force Base - OU1	9	CA	1996									X	O
Mather Air Force Base	9	CA	1996									X	O
McClellan Air Force Base	9	CA	1995									X	O
Micro Storage/Intel Magnetics	9	CA	1992									X	O
Modesto Groundwater Contamination	9	CA	1997									X	O
Moffett Naval Air Station - OU5	9	CA	1996									X	O
Montrose Chemical Corp.	9	CA	1999									X	D
Newmark Ground Water Contamination - Newmark (OU 1)	9	CA	1993									X	O
Newmark Groundwater Contamination - Muscoy (OU 2)	9	CA	1995									X	O
Norton Air Force Base - Base Boundary Area	9	CA	1994									X	C

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Norton Air Force Base - Central Base Area	9	CA	1994									X	C
Pacific Coast Pipelines	9	CA	1996									X	O
Pemaco - OU1	9	CA	2005						X				BI
Pemaco - OU1	9	CA	2005									X	BI
Purity Oil Sales, Inc.	9	CA	1989									X	O
Raytheon Corp	9	CA	1989									X	C
Riverbank Army Ammunition Plant	9	CA	1994									X	O
Sacramento Army Depot	9	CA	1995									X	O
San Fernando Valley (Area 1)	9	CA	1989									X	O
San Fernando Valley (Area 2)	9	CA	1993									X	O
San Gabriel Valley (Area 1) - OU 4	9	CA	1988									X	PD
San Gabriel Valley (Area 1) - OU 1	9	CA	1999									X	PD
San Gabriel Valley (Area 1) - OU 2	9	CA	2000									X	PD
San Gabriel Valley (Area 1) - OU 3	9	CA	1987									X	O
San Gabriel Valley (Area 1) - OU 5	9	CA	2000									X	PD
San Gabriel Valley (Area 2) - La Puente	9	CA	1994									X	O
San Gabriel Valley (Area 2) - SGVWC Plant B5	9	CA	1994									X	BI
San Gabriel Valley (Area 2) - SGVWC Plant B6	9	CA	1994									X	O

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

Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
San Gabriel Valley (Area 2) - Valley County Water	9	CA	1994									X	I
San Gabriel Valley (Area 4)	9	CA	1998									X	D
Selma Pressure Treating	9	CA	1988									X	O
Selma Pressure Treating - 01	9	CA	2005		X								PD
Sharpe Army Depot	9	CA	1993									X	O
Signetics Inc	9	CA	1991									X	PD
Sola Optical USA, Inc.	9	CA	1992									X	C
Southern California Edison, Visalia Pole Yard	9	CA	1994									X	C
Spectra-Physics, Inc.	9	CA	1992									X	O
Stringfellow	9	CA	1990									X	O
Synertek, Inc. (Building 1)	9	CA	1992									X	O
Teledyne Semiconductor	9	CA	1992									X	O
Tracy Defense Depot (DLA)	9	CA	1993									X	O
Travis Air Force Base	9	CA	1998		X								O
Travis Air Force Base	9	CA	1999									X	BI
Travis Air Force Base OU 1	9	CA	1998						X				O
TRW Microwave, Inc (Building 825)	9	CA	1991									X	O
Valley Wood Preserving, Inc.	9	CA	1991									X	O
Van Waters & Rogers	9	CA	1991									X	PD
Watkins-Johnson Co. (Stewart Division)	9	CA	1994									X	O
Western Pacific Railroad Co.	9	CA	1997									X	C
Western Pacific Railroad Co.	9	CA	1997						X				C
Westinghouse Electric (Sunnyvale Plant)	9	CA	2000									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Del Monte Corp. (Oahu Plantation) - OU1	9	HI	2003								X		O
Del Monte Corp. (Oahu Plantation) - OU1	9	HI	2003									X	BI
Adak Naval Air Station	10	AK	2000									X	PD
Elmendorf Air Force Base - OU 6 and Source Area SS19, Perched Aquifer Groundwater at Sd15	10	AK	1997						X				O
Elmendorf Air Force Base - OU2	10	AK	1992						X				C
Fort Richardson - OU B	10	AK	1997						X				C
Fort Wainwright - OU 2 - Building 1168 Leach Well	10	AK	1997	X									C
Fort Wainwright - OU 2 - Drmo Yard	10	AK	1997	X									O
Fort Wainwright - OU 3	10	AK	1996	X									O
Fort Wainwright - OU 4	10	AK	1996	X									O
Fort Wainwright OU 5 WQFS1	10	AK	1999	X									O
Fort Wainwright OU 5 WQFS2	10	AK	1999	X									O
Fort Wainwright OU 5 WQFS3	10	AK	1999	X									O
Bunker Hill Mining & Metallurgical Complex	10	ID	1992									X	PD
Eastern Michaud Flats Contamination OU 1	10	ID	1998									X	PD
Idaho National Engineering Laboratory (USDOE) - OU1-07B (OU1)	10	ID	1995									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
Idaho National Engineering Laboratory (USDOE) - OU3-13 (OU7)	10	ID	1999									X	PD
Idaho National Engineering Laboratory (USDOE) - Test Area North OU 1-07B (OU1)	10	ID	2001		X								O
East Multnomah County Groundwater Contamination	10	OR	1997									X	O
East Multnomah County Groundwater Contamination - Cascade Corporation, Troutdale Gravel Aquifer	10	OR	1997	X									C
Martin-Marietta Aluminum Co.	10	OR	1988									X	O
McCormick & Baxter Creosoting Company (Portland Plant)	10	OR	1996									X	O
Northwest Pipe and Casing Company/Hall Process Company OU 2	10	OR	2001					X					O
Reynolds Metal Company	10	OR	2002									X	BI
Teledyne Wah Chang	10	OR	1994									X	O
Umatilla Chemical Depot (Lagoons)	10	OR	1994									X	O
Union Pacific Railroad Tie Treatment	10	OR	1996									X	O
United Chrome Products, Inc.	10	OR	1986									X	O
American Crossarm & Conduit Co.	10	WA	1993									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

				Groundwater Technologies									
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Project Name	**Region**	**State**	**FY**	**Technology Type**									**Status**
American Lake Gardens/McChord Air Force Base	10	WA	1994									X	O
Bangor Ordnance Disposal	10	WA	1999									X	O
Boomsnub/Airco	10	WA	2000									X	O
Boomsnub/Airco - Soil and Groundwater	10	WA	2000					X					BI
Colbert Landfill	10	WA	1997									X	O
Commencement Bay, Nearshore/Tideflats	10	WA	1991									X	O
Commencement Bay, South Tacoma Channel (Well 12a)	10	WA	1999									X	O
Fairchild Air Force Base	10	WA	1993									X	O
Fairchild Air Force Base - Priority 1 OUs (OU 2) Ft-1	10	WA	1993	X									O
Fort Lewis Logistics Center	10	WA	1990									X	O
Fort Lewis Military Reservation - Landfill 4	10	WA	1993	X									C
Frontier Hard Chrome Inc - OU 1 and 2	10	WA	2001			X							C
Frontier Hard Chrome Inc - OU 1 and 2	10	WA	2001							X			C
Hanford 200 Area (USDOE)	10	WA	1995									X	O
Hanford Site - 100 Area (USDOE) - 100-HR-3	10	WA	1996									X	O
Hanford Site - 100 Area (USDOE) - 100-KR-4	10	WA	1996									X	O
Hanford Site - 100 Area (USDOE) - 100-NR-2	10	WA	1999									X	O

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Groundwater Treatment Technology Summary Matrix (continued)

Groundwater Technologies

Project Name	Region	State	FY	Technology Type									Status
				Air Sparging	Bioremediation	Chemical Treatment	Flushing	In-Well Air Stripping	Multi-Phase Extraction	Permeable Reactive Barrier	Phytoremediation	Pump and Treat	
Hanford Site - 100 Area (USDOE) - OU 2	10	WA	2000							X			O
Harbor Island (Lead)	10	WA	1993									X	O
Harbor Island TankFarms OU2 - BP Facility	10	WA	2000	X									O
Harbor Island TankFarms OU2 - KM Facility, C Yard	10	WA	2000	X									C
Kaiser Aluminum	10	WA	2002									X	BI
Lakewood Site	10	WA	1992									X	O
Naval Air Station Whidbey Island (Ault)	10	WA	1994									X	O
Naval Undersea Warfare Station (4 Areas) - OU 01	10	WA	1998								X		O
North Market Street	10	WA	2000	X									O
Northside Landfill	10	WA	1993									X	O
Palermo Wellfield	10	WA	2000									X	PD
US Naval Bangor Submarine Base - OU 8	10	WA	2000		X								PD
Vancouver Water Station #1 Contamination	10	WA	1998									X	O
Vancouver Water Station #4 Contamination	10	WA	1999									X	O
Western Processing Co., Inc.	10	WA	1992									X	O
Wyckoff/Eagle Harbor	10	WA	1994									X	O

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Appendix C

Definitions of Specific Treatment Technologies

This appendix provides definitions of 17 types of source control (primarily soil) treatment technologies, 9 types of *in situ* groundwater treatment technologies, 8 types of groundwater P&T technologies, and 3 containment technologies. Technologies that are applicable to both source control and groundwater treatment are described only once under the source control treatment section. For P&T technologies, the descriptions focus on the treatment portion of the technology. Groundwater pumping technologies are not addressed in this report. Definitions are based on the Remediation Technologies Screening Matrix and Reference Guide, Version 4.0, which can be viewed at the Federal Remediation Technologies Roundtable (FRTR) web site at *http://www.frtr.gov*.

SOURCE CONTROL TREATMENT TECHNOLOGIES

BIOREMEDIATION uses microorganisms to degrade organic contaminants in soil, sludge, solids, and groundwater either *in situ* or *ex situ*. It can also be used to make metals or metalloids less toxic or mobile. When treating organic contaminants, the microorganisms break down contaminants by using them as a food source or cometabolizing them with a food source. Aerobic processes require an oxygen source, and the end-products typically are carbon dioxide and water. Anaerobic processes are conducted in the absence of oxygen, and the end-products can include methane, hydrogen gas, sulfide, elemental sulfur, and dinitrogen gas. *Ex situ* bioremediation technologies for groundwater typically involve treating extracted groundwater in a bioreactor or constructed wetland. *In situ* techniques stimulate and create a favorable environment for microorganisms to grow and use contaminants as a food and energy source, or to cometabolize them. Generally, this process involves providing some combination of oxygen, nutrients, and moisture, and controlling the temperature and pH. Microorganisms that have been adapted for degradation of specific contaminants are sometimes applied to enhance the process. For the treatment of metals and metalloids, it involves biological activity that promotes the formation of less toxic or mobile species, by either creating ambient conditions that will cause such species to form, or changing the chemical form of the contaminant directly. The treatment may result in oxidation, reduction, precipitation, coprecipitation, or another transformation of the contaminant.

CHEMICAL TREATMENT, also known as chemical reduction/oxidation, typically involves reduction/oxidation (redox) reactions that chemically convert hazardous contaminants to compounds that are nonhazardous, less toxic, more stable, less mobile, or inert. Redox reactions involve the transfer of electrons from one compound to another. Specifically, one reactant is oxidized (loses electrons) and one is reduced (gains electrons). The oxidizing agents used for treatment of hazardous contaminants in soil include ozone, hydrogen peroxide, hypochlorites, potassium permanganate, Fenton's reagent (hydrogen peroxide and iron), chlorine, and chlorine dioxide. This method may be applied *in situ* or *ex situ* to soils, sludges, sediments, and other solids, and may also be applied to groundwater *in situ* or *ex situ* (P&T). P&T chemical treatment may also include the use of ultraviolet (UV) light in a process known as UV oxidation.

ELECTROKINETICS is based on the theory that a low-density current will mobilize contaminants in the form of charged species. A current passed between electrodes is intended to cause aqueous media, ions, and particulates to move through the soil, waste, and water. Contaminants arriving at the electrodes can be removed by means of electroplating or electrodeposition, precipitation or coprecipitation, adsorption, complexing with ion exchange resins, or by the pumping of water (or other fluid) near the electrode.

For **FLUSHING**, a solution of water, surfactants, or cosolvents is applied to the soil or injected into the subsurface to treat contaminated soil or groundwater. When treating soil, the injection is often designed to raise the water table into the contaminated soil zone. Injected water and treatment agents are recovered together with flushed contaminants.

Both on-site and off-site **INCINERATION** use high temperatures (870 to 1,200°C or 1,600 to 2,200°F) to volatilize and combust (in the presence of oxygen) organics in hazardous wastes. Auxiliary fuels are often employed to initiate and sustain combustion. The destruction and removal efficiency (DRE) for properly operated incinerators exceeds the 99.99% requirement for hazardous waste and can be operated to meet the 99.9999% requirement for polychlorinated biphenyls (PCB) and dioxins. Off-gases and combustion residuals generally require treatment. On-site incineration typically uses a transportable unit; for off-site incineration, waste is transported to a central facility.

MECHANICAL SOIL AERATION agitates contaminated soil, using tilling or other means to volatilize contaminants.

MULTI-PHASE EXTRACTION uses a vacuum system to remove various combinations of contaminated groundwater, separate-phase petroleum product, and vapors from the subsurface. The system typically lowers the water table around the well, exposing more of the formation. Contaminants in the newly exposed vadose zone are then accessible to vapor extraction. Once above ground, the extracted vapors or liquid-phase organics and groundwater are separated and treated.

NEUTRALIZATION is a chemical reaction between an acid and a base. The reaction involves acidic or caustic wastes that are neutralized (pH is adjusted toward 7.0) using caustic or acid additives.

OPEN BURN (OB) and **OPEN DETONATION (OD)** operations are conducted to destroy excess, obsolete, or unserviceable (EOU) munitions and energetic materials. In OB operations, energetics or munitions are destroyed by self-sustained combustion, which is ignited by an external source, such as a flame, heat, or a detonation wave. In OD operations, explosives and munitions are destroyed by detonation, which generally is initiated by an energetic charge.

PHYSICAL SEPARATION processes use physical properties to separate contaminated and uncontaminated media, or separate different types of media. For example, different-sized sieves and screens can be used to separate contaminated soil from relatively uncontaminated debris. Another application of physical separation is the dewatering of sediments or sludge.

PHYTOREMEDIATION is a process that uses plants to remove, transfer, stabilize, or destroy contaminants in soil, sediment, or groundwater. The mechanisms of phytoremediation include enhanced rhizosphere biodegradation (takes place in soil or groundwater immediately surrounding plant roots), phytoextraction (also known as phytoaccumulation, the uptake of contaminants by plant roots and the translocation/accumulation of contaminants into plant shoots and leaves), phytodegradation (metabolism of contaminants within plant tissues), and phytostabilization (production of chemical compounds by plants to immobilize contaminants at the interface of roots and soil). Phytoremediation applies to all biological, chemical, and physical processes that are influenced by plants (including the rhizosphere) and that aid in the cleanup of contaminated substances. Phytoremediation may be applied *in situ* or *ex situ* to soils, sludges, sediments, other solids, or groundwater.

SOIL VAPOR EXTRACTION (SVE) is used to remediate unsaturated (vadose) zone soil. A vacuum is applied to the soil to induce the controlled flow of air and remove volatile and some semivolatile organic contaminants from the soil. SVE usually is performed *in situ*; however, in some cases, it can be used as an *ex situ* technology.

For **SOIL WASHING**, contaminants sorbed onto fine soil particles are separated from bulk soil in a water-based system on the basis of particle size. The wash water may be augmented with a basic leaching agent, surfactant, or chelating agent, or by adjusting the pH to help remove contaminants. Soils and wash water are mixed *ex situ* in a tank or other treatment unit. The wash water and various soil fractions are usually separated using gravity settling.

SOLIDIFICATION/STABILIZATION (S/S) reduces the mobility of hazardous substances and contaminants in the environment through both physical and chemical means. The S/S process physically binds or encloses contaminants within a stabilized mass. S/S is performed both *ex situ* and *in situ*. *Ex situ* S/S requires excavation of the material to be treated, and the resultant material must be disposed. *In situ* S/S uses auger/caisson systems and injector head systems to add binders to the contaminated soil or waste without excavation, leaving the resultant material in place.

SOLVENT EXTRACTION uses an organic solvent as an extractant to separate contaminants from soil. The organic solvent is mixed with contaminated soil in an extraction unit. The extracted solution then is passed through a separator, where the contaminants and extractant are separated from the soil.

For **THERMAL DESORPTION**, wastes are heated so that organic contaminants and water volatilize. Typically, a carrier gas or vacuum system transports the volatilized water and organics to a gas treatment system, typically a thermal oxidation or recovery system. Based on the operating temperature of the desorber, thermal desorption processes can be categorized into two groups: high temperature thermal desorption (320 to 560°C or 600 to 1000°F) and low temperature thermal desorption (90 to 320°C or 200 to 600°F). Thermal desorption is an *ex situ* treatment process. *In situ* thermal desorption processes are discussed below as *in situ* thermal treatment.

***IN SITU* THERMAL TREATMENT** is a treatment process that uses heat to facilitate extraction through volatilization and other mechanisms or to destroy contaminants *in situ*. Volatilized contaminants are typically removed from the vadose zone using SVE. Specific types of *in situ* thermal treatment techniques include conductive heating, electrical resistive heating, radio frequency heating, hot air injection, hot water injection, and steam enhanced extraction.

VITRIFICATION uses an electric current to melt contaminated soil at elevated temperatures (1,600 to 2,000°C or 2,900 to 3,650°F). Upon cooling, the vitrification product is a chemically stable, leach-resistant, glass and crystalline material similar to obsidian or basalt rock. The high temperature component of the process destroys or removes organic materials. Radionuclides and heavy metals are retained within the vitrified product. Vitrification may be conducted *in situ* or *ex situ*.

IN SITU GROUNDWATER TREATMENT TECHNOLOGIES

AIR SPARGING involves the injection of air or oxygen into a contaminated aquifer. Injected air traverses horizontally and vertically in channels through the soil column, creating an underground stripper that removes volatile and semivolatile organic contaminants by volatilization. The injected air helps to flush the contaminants into the unsaturated zone. SVE usually is implemented in conjunction with air sparging to remove the generated vapor-phase contamination from the vadose zone. Oxygen added to the contaminated groundwater and vadose-zone soils also can enhance biodegradation of contaminants below and above the water table.

BIOREMEDIATION - See Source Control Treatment Technologies.

CHEMICAL TREATMENT - See Source Control Treatment Technologies.

ELECTROKINETICS - See Source Control Treatment Technologies.

FLUSHING - See Source Control Treatment Technologies.

For **IN-WELL AIR STRIPPING**, air is injected into a double-screened well, causing the volatile organic compounds (VOC) in the contaminated groundwater to transfer from the dissolved phase to the vapor phase in air bubbles. As the air bubbles rise to the surface of the water, the vapors are drawn off and treated by a SVE system.

MULTI-PHASE EXTRACTION - See Source Control Treatment Technologies.

PERMEABLE REACTIVE BARRIERS (PRB), also known as passive treatment walls, are installed across the flow path of a contaminated groundwater plume, allowing the water portion of the plume to flow through the wall. These barriers allow the passage of water while prohibiting the movement of contaminants by employing treatment agents within the wall such as zero-valent metals (usually zero-valent iron), chelators, sorbents, compost, and microbes. The contaminants are either degraded or retained in a concentrated form by the barrier material, which may need to be replaced periodically.

PHYTOREMEDIATION - See Source Control Treatment Technologies.

PUMP AND TREAT TECHNOLOGIES (EX SITU TREATMENT)

In **ADSORPTION**, contaminants concentrate at the surface of a sorbent, thereby reducing their concentration in the bulk liquid phase. This technology is typically applied by passing extracted groundwater through a column containing granular adsorbent. The most common adsorbent is granulated activated carbon. Other natural and synthetic adsorbents include activated alumina, lignin adsorption, sorption clays, and synthetic resins.

AIR STRIPPING partitions volatile organics from extracted groundwater by increasing the surface area of the contaminated water exposed to air. Aeration methods include packed towers, diffused aeration, tray aeration, and spray aeration.

BIOREMEDIATION - See Source Control Treatment Technologies.

CHEMICAL TREATMENT - See Source Control Treatment Technologies.

FILTRATION is the physical process of mechanical separation based on particle size, whereby particles suspended in a fluid are separated by forcing the fluid through a porous medium. As fluid passes through the medium, the suspended particles are trapped on the surface of the medium and/or within the body of the medium.

ION EXCHANGE removes ions from the aqueous phase by the exchange of cations or anions between the contaminants and the exchange medium. Ion exchange materials may consist of resins made from synthetic organic materials that contain ionic functional groups to which exchangeable ions are attached.

METALS PRECIPITATION transforms dissolved contaminants into an insoluble solid, facilitating the contaminant's subsequent removal from the liquid phase by sedimentation or filtration. The process usually uses pH adjustment, addition of a chemical precipitant, and flocculation.

MEMBRANE FILTRATION separates contaminants from water by passing it through a semipermeable barrier or membrane. The membrane allows water and other low molecular weight chemicals to pass, while blocking contaminants with a higher molecular weight. Membrane filtration processes include microfiltration, ultrafiltration, nanofiltration, and reverse osmosis.

MONITORED NATURAL ATTENUATION (MNA) FOR GROUNDWATER

Groundwater **MNA** is the reliance on natural attenuation processes (within the context of a carefully controlled and monitored approach to site cleanup) to achieve site-specific remediation objectives within a time frame that is reasonable, compared with that offered by other, more active methods. The "natural attenuation processes" include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. These *in situ* processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants. Guidance on MNA is available from the document "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (OSWER Directive 9200.4-17P, EPA, April 21, 1999.").

CONTAINMENT TECHNOLOGIES

COVER SYSTEMS, also known as caps or covers, are surface barriers composed of one of more layers of impermeable material designed to contain contaminated source material. COVER SYSTEMS can be used to prevent direct contact with the source material or minimize leachate creation by preventing surface water infiltration into the contained source material.

A **BOTTOM LINER** is a subsurface impermeable barrier designed to prevent the spread of leachate from contaminated source material. They are often used in conjunction with COVER SYSTEMS in the containment of source material.

VERTICAL ENGINEERED BARRIERS (VEB) are subsurface barriers made of an impermeable material designed to contain or divert groundwater. VEBs can be used to contain contaminated groundwater, divert uncontaminated groundwater from a contaminated area, or divert contaminated groundwater from a drinking water intake or other protected resource. VEBs can also be used for the containment of source material.

Appendix D

Treatment Technologies: Summary of Status Report Additions, Changes, and Deletions

Explanation of Appendix D: Summary of Status Report Additions, Changes, and Deletions

This Appendix describes the updates, changes, and deletions made to the database supporting Treatment Technologies for Site Cleanup: Annual Status Report (ASR). The appendix is divided into eleven tables, one for each edition of the ASR beginning with the Second Edition (September 1991). Within each table is a description of the additions, changes, and deletions made to the database supporting the ASR from one edition to the next.

These updates, changes, and deletions are generated primarily through a review of Records of Decisions (RODs), ROD amendments, and Explanations of Significant Differences (ESDs) as well as five-year reviews and online site summaries to identify changes in treatment remedies and mistakes in the database. Prior to the Twelfth Edition, Remedial Project Managers (RPMs) also were contacted to obtain additional reports or information. Due to the large number of new projects based on information gathered from RODs, ROD amendments, and ESDs published since the last edition of the ASR (192 for the Twelfth Edition), the tables in Appendix D do not describe these new projects.

The purpose of Appendix D is to document changes in the ASR database and thereby document changes in treatment remedies at Superfund sites. For each updated, changed, or deleted project, the appendix lists: site identifying information; the specific update, change, or deletion; an explanation of why the update, change, or deletion was made; and a site contact, usually the RPM. Because RPMs were not contacted for the Twelfth Edition, this field has not been included for the Twelfth Edition table. Updated site contacts are available on the Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS).

When new projects are discovered through reports or site contacts and have not yet been documented in a ROD, ROD amendment, or ESD, they are recorded in Appendix D with the specific treatment technology listed in the "Added" column. When a remedy changes from a treatment remedy to one that does not include treatment, the project based on that remedy is listed in Appendix D with a "Yes" in the "Deleted" column. The non-treatment remedy replacing the treatment remedy is described in the "Comments" column. When a remedy changes from one treatment technology to another treatment technology, the new technology is listed in the "Changed To" column.

The database supporting the ASR contains information on specific projects for the treatment of contamination sources and contaminated groundwater at Superfund sites. The database does not track other types of remedies, such as off-site disposal in a landfill or monitored natural attenuation. Therefore, when a remedy is changed from treatment to non-treatment, the project created in the database for that treatment remedy is deleted. Appendix D also shows that project as being deleted.

Each Superfund site may have multiple waste types and multiple areas of contamination, requiring multiple, separate treatments. For each distinct waste type and each distinct area of contamination treated, the ASR database contains a separate treatment project. When a waste is treated through a treatment train, the ASR database contains a separate treatment project for each step in the treatment train. Appendix D reflects this organization of treatment remedies based on specific projects, and may contain multiple rows for the same site. For example, at the Caroll and Dubies Sewage Disposal site in New York, a 1995 ROD indicated that three separate and distinct technologies (bioremediation, soil vapor extraction, and solidification/stabilization treatments) would be used to treat three distinct wastes. Therefore, three separate projects were created in the ASR database for the Caroll and Dubies Sewage Disposal site. However, the remedy was changed for all of these wastes to off-site disposal. Therefore, all three projects were deleted from the ASR database, and Appendix D (in the Tenth Edition) contains three entries for the Caroll and Dubies Sewage Disposal site, one for each deleted project.

The Twelfth Edition of the report adds information about 192 new treatment projects selected for remedial actions in FY 2002 through FY 2005 Records of Decision (RODs), ROD Amendments, and Explanations of Significant Differences (ESDs). These are not listed in Appendix D. Changes to projects from the Eleventh Edition are listed below.

Twelfth Edition (September 2007): Additions, Changes, and Deletions from the Eleventh Edition (February 2004)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 11TH EDITION)	12TH EDITION			COMMENTS
			ADDED	DELETED	CHANGED TO	
1	Charlevoix Municipal Well, MI (6/12/1984)	Dechlorination			Thermal Desorption (ex situ)	The original ROD did not specify which type of treament would be used.
1	Eastland Woolen Mill - OU1, ME (9/19/2002)	Flushing (in situ)		Yes		Based on a FY 2006 Amendment, this technology was no longer needed at the site.
1	Eastland Woolen Mill, ME (9/19/2002)	Pump and Treat		Yes		Based on a FY 2006 Amendment, this technology was no longer needed at the site.
1	Hocomonco Pond, MA (7/22/1992)	Not listed in 11th Edition	Multi-Phase Extraction			
1	New London Submarine Base, CT (3/31/1998)	Pump and Treat		Yes		This technology was not implemented.
1	Nyanza Chemical Waste Dump, MA (9/23/1991)	Pump and Treat			Multi-Phase Extraction	P&T was not implemented due to the occurrence of DNAPL at the site. A 2006 ESD indicated a change in the selected remedy from Pump and Treat to Dual Phase Extraction.
1	O'Connor - OU 2 Management of Migration, ME (9/26/2002)	Multi-Phase Extraction			Multi-Phase Extraction	This project was only for in situ groundwater in the 11th Edition but has been revised to be a project for both source control and in situ groundwater.
1	Union Chemical - OU 1, ME (9/28/2001)	Not listed in 11th Edition	Chemical Treatment - Groundwater			
2	A.O. Polymer, NJ (5/8/1998)	Pump and Treat		Yes		This is a duplicate project.
2	Applied Environmental Services, NY (6/28/1996)	Pump and Treat		Yes		This is a duplicate project.
2	Chemical Control, NJ (9/28/1998)	Not listed in 11th Edition	Bioremediation			
2	Colesville Municipal Landfill, NY (3/29/1991)	Not listed in 11th Edition	Bioremediation			
2	Conklin Dumps, NY (9/3/1992)	Pump and Treat		Yes		The 1991 ROD indicated that groundwater treatment system is impracticable at this site.
2	Dayco Corp LE Carpenter Co, NJ (4/18/1994)	Not listed in 11th Edition	Multi-Phase Extraction			
2	Dover Municipal Well 4, NJ (9/30/1992)	Pump and Treat		Yes		Pump and treat was not implemented because contaminants are naturally attenuating.
2	Ellis Property, NJ (9/27/2000)	Pump and Treat		Yes		This is a duplicate project.
2	Ellis Property, NJ (9/30/1992)	Solidification/Stabilization		Yes		The 1992 ROD specified that S/S may be needed to treat excavated materials but subsequent 5-year reviews and site summaries do not mention its use.
2	Ewan Property - OU 2, NJ (7/13/1994)	Not listed in 11th Edition	Flushing			
2	Ewan Property - OU 2, NJ (9/29/1989)	Not listed in 11th Edition	Bioremediation			
2	Fort Richardson - OU B, AK (9/29/1988)	Chemical Treatment - Groundwater		Yes		Site documents do not mention in situ chemical treatment selection or implementation at this site.
2	GE Wiring Devices, PR (9/30/1988)	Pump and Treat		Yes		Pump and treat was never selected for this site.
2	Haviland Complex, NY (8/1/1997)	Pump and Treat		Yes		A ROD amendment issued in August 1997 declared that the groundwater extraction and treatment system is not required at this site because the existing point-of-use treatment systems provide adequate protection from the contamination.
2	Hertel Landfill, NY (9/27/1991)	Pump and Treat		Yes		A ROD Amendment issued in 2005 has changed the groundwater remedy from pump and treat to ICs and long-term monitoring.

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

Twelfth Edition (September 2007) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 11TH EDITION)	12TH EDITION			COMMENTS
			ADDED	DELETED	CHANGED TO	
2	Hooker - Hyde Park, NY (11/26/1985)	Not listed in 11th Edition	Multi-Phase Extraction			
2	Hooker (102nd Street Landfill), NY (9/26/1990)	Pump and Treat		Yes		This project was for leachate collection/treatment, which is not tracked in the ASR.
2	Hooker (S Area), NY (9/21/2001)	Not listed in 11th Edition	Multi-Phase Extraction			
2	Horseshoe Road Site - OU 1, NJ (9/1/2000)	Materials Handling/Physical Separation		Yes		Technology was not conducted.
2	Mohonk Road Industrial Plant , NY (3/31/2000)	Pump and Treat		Yes		This project is a duplicate entry.
2	Myers Property, NJ (9/28/1990)	Thermal Desorption (ex situ)		Yes		The treatability study for this technology showed that cleanup goals could not be achieved so the remedial plan was changed to excavation and off site disposal in a FY 2000 ROD.
2	Myers Property, NJ (9/28/1990)	Dechlorination		Yes		The treatability study for this technology showed that cleanup goals could not be achieved so the remedial plan was changed to excavation and off site disposal in a FY 2000 ROD.
2	Myers Property, NJ (9/28/1990)	Soil Washing		Yes		The treatability study for this technology showed that cleanup goals could not be achieved so the remedial plan was changed to excavation and off site disposal in a FY 2000 ROD.
2	Naval Air Engineering Center - Areas A And B, NJ (7/7/1997)	Multi-Phase Extraction			Multi-Phase Extraction	This technology was originally classified as groundwater only but was changed to source control only.
2	Naval Air Engineering Station Areas I and J Groundwater OU 26, NJ (9/27/1999)	Bioremediation (in situ) - Groundwater			Chemical Treatment - Groundwater	Bench-scale and pilot studies of the co-metabolism injections (Bioremediation [in situ] - GW) indicated that the remedy was not effective at reducing the areas of higher VOC concentration that exist within the Areas I and J. The 2003 ESD indicated that pilot testing of nanoscale particle technology could effectively reduce the areas's contamination.
2	Naval Weapons Station Earle (Site A), NJ (9/29/1998)	Pump and Treat		Yes		This technology was not mentioned in any of the site documents as a prefered or contingent remedy.
2	Olean Well Field - OU 2, Alcas Property, NY (9/30/1996)	Soil Vapor Extraction		Yes		Based upon remedial design field investigation studies by the PRP, EPA has determined that the application of this technology would not be effective for cleaning up the site contamination.
2	Plattsburgh Air Force Base, NY (3/25/1997)	Pump and Treat		Yes		This technology was originally a pilot project, which are not tracked in the ASR.
2	Sealand Restoration. Inc., NY (9/29/1995)	Pump and Treat			Passive Treatment Wall (Permeable Reactive Barrier)	The original P&T remedy was only to be used if MNA wasn't successfully remediating the site groundwater, so it was never implemented. Also, a FY 2002 ESD stated that further testing of the aquifer determined that the groundwater can only being pumped at very low rates requiring the installation of an inordinate number of extraction wells to capture the plume.
2	Sidney Landfill, NY (9/28/1995)	Pump and Treat		Yes		According to a 2004 ESD, pump and treat was not implemented at this site because the treatment system at a nearby site (Richardson Landfill site) was remediating this groundwater plume.
2	SMS Instruments Inc., NY (1/31/1996)	Pump and Treat		Yes		This is a duplicate project.
2	Vestal Water Supply - Area 4, NY (9/27/1990)	Not listed in 11th Edition	Soil Vapor Extraction			
2	Warwick Landfill, NY (6/27/1991)	Pump and Treat		Yes		No Further Action was selected as the remedy for groundwater at this site.

Twelfth Edition (September 2007) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 11TH EDITION)	12TH EDITION			COMMENTS
			ADDED	DELETED	CHANGED TO	
3	Aberdeen Proving Ground (O-Field), MD (9/27/1991)	Not listed in 11th Edition	Pump and Treat			
3	Abex Corp., VA (9/29/1992)	Solidification/Stabilization		Yes		This project is a duplicate entry for the OU-1 S/S.
3	Allegany Ballistics Laboratory (US Navy) - Site 1 (OU 3), WV (5/29/1997)	Not listed in 11th Edition	Pump and Treat			
3	Boarhead Farm, PA (11/18/1998)	Phytoremediation			Phytoremediation	This technology was originally classified as only a source control project, but it is addressing both source and groundwater.
3	Brown's Battery Breaking Site - OU 2, PA (7/2/1992)	Passive Treatment Wall (Permeable Reactive Barrier)			Chemical Treatment - Groundwater	Remedy changed from a vertical limestone barrier (PRB) to in situ chemical treatment for groundwater in a July 2003 ROD Amendment.
3	Centre County Kepone Superfund Site, PA (3/8/2001)	Soil Vapor Extraction		Yes		A 2001 ROD replaced soil vapor extraction with a multi-phase extraction system. However, there was already a multi-phase extraction project in the ASR database for this site, so this project was deleted.
3	Defense General Supply Center (DLA) - OU8 Acid Neutralization Pits Area, VA (3/25/1992)	Not listed in 11th Edition	Multi-Phase Extraction			
3	Dover Air Force Base, DE (11/4/1992)	Pump and Treat		Yes		This was a dewatering project, not groundwater pump and treat.
3	Halby Chemical Co., DE (3/31/1998)	Pump and Treat		Yes		This techology was addressing surface water not groundwater.
3	McAdoo Associates, PA (9/26/1995)	Pump and Treat		Yes		A 1995 ESD removed P&T as part of the remedy because pumping could not be sustained. Manual bailing was done occassionally.
3	Mid-Atlantic Wood Preservers, Inc., MD (12/31/1990)	Pump and Treat		Yes		Pump and treat was never selected for this site.
3	MW Manufacturing - OU 05, PA (12/22/1997)	Thermal Desorption (ex situ)		Yes		Remedy was replaced with excavation and offsite disposal.
3	Naval Weapons Station -Yorktown OU 13, VA (10/13/1998)	Bioremediation (ex situ) - Land Treatment		Yes		This is a duplicate project.
3	Palmerton Zinc Pile Superfund Site OU-3, PA (10/9/2001)	Bioremediation (in situ) - Other			Solidification/ Stabilization	The original remedy selected was tilling, which was misinterpreted to be bioremediation (aeration) when it was actually addition and tilling of amendments (stabilization).
3	Rhinehart Tire Fire Dump, VA (9/29/2000)	Pump and Treat		Yes		Treatment was for waste ponds, not groundwater.
3	Standard Chlorine of Delaware, Inc., DE (3/9/1995)	Thermal Desorption (ex situ)		Yes		EPA is currently re-evaluating the remedy for soils and sediments and is conducting treatability studies of insitu chemical oxidation.
3	Strasburg Landfill, PA (6/29/1989)	Pump and Treat		Yes		A 1999 ROD selected "no action" for site groundwater.
3	The Crater Resources Superfund Site, PA (9/27/2000)	Materials Handling/Physical Separation		Yes		Technology is actually excavation and disposal which isn't tracked by ASR.
4	62nd Street Dump, FL (6/27/1990)	Pump and Treat		Yes		P&T was originally selected in ROD but eliminated in a 1995 Amendment. The P&T conducted at this site was actually for dewatering during source activities not to address groundwater.
4	Aberdeen Pesticide Dumps, NC (9/16/1997)	Pump and Treat		Yes		This project was an interim remedy (P&T) and became a duplicate for the final remedy, which is included as another P&T project. There is only 1 P&T system for OU5.
4	Aberdeen Pesticide Dumps, OU3, NC (9/15/1997)	Not listed in 11th Edition	Phytoremediation			
4	American Creosote Works OU2 Phase 1, FL (2/3/1994)	Multi-Phase Extraction			Multi-Phase Extraction	This project was only for in situ groundwater in the 11th Edition but has been revised to be a project for both source control and in situ groundwater.
4	American Creosote Works OU2 Phase 2, FL (2/3/1994)	Bioremediation (ex situ) - Other		Yes		This project is referring to the aboveground treatment component of a P&T system, so it should not be included as a separate project.

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Twelfth Edition (September 2007) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 11TH EDITION)	12TH EDITION			COMMENTS
			ADDED	DELETED	CHANGED TO	
4	Bypass 601 Groundwater Contamination, NC (4/20/1993)	Pump and Treat		Yes		Following a source removal action, a FY 1997 ROD Amendment was issued that determined groundwater was not an area-wide problem and replaced P&T with ACLs and MNA.
4	Cape Fear Wood Preserving, NC (6/30/1989)	Solidification/Stabilization		Yes		Technology was a possible follow up treatment to thermal desorption but does not appear to have been implemented per the 2001 ROD Amendment.
4	Carolina Transformer Co., NC (8/29/1991)	Pump and Treat		Yes		With the successful completion of source remediation, groundwater has minimal threat to future use of the site and the groundwater remedy was changed to MNA (in a FY 2005 ROD).
4	Carrier Air Conditioning - North Remediation System, TN (9/3/1992)	Not listed in 11th Edition	Soil Vapor Extraction			
4	Cedartown Municipal Landfill, GA (11/2/1993)	Pump and Treat		Yes		A ROD Amendment issued in May 1998 removed P&T as a contingent remedy.
4	Chemtronics, Inc. - Back Valley, NC (4/26/1989)	Not listed in 11th Edition	Pump and Treat			
4	Cherry Point Marine Corps Air Station - OU 1, NC (12/1/1997)	Not listed in 11th Edition	Air Sparging			
4	Cherry Point Marine Corps Air Station - OU 1, NC (12/1/1997)	Not listed in 11th Edition	Soil Vapor Extraction			
4	Cherry Point Marine Corps Air Station - OU 2, NC (8/28/1999)	Soil Vapor Extraction		Yes		This is a duplicate project.
4	Ciba Geigy McIntosh Plant OU4, AL (7/14/1992)	Not listed in 11th Edition	Vertical Engineered Barrier			
4	Distler Brickyard, KY (1/11/1995)	Not listed in 11th Edition	Bioremediation			
4	FCX - Washington, NC (9/15/1993)	Pump and Treat		Yes		A 2005 ROD Amendment changed the remedy from pump and treat to MNA.
4	Helena Chemical Company (Tampa Plant), FL (5/7/1996)	Not listed in 11th Edition	Neutralization			
4	Jacksonville Naval Air Station, FL (9/29/1994)	Pump and Treat		Yes		Site documents do not mention P&T selection or implementation at this site.
4	Koppers Co Inc (Charleston Plant) Former Treatment and Old Impoundment Areas, SC (4/29/1998)	Not listed in 11th Edition	Multi-Phase Extraction			
4	Mathis Brothers Landfill, GA (3/24/1993)	Pump and Treat		Yes		Remedy was changed in FY 1996 Amendment from pump and treat to quarterly monitoring.
4	Miami Drum Services - Hialeah, FL (9/16/1985)	Not listed in 11th Edition	Pump and Treat			
4	Milan Army Ammunition Plant OU1, TN (9/1/1992)	Not listed in 11th Edition	Pump and Treat			
4	Milan Army Ammunition Plant OU3, TN (9/29/1993)	Not listed in 11th Edition	Pump and Treat			
4	Munisport Landfill, FL (7/26/1990)	Pump and Treat		Yes		Wells previously installed were to control leachate flow into groundwater, not to pump and treat groundwater.
4	Newport Dump, KY (3/27/1987)	Pump and Treat		Yes		P&T was never selected for this site.
4	North Belmont PCE, NC (9/24/1997)	Pump and Treat			In-Well Air Stripping	The 1997 ROD specified in-well air stripping and in situ bioremediation as the selected remedies.
4	Northwest 58th Street Landfill, FL (9/21/1987)	Pump and Treat		Yes		This project was for leachate collection/treatment, which is not tracked in the ASR.

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

Twelfth Edition (September 2007) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 11TH EDITION)	12TH EDITION			COMMENTS
			ADDED	DELETED	CHANGED TO	
4	Schuylkill Metals Corp, FL (9/15/1998)	Pump and Treat		Yes		Treatment was associated with groundwater encountered during excavation/dewatering activities.
4	Sherwood Medical Industries - Floridan Aquifer, FL (9/18/1997)	Not listed in 11th Edition	Pump and Treat			
4	Solitron Microwave, FL (11/1/2000)	Pump and Treat		Yes		P&T was not implemented because it was never selected as a remedy for this site.
4	Stauffer Chemical - Cold Creek Plant (OU1), AL (9/27/1989)	Not listed in 11th Edition	Pump and Treat			
4	Stauffer Chemical LeMoyne Plant - Halby Pond (OU1), AL (9/27/1989)	Not listed in 11th Edition	Pump and Treat			
4	Tennessee Products OU-1, TN (9/30/2002)	Recycling		Yes		According to a FY 2004 ESD, estimated volume of contaminated media has decreased, which caused the original disposal option of recycling the media at a waste to fuel facility to be no longer cost-effective. Disposing the waste at an EPA approved off-site municipal (Subtitle D) landfill is estimated to be about half the cost of the original remedy.
4	Trans Circuits Inc., FL (4/12/2001)	Pump and Treat		Yes		This technology is a water supply action, which is not tracked in the ASR.
4	Whitehouse Oil Pits - OU 1, FL (9/24/1998)	Solidification/Stabilization		Yes		Remedy was changed to source containment, which is not tracked in the ASR.
4	Whitehouse Oil Pits - OU 1, FL (9/24/1998)	Passive Treatment Wall (Permeable Reactive Barrier)		Yes		According to the 2001 ESD, evaluation indicated that adding lime to the groundwater could increase the amount of calcium in the system, which could adversely affect the soil bentonite slurry wall. In addition, groundwater modeling indicated that the slurry wall would be protective without the lime curtain, and physical testing confirmed the site groundwater would not degrade the slurry wall backfill over time.
4	Whitehouse Oil Pits, FL (6/16/1992)	Pump and Treat		Yes		P&T was selected as a contingent remedy but does not seem to not have been implemented.
5	Aircraft Components Chemical Operable Unit OU-2, MI (9/25/2002)	Bioremediation (in situ) - Groundwater		Yes		This is a duplicate project.
5	Algoma Municipal Landfill, WI (9/29/1990)	Passive Treatment Wall (Permeable Reactive Barrier)		Yes		There is no mention of this technology in any of the site documents.
5	Bofors Nobel OU1, MI (7/16/1999)	Phytoremediation			Phytoremediation	This technology was originally classified as only a source control project, but it's addressing both source and groundwater.
5	Buckeye Reclamation, OH (8/19/1991)	Pump and Treat		Yes		Treatment is no longer necessary according to a FY 2003 ESD. Monitoring shows only marginal exceedence of ROD criteria, and values are directly related to acid mine drainage and are considered as background.
5	Charlevoix Municipal Well, MI (6/12/1984)	Pump and Treat		Yes		This technology is a water supply action, which is not tracked in the ASR.
5	Clare Water Supply, MI (5/15/1997)	Multi-Phase Extraction			Multi-Phase Extraction	This project was only for in situ groundwater in the 11th Edition but has been revised to be a project for both source control and in situ groundwater.
5	Delavan Municipal Well #4 - CSES, WI (9/28/2000)	Not listed in 11th Edition	Pump and Treat			
5	Delavan Municipal Well #4 - CSES, WI (9/28/2000)	Not listed in 11th Edition	Soil Vapor Extraction			
5	Delavan Municipal Well #4 - Plant No. 2, WI (9/28/2000)	Not listed in 11th Edition	Soil Vapor Extraction			

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

Twelfth Edition (September 2007) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 11TH EDITION)	12TH EDITION			COMMENTS
			ADDED	DELETED	CHANGED TO	
5	Delavan Municipal Well #4 - SES, WI (9/28/2000)	Not listed in 11th Edition	Pump and Treat			
5	Delavan Municipal Well #4 - SES, WI (9/28/2000)	Not listed in 11th Edition	Soil Vapor Extraction			
5	Dupage County Landfill/Blackwell Forest Preserve, IL (9/30/1998)	Pump and Treat		Yes		This project was for leachate collection/treatment, which is not tracked in the ASR.
5	Electrovoice, MI (6/23/1992)	Pump and Treat		Yes		A FY 1995 ESD selected subsurface volatilization and ventilation system along with natural attenuation in place of pump and treat. However, there was already a soil vapor extraction project in the ASR database for this site, so this project was deleted.
5	Enviro. Conservation and Chemical, IN (9/25/1987)	Pump and Treat		Yes		A 1991 ROD Amendment replaces P&T with SVE. However, there was already a soil vapor extraction project in the ASR database for this site, so this project was deleted. In addition, the SVE system was shutdown in 2001 because not effective and a 2006 ESD selected new remedy.
5	Feed Materials Production Center (USDOE) - OU 4, OH (12/7/1994)	Vitrification		Yes		Pilot-scale testing of this technology showed that it was not effective and has been replaced with chemical stabilization. There was already a solidification/stabilization project in the ASR database for this site, so this project was deleted.
5	Galesburg/Koppers Shallow Aquifer, IL (6/30/1989)	Pump and Treat		Yes		P&T was replaced with 2 in situ bio systems according to a 2001 ESD because pumping tests conducted during the design phase showed the volume of water produced from the aquifer was more than anticipated. However, these bioremediation projects were already in the ASR database for this site, so this project was deleted.
5	K & L Landfill, MI (9/28/1990)	Pump and Treat		Yes		Remedy changed to MNA in a FY 2003 ROD.
5	Kummer Sanitary Landfill, MN (9/29/1990)	Pump and Treat		Yes		P&T was selected but never implemented at this site. A FY 1995 ROD was issued after the insitu bioremediation pilot study, which determined that the groundwater was naturally attenuating.
5	Lakeland Disposal Services, Inc., IN (10/15/1998)	Not listed in 11th Edition	Thermal Desorption			
5	MacGillis and Gibbs/Bell Lumber and Pole - OU 2, MN (9/30/1991)	Not listed in 11th Edition	Multi-Phase Extraction			
5	Midco I, IN (6/30/1989)	Solidification/Stabilization		Yes		At the time of the 1992 ROD Amendment, it was anticipated that the incremental costs for treating the excavated sediments by S/S would be very minor because the sediments would be treated in conjunction with the contaminated soils below the sediments. However, with the changes in the 2004 ESD, treating the excavated sediments by S/S would add significantly to the costs. For these reasons, ex situ S/S is eliminated.
5	Moss-American, WI (9/27/1990)	Bioremediation (ex situ) - Slurry Phase		Yes		According to a FY 1998 ROD, this technology was not effective in treating all contaminants and was changed to Thermal Desorption. However, there was already a thermal desorption project in the ASR database for this site, so this project was deleted.
5	Moss-American, WI (9/27/1990)	Soil Washing		Yes		According to a FY 1998 ROD, this technology was not effective in treating all contaminants and was changed to Thermal Desorption. However, there was already a thermal desorption project in the ASR database for this site, so this project was deleted.
5	Mound Plant (US DOE), OH (6/12/1995)	Not listed in 11th Edition	Air Sparging			

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

Twelfth Edition (September 2007) (continued)

			12TH EDITION			
REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 11TH EDITION)	ADDED	DELETED	CHANGED TO	COMMENTS
5	Mound Plant (US DOE), OH (6/12/1995)	Not listed in 11th Edition	Soil Vapor Extraction			
5	New Brighton/Arden Hills - OU 2 (Deep GW), MN (12/11/1997)	Not listed in 11th Edition	Pump and Treat			
5	New Brighton/Arden Hills - OU 2 (Site A), MN (12/11/1997)	Not listed in 11th Edition	Pump and Treat			
5	New Brighton/Arden Hills - OU 2 (Site K), MN (12/11/1997)	Not listed in 11th Edition	Pump and Treat			
5	New Brighton/Arden Hills (OU 3), MN (9/30/1992)	Not listed in 11th Edition	Pump and Treat			
5	Ninth Avenue Dump, OU2, IN (10/1/1991)	Pump and Treat		Yes		Treatment was associated with groundwater encountered during dewatering activities.
5	Powell Road Landfill, OH (9/30/1993)	Pump and Treat		Yes		P&T is no longer necessary at this site.
5	Reilly Tar & Chemical (Dover Plant), OH (3/31/1997)	Not listed in 11th Edition	Incineration			
5	Reilly Tar & Chemical (St Louis Park) - OU3, MN (9/30/1992)	Not listed in 11th Edition	Pump and Treat			
5	Reilly Tar & Chemical (St Louis Park) - OU4, MN (9/28/1990)	Not listed in 11th Edition	Pump and Treat			
5	Reilly Tar & Chemical (St Louis Park) - OU5, MN (6/30/1995)	Not listed in 11th Edition	Pump and Treat			
5	Sangamo Electric Dump/Crab Orchard National Wildlife Refuge - PCB Areas OU, IL (6/23/2000)	Soil Vapor Extraction			Multi-Phase Extraction	Site documents indicate that this technology was multi-phase extraction for groundwater.
5	Sangamo Electric Dump/Crab Orchard National Wildlife Refuge, OU - MISCA, IL (9/12/2002)	Pump and Treat		Yes		This action was in conjunction with plant demolition and included treatment and discharge of impounded pond water that was part of the existing wastewater treatment plant. This was not pumping and treating of groundwater.
5	Schmalz Dump, WI (9/24/1993)	Pump and Treat		Yes		Treatment was associated with groundwater encountered during excavation/dewatering activities.
5	Spiegelberg Landfill, MI (9/30/1986)	Pump and Treat		Yes		Data entry error. Duplicate project.
5	Tar Lake, MI (9/29/1992)	Air Sparging			Pump and Treat	Air Sparging was never specified as the remedy in the 1992 ROD. Pump & treat was selected as an interim remedy for groundwater at this OU.
5	Tippecanoe Sanitary Landfill, Inc., IN (9/30/1997)	Pump and Treat		Yes		This project was for leachate treatment not contaminated groundwater.
5	Verona Well Field (Paint Shop), MI (9/1/2000)	Not listed in 11th Edition	Air Sparging			
5	Verona Well Field (Thomas Solvent facility), MI (9/1/2000)	Not listed in 11th Edition	Air Sparging			
5	Verona Well Field, MI (6/26/1997)	Pump and Treat		Yes		This is a duplicate project.
5	Waite Park Wells (Electric Machinery), MN (9/14/1999)	Not listed in 11th Edition	Soil Vapor Extraction			
5	Woodstock Municipal Landfill, IL (6/30/1993)	Pump and Treat		Yes		The selected remedy (MNA) is functioning as intended; therefore, it is assumed that the contingent P&T remedy will not be implemented.
6	Air Force Plant 4 - Building 181, TX (8/26/1996)	Multi-Phase Extraction			Multi-Phase Extraction	This project was only for in situ groundwater in the 11th Edition but has been revised to be a project for both source control and in situ groundwater.

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

Twelfth Edition (September 2007) (continued)

			12TH EDITION			
REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 11TH EDITION)	ADDED	DELETED	CHANGED TO	COMMENTS
6	American Creosote Works, Inc. (Winnfield Plant), LA (4/28/1993)	Bioremediation (in situ) - Biosparging		Yes		This site had 2 insitu bioremediation projects in the database (1 for source and 1 for groundwater); however, there should only have been 1 insitu bioremediation project for both source control and groundwater.
6	Bailey Waste Disposal, TX (12/16/1996)	Pump and Treat		Yes		Treatment was associated with groundwater encountered during construction/dewatering activities.
6	Brio Refining, TX (7/2/1997)	Not listed in 11th Edition	Multi-Phase Extraction			
6	Brio Refining, TX (7/2/1997)	Incineration (on-site)			Vertical Engineered Barriers (VEB)	Based on a focused feasibility study conducted to evaluate alternatives to the incineration remedy selected in the 1988 ROD, a 1997 ROD Amendment selected vertical engineered barrier as a preferred alternative.
6	Highway 71/72 Refinery Site, LA (9/28/2000)	Pump and Treat		Yes		This technology was never specified as a remedy in a ROD.
6	Koppers Co Inc - Texarkana Plant, TX (8/20/2002)	Multi-Phase Extraction			Multi-Phase Extraction	This project was only for in situ groundwater in the 11th Edition but has been revised to be a project for both source control and in situ groundwater.
6	Marion Pressure Treating Company, LA (6/28/2002)	Pump and Treat			Multi-Phase Extraction	This technology is Dual Phase Extraction not pump and treat.
6	North Railroad Avenue Plume Superfund Site, NM (9/27/2001)	Bioremediation (ex situ) - Other		Yes		This technology was not mentioned in any of the site documents.
6	Odessa Chromium No 2, 2nd Unit, TX (9/9/1994)	Pump and Treat		Yes		Data entry error. Duplicate project.
6	Old Inger Oil Refinery, LA (9/25/1984)	Pump and Treat		Yes		P&T not required at the site after implementaion of other elements of the site remedy according to a FY 2006 ESD.
6	South 8th Street Landfill - OU 01, AR (7/22/1998)	Solidification/Stabilization			Solidification/ Stabilization	Based on treatability studies, it was determined that in situ S/S would be a viable alternative to ex situ S/S. However, there was already an insitu S/S project for this site, so this project was deleted.
6	Southern Shipbuilding, LA (9/15/1997)	Pump and Treat		Yes		According to RPM, groundwater was not addressed at this site because groundwater was shallow (about 2 feet bgs) and low levels of contamination were present. Water from surface impoundments was pumped, which likely included precipitation, runoff, and some groundwater because it was so shallow. The concern at this site was direct contact with the surface impoundments and the breaking of the levees, which would allow water to spread to the nearby bayou.
6	Tinker Air Force Base - Soldier Creek And Building 3001, OK (8/15/1990)	Bioventing		Yes		Bioventing was considered as an alternative however, it was never implemented.
7	Cherokee County, KS (8/20/1997)	Pump and Treat		Yes		P&T was never selected for this site.
7	Fort Riley, KS (8/7/1997)	Pump and Treat		Yes		No issues with the performance of selected remedy were found; therefore, it is assumed that the contingent P&T remedy will not be implemented.
7	Hastings Groundwater Contamination, NE (6/30/1993)	Pump and Treat		Yes		This project is being covered by another profile for OU #18 (Plume). Also, OU #13 (Plume) was changed to NFA by a ROD (6/25/01).
7	Kem-Pest Laboratories, MO (12/31/1990)	Pump and Treat		Yes		Treatment was for water that accumulated in the basement of the building and not for groundwater extraction and treatment.
7	Mason City Coal Gasification Site, IA (9/19/2000)	Pump and Treat		Yes		MNA is occurring at the site. Therefore, it is assumed that P&T (contingent remedy) will no longer be required.
7	Oronogo-Duenweg Mining Belt, MO (7/29/1998)	Pump and Treat		Yes		This technology is a water supply action, which is not tracked in the ASR.
7	White Farm Equipment Co., IA (9/28/1990)	Pump and Treat		Yes		A 1992 ESD removed groundwater treatment.

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

Twelfth Edition (September 2007) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 11TH EDITION)	12TH EDITION			COMMENTS
			ADDED	DELETED	CHANGED TO	
8	Anaconda Co. Smelter - OU 4, MT (9/29/1998)	Solidification/Stabilization			Neutralization	According the 1998 ROD, stabilization was actually slope stabilization, which isn't tracked in the ASR. The only treatment being conducted at the OU is soil neutralization.
8	Anaconda Co. Smelter - OU 7, MT (3/8/1994)	Not listed in 11th Edition	Neutralization			
8	Anaconda Co. Smelter, MT (9/23/1991)	Pump and Treat		Yes		This is leachate collection/treatment and not groundwater pump and treat.
8	Arsenic Trioxide Site, ND (2/5/1988)	Pump and Treat		Yes		This technology is a water supply action, which is not tracked in the ASR.
8	Broderick Wood Products - SBCW, CO (3/24/1995)	Not listed in 11th Edition	Vertical Engineered Barrier			
8	Broderick Wood Products, CO (3/24/1992)	Not listed in 11th Edition	Multi-Phase Extraction			
8	Chemical Sales Co., CO (3/27/2000)	Pump and Treat		Yes		A FY 2005 ESD indicated that during remedial design, it was determined that the plume had dispersed and no longer required active treatment.
8	Hill Air Force Base OU2 SRS, UT (9/30/1991)	Not listed in 11th Edition	Multi-Phase Extraction			
8	Hill Air Force Base OU2, UT (9/30/1991)	Not listed in 11th Edition	Pump and Treat			
8	Monticello Mill Tailings (USDOE), UT (9/29/1998)	Pump and Treat		Yes		Treatment was associated with groundwater encountered during dewatering activities.
8	Mystery Bridge Road/Highway 20 - DOW/DSI, WY (9/24/1990)	Not listed in 11th Edition	Pump and Treat			
8	Rocky Flats Plant (USDOE) - East Trenches, CO (1/1/1999)	Not listed in 11th Edition	Permeable Reactive Barrier			
8	Rocky Flats Plant (USDOE) - Solar Pond, CO (6/1/1999)	Not listed in 11th Edition	Permeable Reactive Barrier			
8	Rocky Mountain Arsenal Onpost OU (Army Complex Trenches, Shell Trenches), CO (6/11/1996)	Vertical Engineered Barriers (VEB)		Yes		The slurry walls discussed in the 1996 ROD are for source control not groundwater containment.
8	Valley Wood Preserving, Inc., CO (9/8/1993)	Pump and Treat		Yes		Site documents do not mention P&T selection or implementation at this site.
9	Advanced Micro Devices - Offsite OU (commingled GW plume from AMD, TRW, and Signetics sites), CA (9/11/1991)	Not listed in 11th Edition	Pump and Treat			
9	Andersen Air Force Base, OU3, GU (6/16/1998)	Pump and Treat		Yes		MNA was selected as the remedy for restoration of the aquifer. Groundwater treatment is being done only for waster supply, which is not tracked in the ASR.
9	Barstow Marine Corps Logistics Base - OU 01 (CAOC 26), CA (4/22/1998)	Not listed in 11th Edition	Air Sparging			
9	Barstow Marine Corps Logistics Base - OU 01 (CAOC 26), CA (4/22/1998)	Not listed in 11th Edition	Soil Vapor Extraction			
9	Barstow Marine Corps Logistics Base - OU 02 Nebo North, CA (4/22/1998)	Not listed in 11th Edition	Air Sparging			
9	Barstow Marine Corps Logistics Base - OU 02 Nebo North, CA (4/22/1998)	Not listed in 11th Edition	Soil Vapor Extraction			

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

Twelfth Edition (September 2007) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 11TH EDITION)	12TH EDITION			COMMENTS
			ADDED	DELETED	CHANGED TO	
9	Barstow Marine Corps Logistics Base - OU 02 Nebo North, CA (4/22/1998)	Not listed in 11th Edition	Pump and Treat			
9	Barstow Marine Corps Logistics Base - OU 02 Nebo South, CA (4/22/1998)	Not listed in 11th Edition	Air Sparging			
9	Barstow Marine Corps Logistics Base - OU 02 Nebo South, CA (4/22/1998)	Not listed in 11th Edition	Soil Vapor Extraction			
9	Castle Air Force Base (Castle Vista Plume), CA (5/21/1997)	Not listed in 11th Edition	Pump and Treat			
9	Castle Air Force Base (OU2), CA (5/21/1997)	Not listed in 11th Edition	Pump and Treat			
9	Castle Air Force Base (Phase 2), CA (5/21/1997)	Not listed in 11th Edition	Pump and Treat			
9	Hexcel, CA (9/21/1993)	Pump and Treat		Yes		Site has been withdrawn or removed from NPL proposal list. Remediation will no longer be conducted.
9	Intel Corp. (Mountain View Plant), CA (8/24/1999)	Pump and Treat		Yes		This is a duplicate project.
9	Lawrence Livermore National Laboratory - Site 300 - Bld 834 (OU2), CA (2/23/2001)	Not listed in 11th Edition	Soil Vapor Extraction			
9	Lawrence Livermore National Laboratory - Site 300 - Bldg 834 (OU2), CA (2/23/2001)	Not listed in 11th Edition	Pump and Treat			
9	Lawrence Livermore National Laboratory - Site 300 - eastern GSA (OU1), CA (1/29/1997)	Not listed in 11th Edition	Pump and Treat			
9	Lawrence Livermore National Laboratory - Site 300 - GSA, Bldg 875 (OU1), CA (1/29/1997)	Not listed in 11th Edition	Soil Vapor Extraction			
9	Lawrence Livermore National Laboratory - TF5475 area, CA (2/23/2000)	Not listed in 11th Edition	Chemical Treatment - Groundwater			
9	Lawrence Livermore National Laboratory, CA (2/23/2001)	Soil Vapor Extraction		Yes		This project was incorrectly entered under LLNL-Main Site instead of LLNL-Site 300 and was deleted to avoid double counting.
9	Lawrence Livermore National Laboratory, CA (8/5/1992)	Not listed in 11th Edition	Pump and Treat			
9	Marine Corps Air Station Yuma, AZ (9/8/2000)	Pump and Treat		Yes		P&T was a contingent remedy but will not be necessary based on success of other remedial actions (soil vapor extraction and air sparging).
9	McColl, CA (6/30/1993)	Pump and Treat		Yes		Site documents do not mention P&T selection or implementation at this site.
9	McCormick & Baxter Creosoting Co., CA (3/31/1999)	Pump and Treat			Multi-Phase Extraction	The purpose of the system is to recover LNAPL not groundwater.
9	Mesa Area Ground Water Contamination, AZ (9/27/1991)	Pump and Treat		Yes		P&T was not conducted because site was removed from NPL.
9	Motorola 52nd Street - OU 1, AZ (9/30/1988)	Not listed in 11th Edition	Pump and Treat			
9	Muscoy, CA (3/24/1995)	Pump and Treat		Yes		Data entry error. This OU belongs to another site (Newmark Groundwater Contamination).
9	National Semiconductor Corp. - OU 1, Subunit 1, CA (9/11/1991)	Soil Vapor Extraction		Yes		Remedies at this site are being conducted with remedies at the an adjacent site (Advanced Micro Devices-Arques [former Monolithic Memories]). This project was deleted to avoid double-counting.

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

Twelfth Edition (September 2007) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 11TH EDITION)	12TH EDITION			COMMENTS
			ADDED	DELETED	CHANGED TO	
9	National Semiconductor Corp., CA (10/16/1997)	Pump and Treat		Yes		Remedies at this site are being conducted with remedies at the an adjacent site (Advanced Micro Devices-Arques [former Monolithic Memories]). This project was deleted to avoid double-counting.
9	Newmark Groundwater Contamination - Muscoy (OU 2), CA (3/24/1995)	Not listed in 11th Edition	Pump and Treat			
9	Norton Air Force Base - Base Boundary Area, CA (11/24/1993)	Not listed in 11th Edition	Pump and Treat			
9	Phoenix Goodyear Airport Area-South Facility, AZ (12/22/1995)	Not listed in 11th Edition	Air Sparging			
9	Phoenix Goodyear Airport Area-South Facility-Groundwater Unit A, AZ (9/26/1989)	Not listed in 11th Edition	Pump and Treat			
9	Phoenix-Goodyear Airport Area-South Facility-Groundwater B/C Unit, AZ (9/26/1989)	Not listed in 11th Edition	Pump and Treat			
9	Raytheon, Mountain View, CA (6/9/1989)	Pump and Treat		Yes		This is a duplicate project, there is only 1 P&T project at this site. The aboveground components have been changed and moved, but it should only be considered 1 system.
9	San Gabriel Valley (Area 1) - OU 1, CA (6/23/1999)	Not listed in 11th Edition	Pump and Treat			
9	San Gabriel Valley (Area 1) - OU 2, CA (11/10/1999)	Not listed in 11th Edition	Pump and Treat			
9	San Gabriel Valley (Area 1) - OU 3, CA (9/30/1987)	Not listed in 11th Edition	Pump and Treat			
9	San Gabriel Valley (Area 1) - OU 5, CA (9/29/2000)	Not listed in 11th Edition	Pump and Treat			
9	San Gabriel Valley (Area 2) - SGVWC Plant B5, CA (3/31/1994)	Not listed in 11th Edition	Pump and Treat			
9	San Gabriel Valley (Area 2) - SGVWC Plant B6, CA (3/31/1994)	Not listed in 11th Edition	Pump and Treat			
9	San Gabriel Valley (Area 2) - Valley County Water, CA (3/31/1994)	Not listed in 11th Edition	Pump and Treat			
9	Schofield Barracks (US Army), HI (2/7/1997)	Pump and Treat		Yes		This technology is a water supply action, which is not tracked in the ASR.
9	Solvent Service, CA (9/27/1990)	Pump and Treat		Yes		Site has been withdrawn or removed from NPL proposal list. Remediation will not longer be conducted.
9	Travis Air Force Base OU 1, CA (12/6/1997)	Multi-Phase Extraction			Multi-Phase Extraction	This project was only for in situ groundwater in the 11th Edition but has been revised to be a project for both source control and in situ groundwater.
9	Valley Wood Preserving, Inc., CA (9/27/1991)	Solidification/Stabilization		Yes		Cleanup goals for Arsenic were below the site background levels. 2003 ROD states the new remedy is excavation and off-site disposal with no treatment.
9	Western Pacific Railroad Co., CA (9/30/1997)	Not listed in 11th Edition	Multi-Phase Extraction			
9	Williams Air Force Base - OU 3, AZ (6/8/1996)	Soil Vapor Extraction		Yes		Following a SVE treatability study, it was determined that cleanup goals could not be achieved. A ROD Amendment changed the remedy to institutional controls.
9	Williams Air Force Base - OU2, AZ (3/7/2006)	Pump and Treat			In Situ Thermal Treatment	Treatability tests indicated that pump and treat was not feasible. Because the replacement insitu thermal project was selected in FY 2006, it is not included in the ASR 12th.

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

Twelfth Edition (September 2007) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 11TH EDITION)	12TH EDITION			COMMENTS
			ADDED	DELETED	CHANGED TO	
10	Arctic Surplus, AK (9/28/1995)	Solvent Extraction		Yes		The volume of PCB-contaminated soil above 50 mg/kg is relatively insignificant compared to the total volume of contaminated soil and is much less than originally estimated in the 1995 ROD. Consequently, the on-site solvent extraction treatment becomes less cost effective in treating this soil then off-site disposal (according to a FY 2003 ESD).
10	Cascade Corporation, Troutdale Gravel Aquifer, OR (12/31/1996)	Pump and Treat		Yes		Data entry error. Duplicate project.
10	Eielson Air Force Base - OU1 (Blair Lakes), AK (9/28/1994)	Not listed in 11th Edition	Multi-Phase Extraction			
10	Eielson Air Force Base - OU2 (Fuel Area), AK (9/28/1994)	Not listed in 11th Edition	Multi-Phase Extraction			
10	Eielson Air Force Base - OU2 (POL Storage Area), AK (9/28/1994)	Not listed in 11th Edition	Soil Vapor Extraction			
10	Elmendorf Air Force Base, AK (9/1/1992)	Pump and Treat			Multi-Phase Extraction	P&T was changed to dual-phase extraction because groundwater and free product are both being recovered.
10	Fort Lewis Logistics Center, WA (9/25/1990)	In Situ Thermal Treatment			In Situ Thermal Treatment	This project was for both source control and in situ groundwater in the 11th Edition but has been revised to be a project for source control only. In situ thermal treatment is no longer considered an applicable technology for groundwater.
10	Fort Richardson - OU B, AK (9/15/1997)	Multi-Phase Extraction			Multi-Phase Extraction	This project was only for in situ groundwater in the 11th Edition but has been revised to be a project for both source control and in situ groundwater.
10	Fort Richardson - OU B, AK (9/15/1997)	Air Sparging		Yes		The project is describing air stripping of the extracted groundwater from the dual-phase system, which should not have been classified as Air Sparging. The Air Sparging that was conducted at the site was part of a brief treatability study done in conjunction with SVE (before the ROD) and it was determined to be ineffective; treatability studies are not tracked in the ASR.
10	Fort Richardson - OU B, AK (9/18/1997)	Not listed in 11th Edition	In Situ Thermal Treatment			
10	Fort Richardson, AK (9/15/1997)	Pump and Treat		Yes		Groundwater is being treated by the dual-phase extraction system; there is not a separate P&T system at this site.
10	Frontier Hard Chrome Inc - OU 1 and 2, WA (8/30/2001)	Chemical Treatment - Groundwater		Yes		This is a duplicate of the permeable reactive barrier technology.
10	Frontier Hard Chrome, Inc., WA (7/5/1988)	Pump and Treat		Yes		Site remedy was changed to two insitu innovative technologies in a FY 2001 ROD Amendment. However, these projects were already in the ASR database for this site, so this project was deleted.
10	Frontier Hard Chrome, Inc., WA (7/5/1988)	Solidification/Stabilization		Yes		The technology was determined to be ineffective at preventing the spread of contamination.
10	GOULD, INC., OR (6/5/1997)	Pump and Treat		Yes		Pump and treat was not applied at this site because groundwater cleanup was not necessary. A No Further Action ROD was issued on 09/28/2000 for groundwater.
10	Hanford Site - 100 Area - OU 2, WA (10/24/1999)	Chemical Treatment - Groundwater			Passive Treatment Wall (Permeable Reactive Barrier)	Technology is actually a permeable reactive barrier.
10	Hanford Site - 100 Area (100-NR-2), WA (9/29/1999)	Not listed in 11th Edition	Pump and Treat			
10	Hanford Site - 100 Area, WA (9/29/1999)	Not listed in 11th Edition	Bioremediation			
10	Hanford Site - 100 Area, WA (9/29/1999)	Not listed in 11th Edition	Bioremediation			

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

Twelfth Edition (September 2007) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 11TH EDITION)	12TH EDITION			COMMENTS
			ADDED	DELETED	CHANGED TO	
10	Harbor Island S-GWOU1, WA (9/30/1993)	Not listed in 11th Edition	Multi-Phase Extraction			
10	Harbor Island S-GWOU1, WA (9/30/1993)	Not listed in 11th Edition	Bioremediation			
10	Harbor Island Tank Farms OU2 (BP Facility), WA (1/1/2000)	Not listed in 11th Edition	Multi-Phase Extraction			
10	Harbor Island Tank Farms OU2 (BP Facility), WA (1/1/2000)	Not listed in 11th Edition	Air Sparging			
10	Harbor Island Tank Farms OU2 (KM Facility), WA (12/1/1999)	Not listed in 11th Edition	Multi-Phase Extraction			
10	Harbor Island Tank Farms OU2 (KM Facility, C Yard), WA (12/1/1999)	Not listed in 11th Edition	Air Sparging			
10	Harbor Island Tank Farms OU2 (Shell Facility), WA (11/1/1998)	Not listed in 11th Edition	Multi-Phase Extraction			
10	Harbor Island Tank Farms OU2 (Shell Facility), WA (11/1/1998)	Not listed in 11th Edition	Soil Vapor Extraction			
10	Idaho National Engineering and Environmental Laboratory (USDOE) - OU 11 Power Burst Facility and Auxiliary Reactor Area, ID (1/21/2000)	Incineration (off-site)		Yes		Based on a 2005 ESD, incineration will not be conducted for wastes at this OU. Wastes will be combined with OU3 wastes and addressed under that OU.
10	Idaho National Engineering and Environmental Laboratory (USDOE) OU3-13 (OU7), ID (9/28/1999)	Not listed in 11th Edition	Pump and Treat			
10	McChord Air Force Base (Wash Rack/Treatment Area), WA (9/29/1992)	Pump and Treat		Yes		The 90-day pilot test conducted during remedial design, showed that passive fuel recovery is not appropriate because the thickness of the floating fuel layer was significantly less than anticipated. The FY 1994 ESD indicated that during the design, it was determined that MNA would be a more appropriate remedy.
10	Naval Undersea Warfare Engineering Station (4 Waste Areas), WA (9/28/1999)	Pump and Treat		Yes		Site documents do not mention P&T selection or implementation at this site.
10	Northwest Pipe & Casing/Hall Process Company, OR (9/27/2001)	Pump and Treat		Yes		This technology was never specified as a remedy in a ROD.
10	Silver Mountain Mine, WA (3/27/1990)	Pump and Treat		Yes		P&T is not being conducted at this site.
10	Tulalip Landfill, WA (3/1/1996)	Pump and Treat		Yes		P&T is not being conducted at this site.
10	Umatilla Chemical Depot (Lagoons) - OU 7, OR (7/19/1994)	Open Detonation			Decontamination of Debris	Technology is actually decontamination of debris and not open detonation. No open detonation was being conducted in this OU. This new technology, however, is not tracked in the ASR.
10	Union Pacific Railroad Tie Treatment - DNAPL, OR (3/27/1996)	Not listed in 11th Edition	Multi-Phase Extraction			
10	Union Pacific Railroad Tie Treatment - Vadose Zone Soils, OR (3/27/1996)	Bioventing		Yes		This is a duplicate project.
10	Wyckoff/Eagle Harbor, WA (2/14/2000)	In Situ Thermal Treatment			In Situ Thermal Treatment	This project was for both source control and in situ groundwater in the 11th Edition but has been revised to be a project for source control only. In situ thermal treatment is no longer considered an applicable technology for groundwater.

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

The eleventh edition of the report adds information about 272 new treatment projects selected for remedial actions in FY 2000, FY 2001, and FY 2002 Records of Decision (RODs), ROD Amendments, and Explanations of Significant Differences (ESDs). These are not listed in Appendix D.
Changes to projects from the tenth edition are listed below.

Eleventh Edition (February 2004): Additions, Changes, and Deletions from the Tenth Edition (February 2001)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 10TH EDITION)	11TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
1	Linemaster Switch Corporation, CT (7/21/1993)	Soil Vapor Extraction		Yes		This remedy is a component of the multi-phase extraction system at this site. Therefore, this project has been deleted.	William Lovely 617-918-1240 lovely.william@epa.gov
1	New Bedford Harbor, MA (4/27/1999)	Solidification/stabilization			Physical Separation	The site contact indicated that a ROD Amendment changed the remedy to dewatering followed by off-site disposal.	Jim Brown 617-918-1308 brown.jim@epa.gov
1	Otis Air National Guard Area of Contamination CS16 and CS17 OU11, MA (5/5/1999)	Solidification/stabilization		Yes		The site contact indicated that remedy was changed to excavation and off-site disposal.	Bob Lim 617-918-1392 lim.robert@epa.gov
1	Otis Air National Guard Fuel Spill No 9 OU10, MA (7/6/1999)	Solidification/stabilization		Yes		The site contact indicated that remedy was changed to excavation and off-site disposal.	Bob Lim 617-918-1392 lim.robert@epa.gov
1	Otis Air Natioinal Guard – Fuel Spill 12, MA (9/25/1995)	Air Sparging	Yes				Bob Lim 617-918-1392 lim.robert@epa.gov
1	Otis Air National Guard OU 8, MA (8/16/1999)	Solidification/stabilization		Yes		The site contact indicated that remedy was changed to excavation and off-site disposal.	Bob Lim 617-918-1392 lim.robert@epa.gov
2	Brewster Well Field – OU 2, NY (9/29/1988)	Incineration	Yes				Lisa Wong 212-637-4267 wong.lisa@epa.gov
2	Cosden Chemical Coatings, NJ (9/30/1992)	Solidification/stabilization		Yes		A FY 1998 ESD changed the remedy to off-site treatment and/or disposal.	Edward Finnerty 212-637-4367 finnerty.ed@epa.gov
2	General Motors/Central Foundry Division, NY (3/31/1992)	Thermal Desorption			Solidification/ stabilization	Community relations issues	Anne Kelly 212-637-4397 kelly.anne@epa.gov
2	FAA Technical Center – Area B Navy Fire Testing Facility, NJ (9/20/1996)	Air Sparging (in situ) – Groundwater		Yes		Based on subsequent investigations, the groundwater plume was found to be more extensive than initial investigations indicated. The costs to implement this technology became prohibitive.	Bill Roach 212- 637-4335 roach.bill@epa.gov
2	FAA Technical Center – Area B Navy Fire Testing Facility, NJ (9/20/1996)	Soil Vapor Extraction		Yes		Based on subsequent investigations, the groundwater plume was found to be more extensive than initial investigations indicated. The costs to implement this technology became prohibitive.	Bill Roach 212- 637-4335 roach.bill@epa.gov

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

Eleventh Edition (February 2004) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 10TH EDITION)	11TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
2	Love Canal, NY (7/1/1982)	Vertical Engineered Barrier		Yes		Slurry wall was considered but not installed.	Damian Duda 212-637-4269 duda.damian@epa.gov
2	Reynolds Metals Company Study Area (RMC), NY (9/27/1993)	Incineration (off-site)			Solidification/ stabilization	Community relations issues	Anne Kelly 212-637-4397 kelly.anne@epa.gov
2	Vineland Chemical Co., Inc. – OU 1, NJ (9/29/1989)	Flushing (in situ)		Yes		The site contact indicated that the remedy was not implemented because it was determined that the technology would not be effective.	Matthew Westgate 212-637-4422 westgate.matthew@epa.gov
3	Browns Battery Breaking Site – OU 2, PA (7/2/1992)	Chemical Treatment	Yes				Christopher J. Corbett 215-814-3220 corbett.chris@epa.gov
3	Brown's Battery Breaking Site – OU 2, PA (7/2/1992)	Passive Treatment Wall		Yes		The site contact indicated that in situ chemical treatment was determined to work better.	Christopher J. Corbett 215-814-3220 corbett.chris@epa.gov
3	Eastern Diversified Metals, PA (3/29/1991)	Solidification/stabilization		Yes		A FY 2001 ROD was issued changing the remedy to capping.	John Banks 215-814-3214 banks.john_d@epa.gov
3	Naval Surface Warfare Center, Site 17, VA (9/30/1998)	Phytoremediation		Yes		The site contact indicated that this technology is not actually phytoremediation but rather an alternative landfill cover.	Paul Leonard 215-814-3350 leonard.paul@epa.gov
3	Ordnance Works Disposal Areas, WV (9/30/1999)	Thermal Desorption			Physical Separation	The site contact indicated that the remedy was not conducted. The coal tar was removed and used as a fuel (classified as physical separation).	Christian Matta 215-814-2317 matta.christian@epa.gov
3	Revere Chemical, PA (12/27/1993)	Vertical Engineered Barrier		Yes		Following SVE treatment of the soil, it was not necessary to install a VEB.	Ruth Scharr 215-566-3191 scharr.ruth@epa.gov
3	Seagertown Industrial Area, PA (1/29/1993)	Air Sparging			Bioremediation (in situ) – Groundwater	The site contact indicated that the technology was changed to enhanced bioremediation.	Christopher J. Corbett 215-814-3220 corbett.chris@epa.gov
3	Saegertown Industrial Area, PA (1/29/1993)	Soil Vapor Extraction		Yes		The site contact indicated that a ROD Amendment has been issued that selects bioremediation.	Christopher J. Corbett 215-814-3220 corbett.chris@epa.gov

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

Eleventh Edition (February 2004) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 10TH EDITION)	11TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
3	Standard Chlorine of Delaware, Inc., DE (3/9/1995)	Bioremediation (ex situ) – Other			Thermal Desorption	The site contact indicated that the contingent remedy was implemented because the goals could not be met.	Hilary Thornton 215-814-3323 thornton.hilary@epa.gov
3	Tonolli Corp, PA (3/12/1999)	Bioremediation (ex situ) – Land Treatment		Yes		The site contact indicated that the remedy was not implemented at this site.	John Banks 215-814-3214 banks.john_d@epa.gov
4	Aberdeen Pesticide Dumps (Amendment), NC (9/30/1991)	Thermal Desorption		Yes		This project was listed as a duplicate entry.	Luis E. Flores 404-562-8807 flores.luis@epa.gov
4	Calhoun Park Area – OU 01, SC (9/30/1998)	Chemical Treatment – Oxidation/Reduction		Yes		The site contact indicated the technology changed to excavation and off-site disposal.	Terry Tanner 404-562-8797 tanner.terry@epa.gov
4	Carolina Transformer Co., NC (8/29/1991)	Solidification/stabilization		Yes		The site contact indicated that this technology was replaced by solvent extraction.	Luis E. Flores 404-562-8807 flores.luis@epa.gov
4	Homestead Air Force Base OU 28, FL (8/15/1999)	Solidification/stabilization		Yes		The site contact indicated that remedy was changed to excavation and off-site disposal.	Doyle Brittain 404-562-8549 brittain.doyle@epa.gov
4	Homestead Air Force Base – OU 02, FL (7/16/1998)	Solidification/stabilization		Yes		This technology was a contingent remedy and was to be implemented if excavated soils failed TCLP for lead. This technology was not necessary since the excavated soil passed the TCLP for lead.	Doyle Brittain 404-562-8549 brittain.doyle@epa.gov
4	JFD Electronics/Channel Master, NC (9/10/1992)	Solidification/Stabilization	Yes				Samantha Urquhart-Foster 404-562-8760 urquhart_foster.samantha @epa.gov
4	JFD Electronics/Channel Master, NC (9/10/1992)	Solidification/stabilization		Yes		The estimated volume of contaminated soil decreased from 1,250 cubic yards to 650 cubic yards. Treatment is no longer necessary, and soils will be excavated for off-site disposal.	Samantha Urquhart-Foster 404-562-8760 urquhart_foster.samantha @epa.gov

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

Eleventh Edition (February 2004) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 10TH EDITION)	11TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
4	Peak Oil/Bay Drum, FL (6/21/1993)	Bioremediation (in situ) – Other			Solidification/ stabilization	The site contact indicated that the technology was changed to solidification/stabilization followed by capping.	Wesley Hardegree 404-562-8938 hardegree.wes@epa.gov
4	Peak Oil/Bay Drum OU 2 – Site Wide Groundwater, FL (8/9/1993)	Bioremediation	Yes				Wesley Hardegree 404-562-8938 hardegree.wex@epa.gov
4	Peak Oil/Bay Drum – OU 1, FL (6/21/1993)	Flushing (in situ)		Yes		A FY 2001 ESD deleted this remedy.	Wesley Hardegree 404-562-8938 hardegree.wes@epa.gov
4	Savannah River Site USDOE OU 66, SC (9/28/1999)	Solidification/Stabilization	Yes				Ken Feely 404-562-8512 feely.ken@epa.gov
4	Savannah River Site – USDOE – OU 60, SC (9/28/1999)	Solidification/Stabilization	Yes				Ken Feely 404-562-8512 feely.ken@epa.gov
4	Shuron Inc – OU 01, SC (9/9/1998)	Solidification/stabilization		Yes		Based on the FY 1998 ROD, the cost-effectiveness of this technology versus excavation and off-site disposal was determined. Excavation and off-site disposal was selected as the remedy.	Ralph Howard 404-562-8829 howard.ralph@epa.gov
4	Smiths Farm OU2, KY (9/17/1993)	Bioremediation	Yes				Antonio Deangelo 404-562-8826 deangelo.antonio@epa.gov
5	ALGOMA MUNICIPAL LANDFILL, WI (9/29/1990)	Permeable Reactive Barrier	Yes				David Linnear 312-886-1841 linnear.david@epa.gov
5	American Chemical Services, Inc, IN (7/27/1999)	Vertical Engineered Barrier		Yes		Data entry error. This project was entered as a duplicate.	Kevin Adler 312-886-7078 adler.kevin@epa.gov
5	American Chemical Services, Inc. – offsite, IN (7/27/1999)	Soil Vapor Extraction		Yes		Data entry error. This project was entered as a duplicate.	Kevin Adler 312-886-7078 adler.kevin@epa.gov

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Eleventh Edition (February 2004) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 10TH EDITION)	11TH EDITION ADDED	11TH EDITION DELETED	11TH EDITION CHANGED TO	COMMENTS	CONTACTS/PHONE
5	Cliff/Dow Dump, MI (9/27/1989)	Incineration (off-site)		Yes		This remedy was changed to excavation and off-site disposal.	Kenneth Glatz 312-886-1434 glatz.kenneth@epa.gov
5	Conrail Rail Yard – OU 2, IN (9/9/1994)	Air Sparging (in situ) – Groundwater		Yes		The site contact indicated that during the remedial investigation, one hit of contamination was found. However, that one hit has been found since; therefore, the technology will not be implemented.	Brad Bradley 312-886-4742 bradley.brad@epa.gov
5	Macgillis and Gibbs/Bell Lumber and Pole – OU1, MN (9/30/1999)	Chemical Treatment – Oxidation/Reduction		Yes		This technology was listed as the preferred remedy in the FY 1999 ROD. However, no responses (bids) were received to implement the technology.	Darryl Owens 312-886-7089 owens.darryl@epa.gov
5	Macgillis and Gibbs/Bell Lumber and Pole – OU3, MN (9/30/1999)	Bioremediation (ex situ) – Biopile		Yes		Data entry error. This project should not have been listed for OU3, only for OU1.	Darryl Owens 312-886-7089 owens.darryl@epa.gov
5	Macgillis and Gibbs/Bell Lumber and Pole – OU3, MN (9/30/1999)	Chemical Treatment – Oxidation/Reduction		Yes		Data entry error. This project should not have been listed for OU3, only for OU1.	Darryl Owens 312-886-7089 owens.darryl@epa.gov
5	Moss-American Groundwater, WI (4/29/1997)	Bioremediation	Yes				Russell Hart 312-886-4844 hart.russell@epa.gov
5	Motor Wheel Disposal Site, MI (9/30/1991)	Vertical Engineered Barrier		Yes		Further study indicated the slurry wall was not necessary.	Heather Nelson 312-353-0685 nelson.heather@epa.gov
5	Organic Chemicals, Inc. – OU 2, MI (2/5/1997)	Solidification/stabilization		Yes		The site contact indicated an ESD was issued that states the actual volume of soil to be treated was too small to cost-effectively treat using this technology.	Thomas Williams 312-886-6157 williams.thomas@epa.gov
5	Sangamo Electric Dump/Crab Orchard National Wildlife Refuge – Explosives/Munitions Manufacturing Area OU, IL (2/19/1997)	Incineration	Yes				Nanjunda Gowda 312-353-9236 gowda.nanjunda@epa.gov
5	South Macomb Disposal Authority, MI (8/31/1991)	Vertical Engineered Barrier		Yes		Replaced slurry wall with expaned leachate collection system.	David Kline 517-373-8354 klined@state.mi.us

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Eleventh Edition (February 2004) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 10TH EDITION)	11TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
5	Springfield Township Dump, MI (9/29/1990)	Air Sparging	Yes				Kevin Adler 312-886-7078 adler.kevin@epa.gov
5	Springfield Township Dump – OU 01, MI (6/10/1998)	Solidification/stabilization		Yes		The FY 1998 ROD Amendment listed this technology as a contingent remedy. However, this technology will not be implemented.	Kevin Adler 312-886-7078 adler.kevin@epa.gov
5	Springfield Township Dump – OU 01, MI (6/10/1998)	Thermal Desorption		Yes		The FY 1998 ROD Amendment listed this technology as a contingent remedy. However, this technology will not be implemented.	Kevin Adler 312-886-7078 adler.kevin@epa.gov
5	Springfield Township Dump – 90ROD, MI (9/29/1990)	Solidification/stabilization		Yes		The site contact indicated that a ROD Amendment has been issued that deleted this technology.	Kevin Adler 312-886-7078 adler.kevin@epa.gov
5	Tar Lake – Pump & Treat, MI (9/29/1992)	Air Sparging	Yes				Thomas Bloom 312-886-1967 bloom.thomas@epa.gov
5	Thermo-Chem, Inc OU1, MI (9/30/1991)	Soil Vapor Extraction	Yes				Kenneth Glatz 312-886-1434 glatz.kenneth@epa.gov
6	Popile, AR (2/1/1993)	Bioremediation (in situ) – Groundwater		Yes		A FY 2001 ROD Amendment deleted this remedy.	Shawn Ghose 214-665-6782 ghose.shawn@epa.gov
6	Popile, AR (2/1/1993)	Bioremediation (ex situ) – Land Treatment		Yes		A FY 2001 ROD Amendment deleted this remedy.	Shawn Ghose 214-665-6782 ghose.shawn@epa.gov
6	Sheridan Disposal Services, TX (12/29/1988)	Bioremediation (ex situ) – Slurry Phase			Solidification/ stabilization	The site contact indicated that alternatives were to be evaluated due to the length of time that has passed.	Gary A. Baumgarten 214-665-6749 baumgarten.gary@epa.gov
7	Ace Services, KS (5/5/1999)	Bioremediation (in situ) – Groundwater			Pump and Treat	The FY 2001 ROD Amendment changed the remedy due to a change in the use of the treated water and because of an increase in the size of the contaminated plume.	Bob Stewart 913-551-7654 stewart.robert@epa.gov

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Eleventh Edition (February 2004) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 10TH EDITION)	11TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
7	Lake City Army Ammunition Plant Area 18 OU, MO (4/22/1999)	Multi-Phase Extraction		Yes		The site contact indicated that site conditions were identified for which the technology was not implementable.	Scott Marques 913-551-7131 Marquess.scott@epa.gov
7	Peoples Natural Gas, IA (9/16/1991)	Bioremediation (in situ) – Other		Yes		The site contact indicated that this remedy has been discontinued.	Diana Engeman 913-551-7746 engeman.diana@epa.gov
7	Valley Park Tce Wainwright OU1 Ex-situ SVE, MO (4/26/1996)	Soil Vapor Extraction	Yes				Steve Auchterlonie 913-551-7778 auchterlonie.steve@epa.gov
8	Rocky Mountain Arsenal OU 23, CO (5/3/1990)	Vertical Engineered Barrier		Yes		A ROD signed on 6/11/96 eliminated the VEB for groundwater containment.	Laura Williams 303-312-6660 williams.laura@epa.gov
9	Southern California Edison, Visalia Pole Yard, CA (6/10/1994)	Bioremediation	Yes				Shea Jones 415-972-3148 jones.shea@epa.gov
9	Tracy Defense Depot (USArmy) – OU 01, CA (4/14/1998)	Bioventing		Yes		The site contact indicated that this technology was not implemented.	Michael Work 415-972-3024
9	Williams Air Force Base – OU 2, AZ (8/16/1996)	Soil Vapor Extraction	Yes				Michael Wolfram 415-972-3027 wolfram.michael@epa.gov
10	Fort Lewis Logistics Center, WA (9/25/1990)	In Situ Thermal Treatment	Yes				Bob Kievit 360-753-9014 kievit.bob@epa.gov
10	Harbor Island – Soil and Groundwater OU, WA (9/30/1993)	Soil Vapor Extraction	Yes				Neil Thompson 206-553-7177 thompson.neil@epa.gov
10	Harbor Island (Lead) – Soil And Groundwater OU, WA (9/30/1993)	Thermal Desorption		Yes		This remedy was changed to excavation and off-site disposal.	Neil Thompson 206-553-7177 thompson.neil@epa.gov
10	Lockheed Shipyard Facility/ Harbor Island – OU 3, WA (6/28/1994)	Thermal Desorption		Yes		This remedy was changed to excavation and off-site disposal.	Neil Thompson 206-553-7177 thompson.neil@epa.gov
10	Union Pacifice Railroad Tie Treatment – Vadose Zone Soils, OR (3/27/1996)	Bioremediation	Yes				Alan Goodman 503-326-3685 goodman.al@epa.gov

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

The tenth edition of the report adds information about 133 new treatment projects selected for remedial actions in FY 1998 and FY 1999 Records of Decision (RODs), ROD Amendments, and Explanations of Significant Differences (ESDs). These are not listed in Appendix D.

Tenth Edition (March 2001): Additions, Changes, and Deletions from the Ninth Edition (April 1999)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 9TH EDITION)	10TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
1	New Bedford, MA (04/06/90)	Solidification/Stabilization		Yes		RODs from FY 1998 and 1999 changed the remedy from on-site incineration followed by solidification/stabilization to off-site disposal due to community concerns. The incineration portion of the remedy was deleted in the eighth edition based on information provided by the site contact, and does not appear in this table.	Jim Brown 617-573-5779 brown.jim@epa.gov
1	Silresim Chemical, MA (09/19/91)	Solidification/Stabilization		Yes		Specified in a FY 1991 ROD as a contingent remedy to treat soils not effectively treated by soil vapor extraction, but never implemented. Soil vapor extraction treatment is currently treating soil effectively.	Mark Otis 978-318-8895 e-mail address not available
1	Loring Air Force Base - OU 10, Entomology Shop, ME (removal action, no ROD date available)	Bioremediation (in situ) - Bioventing			Soil Vapor Extraction	The site contact indicated that the remedy was changed because bioventing was determined to be unsuitable due to site hydrogeology.	Mike Napilinski 617-918-1268 napilinski.mike@epa.gov
2	Carroll & Dubies Sewage Disposal, NY (03/31/95)	Bioremediation (in situ) - Lagoon		Yes		A FY 1998 ESD changed the remedy to off-site treatment and disposal because additional site investigation revealed that the waste could be easily separated from the underlying soil. The type of off-site treatment has not been determined.	Maria Jon 212-637-3967 jon.maria@epa.gov
2	Carroll & Dubies Sewage Disposal, NY (03/31/95)	Soil Vapor Extraction		Yes		A FY 1998 ESD changed the remedy to off-site treatment and disposal because additional site investigation revealed that the waste could be easily separated from the underlying soil. The type of off-site treatment has not been determined.	Maria Jon 212-637-3967 jon.maria@epa.gov
2	Carroll & Dubies Sewage Disposal, NY (03/31/95)	Solidification/Stabilization		Yes		A FY 1998 ESD changed the remedy to off-site treatment and disposal because additional site investigation revealed that the waste could be easily separated from the underlying soil. The type of off-site treatment has not been determined.	Maria Jon 212-637-396 jon.maria@epa.gov
2	Ellis Property, NJ (09/30/92)	Solidification/Stabilization		Yes		The site contact indicated that the remedy was changed to off-site disposal because additional site investigation revealed that the contaminant levels were lower than expected.	Richard Ho 212-637-4372 ho.richard@epa.gov
2	Ewan Property - OU 2, NJ (09/29/88)	Chemical Treatment - Groundwater		Yes		The site contact indicated that the remedy was changed to groundwater pump-and-treat because treatability studies indicated that in situ chemical treatment was not effective.	Stephen Cipot 212-637-4411 cipot.stephen@epa.gov

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

Tenth Edition (March 2001) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 9TH EDITION)	10TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
2	Fried Industries, NJ (6/27/94)	Solidification/Stabilization		Yes		The site contact indicated that the remedy was changed to off-site disposal because additional site investigation revealed large amounts of contaminated debris. The use of solidification/ stabilization on this debris would have been impractical.	Tom Porucznik 212-637-4370 porucznik.tom@epa.gov
2	GCL Tie And Treating - OU 2, NY (3/31/95)	Thermal Desorption		Yes		The site contact indicated that the sediments of OU 2 have been combined with the soils of OU 1 for treatment using thermal desorption. The work is documented in the 10th edition of the ASR as a single project. Therefore, the OU 2 project has been deleted.	Janet Cappelli 212-637-4270 cappelli.janet@epa.gov
2	GE Wiring Devices, PR (9/30/88)	Soil Washing			Incineration (off-site)	A FY 1999 ROD amendment changed the remedy because the cost of soil washing was too high.	Caroline Kwan 212-637-4275 kwan.caroline@epa.gov
2	Lipari Landfill, NJ (9/30/85)	Project not in 9th edition of the ASR. Original ROD did not include this project.	Dual-Phase Extraction			The site contact indicated that dual-phase extraction was added at this site to remove insoluble volatile organic compounds.	Fred Cataneo 212-637-4428 cataneo.fred@epa.gov
2	Reynolds Metals Company - Study Area, NY (09/27/93)	Thermal Desorption			Incineration (off-site)	The site contact indicated that the remedy was changed from on-site thermal desorption to off-site incineration because the cost of thermal desorption was too high.	Anne Kelly 212-637-4264 kelly.anne@epa.gov
2	Tutu Well Field - VI (8/5/96)	Bioremediation (in situ) - Other		Yes		ROD was misinterpreted. The technology used at the site was soil vapor extraction. This is not a distinct project, it is part of the Tutu Well Field Esso project, which is already listed in the ASR database.	Caroline Kwan 212-637-4275 kwan.caroline@epa.gov
3	Avco Lycoming, PA (12/30/96)	Chemical Treatment - Groundwater			Bioremediation (in situ) - Groundwater	ROD was misinterpreted. Technology used stimulates microbes to create an environment in which hexavalent chromium will be reduced to its trivalent state. This technology is more accurately identified as bioremediation.	Jill Lowe 215-814-5336 lowe.jill@epa.gov
3	Brodhead Creek, PA (3/29/91)	Incineration (off-site)		Yes		ROD was misinterpreted. Incineration is of non-aqueous phase liquids collected through in situ thermal treatment process, which is considered treatment of residuals, and not source treatment.	John Banks 215-814-3214 banks.john-d@epa.gov
3	Cryochem, Inc. - OU 3, PA (9/30/91)	Soil Vapor Extraction		Yes		A FY 1998 ESD eliminated the soil vapor extraction portion of the remedy because soil sampling showed that contaminant concentrations were below remediation goals and soil gas assessment showed that the contaminant levels were below typical levels for effective soil vapor extraction treatment.	Joseph McDowell 215-566-3192 mcdowell.joseph@epa.gov

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Tenth Edition (March 2001) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 9TH EDITION)	10TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
3	Delaware Sand & Gravel Landfill, DE (9/30/93)	Incineration (off-site)			Soil Vapor Extraction	The site contact indicated that the remedy was changed because the cost of incineration was too high.	Philip Rotstein 215-814-3232 rotstein.phil@epa.gov
3	Douglassville Disposal, PA (6/30/89)	Incineration (off-site)		Yes		A FY 1999 ROD amendment changed the remedy from a treatment train of incineration followed by solidification/ stabilization to solidification/stabilization only, because this technology was determined to be as effective and less expensive.	Victor J. Janosik 215-814-3217 janosik.victor@epa.gov
3	Hunterstown Road, PA (8/2/93)	Incineration (off-site)		Yes		The site contact indicated that this remedy was not implemented because additional site investigations revealed that treatment was not required before off-site disposal of the waste.	John Banks 215-814-3214 banks.john-d@epa.gov
3	North Penn Area 6, PA (9/29/95)	In Situ Thermal Treatment (Hot Air Injection)		Yes		The site contact indicated that treatability testing revealed that treatment goals could not be met. A replacement remedy has not yet been selected.	Gregory Ham 215-566-3194 ham.greg@epa.gov
3	Ordnance Works Disposal Areas, WV (9/29/89)	Bioremediation (ex situ) - Land Treatment			Thermal Desorption	A FY 1999 ROD changed the treatment train of bioremediation followed by solidification/stabilization to thermal desorption because treatability studies revealed that the remedy could not meet cleanup goals.	Chris Matta 215-814-2317 matta.christian@epa.gov
3	Ordnance Works Disposal Areas, WV (9/29/89)	Solidification/Stabilization			Thermal Desorption	A FY 1999 ROD changed the treatment train of bioremediation followed by solidification/stabilization to thermal desorption because treatability studies revealed that the remedy could not meet cleanup goals.	Chris Matta 215-814-2317 matta.christian@epa.gov
3	Whitmoyer Laboratories - OU 3, PA (12/31/90)	Bioremediation (ex-situ) - Other			Thermal Desorption	The site contact indicated that the remedy was changed because additional site investigations revealed arsenic contamination, which could not be effectively treated with bioremediation.	Christoper Corbett 215-814-3220 corbett.chris@epa.gov
4	Aberdeen Pesticide Dumps, NC (9/30/91)	Incineration (off-site)			Thermal Desorption	The site contact indicated that the remedy was changed due to public protest. The remedy change will be documented in a future ROD amendment.	Randy McElveen 919-733-2801 e-mail address not available
4	American Creosote Works - OU 2 Phase 1, FL (2/3/94)	Project not in 9th edition of the ASR. Original ROD did not include this project.	Dual-Phase Extraction			ROD was misinterpreted.	Mark Fite 404-562-8927 fite.mark@epa.gov

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Tenth Edition (March 2001) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 9TH EDITION)	10TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
4	Cape Fear Wood Preserving, NC (6/30/89)	Solidification/Stabilization		Yes		This remedy was part of a treatment train including thermal desorption. The site contact indicated that this remedy was not implemented because thermal desorption treatment met the cleanup goals without solidification/stabilization.	Jon Bornholm 404-562-8820 bornholm.jon@epa.gov
4	Cecil Field Naval Air Station - OU 2, Site 5, FL (6/24/96)	Air Sparging (in situ) - Groundwater		Yes		The site contact indicated that the remedy was changed to monitored natural attenuation because additional site investigations revealed contaminant concentrations much lower than expected.	Debbie Vaughn-Wright 404-562-8539 vaughn-wright.debbie@epa.gov
4	Cecil Field Naval Air Station - OU 2, Site 5, FL (6/24/96)	Bioremediation (ex situ) - Other			Incineration (off-site)	The site contact indicated that the remedy was changed to monitored natural attenuation because additional site investigations revealed contaminant concentrations much lower than expected.	Debbie Vaughn-Wright 404-562-8539 vaughn-wright.debbie@epa.gov
4	Creotox Chemical Products	Bioremediation (ex situ) - Land Treatment		Yes		The site contact indicated that the remedy was changed to off-site incineration because bioremediation could not meet the cleanup goals.	Samantha Urquhart-Foster 404-562-8760 urquhart-foster.samantha@epa.gov
4	Fullco Lumber Company, AL (5/8/95)	Bioremediation (ex situ) - Other		Yes		A report generated for the site indicated that bioremediation could not meet cleanup goals. A replacement remedy has not yet been selected.	Waynon Johnson 404-562-8769 johnson.waynon@epa.gov
4	Chevron Chemical Company, FL (5/22/96)	Air Sparging (in situ) - Groundwater		Yes		The site contact indicated that the remedy was unnecessary because monitored natural attenuation effectively met cleanup goals.	Bill Denman 404-562-8939 denman.bill@epa.gov
4	Chevron Chemical Company, FL (5/22/96)	Permeable Reactive Barrier		Yes		The site contact indicated that the remedy was unnecessary because monitored natural attenuation effectively met cleanup goals.	Bill Denman 404-562-8939 denman.bill@epa.gov
4	General Electric Company - Shepard Farm Site, NC (9/29/95)	Bioremediation (in situ) - Groundwater		Yes		The site contact indicated that the remedy was changed to pump-and-treat of groundwater because treatability testing indicated that bioremediation was not effective.	Giezelle Bennett 404-562-8824 bennett.giezelle@epa.gov
4	Palmetto Wood Preserving, SC (9/30/87)	Project not in 9th edition of the ASR. Original ROD did not include this project.	Chemical Treatment	Yes		The site contact indicated that chemical treatment was added to reduce chromium to its trivalent state prior to treatment by solidification/stabilization.	Al Cherry 404-562-8828 cherry.al@epa.gov

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Tenth Edition (March 2001) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 9TH EDITION)	10TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
4	Tower Chemical Co., FL (7/9/87)	Incineration (on-site)		Yes		The site contact indicated that additional site investigations revealed different contaminants than expected and that incineration would not be appropriate. A revised remedy for the site has not yet been developed.	Galo Jackson 404-562-8937 jackson.galo@epa.gov
5	American Chemical Services, Inc., IN (9/30/92)	Thermal Desorption		Yes		A FY 1999 ROD changed the remedy to installation of an impermeable cap and off-site disposal of some wastes because additional site investigations revealed additional volumes of contaminated soil and debris, making thermal desorption impractical.	Kevin Adler 312-886-7078 adler.kevin@epa.gov
5	Conrail Rail Yard - OU 2, IN (9/9/94)	Soil Vapor Extraction		Yes		The site contact indicated that additional site investigations revealed that contaminant concentrations were lower than expected and soil vapor extraction was unnecessary.	Brad Bradley 312-886-4742 bradley.brad@epa.gov
5	Tar Lake, MI (9/29/92)	Solidification/Stabilization			Thermal Desorption	The site contact indicated that the remedy was changed to reduce costs.	Thomas Bloom 312-886-1967 bloom.thomas@epa.gov
5	Koppers Coke - Groundwater OU, MN (4/21/94)	Bioremediation (in situ) - Groundwater		Yes		The site contact indicated that the remedy was replaced with monitored natural attenuation because treatability testing revealed that bioremediation was not increasing the rate of degradation of contaminants.	Mark Rys 651-296-7706 mark.rys@pca.state.mn.us
5	Macgillis And Gibbs/ Bell Lumber And Pole - OU 1, MN (12/30/92)	Incineration (on-site)			Chemical Treatment Followed by Bioremediation	A FY 1999 ROD amendment changed the remedy to a treatment train consisting of chemical treatment followed by bioremediation (biopile) because incineration was too expensive and difficult to implement.	Darryl Owens 312-886-7089 owens.darryl@epa.gov
5	Macgillis And Gibbs/ Bell Lumber And Pole - OU 3, MN (9/22/94)	Incineration (on-site)		Yes	Chemical Treatment Followed by Bioremediation	A FY 1999 ROD amendment changed the remedy to a treatment train consisting of chemical treatment followed by bioremediation (biopile) because incineration was too expensive and difficult to implement.	Darryl Owens 312-886-7089 owens.darryl@epa.gov
5	Moss-American, WI (9/27/90)	Bioremediation (ex situ) - Slurry Phase			Thermal Desorption	A FY 1998 ROD replaced the treatment train of soil washing followed by slurry phase bioremediation with thermal desorption because the original remedy could not meet cleanup goals. The bioremediation project was changed to thermal desorption and the soil washing project was deleted.	Russell Hart 312-886-4844 hart.russell@epa.gov

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Tenth Edition (March 2001) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 9TH EDITION)	10TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
5	Moss-American, WI (9/27/90)	Soil Washing		Yes		A FY 1998 ROD replaced the treatment train of soil washing followed by slurry phase bioremediation with thermal desorption because the original remedy could not meet cleanup goals. The bioremediation project was changed to thermal desorption and the soil washing project was deleted.	Russell Hart 312-886-4844 hart.russell@epa.gov
5	Refuse Hideaway Landfill, WI (6/28/95)	Bioremediation (in situ) - Groundwater		Yes		The site contact indicated that the remedy was changed to monitored natural attenuation because the contaminants are naturally attenuating.	Anthony Rutter 312-886-8961 rutter.anthony@epa.gov
6	Air Force Plant 4 - Building 181, TX (8/26/96)	Soil Vapor Extraction		Yes		The site contact indicated that the remedy was changed to dual phase extraction and combined with another project at the site already listed in the ASR.	George Walters 937-255-7716 george.walters@wpafb.af.mil
6	Atchison, Topeka, & Santa Fe Clovis/Santa Fe Lake - Tph Soil, NM (9/23/98)	Bioremediation (in situ) - Other		Yes		The site contact indicated that contaminated soil was combined with sediments in an existing ex-situ bioremediation unit at the site. No information is currently available on why this change occurred.	Tetra Sanchez 214-665-6686 sanchez.tetra@epa.gov
6	Baldwin Waste Oil, TX (7/1/92)	Bioremediation (in situ) - Other			Bioremediation (ex situ) - Land Treatment	ROD was misinterpreted.	Gary Guerra 214-665-3120 guerra.gary@epa.gov
6	Double Eagle Refinery Co., OK (9/28/92)	Project not in 9th edition of the ASR. Original ROD did not include this project.	Neutralization			ROD was misinterpreted.	Phillip Allen 214-665-8516 allen.phillip@epa.gov
6	Oklahoma Refining Company - Hazardous Landfill, OK (6/9/92)	Bioremediation (in situ) - Other			Bioremediation (ex situ) - Land Treatment	ROD was misinterpreted.	Earl Hendrick 214-665-8519 hendrick.earl@epa.gov
6	Texarkana Wood Preserving, TX (9/25/90)	Incineration (on-site)		Yes		A FY 1998 ROD changed the remedy to on-site containment through capping because of community concerns.	Earl Hendrick 214-665-8519 hendrick.earl@epa.gov
6	United Creosoting Co., TX (9/29/89)	Solvent Extraction		Yes		A FY 1998 ROD amendment changed the remedy from a treatment train of solvent extraction followed by incineration to off-site disposal because the cost was too high and the capacity of the treatment unit was too small.	Earl Hendrick 214-665-8519 hendrick.earl@epa.gov

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

Tenth Edition (March 2001) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 9TH EDITION)	10TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
6	United Creosoting Co., TX (9/29/89)	Incineration (off-site)		Yes		A FY 1998 ROD amendment changed the remedy from a treatment train of solvent extraction followed by incineration to off-site disposal because the cost was too high and the capacity of the solvent extraction treatment unit was too small.	Earl Hendrick 214-665-8519 hendrick.earl@epa.gov
6	Prewitt Abandoned Refinery, NM (9/30/92)	Dual Phase Extraction			Air Sparging	ROD was misinterpreted.	Gregory Lyssy 214-665-8317 lyssy.gregory@epa.gov
7	Hastings Groundwater Contamination- Colorado Ave., OU 1, NE (09/30/91)	Project not in 9th edition of the ASR.	Air sparging (in situ) - Groundwater			ROD was misinterpreted.	Darrell Sommerhauser 913-551-7711 sommerhauser.darrell@epa.gov
7	Hastings Groundwater Contamination- Colorado Ave., OU 1, NE (09/30/91)	Project not in 9th edition of the ASR.	In-Well Air Stripping			ROD was misinterpreted.	Darrell Sommerhauser 913-551-7711 sommerhauser.darrell@epa.gov
7	Midwest Manufacturing/North Farm, IA (2/28/93)	Bioremediation (in situ) - Other		Yes		ROD was misinterpreted.	Diane Easley 913-551-7797 easley.diane@epa.gov
7	Sherwood Medical Co., NE (9/5/1995)	Soil Vapor Extraction (ex situ)			Mechanical Soil Aeration	The site contact indicated that, after mechanical soil aeration was conducted in preparation for ex situ soil vapor extraction, the contaminant concentrations met cleanup goals and soil vapor extraction was unnecessary.	Steve Auchterlonie 913-551-7778 auchterlonie.steve@epa.gov
8	Broderick Wood Products, CO (9/24/91)	Incineration (off-site)		Yes		ROD was misinterpreted.	Armando Saenz 313-302-6359 saenz.armando@epa.gov
8	Lockheed/Martin - Denver Aerospace, CO (9/24/90)	Solidification/Stabilization		Yes		The site contact indicated that the remedy was not required because additional site investigation revealed contaminant levels were below cleanup goals.	Charles Johnson 303-692-3348 Johnson.Charles@State.CO.US
8	Rocky Flats Plant - Buffer Zone, CO (08/10/92)	Soil Vapor Extraction			Permeable Reactive Barrier	The site contact indicated that the remedy was changed because additional contamination was found that was not amenable to soil vapor extraction, including dense non-aqueous phase liquids.	Norma Casaneda 303-966-4226 casaneda.norma@epa.gov
8	Rocky Mountain Arsenal - Onpost OU, Hex Pits, CO (6/11/96)	Thermal Desorption			In Situ Thermal Treatment	ROD was misinterpreted.	Kerry Guy 303-312-7288 guy.kerry@epa.gov

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Tenth Edition (March 2001) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 9TH EDITION)	10TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
8	Rocky Mountain Arsenal - Onpost OU, CO (6/11/96)	Soil Washing		Yes		The site contact indicated that this remedy was specified as a contingent remedy, but never implemented.	Kerry Guy 303-312-7288 guy.kerry@epa.gov
8	Sand Creek Industrial, OU 4, CO (4/2/94)	Soil Vapor Extraction		Yes		ROD was misinterpreted.	Erna Waterman 303-312-6762 waterman.erna@epa.gov
8	Summitville Mine - OU 2, CO (12/15/94)	Project not in 9th edition of the ASR.	Neutralization			ROD was misinterpreted.	Victor Ketellaper 303-312-6578 ketellapper.victor@epa.gov
8	Utah Power & Light/American Barrel, UT (7/7/93)	Solidification/Stabilization		Yes		ROD was misinterpreted.	Paula Schmittdiel 303-312-6861 schmittdiel.paula@epa.gov
9	Navajo Toxaphene, AZ (1/1/95)	Bioremediation (in situ) - Other			Bioremediation (ex situ) - Other	ROD was misinterpreted.	Robert Mandel 415-744-2290 mandel.bob@epa.gov
9	Williams Air Force Base - OU 3, AZ (12/30/92)	Bioventing			Soil Vapor Extraction	The site contact indicated that the remedy was changed because bioventing could not meet cleanup goals.	Sean Hogan 415-744-2334 hogan.sean@epa.gov
10	Queen City Farms, WA (10/24/86)	Solidification/Stabilization		Yes		The site contact indicated that the project was solidification only, and no stabilization occurred. Solidification only projects are not currently tracked in the ASR.	Neil Thompson 206-553-7177 thompson.neil@epa.gov

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

Ninth Edition (April 1999): Additions, Changes, and Deletions from the Eighth Edition (November 1996)

The ninth edition of the report adds information about 42 treatment selected for remedial actions in FY 1996 and FY 1997 RODs, – treatment technologies non-Superfund, and innovative technologies selected for two RCRA corrective actions. Other changes are listed below.

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 8TH EDITION)	9TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
1	Beacon Heights Landfill, CT (09/28/90)	Incineration (off site)		Yes		At $20 billion, incineration was considered cost-prohibitive. In addition, the community was concerned about the safety of transporting 22 acres of material by truck over switchback mountain roads.	Elise Jakabhazy 617-573-5760
1	Cannon Engineering - Plymouth OU, MA (03/31/88)	Incineration (off site)		Yes		About 264 tons of soil contaminated with lead and PCBs were disposed of at the Adams Center Sanitary Landfill in Fort Wayne, Indiana. Incineration was never used. PRP's contractor was allowed to put soil in a landfill without ROD amendment or ESD.	Dan Coughlin 617-573-9621
1	Charles George Reclamation Trust Landfill, MA (09/29/88)	Solidification/ stabilization		Yes		The contaminated area was capped instead of using solidification/stabilization. The estimated volume of contaminated media had decreased; the technology was no longer effective.	Elaine Stanley 617-223-5515
1	Iron Horse Park - OU 1, MA (09/15/88)	Bioremediation (ex situ) - land treatment		Yes		Land treatment was changed to asphalt batching off site at a state-permitted soil recycling facility. Bioremediation was taking longer than expected; treatment goals could not be met. An ESD was issued in October 1997.	Don McElroy 617-223-5571
1	Salem Acres, MA (03/25/93)	Solidification/ stabilization		Yes		Contaminated soils were excavated and hauled from the site instead of using solidification/stabilization. The estimated volume of contaminated media had decreased; the technology was no longer effective.	Elaine Stanley 617-223-5515
1	Sullivan's Ledge, MA (06/28/89)	Solidification/ stabilization		Yes		Stabilization is no longer part of the remedy. An ESD was issued in 1996 to eliminate that requirement.	Dave Lederer 617-573-9665
1	Sullivan's Ledge, MA (09/27/91)	Solidification/ stabilization		Yes		Stabilization is no longer part of the remedy. An ESD was issued in 1996 to eliminate that requirement.	Dave Lederer 617-573-9665
1	Loring AFB - OU 11, Vehicle Maintenance Building, ME (05/20/96)	Soil vapor extraction		Yes		Never implemented. Soils were excavated and connected to the base laundry SVE; soils were put into rolloff containers with PVC pipe.	Mike Nalipinski 617-223-5503

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Ninth Edition (April 1999) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 8TH EDITION)	9TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
1	O'Connor, ME (09/27/89)	Incineration (off site)		Yes		Problems included high cost for implementation of the technology and equipment or site problems. Contaminated soil was landfilled off site. An ESD was issued on 07/11/94.	Ross Gilleland 617-573-5766
1	O'Connor, ME (09/27/89)	Solidification/ stabilization		Yes		The solidification/ stabilization remedy option provided treatment of lead if incineration was chosen. Incineration was not selected as a remedy. Contaminated soil was landfilled off site. An ESD was issued on 07/11/94.	Ross Gilleland 617-573-5766
1	Union Chemical, ME (12/27/90)	Incineration (off site)		Yes		Misinterpretation of the ROD. The 1990 ROD selected thermal desorption. That remedy was subsequently changed to SVE in 1994. An ESD was issued in April 1994. See page D-36 for more information.	Terrence Connelly 617-573-9638
1	Union Chemical, ME (12/27/90)	Solidification/ stabilization		Yes		Misinterpretation of the ROD. The 1990 ROD selected thermal desorption. That remedy was subsequently changed to SVE in 1994. An ESD was issued in April 1994. See page D-36 for more information.	Terrence Connelly 617-573-9638
1	Ottati & Goss/Kingston Steel Drum - OU 4, NH (01/16/87)	Incineration (on site)			Thermal desorption	A change in cleanup level may be necessary under new risk guidance issued since the ROD was signed. Thermal desorption is more cost effective; the volume of contaminated media had increased. A change in future use from residential to nonresidential would require a ROD amendment.	Richard Goehlert 617-573-5742
1	South Municipal Water Supply Wells, NH (09/27/89)	Soil vapor extraction		Yes		A second ESD, issued in February 1997, granted a technical impracticality waiver. The waiver eliminated SVE because of the presence of DNAPLs. The SVE system has been shut down.	Roger Duwart 617-573-9628 Tom Andrews (NHDES) 603-271-2910
1	South Municipal Water Supply Wells, NH (09/27/89)	In situ air stripping (air sparging)		Yes		The air injection well was not installed deep enough to deliver air below the water table. Because of installation of deeper air injection wells would have caused penetration of a confining layer, that activity was not performed. An ESD was issued on 02/03/97.	Roger Duwart 617-573-9628 Tom Andrews (NHDES) 603-271-2910
1	Davis Liquid Waste, RI (09/29/87)	Solidification/ stabilization		Yes		Solidification/stabilization was proposed in the ROD as a treatment for the residues of incineration, but thermal desorption was used instead of incineration. Therefore, solidification/stabilization was not used. No ROD amendment or ESD was needed.	Neil Handler 617-573-9636

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Ninth Edition (April 1999) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 8TH EDITION)	9TH EDITION			COMMENTS	CONTACTS/PHONE
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2	Cosden Chemical Coatings Corp., NJ (09/30/92)	Solidification/ stabilization		Yes		The estimated volume of contaminated media had decreased; the technology was no longer effective. An ESD is to be issued in the near future.	Edward Finnerty 212-637-4367
2	De Rewal Chemical Co., NJ (09/29/89)	Solidification/ stabilization		Yes		The treatability study indicated that leaching inorganics from the solidified mass would increase contamination of the groundwater. An ESD, issued on 06/12/97, eliminates solidification/ stabilization and provides for off-site disposal.	Lawrence Granite 212-637-4423
2	Ellis Property, NJ (09/30/92)	Incineration (off site)			Solidification/ stabilization	Off-site incineration never was used because of high cost; chemical stabilization was used instead.	Richard Ho 212-637-4372
2	Kauffman & Minteer, NJ (09/27/96)	Incineration (off site)		Yes		No hazardous waste has been detected at this OU. The nonhazardous waste currently is being excavated and disposed of with no treatment. Additional characterization currently is being performed.	Paolo Pascetta 212-637-4383
2	Reich Farms, NJ (09/30/88)	Incineration (off site)		Yes		This was a contingency in the ROD. The ROD specified enhanced volatilization followed by either incineration or on-site disposal. All soil was treated successfully by enhanced volatilization and thus incineration was not necessary.	Jonathan Gorin 212-637-4361
2	Renora, Inc., NJ (09/29/87)	None				Original remedy was not listed in the ASR. The 1987 ROD selected bioremediation (in situ) for groundwater. It was cancelled because treatability studies showed bioremediation to be ineffective in treating PAH-contaminated soils. A ROD Amendment signed on 09/30/94 changed the remedy to off-site disposal.	Jonathan Gorin 212-637-4361
2	Roebling Steel Co., NJ (03/29/90)	Solidification/ stabilization		Yes		Solidification/stabilization was considered and rejected because of the high cost of cleaning up a large area of contamination (10 acres). A ROD amendment is expected in December 1998.	Tamara Rossi 212-637-4368
2	Roebling Steel Co., NJ (09/26/91)	Solidification/ stabilization		Yes		Solidification/stabilization was considered and rejected because of the high cost of cleaning up a large area of contamination (10 acres). A ROD amendment is expected in December 1998.	Tamara Rossi 212-637-4368
2	Swope Oil & Chemical, NJ (09/27/91)	Incineration (off site)		Yes		Remedy included only SVE treatment, and no off-site incineration was conducted. Misinterpretation of ROD.	Joseph Gowers 212-637-4413

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Ninth Edition (April 1999) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 8TH EDITION)	9TH EDITION			COMMENTS	CONTACTS/PHONE
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2	Waldick Aerospace Devices, Inc., NJ (03/29/91)	Incineration (off site)		Yes		Misinterpretation of the ROD. Off-site incineration never was implemented. The ROD specified on-site thermal treatment or thermal desorption.	Daniel Weissman 212-637-4384 George Buc (USACE) 908-389-3040 Dave Modricker (USACE) 717-748-4505
2	Waldick Aerospace Devices, Inc., NJ (09/29/87)	Solidification/ stabilization		Yes		Misinterpretation of the ROD.	Daniel Weissman 212-637-4384
2	White Chemical Corp., NJ (09/26/91)	Solidification/ stabilization		Yes		Misinterpretation of the ROD. ROD specified that the site should be stabilized, referring to the site stabilization process performed during a previous remedial action. This did not mean treatment using stabilization/solidification.	Betsy Donovan 212-637-4369
2	Brookhaven National Laboratory (USDOE) - OU 4, NY (03/25/96)	This is an FY96 ROD that was not listed in the eighth edition.	Soil vapor extraction			Soil vapor extraction was added to enhance the existing in situ air stripping system.	Mary Logan 212-637-4321
2	Circuitron Corp., NY (03/29/91)	Incineration (off site)		Yes		Misinterpretation of the ROD. Soil was excavated and transported to an approved RCRA treatment and disposal facility. Incineration (off site) was selected as the method of treatment to develop a conservative cost estimate.	Sharon Trocher 212-637-3965
2	Hooker (102nd Street Landfill), NY (09/26/90)	Incineration (off site)		Yes		Original ROD specified incineration of sediments outside slurry wall. Slurry has been repositioned to contain any migration of NAPL plumes. The site will be capped instead. ROD Amendment issued 06/9/95.	Paul Olivo 212-637-4280
2	Love Canal - 93rd St. School, NY (09/26/88)	Solidification/ stabilization		Yes		Residents did not want any materials treated on site. Materials were disposed of off site instead. A ROD amendment was issued in 05/91.	Damian Duda 212-637-4269
2	Marathon Battery Corp., NY (09/30/88)	Solidification/ stabilization		Yes		All three solidification/ stabilization projects were conducted as one project, even though three RODs were issued. The work is documented in the ASR as a single project. Therefore, the two other projects have been deleted.	Pam Tames 212-637-4255

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Ninth Edition (April 1999) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 8TH EDITION)	9TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
2	Marathon Battery Corp., NY (09/30/89)	Solidification/ stabilization		Yes		All three solidification/ stabilization projects were conducted as one project, even though three RODs were issued. The work is documented in the ASR as a single project. Therefore, the two other projects have been deleted.	Pam Tames 212-637-4255
2	Mattiace Petrochemicals - OU 1, 5, and 6, NY (06/27/91)	Incineration (off site)		Yes		The ROD identified incineration as a possible method of treatment, but incineration was not the selected remedy.	Edward Als 212-637-4272
2	Olean Well Field - OU 2, NY (09/30/96)	In situ air stripping (air sparging)		Yes		Air sparging was considered for the dry cleaning. A pilot test demonstrated that air sparging was not feasible because of site conditions. Contaminated soil will be excavated instead (a contingency in the ROD, so no ESD or ROD amendment is necessary).	Thomas Taccone 212-637-4281
2	Solvent Savers, NY (09/30/90)	Thermal desorption			Soil vapor extraction	SVE is being conducted as a pilot study, but thermal desorption may be used in the future.	Lisa Wong 212-637-4267
3	Delaware Sand & Gravel Landfill - OU 4 and OU 5, DE (09/30/93)	Soil vapor extraction			Bioremediation (in situ) - bioventing	Treating soil with SVE followed by bioventing would not have enhanced the rate of removal of VOCs from soil. Therefore, bioventing was used without SVE. The remedy was a contingency in the ROD.	Eric Newman 215-814-3237
3	E.I. DuPont-Newport Site, DE (09/23/93)	None				Original remedy was not listed in the ASR. The 1993 ROD selected solidification/stabilization (in situ). However, the waste was much deeper than originally estimated. Due to the increased volume of waste, the cleanup costs were significantly higher than cited in the 1993 ROD. On 08/16/95 EPA issued and ESD to change the remedy to containment with pump-and-treat for groundwater.	Lisa Brown 215-814-5528
3	Halby Chemical Co. - OU 1, Process Plant Area, DE (06/28/91)	Solidification/ stabilization			Chemical treatment	Misinterpretation of ROD; in situ chemical oxidation was used.	Eric Newman 215-814-3237
3	Aberdeen Proving Ground (Edgewood Area) J-Field Soil OU, MD (09/27/96)	This is an FY96 ROD that was not listed in the eighth edition.			Phyto-remediation	Incineration and solidification/stabilization, provided for in the original ROD, was considered dangerous because of the presence of unexploded ordnance. A ROD amendment is to be issued in the near future for a change to phytoremediation.	Steven R. Hirsh 215-566-3352

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Ninth Edition (April 1999) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 8TH EDITION)	9TH EDITION ADDED	DELETED	CHANGED TO	COMMENTS	CONTACTS/PHONE
3	Mid-Atlantic Wood Preservers, MD (12/31/90)	Solidification/ stabilization		Yes		The remedy was a contingency in the ROD. Solidification/ stabilization was to be used only if the level of arsenic was above 1000 mg/kg. Results of soil analysis on all samples at the site show levels of arsenic below 1,000 mg/kg.	Eric Newman 215-814-3237
3	Aladdin Plating, PA (09/27/88)	Solidification/ stabilization		Yes		A vendor demonstration of electrokinetics to treat contaminated groundwater and soils will continue. A subsequent ROD issued on 12/30/93 requires institutional controls and monitoring, but no solidification/stabilization.	Gregory D. Hamm 215-566-3194
3	Berks Sand Pit, PA (09/29/88)	Incineration (off site)		Yes		The source of contamination in sediments is being eliminated because of lowering of the water table, eliminating the need for excavation and incineration (off site) of sediments. An ESD has been proposed and will be made final after a public comment period of 30 days.	Bruce Rundell 215-566-3317
3	Brown's Battery Breaking Site - OU 2, PA (07/02/92)	Plasma high- temperature recovery		Yes		Problems with implementation include high cost and equipment or site problems.	Richard Watman 215-566-3219
3	Douglassville Disposal, PA (06/30/89)	Incineration (on site)		Yes		Community concerns prohibited the use of the technology. A feasibility study of solidification/stabilization is being conducted. A ROD amendment is expected in FY99.	Victor J. Janosik 215-566-3217
3	Drake Chemical - Phase II, PA (05/13/86)	Incineration (on site)		Yes		This is a duplicate project. Both the 1986 and the 1988 ROD specified incineration. Incineration (on site) was chosen because of a preference for on-site treatment. The work is documented as a single project.	Gregg Crystall 215-566-3207
3	Hebelka Auto Salvage Yard, PA (09/30/91)	Solidification/ stabilization		Yes		The 1991 ROD refers to solidification/stabilization of lead-contaminated soils completed under the 1989 ROD, but the 1991 ROD specifies monitoring of groundwater only; no solidification/stabilization of additional sites is specified.	Frederick N. Macmillan 215-814-3201
3	M.W. Manufacturing, PA (03/31/89)	Incineration (off site)			Solidification/ stabilization and Thermal Desorption	Results of treatability study showed burning fluff caused potential threat due to emissions of dioxin. Thus, offsite incineration was not implemented. ROD Amendment issued 12/22/97 selected ex-situ stabilization and low temperature thermal desorption.	Bhupendra Khona 215-566-3213

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Ninth Edition (April 1999) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 8TH EDITION)	9TH EDITION			COMMENTS	CONTACTS/PHONE
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3	Publicker Industries, Inc. - OU 3, PA (12/28/95)	Solidification/ stabilization		Yes		The remedy was a contingency. Wastes were disposed of in a landfill.	Frances Costanzi 215-566-3196
3	Greenwood Chemical Co., VA (12/29/89)	Solidification/ stabilization		Yes		Solidification/stabilization of soils contaminated with arsenic would not have been cost-effective for the small volume of waste present. No ROD amendment or ESD was issued.	Philip Rotstein 215-814-3232
3	Rentokil Virginia Wood Preserving, VA (06/22/93)	Incineration (off site)		Yes		Cost too high. A value engineering analysis indicated that contaminants in soil could successfully be contained with a slurry wall and cap. A pump and treat system for dewatering could effectively immobilize contaminants. ROD Amendment issued 08/27/96.	Andrew C. Palestini 215-566-3233
3	Rentokil Virginia Wood Preserving, VA (06/22/93)	Solidification/ stabilization		Yes		Cost too high. A value engineering analysis indicated that contaminants in soil could successfully be contained with a slurry wall and cap. A pump and treat system for dewatering could effectively immobilize contaminants. ROD Amendment issued 08/27/96.	Andrew C. Palestini 215-566-3233
3	Saunders Supply Co., VA (09/30/91)	Solidification/ stabilization		Yes		Solidification/stabilization was a contingency that was found to be unnecessary.	Andrew C. Palestini 215-566-3233
3	Fike Chemical, Inc. - OU 1, WV (09/29/88)	Solidification/ stabilization		Yes		Misinterpretation of the ROD. The ROD called for drainage of water and liquid from the lagoon (referred to as "stabilization" in the ROD). Lagoon sludge then was to be sent off site for incineration.	Katherine Lose 215-566-3240
3	Fike Chemical, Inc.-WV (03/31/92)	Neutralization		Yes		The excavated drums were damaged and were sent off site for disposal. ESD issued 05/13/93.	Katherine Lose 215-566-3240
3	Fike Chemical, Inc. - OU 3 - Drum Removal, WV (03/31/92)	Solidification/ stabilization		Yes		Stabilizing in the ROD referred to stabilizing acidic wastes. The closeout report indicated that all nonhazardous soils were landfilled and hazardous wastes were incinerated. Solidification/ stabilization was a contingency remedy.	Katherine Lose 215-566-3240
4	Ciba Geigy (McIntosh Plant), AL (07/14/92)	Solidification/ stabilization		Yes		Solidification/stabilization was not implemented because it would bring about no cost savings.	Charles L. King, Jr. 404-562-8931

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Ninth Edition (April 1999) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 8TH EDITION)	9TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
4	Ciba Geigy (McIntosh Plant) - OU 3, AL (07/25/95)	Bioremediation (in situ) - other			Incineration (on site)	The treatability study was unsuccessful; treatment goals could not be met. Wastes are being incinerated instead.	Charles L. King, Jr. 404-562-8931
4	Anodyne, Inc., FL (06/17/93)	Solidification/ stabilization		Yes		The amount of contaminated soil was less than anticipated, and the soil was excavated and landfilled off site.	Brad Jackson 404-562-8925
4	Brown Wood Preserving, FL (04/8/88)	Solidification/ stabilization		Yes		Contingency. This technology in ROD was to be considered only if ex situ biodegradation - land treatment did not attain the desired cleanup levels for the appropriate indicator chemicals within the two-year time period. Goals were met within 18 months.	Rosalind Brown 404-562-8870
4	Cecil Field Naval Air Station - OU 2, Sites 5 and 17, FL (06/24/96)	Bioremediation (in situ) - groundwater			Air sparging	Bioremediation was begun, but the cleanup goals were revised. A ROD amendment is to be issued soon, and air sparging will be used.	Debbie Vaughn-Wright 404-562-8539
4	Cecil Field Naval Air Station - OU 6, Site 11, FL (09/14/94)	Incineration (off site)		Yes		Wastes were below LDR standards for treatment. Waste was sent off site to a RCRA subtitle C landfill.	Debbie Vaughn-Wright 404-562-8539
4	Cecil Field Naval Air Station - OU 7, FL (07/17/96)	Bioremediation (in situ) - groundwater		Yes		SVE and bioremediation were to be implemented in the downgradient area, but concentrations of contaminants have decreased. Therefore, the remedy will not be implemented.	Debbie Vaughn-Wright 404-562-8539
4	Cecil Field Naval Air Station - OU 7, FL (07/17/96)	Soil vapor extraction		Yes		SVE and bioremediation were to be implemented in the downgradient area, but concentrations of contaminants have decreased. Therefore, the remedy will not be implemented.	Debbie Vaughn-Wright 404-562-8539
4	Coleman-Evans Wood Preserving - Amendment, FL (09/26/90)	Solidification/ stabilization			Thermal desorption	The 1990 ROD amendment selected a technology train of bioremediation, soil washing and S/S. Treatability studies indicated presence of dioxin, which cannot be treated with bioremediation. So, remedy changed to thermal desorption. ROD Amendment 9/25/97.	Randall Chaffins 404-562-8929
4	Gold Coast Oil Corp., FL (09/11/87)	Solidification/ stabilization		Yes		The estimated volume of contaminated media had decreased, and the technology was no longer effective.	Brad Jackson 404-562-8925

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Ninth Edition (April 1999) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 8TH EDITION)	9TH EDITION			COMMENTS	CONTACTS/PHONE
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4	Homestead Air Reserve - OU 6, Site SS-3, FL (06/27/95)	Thermal desorption		Yes		Excavation, hauling, and landfilling as a non-RCRA solid waste was less costly, as per the ESD issued on 10/22/97. One 55-gal. drum and 1,350 cu yd of waste were hauled to a non-RCRA landfill. Data in design showed reduced volume of soil.	Patricia Goldberg 404-562-8543 Doyle Brittain 404-562-8549
4	Reeves Southeastern Galvanizing - OU 1, FL (10/13/92)	Solidification/ stabilization		Yes		Implementability (equipment problems and site problems). The PRP could not find a treatment mix that could meet performance standards. An ESD was issued on 04/17/97.	Randall Chaffins 404-562-8929
4	Stauffer Chemical Company, FL (12/01/95)	Bioremediation (ex situ)			Bioremediation (ex situ)-composting	The change was made to identify a specific type of ex situ bioremediation.	Brad Jackson 404-562-8925
4	Whitehouse Oil Pits - Amendment, FL (06/16/92)	Bioremediation (ex situ) - slurry-phase		Yes		Treatment goals could not be met. A ROD amendment was to be issued in mid-September 1998, and a public comment period will be conducted.	Mark Fite 404-562-8927
4	Marine Corps Logistics Base - OU 3, PSC 16 & 17, GA (08/14/92)	Solidification/ stabilization		Yes		Misinterpretation of ROD; soil was mixed with clean fill and then disposed of at a permitted landfill. No solidification/stabilization was performed.	Robert Pope 404-562-8506
4	Marzone Inc./Chevron Co. - OU 1, GA (09/30/94)	Thermal desorption		Yes Yes		Remedy was too costly, the community was opposed to the remedy, and dioxin was discovered. Therefore, the technology was not implemented, and the soil was excavated and disposed of at an off-site landfill. A ROD amendment was issued on 06/18/97.	Annie Godfrey 404-562-8919
4	Mathis Brothers Landfill - South Marble Top Road, GA (03/24/93)	Bioremediation (ex situ) - slurry-phase				Excavation, landfilling, and incineration were less costly and required less time. Soils were excavated and transported off site for landfilling if nonhazardous, and incinerated if hazardous.	Charles L. King, Jr. 404-562-8931
4	Smith's Farm - OU 1, KY (09/29/89)	Solidification/ stabilization		Yes		Solidification/stabilization was planned for the heavy metals remaining in the treated soils after the thermal desorption, but the treatment was not necessary.	Antonio DeAngelo 404-562-8826
4	Aberdeen Pesticide Dumps (Amendment), NC (09/30/91)	Solidification/ stabilization			Incineration (off site)	Arsenic is a contaminant at the site. Because the arsenic was commingled with pesticide wastes, all soil contaminated with arsenic was incinerated, and no soil required stabilization.	Kay Crane 404-562-8795

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4	Cape Fear Wood Preserving, NC (06/30/89)	Soil washing			Thermal desorption	An ESD issued in 1993 changed the remedy from soil washing to thermal desorption.	Jon Bornholm 404-562-8820
4	Chemtronics, Inc., NC (040/5/88)	Solidification/ stabilization		Yes		The project was canceled during the design phase, and the site was capped.	Jon Bornholm 404-562-8820
4	Marine Corps Base, Camp Lejeune - OU 12, Site 3 - The Old Creosote Plant, NC (04/03/97)	Bioremediation (ex situ) - solid-phase		Yes		Treatment goals could not be met during treatability testing, and therefore bioremediation (ex situ) – solid-phase will not be implemented. A ROD amendment that specifies disposal of the contaminated soils in an off-site landfill is being prepared.	Gena Townsend 404-562-8538
4	Sodyeco - Area C, NC (09/24/87)	Soil vapor extraction		Yes		During installation, contaminated drums were encountered, excavated, and removed. Contamination therefore decreased, and SVE no longer was required.	Michael Townsend 404-562-8813
4	Geiger (C&M Oil), SC (6/1/87)	Solidification/ stabilization		Yes		A ROD amendment was issued on 07/13/93.	Sheri Panabaker 404-562-8810
4	Kalama Specialty Chemicals, SC (09/28/93)	Solidification/ stabilization		Yes		The amount of contaminated material was less than originally estimated, so it was excavated and disposed of off site. Contingency in ROD.	Steven Sandler 404-562-8818
4	Kalama Specialty Chemicals, SC (09/28/93)	Mechanical soil aeration		Yes		The amount of contaminated material was less than originally estimated, so it was excavated and disposed of off site. Contingency in ROD.	Steven Sandler 404-562-8818
4	Savannah River (TNX Area), SC	In situ air stripping (air sparging)		Yes		Problems with implementability (equipment problems, on site problems) arose; development of an air recirculation well was not possible. Areas of low permeability precluded formation of the required recirculation cell. An ESD is to be issued in near the future.	Joao Cardoso-Neto (Bechtel) 803-952-6495 Keith A. Collinsworth (SCDHEC) 803-896-4055 Constance A. Jones 404-562-8551

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4	Savannah River (USDOE) - M Area Settling Basin, SC	In situ air stripping (air sparging)		Yes		This is a demonstration project, not a full-scale application.	Mike Simmons (DOE) 803-725-1627 Brian Looney (WSRC) 803-725-1627
4	Savannah River (USDOE) - OU 1, SC (06/29/92)	Solidification/ stabilization		Yes		The work was completed as a RCRA project that is not applicable to the ASR.	Mike Simmons (DOE) 803-725-1627 Brian Looney (WSRC) 803-725-3692
4	Amnicola Dump, TN (03/30/89)	Solidification/ stabilization		Yes		The volume of soil was much less than had been indicated in the ROD, and it was more cost-effective to dispose of the soil off site.	Robert West 404-562-8806
4	Arlington Blending and Packaging Co., TN (06/28/91)	Solidification/ stabilization		Yes		The estimated volume of contaminated media has decreased; the technology no longer is effective. An ESD is to be issued in near future.	Derek Matory 404-562-8800
4	Wrigley Charcoal, TN (09/30/91)	Incineration (off site)		Yes		The technology was too expensive; disposed of off site in a landfill. A ROD amendment was issued on 02/02/95.	Lisa Montalvo 404-562-8805
4	Wrigley Charcoal, TN (09/30/91)	Solidification/ stabilization		Yes		The technology was too expensive; disposed of off site in a landfill. A ROD amendment was issued on 02/02/95.	Lisa Montalvo 404-562-8805
5	Acme Solvent Reclaiming, Inc., IL (12/31/90)	Incineration (off site)		Yes		The ROD identifies off-site incineration as a contingency. The technology was never implemented.	David Linnear 312-886-1841
5	Belvidere Municipal Landfill - No. 1, IL (06/29/88)	Incineration (off site)		Yes		Incineration off site was included in the ROD to be used if the concentration of PCBs was greater than 50 ppm. Because the concentration was not, PCBs were disposed of off site.	William Ballard 312-353-6083
5	Byron/Johnson Salvage Yard, IL (03/13/85)	Incineration (off site)		Yes		Excavation, hauling, and landfilling were used instead of off-site incineration as indicated in the ROD because of high cost.	Bill Bolen 312-353-6316
5	Savanna Army Depot Activity, IL	Solidification/ stabilization		Yes		This project is a RCRA closure - state oversight.	David Seely 312-886-7058

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5	Fisher-Calo, IN (08/07/90)	Soil vapor extraction			Bioremediation (in situ) - biosparging	Biosparging was determined to be more effective than SVE; no ROD amendment or ESD has been issued.	Jeffrey Gore 312-886-6552
5	Main Street Well Field, IN (03/29/91)	Incineration (off site)		Yes		Off-site incineration was never implemented at this site.	Deborah Orr 312-886-7576
5	Wayne Waste Oil, IN (03/30/90)	Bioremediation (in situ)			Bioremediation (in situ) - biosparging	The technology has been reclassified.	Jeffrey Gore 312-886-6552
5	Wayne Waste Oil, IN (03/30/90)	Solidification/ stabilization		Yes		The technology was determined to be unnecessary. Metals were the only contaminants of concern, and the site had been capped already. Consequently, the risk was minimized. No ROD amendment or ESD was written.	Jeffrey Gore 312-886-6552
5	Wedzeb, IN (06/30/89)	Incineration (off site)		Yes		52,000 drums of PCB capacitors were incinerated off site in 1987 at the Apptus facility in Kansas. Soil was excavated and disposed of off site because the contamination remaining in soil was low. No ROD amendment or ESD was issued.	Kenneth Theisen 312-886-1959
5	Berlin & Farro Liquid Incineration, MI (02/29/84)	Incineration (off site)		Yes		Contingency in the ROD. ROD specified transportation of PCB liquid wastes, if any, to an approved off-site incinerator.	Robert Whippo 312-886-4759
5	Burrows Sanitation, MI (09/30/86)	Solidification/ stabilization		Yes		The volume of contamination was smaller than originally had been estimated. It was more cost-effective to excavate and dispose of off site under removal authority.	Jeffrey Gore 312-886-6552
5	Carter Industrials, Inc., MI (09/18/91)	Incineration (off site)		Yes		1991 ROD specified thermal desorption, not incineration off-site. Misinterpretation of ROD. Amended ROD 2/28/95 canceled remedy because the cost for off-site disposal dropped, there was less soil, and restrictions on interstate transport have decreased.	Jon Peterson 312-353-1264
5	Clare Water Supply, MI (09/16/92)	Thermal desorption		Yes		The remedy should have been listed as SVE. The 1992 ROD specified SVE, not thermal desorption, but SVE was not feasible because of the low permeability of soils. A ROD amendment was issued on 05/15/97.	Jon Peterson 312-353-1264

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5	Duell-Gardner Landfill, MI (09/07/93)	Thermal desorption		Yes		The volume of contaminated material was much smaller than originally had been estimated. Consequently, it was more cost-effective to excavate and dispose of the material off site. A ROD amendment was to be issued in FY98.	Lolita Hill 312-353-1621
5	Electrovoice, MI (06/23/92)	Solidification/ stabilization		Yes		Solidification/stabilization was identified as a contingency remedy in the 1992 ROD. If cleanup goals are not achieved by the SVE system, the soils will be excavated and stabilized. The SVE system is in operation and its performance will be reviewed next year.	Karen Sikora 312-886-1843
5	Forest Waste Products, MI (03/31/88)	Incineration (off site)		Yes		An ESD is to be issued in the near future.	Elizabeth Reiner 312-353-6576
5	H. Brown Company, Inc., MI (09/30/92)	Solidification/ stabilization		Yes		The site was capped with clay and covered with asphalt so that the property could be redeveloped. Two ROD amendments have been issued. The first, issued on 09/29/95, removed solidification/stabilization from the project.	Timothy Prendiville 312-886-5122
5	Thermo-Chem, Inc. - OU 1, MI (09/30/91)	Incineration (off site)		Yes		The concentrations of the contaminants in the soil were low and it was not cost-effective to treat the soil with incineration. The metals could not be treated with incineration. The contaminated soil was excavated and disposed of off site.	James Hahnenberg 312-353-4213
5	MacGillis and Gibbs/Bell Lumber and Pole - OU 3, MN (09/22/94)	Bioremediation (in situ) - groundwater		Yes		The technology is ex situ, not in situ. Groundwater is being pumped and treated above ground.	Darryl Owens 312-886-7089 Miriam Horneff (MPCA) 612-296-7228
5	Ritari Post and Pole - OU 1, MN (06/30/94)	Incineration (off site)			Bioremediation (ex situ) - land treatment	Incineration was too expensive.	Ted Smith 312-353-6571 John Moeger (MPCA) 612-296-9707
5	Ritari Post and Pole - OU 1, MN (06/30/94)	Incineration (off site)		Yes		Incineration was too expensive. Chemical oxidation may be used to treat highly contaminated soils, and land treatment will be used for lower concentrations; the use of off site incineration would move the risk outside the site. An ESD is to be issued.	Ramon Torres 312-886-3010

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5	Allied Chem & Ironton Coke, OH (12/28/90)	Incineration (on site)		Yes		Contaminated soil volume decreased. A ROD amendment was to be issued in May or June 1998. Soil contaminated with soft tar will be excavated, soil that meets the TCLP limit will be recycled for alternative fuel, and soil that fails the TCLP limit will be disposed of at an off-site landfill.	Matthew Mankowski 312-886-1842
5	Fields Brook, OH (09/30/86)	None				The original remedy in the 1986 ROD was not listed in the ASR. The 1986 ROD specified solidification of sediments. EPA issued and ESD on 08/15/97 changed solidification to disposal.	Terese Van Donsal 312-353-6564
5	Summit National Liquid Disposal Service - Amendment, OH (11/02/90)	Incineration (off site)		Yes		The 1988 ROD and the 1990 ROD amendment both specified incineration on site. It is documented as a project under the 1988 ROD.	Anthony Rutter 312-886-8961
5	Mid-State Disposal Landfill, WI (09/30/88)	Solidification/ stabilization		Yes		Solidification/stabilization was identified as a contingency that was to be used only to solidify the sludge lagoon so that a cap could be placed over it. Solidification/ stabilization was deemed unnecessary. A geomembrane cap was used without solidification/ stabilization.	Mary Tierney 312-886-4785
5	Onalaska Municipal Landfill, WI (08/14/90)	Bioremediation (in situ)			Bioremediation (in situ) - bioventing	The technology was reclassified from bioremediation in situ to bioventing.	George Mickelson (WIDNR) 608-267-0858 Kevin Adler 312-886-7078
5	Spickler Landfill, WI (06/03/92)	Solidification/ stabilization		Yes		Results of a test of stabilization/solidification showed that the technology would not provide a significant reduction in the mobility or hydraulic conductivity of mercury wastes. An impermeable cap with synthetic liner was used to eliminate infiltration.	John Fagiolo 312-886-0800
6	Gurley Pit, AR (10/06/86)	Incineration (off site)		Yes		The cost was too high; transportation and safety problems also arose.	Ernest R. Franke 214-665-8521
6	Popile, AR (02/01/93)	Bioremediation (ex situ)			Bioremediation (ex situ) - land treatment	The RI data is being reviewed to determine whether there is a more appropriate remedy. The site was capped under a removal action. FS decisions will be made in 1999.	Shawn Ghose 214-665-6782

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6	Popile, AR (02/01/93)	Bioremediation (in situ)			Bioremediation (in situ) - groundwater	The RI data is being reviewed to determine whether there is a more appropriate remedy. The site was capped under a removal action. FS decisions will be made in 1999. The original remedy had been composting, but the remedy was changed to bioremediation in situ - groundwater.	Shawn Ghose 214-665-6782
6	Vertac, Inc., AR (06/30/93)	Incineration (off site)		Yes		This project has been consolidated with off-site incineration under the 1993 ROD for OU1. All material specified in that ROD was incinerated off site according to a 1995 ESD. See information under the listing for incineration off site at OU1.	Phillip Allen 214-665-8516
6	Vertac, Inc. - Onsite OU 1, AR (05/25/95)	Incineration (on site)			Incineration (off site)	An on-site incinerator was present after use for a previous removal action. The PRP and the incinerator operator could not agree on a price, so EPA allowed the PRP to choose to incinerate the soils off site. An ESD was issued on 05/25/95.	Mike Arjmandi (ADPCE) 501-682-0852 Phillip Allen 214-665-8516
6	Bayou Bonfouca - Source Control OU (Amendment), LA (07/20/95)	Incineration (off site)		Yes		This ROD amendment (07/20/95) actually covered the off-site incineration of waste from the Southern Shipbuilding Corporation site. Therefore, no waste from Bayou Bonfouca was incinerated off site or addressed by this ROD amendment.	Mark Hansen 214-665-7548
6	Pab Oil & Chemical Services, Inc., LA (09/22/93)	Bioremediation (ex situ) - other			Solidification/ Stabilization	Bioremediation was discontinued because of implementability problems. An ESD was issued on 03/12/1997.	Caroline Ziegler 214-665-2178
6	Atchison, Topeka, & Santa Fe Clovis/Santa Fe Lake - TPH lake sediments, NM (09/23/88)	Bioremediation (ex situ) - land treatment		Yes		No information available.	Donald H. Williams 214-665-2197
6	Oklahoma Refining Co., OK (06/09/92)	Bioremediation (ex situ) - other			Bioremediation (ex situ) - land treatment	The type of bioremediation was clarified; there was no actual remedy change.	Kelly Dixon (ODEQ) 405-702-5141 Earl Hendrick 214-665-8519

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6	Bailey Waste Disposal, TX (06/28/88)	Solidification/ stabilization		Yes		Cost too high; treatment goals could not be met; more contamination than planned. New remedy includes excavation and offsite disposal of problematic wastes and installation of a geocomposite cap over mixed industrial and municipal wastes. ROD Amendment 12/16/96.	Chris Villarreal 214-665-6758
6	Brio Refining, TX (03/31/88)	Solidification/ stabilization		Yes		Solidification/ stabilization was considered during the RI/FS stages, but was not included in the ROD because it could not meet treatment levels. No ROD Amendment or ESD therefore was necessary.	John Meyer 214-665-6742
6	Kelly Air Force Base - Site 1100, Phase II, TX	This phase is an addition to the phase listed in the eighth edition.	Soil vapor extraction			No information available.	Bill Hall 210-925-3100
6	Kelly Air Force Base - Site 1100, Phase III, TX	This phase is an addition to the phase listed in the eighth edition.	Bioremediation (in situ)-bioventing			No information available.	Bill Hall 210-925-3100
6	Petro-Chemical Systems, Inc.-OU 2, TX (04/30/98)	This is an FY98 ROD that was not listed in the eighth edition.	Thermal desorption				Chris Villarreal 214-665-6758
6	Petrochemical (Turtle-Bayou), TX (09/06/91)	Incineration (off site)			Soil vapor extraction	Misinterpretation of ROD. SVE currently is being used to remediate four soil areas at the site.	Chris Villarreal 214-665-6758
6	Sheridan Disoposal Services, TX (12/29/88)	Solidification/ stabilization		Yes		Misinterpretation of the ROD.	Gary A. Baumgarten 214-665-6749
6	South Cavalcade Street, TX (09/26/88)	Incineration (off site)		Yes		The 09/26/88 ROD listed incineration (off site) for sludges, if encountered. However, no sludges were not found and therefore incineration was not performed.	Glenn Celerier 214-665-8523
6	South Cavalcade Street, TX (09/26/88)	Soil washing		Yes		A pilot study of soil washing showed that 40 percent of the volume could not be washed to meet goals. Soils contaminated with carcinogenic PAHs at levels higher than 700 ppm will be sealed and contained beneath a six-inch-thick reinforced concrete cap. A ROD amendment was issued on 06/27/97.	Glenn Celerier 214-665-8523

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6	South Cavalcade Street, TX (09/26/88)	Flushing (in situ)		Yes		Estimated volume of contaminated soil much less than anticipated, but treatment goals could not be reached anyway. Will cap the site instead. ROD Amendment issued 6/27/97.	Glenn Celerier 214-665-8523
7	Midwest Manufacturing/North Farm (Amendment), IA (09/30/93)	Solidification/ stabilization		Yes		The cost was too high; contaminant levels for both OUs were lower than before. Site risks were evaluated to determine that monitoring with institutional controls would effectively address the contamination at both OUs. The original ROD was issued in 1988.	Diane Easley 913-551-7797
7	Strother Field Industrial Park, KS (03/31/94)	Soil vapor extraction		Yes		The application of SVE technology is impractical at this site because the soil permeability is too low. The remedy proposed in the ESD is a pump-and-treat system with monitored natural attenuation. An ESD was to be issued by 09/30/98.	Paul Roemerman 913-551-7694
7	Ellisville Site - Bliss, MO (09/29/86)	Incineration (off site)				The 1986 ROD called for interim storage of contaminated soil on site and incineration at an off-site commercial facility. The 1991 ROD called for off-site incineration at the Times Beach, MO site operated by the PRPs. A ROD amendment was issued on 09/30/91.	Robert Feilds 913-551-7697
7	Missouri Electric Works, MO (09/28/90)	Incineration (on site)			Thermal desorption	On-site incineration was too expensive. A ROD amendment was issued in September 1995.	Pauletta France-Isetts 913-551-7701
7	Shenandoah Stables, MO (09/28/90)	Solidification/ stabilization		Yes		Misinterpretation of the ROD.	Robert Feild 913-551-7697
8	Broderick Wood Products, CO (03/24/92)	Bioremediation (in situ) - groundwater			Bioremediation (in situ) - bioventing	The remedy was changed to bioventing in the ESD issued on 03/24/95. The pump-and-treat system did not work with LNAPLs; therefore, the cost of implementing it would be high.	Armando Saenz 303-312-6559
8	Fort Carson - Building 9648 OU, CO	Bioremediation (in situ) - other			Bioremedi-ation (in situ) - bioventing	The technology was reclassified.	John Cloonan 719-526-8004
8	Lockheed/Martin - W C Astronautics Facility, CO (09/24/90)	Soil vapor extraction			Thermal desorption	SVE will not be used. All soil will be excavated and treated by thermal desorption. Doing so will allow the site owner to reduce risk, eliminate the need for post-closure care, and clean-close the unit.	George Dancik 303-312-6206 Charles Johnson (CDPHE) 303-692-3348

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8	Rocky Mountain Arsenal - OU 17, CO (05/14/90)	Solidification/ stabilization		Yes		The ROD was misinterpreted.	Laura Williams 303-312-6660
8	Rocky Mountain Arsenal - OU 28, CO (01/15/93)	Solidification/ stabilization		Yes		OU 28 was the evaluation of alternatives for treatment of various future waste streams at RMA. Solidification/ stabilization was considered, but no actions were taken under OU 28.	Laura Williams 303-312-6660
8	Rocky Mountain Arsenal - OU 29, CO (01/15/93)	Incineration (off site)		Yes		OU 29 was an interim remedial action to address PCB wastes. Both off-site incineration and off-site landfilling were selected as the most preferable alternatives for disposal of PCB wastes. The PCB wastes were ultimately disposed of by landfilling.	Laura Williams 303-312-6660
8	Sand Creek Industrial, CO (09/28/90)	Incineration (off site)		Yes		No information is available.	Erna Waterman 303-312-6762
8	Summitville Mine - OU 0, CO (12/15/94)	Neutralization		Yes		The ROD was misinterpreted.	Victor Ketallappet 303-312-6528
8	Burlington Northern (Somers Plant) - Soil, Base - OU 4, UT (06/14/94)	Bioremediation (in situ) - other		Yes		The ROD was misinterpreted.	James C. Harris 406-441-1150
8	Montana Pole and Treating Plant - Soil OU, MT (09/21/93)	Bioremediation (in situ) - other		Yes		The ROD was misinterpreted.	James C. Harris 406-441-1150 Neil Marsh (MT) 406-444-1420
8	Silver Bow Creek/Butte Area - Rocker Timber Framing and Treatment Plant OU, MT (06/30/92)	Solidification/ stabilization		Yes		Solidification/stabilization treatment was recommended only if chemical treatment was not successful. The estimated volume of contaminated media had decreased; the technology was no longer effective.	Mike Bishop 406-441-1150
8	Ellsworth AFB - Abandoned Fire Protection Area, SD (05/10/96)	Soil vapor extraction		Yes		The FY96 ROD only expanded the dual phase system from the FY95 ROD, but did not add any technologies.	Peter Ismert 303-312-6665

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Ninth Edition (April 1999) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 8TH EDITION)	9TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
8	Hill Air Force Base - OU 4, UT (06/14/94)	Soil vapor extraction		Yes		The bottom half of the landfill is below the water table, and the landfill does not have a slurry wall to divert groundwater flow from it. Therefore, SVE technology could not be implemented. A series of 3 trenches collects leachate from the landfill.	Dr. Dan Atkins (DoD) 801-775-2559 Rob Stites 303-312-6664
8	Utah Power & Light/American Barrel, UT (07/07/93)	Incineration (off site)		Yes		Off-site incineration was specified as a contingent remedy but never was implemented.	Paula Schmittdiel 303-312-6861
9	Fairchild Semiconductor (Mt. View) - Bldg 1-4 (515 & 545 N. Whisman Rd./313 Fairchild Dr.), CA (06/30/89)	Soil vapor extraction		Yes		The water table rose and is now too high for SVE to be effective. A pump-and- treat system currently is being used. No ROD amendment or ESD was issued.	Dennis Curran Smith Env. Tech. Corp. 415-960-1640 Eugenia Chow 415-744-2258
9	FMC Corp. (Fresno Plant), CA (06/28/91)	Solidification/ stabilization		Yes		Removed from proposed NPL listing.	Cynthia Wetmore 415-744-2234
9	Intel, Mountian View, CA (06/09/89)	Mechanical soil aeration		Yes		Soil was excavated and shipped off site.	Eugenia Chow 418-744-2258
9	J.H. Baxter, CA (09/27/90)	Bioremediation (ex situ) - land treatment			Bioremediation (in situ) - bioventing	Ex situ bioremediation was replaced with in situ bioremediation. Landfarming may be used; biomass culture was added to contaminated soil. ESD issued 3/27/98.	Kathy Setian 415-744-2254 Beatriz Bofill 415-744-2235
9	Koppers (Oroville Plant), CA (09/13/89)	Solidification/ stabilization		Yes		Treatment goals could not be met. The concentrations of dioxins were sufficiently high that solidification/ stabilization was not feasible. A ROD amendment was issued on 08/29/96.	Charles Berrey 415-744-2223
9	March AFB - OU 1, Area 5 & Site 4, CA (06/20/96)	Bioremediation (in situ) - bioventing		Yes		No information available.	Richard Russell 415-744-2406
9	March AFB - OU 1, Area 5 & Site 4, CA (06/20/96)	Thermal desorption				No information available.	Richard Russell 415-744-2406

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Ninth Edition (April 1999) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 8TH EDITION)	9TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
9	Mather AFB - Soil and Groundwater OU/Smaller UST Sites, CA	Bioremediation (in situ)			Bioremediation (in situ) - bioventing	The technology was reclassified from bioremediation in situ to bioventing.	Kathleen Salyer 415-744-2214 Terry Winsor (Montgomery Watson) 916-231-4430
9	McColl, CA (06/30/93)	Solidification/ stabilization		Yes		Technology had implementation problems. EPA selected the contingency remedy of RCRA-equivalent closure for the sump wastes. Pilot and full-scale treatability studies were conducted during 1994 and 1995 to determine the feasibility of solidification/stabilization.	Patti Collins 415-744-2229
9	Purity Oil Sales, Inc., CA (09/26/89)	Solidification/ stabilization		Yes		The reason for deletion of the technology is unknown. An ESD was issued in 1995, and capping was performed at the site.	Rosemarie Caraway 415-744-2231
9	Raytheon, Mountain View, CA (06/09/89)	Mechanical soil aeration		Yes		Soil was excavated and shipped off site for disposal.	Eugenia Chow 415-244-2258
9	Roseville Drums, CA (03/03/88)	Bioremediation (in situ)		Yes	Bioremediation (in situ) - bioventing	The technology was reclassified from bioremediation in situ to bioventing.	Bradley Shipley 415-744-2287
9	Sacramento Army Depot, CA (01/17/95)	Solidification/ stabilization		Yes		The 1995 ROD was a base-wide ROD. It reiterated the S/S remedy specified in the 3/29/93 ROD. It did not add another S/S project. Hence there is only one S/S project at SAD.	Marlon Mezquita 415-744-1499
9	Southern California Edison, Visalia Pole Yard, CA (06/10/94)	Bioremediation (in situ) - groundwater			Thermally enhanced recovery	The remedy was implemented as a contingency. The remedy is actually "dynamic underground stripping." Treatment goals could not be met because concentrations were too high for bioremediation to work in a timely manner.	Richard Procunier 415-744-2219 Emmanuel Mensall (CADTSC) 916-255-3704
9	Southern California Edison, Visalia Pole Yard - Groundwater OU, CA (06/10/94)	Bioremediation (in situ) - groundwater		Yes		The remedy implemented was a contingency. Concentrations were too high. Bioremediation could not achieve cleanup levels in a realistic time frame.	Richard Procunier 415-744-2219 Emmanuel Mensall (CADTSC) 916-255-3704

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Ninth Edition (April 1999) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 8TH EDITION)	9TH EDITION ADDED	9TH EDITION DELETED	9TH EDITION CHANGED TO	COMMENTS	CONTACTS/PHONE
9	Valley Wood Preserving, Inc., CA (09/27/91)	Solidification/ stabilization		Yes		The estimated volume of contaminated media had decreased; the technology was no longer effective. A ROD amendment is to be issued in near future.	Michelle Lau 415-744-2227
10	FAA Northway Station, AK	Bioremediation (in situ)			Bioremediation (in situ) - groundwater	The technology was reclassified.	Daniel McKay 603-646-4738
10	FAA Strawberry Point Station, AK	Bioremediation (in situ)			Bioremediation (in situ) - biosparging	The technology was reclassified.	Daniel McKay 603-646-4738
10	Fort Wainwright - OU 1 - Chemical Agent Dump Site, AK (07/20/95)	Neutralization		Yes		Non-invasive geophysical investigations indicated the presence of buried chemical agents. However, when excavation was completed, the agents were undetectable.	David Williams (USACE) 907-753-5657 Dianne Soderlund 907-271-3425
10	U.S. DOE Idaho National Engineering and Environmental Lab - OU 23, ID	Solidification/ stabilization			Vitrification	Solidification/stabilization was never used at the site.	Terrell Smith Lockheed Marietta GW Restoration Dept. 208-526-5692 Wayne Pierre 206-553-7261
10	McCormick and Baxter Creosoting Company (Portland Plant), OR (03/29/96)	Solidification/ stabilization		Yes		Treatment goals could not be met. Decided to dispose offsite. The excavated soil contaminated with F-listed waste will be disposed offsite at a landfill. ROD Amendment to be issued in 1998.	Alan Goodman 503-326-3685
10	Union Pacific Railroad Tire Treatment, OR (03/27/96)	Bioremediation (in situ)			Bioremediation (in situ) - bioventing	Reclassified technology.	Brian McClure (ORDEQ) 541-298-7255 Alan Goodman 503-326-3685
10	American Crossarm & Conduit, WA (06/30/93)	Solidification/ stabilization		Yes		Excavated and transported contaminated soil to a landfill in Arlington, OR. Flyash was added to absorb moisture. ROD called for the material to be solidified off site.	Lee Marshall 206-553-2723

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Ninth Edition (April 1999) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 8TH EDITION)	9TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
10	Commencement Bay, South Tacoma Field, WA (09/29/94)	Soil vapor extraction		Yes		The plume was smaller than had been estimated; contamination levels have decreased. SVE was discussed as an option but never implemented.	Cami Grandinetti 206-553-8696
10	Commencement Bay, South Tacoma Field, WA (09/29/94)	In situ air stripping (air sparging)		Yes		The plume smaller than had been estimated; contamination levels have decreased. Air sparging was never implemented, and no ROD amendment or ESD was issued.	Cami Grandinetti 206-553-8696
10	Harbor Island (Lead), WA (09/30/93)	Incineration (off site)		Yes		Contaminated soil was disposed of at a hazardous waste disposal facility. The technology was a contingency in the ROD.	Keith A. Rose 206-553-7721
10	Queen City Farms, WA (10/24/85)	None	Solidification/ Stabilization			This remedy was not listed in the ASR.	Neil Thompson 206-553-7177
10	Western Processing Co., Inc., WA	Thermal desorption		Yes		Contaminated soil was excavated and transported off site to a landfill in Arlington, OR. The remedy was contingent and never implemented.	Lee Marshall 206-553-2723
10	Western Processing Co., Inc. - ESD, WA (12/11/95)	Bioremediation (in situ) - other		Yes		Natural attenuation already was occurring at site. Bioremediation would not enhance the degradation of contaminants. An ESD will be issued to note the change.	Lee Marshall 206-553-2723
10	Western Processing Co., Inc. - Phase I, WA (08/05/84)	Incineration (off site)		Yes		Contaminated soil was excavated and disposed of off site. Incineration was not required. The specified remedy in the ROD was off-site disposal or incineration, so no amendment or ESD was required.	Lee Marshall 206-553-2723
10	Western Processing Co., Inc. - Phase II, WA (09/25/85)	Solidification/ stabilization		Yes		The technology never was specified in the ROD as the preferred remedy and therefore never was used at the site. Flyash was added to the soil to absorb moisture for easy transportation. The soil was excavated and disposed of off site.	Lee Marshall 206-553-2723

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

The eighth edition of this report added information about 38 innovative treatment technologies selected for remedial action under FY 1995 RODs and 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	New Bedford, MA (04/06/90)	Incineration (on site)		Yes		Remedy canceled because of community concerns. No alternative selected at this time.	David Dickerson 617-573-9632
1	Norwood PCBs, MA (09/29/89)	Solvent extraction		Yes		Remedy not implemented because of space constraints on-site, cost, and safety issues. New cleanup goals based on future land use and changes in risk assessment methodologies. Site will be capped instead. ROD Amendment issued on 5/17/96.	Bob Cianciarulo 617-573-5778
1	Wells G&H, MA (09/14/89)	Incineration (on site)			Incineration (off site)	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	Wells G&H, OU1, MA (09/14/89)	Soil vapor extraction	Soil vapor extraction and in situ 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
1	Davis Liquid Waste, RI (09/29/87)	Incineration (on site)			Thermal desorption	Thermal desorption cheaper and more effective based on performance data. ESD signed on 7/19/96.	Neil Handler 617-543-9636
2	Brook Industrial Park, OU 1, NJ (09/30/94)	Incineration (on site)		Yes		Misinterpretation of ROD. Will conduct off-site incineration or disposal.	Donna Vizian 212-637-4295
2	De Rewal Chemical, NJ (09/29/89)	Incineration (on site)		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)	Incineration (on site)			Thermal desorption*	ROD specified thermal treatment of marsh sediments. Thermal desorption was selected as the treatment.	Fred Cataneo 212-637-4428
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

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

Eighth Edition (November 1996)(continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 7TH EDITION)	8TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
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
2	Love Canal, NY (10/1/87)	Incineration (on site)			Incineration (off site)	PRP was conducting on-site incineration at another site. Waste was transported to that site for incineration. ESD issued 11/96.	Damian Duda 212-637-4269 Doug Carbarini 212-637-4263
2	Sarney Farm, NY (09/27/90)	Incineration (on site)			Thermal desorption*	Misinterpretation of the ROD.	Kevin Willis 212-637-4271
3	Delaware Sand & Gravel, DE (04/22/88)	Incineration (on site)			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)	Incineration (on site)			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)	Incineration (on site)			Incineration (off site)	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)	Incineration (on site)		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)	Incineration (on site)			Incineration (off site)	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)	Incineration (on site)			Incineration (off site)	Remedy changed because the volume of wastes was less than originally projected. ESD signed on 12/28/94.	Chris Corbet 215-566-3220

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Eighth Edition (November 1996)(continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 7TH EDITION)	8TH EDITION			COMMENTS	CONTACTS/PHONE
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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. ROD amendment issued on 8/27/96.	Andrew Palestini 215-597-1286
3	Saunders Supply Co., 0U 1, VA (09/30/91)	Dechlorination and Thermal desorption			Incineration (off site)	Remedy changed to off-site incineration due to implementability, short-term effectiveness, and cost. ROD Amendment issued on 9/27/96.	Andrew Palestini 215-597-1286
3	Ordnance Works Disposal, WV (03/31/88)	Incineration (on site)		Yes	Bioremediation (ex situ)*	Remedy changed because of community concerns. ROD amended in 1/89.	Melissa Whittington 215-566-3235
4	Ciba-Geigy (McIntosh Plant), OU 2, AL (09/30/91)	Thermal desorption			Incineration (on site)*	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)	Flushing (in situ)		Yes		Treatability study showed percolation from precipitation was just as effective. Minimal benefit would be gained from flushing (in situ).	Charles L. King, Jr. 404-562-8931
4	Ciba-Geigy (McIntosh Plant), OU 4, AL (07/14/92)	Thermal desorption			Incineration (on site)	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)	Flushing (in situ)		Yes		Treatability study showed percolation from precipitation was just as effective. Minimal benefit would be gained from flushing (in situ).	Charles L. King, Jr. 404-562-8931
4	Mowbray Engineering, AL (09/25/86)	Incineration (on site)		Yes	Solidification/ stabilization	Remedy changed because of cost.	Tim Woolheater 404-347-2643
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	Zellwood Groundwater, FL (12/17/87)	Incineration (on site)			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

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Eighth Edition (November 1996)(continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 7TH EDITION)	8TH EDITION			COMMENTS	CONTACTS/PHONE
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4	Mathis Brothers Landfill (South Marble Top Road), GA (03/24/93)	Incineration (on site)			Incineration (off-site) and bioremediation (ex-situ)*	Remedy changed because of community concerns, cost-effectiveness, and decreased waste volume from original ROD. Bioremediation will treat dicamba wastes. Incineration (off site) will treat all other wastes.	Charles L. King.Jr. 404-562-8931
4	Smith's Farm Brooks, KY (09/29/89)	Incineration (on site)			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)	Incineration (on site)			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	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
4	Geiger/C&M Oil, SC (06/01/87)	Incineration (on site)			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	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
4	American Creosote Works (Jackson Plant), TN (01/05/89)	Incineration (on site)		Yes		Action completed as a removal by excavating and disposing off site. ESD issued in 1992.	Femi Akindale 404-347-7791
5	Acme Solvent Reclaiming, IL (09/27/85)	Incineration (on site)		Yes		PRPs excavated and disposed of soil off-site.	Deborah Orr 312-886-7576
5	Fort Wayne Reduction, IN (08/26/88)	Incineration (on site)			Incineration (off site)	Remedy changed to ROD contingency off-site incineration because of community concerns, cost, and implementability.	Fred Mickey 312-886-5123

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Eighth Edition (November 1996)(continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 7TH EDITION)	8TH EDITION			COMMENTS	CONTACTS/PHONE
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5	Ninth Avenue Dump, IN (06/30/89)	Incineration (on site)			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)	Incineration (on site)		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)	Incineration (on site)			Incineration (off site)	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	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	Springfield Township Dump, MI (09/29/90)	Incineration (on site)		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	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	Arrowhead Refinery Co., MN (09/30/86)	Incineration (on site)			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
5	Ritari Post and Pole, OU 1, MN (06/30/94)	Incineration (on site)			Incineration (off site)	Misinterpretation of ROD. Remedy now being reconsidered. Capping is a contingency.	Ramon Torres 312-886-3010
5	Fields Brook, OH (09/30/86)	Incineration (on site)			Incineration (off site)	Remedy changed because of cost, community concerns, and reduced concentration. ESD issued on 8/15/97.	Ed Hanlon 312-353-9228
5	Pristine, OH (12/31/87)	Incineration (on site)			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)	Incineration (on site)			Thermal desorption*	1990 ROD amendment specified thermal destruction. Thermal desorption selected as the thermal destruction technology.	Tom Alcamo 312-886-7278

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Eighth Edition (November 1996)(continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 7TH EDITION)	8TH EDITION			COMMENTS	CONTACTS/PHONE
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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) - other		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
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	Vertac, AR (09/27/90)	Incineration (on site)		Yes		Incinerator would not function properly. Community preferred landfilling and was cheaper. ROD amendment issued 9/17/96.	Phillip Allen 214-665-8516
6	Gulf Coast Vacuum Services, OU 1, LA (09/30/92)	Incineration (on site)			Bioremediation (ex situ)- land treatment	Agreement between PRPs and EPA to meet the treatment standards using bioremediation.	Kathleen Aisling 214-665-8509
6	MOTCO, TX (03/15/85)	Incineration (on site)			Incineration (off site)	Remedy changed because of contractor problems and cost. ESD has been issued.	Mary Ann Abramson 214-665-6754
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

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

Eighth Edition (November 1996)(continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 7TH EDITION)	8TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
7	People's Natural Gas, IA (06/16/91)	Bioremediation (in situ) - other	Air sparging				Diana Engeman 913-551-7797
7	Hastings Groundwater Contamination (East Industrial), NE (09/28/90)	Incineration (on site)			Incineration (off site)	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
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)	In situ air stripping		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
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	Broderick Wood Projects, CO (06/30/88)	Incineration (on site)		Yes	Incineration (off site)*	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
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)	Flushing (in situ)			Bioremediation (ex situ) - land treatment*	Further investigation indicated flushing (in situ) 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

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

Eighth Edition (November 1996)(continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 7TH EDITION)	8TH EDITION ADDED	8TH EDITION DELETED	8TH EDITION CHANGED TO	COMMENTS	CONTACTS/PHONE
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, cyanide concentrations were reduced and bioremediation was not necessary. ESD issued on 6/4/97.	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
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, more dioxins discovered and land use scenario changed. 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 issued on 8/29/96.	Fred Schauffler 415-744-2359
9	Koppers Company, Inc. (Oroville Plant), CA (09/13/89)	Bioremediation (in situ) - other		Yes		Presence of metals and dioxins made bioremediation infeasible, and land use scenario changed. 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 issued on 8/29/96.	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

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

Eighth Edition (November 1996)(continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 7TH EDITION)	8TH EDITION ADDED	DELETED	CHANGED TO	COMMENTS	CONTACTS/PHONE
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
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 on-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 this report added information about 42 innovative treatment technologies selected for remedial action under 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)	Bioremediation (ex situ) - 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 (ex situ) - 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)	Flushing (in situ) 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			Mechanical aeration	It was determined that SVE was not a viable remedy; soil was too tightly compacted. No alternative has been selected. ESD issued on 11/22/95.	Jim Harper 215-597-6906
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	Incineration (off site)	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 (approximately $300 per cu yd). It is less expensive to dispose of the wastes at TSCA landfill (approximately $186 per Ton).	Jon Peterson 312-353-1264

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

Seventh Edition (September 1995) (Continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 6TH EDITION)	7TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
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
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)	Flushing (in situ)		Yes		Flushing (in situ) 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

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

Seventh Edition (September 1995) (Continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 6TH EDITION)	7TH EDITION ADDED	7TH EDITION DELETED	7TH EDITION CHANGED TO	COMMENTS	CONTACTS/PHONE
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
9	Fairchild Semiconductor, CA (06/30/89)	Two listings for soil vapor extraction	Three more soil vapor extraction 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	Four 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 stratigraph •Reluctance to put holes into the landfill, which could lead to leaching of contaminants	Cami Grandinetti 206-553-8696
10	Gould, Inc., OR (03/31/88)	Soil washing		Yes		Will cap the landfill and conduct pump-and-treat operations. 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.

Seventh Edition (September 1995) (Continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 6TH EDITION)	7TH EDITION ADDED	DELETED	CHANGED TO	COMMENTS	CONTACTS/PHONE
10	Naval Submarine Base, Bangor Site A, OU 1, WA (12/10/91)	Soil washing			Flushing (in 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)	Flushing (in situ)		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)	Bioremediaiton (in situ)-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 this report added information about 53 innovative treatment technologies selected for remedial action under 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 (In situ)			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)	Flushing (in situ)		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
2	Naval Air Engineering Center, OU 7, Interim Action, NJ (03/16/92)	Flushing (in situ)		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)	Flushing (in situ)			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
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

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

Sixth Edition (September 1994)(continued)

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)	Flushing (in situ)		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 (ex situ) (slurry-phase)			Bioremediation (ex situ) - 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
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) (magnetically enhanced land farming)			Adding technology to treat more highly contaminated soil. ROD Amendment issued on 9/4/97.	Tom Alcamo 312-886-7278

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

Sixth Edition (September 1994)(continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 5TH EDITION)	6TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
5	Allied Chem & Ironton Coke, OU 2, OH (12/28/90)	Bioremediation (in situ)		Yes		Adding technology to treat more highly contaminated soil. ROD Amendment issued on 9/4/97.	Tom Alcamo 312-886-7278
5	United Scrap Lead/SIA, OH (09/30/88)	Soil washing		Yes		Determined to be too expensive. Soil disposed off-site if lead levels above 1,550 ppm; containment of soil below this level. ROD amendment issued on 6/27/97.	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
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

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

Sixth Edition (September 1994)(continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 5TH EDITION)	6TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
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
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 this 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 ADDED	5TH EDITION DELETED	5TH EDITION CHANGED TO	COMMENTS	CONTACTS/PHONE
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)	Flushing (in situ)		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)	Flushing (in situ)		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)	Flushing (in situ)		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
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

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

Fifth Edition (September 1993) (continued)

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)	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)		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
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)		Soil vapor extraction			Remedy added.	Joe Healy 415-744-2331
9	Teledyne Semiconductors, CA (03/22/91)		Soil vapor extraction			Dropped by mistake from fourth edition.	Kevin Graves (CA) 510-286-0435 Sean Hogan 415-744-2233

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

Fifth Edition (September 1993) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 4TH EDITION)	5TH EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
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 this 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)		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 this report added information to the 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)	Flushing (in situ)		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	Incineration	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			Thermal desorption	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		Yes		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)	Flushing (in situ)		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

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

Third Edition (April 1992) (continued)

REGION	SITE NAME, STATE (ROD DATE)	TECHNOLOGY (LISTED IN 2ND EDITION)	3RD EDITION			COMMENTS	CONTACTS/PHONE
			ADDED	DELETED	CHANGED TO		
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 this report added information about 45 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		
1	Re-Solve, MA (09/24/87)	Chemical extraction		Yes	Dechlorination	Reclassified technology.	Lorenzo Thantu 212-637-4240
2	GE Wiring Services, PR (09/30/88)	Chemical treatment			Soil washing	Reclassified technology.	Caroline Kwan 212-637-4275
2	SMS Instruments (Deer Park), NY (09/29/89)	Chemical treatment				ROD was misinterpreted during ROD analysis.	Miko Fayon 212-637-4250
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)	Flushing (in situ)		Yes (changed to soil vapor extraction in third edition)		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
6	Sol Lynn/Industrial Transformers, TX (03/25/88)	Thermal desorption			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 E

RODs Selecting Monitored Natural Attenuation

RODs Selecting Monitored Natural Attenuation

Region	Site Name	State	ROD Date
1	Atlas Tack Corp. Superfund Site	MA	3/10/2000
1	Barkhamsted-New Hartford Landfill	CT	9/28/2001
1	Brunswick Naval Air Station	ME	9/30/1994
1	Brunswick Naval Air Station Site 9 OU6	ME	9/28/1999
1	Burgess Brothers Landfill - OU 01	VT	9/25/1998
1	Cannon Engineering	MA	3/31/1988
1	Coakley Landfill	NH	9/30/1994
1	Dover Municipal Landfill	NH	9/10/1991
1	Dover Municipal Landfill, OU1	NH	9/30/2004
1	Fletcher's Paint Works & Storage - OU 01	NH	9/30/1998
1	Fort Devens - OU 05	MA	2/18/1998
1	Fort Devens, Areas Of Contamination (AOC) 43G and 43J	MA	10/17/1996
1	Gallup's Quarry	CT	9/30/1997
1	Mottolo Pig Farm	NH	3/29/1991
1	Natick Laboratory Army Research, Development, and Engineering Center	MA	9/19/2001
1	New Hampshire Plating Co. - OU 01	NH	9/28/1998
1	Pease Air Force Base - OU 4	NH	6/26/1995
1	Pease Air Force Base - OU 4	NH	9/26/1995
1	Pease Air Force Base - OU 6	NH	9/18/1995
1	Pease Air Force Base - OU 7	NH	12/30/2003
1	Peterson/Puritan	RI	9/30/1993
1	Picillo Farm	RI	9/27/1993
1	PSC Resources	MA	9/15/1992
1	Saco Municipal Landfill	ME	9/29/2000
1	Savage Municipal Water Supply	NH	9/27/1991
1	Solvents Recovery Service of New England, OU3	CT	9/30/2005
1	Tibbetts Road - OU 01	NH	9/28/1998
1	Tinkham Garage, OU1	NH	3/31/2003
1	Town Garage Radio Beacon	NH	9/30/1992
1	Troy Mills Landfill, OU1	NH	9/30/2005
1	W.R. Grace & Co., Inc (Acton Plant), OU3	MA	9/30/2005
1	West Site/Hows Corner Superfund Site	ME	9/24/2002
1	Western Sand & Gravel	RI	4/16/1991
2	Carroll and Dubies Sewage Disposal	NY	9/30/1996
2	Conklin Dumps	NY	3/29/1991
2	Dupont /Necco Park - OU 01	NY	9/18/1998
2	Forest Glen Subdivision OUs 2 & 3	NY	9/30/1999
2	Global Sanitary Landfill - OU 2	NJ	9/29/1997
2	Goldisc Recordings, Inc. - OU 02	NY	9/30/1998
2	Island Chemical Corp/Virgin Islands Chemical Corp., OU1	VI	8/13/2002
2	Islip Municipal Sanitary Landfill	NY	9/30/1992
2	Johnstown City Landfill	NY	3/31/1993
2	Jones Chemicals, Inc.	NY	9/27/2000
2	Juncos Landfill	PR	10/5/1993
2	Kin-Buc Landfill	NJ	9/28/1992
2	Malta Rocket Fuel Area	NY	7/13/1996
2	Marathon Battery	NY	9/30/1988
2	Naval Air Engineering Center	NJ	1/5/1995
2	Naval Air Engineering Station Areas I & J Groundwater OU 26	NJ	9/27/1999
2	Naval Weapons Station Earle - OU 2, Site 19	NJ	9/25/1997
2	Naval Weapons Station Earle (Site A) - OU 03	NJ	9/29/1998
2	Plattsburgh Air Force Base	NY	3/31/1995
2	Preferred Plating Corporation (ROD Amendment)	NY	9/30/1997
2	Renora	NJ	9/29/1987
2	Ringwood Mines/Landfill	NJ	9/29/1988
2	Robintech, Inc./National Pipe Company	NY	7/25/1997
2	Rosen Brothers Scrap Yard/Dump - OU 01	NY	3/23/1998
2	Sarney Farm	NY	9/27/1990
2	Smithtown Groundwater Contamination, OU1	NY	9/30/2004
2	Sidney Landfill, OU1	NY	9/24/2004
2	Tutu Wellfield	VI	8/5/1996
2	Volney Municipal Landfill, OU1	NY	10/19/2001
2	Woodland Routes 72 Dump and 532 Dump	NJ	7/1/1999
2	York Oil Co. - OU 02	NY	9/29/1998
3	Aberdeen Proving Ground (Edgewood Area), OU 21	MD	9/30/2004
3	Aberdeen Proving Ground (Edgewood Area), OU 11	MD	5/9/2005
3	Allegany Ballistics Laboratory (US Navy) - OU 05	WV	6/30/1998
3	Bell Landfill	PA	9/30/1994
3	Crater Resources Superfund Site	PA	9/27/2000
3	Dover Air Force Base - OU 10	DE	9/26/1995
3	Dover Air Force Base - OU 11	DE	9/26/1995
3	Dover Air Force Base, Fire Training Area 3, East Management Unit	DE	9/30/1997
3	Dover Air Force Base, Landfill 13, East Management Unit	DE	9/30/1997
3	Dover Air Force Base, Liquid Waste Disposal Area 14 and Landfill 15, Area 1, East Management Unit	DE	9/30/1997
3	Dover Gas Light Co	DE	8/16/1994
3	East Mt. Zion	PA	6/29/1990
3	Koppers Co., Inc. (Newport Plant), OU1	DE	9/30/2005
3	Malvern TCE - OU 01	PA	11/26/1997

RODs Selecting Monitored Natural Attenuation (continued)

Region	Site Name	State	ROD Date
3	Mid-Atlantic Wood Preservers	MD	12/31/1990
3	New Castle Spill	DE	9/28/1989
3	Ohio River Park - OU 03	PA	9/17/1998
3	Old City Of York Landfill	PA	3/31/2000
3	Osborne Landfill - OU 02	PA	12/30/1997
3	Rodale Manufacturing Co. Inc. Site OU 1	PA	9/30/1999
3	Tobyhanna Army Depot	PA	9/28/2000
3	Tobyhanna Army Depot - OU 1, Areas A & B	PA	9/30/1997
3	Westline	PA	6/29/1988
3	Woodlawn Landfill Site	MD	9/30/1999
4	Aberdeen Pesticide Dumps OU 3	NC	9/30/2003
4	Aberdeen Pesticide Dumps OU 5	NC	6/4/1999
4	Agrico Chemical Co.	FL	8/18/1994
4	Anodyne	FL	6/17/1993
4	Arlington Blending and Packaging (ROD Amendment)	TN	7/24/1997
4	B&B Chemical Co., Inc.	FL	9/12/1994
4	Blue Ridge Plating Company, OU1	NC	9/29/2004
4	BMI-Textron	FL	8/11/1994
4	Camp Lejeune Military Reservation	NC	9/26/2000
4	Camp Lejeune Military Reservation, OU 7	NC	7/6/2005
4	Carolina Transformer Co., OU1	NC	7/22/2005
4	Cecil Field Naval Air Station - OU 06	FL	9/25/1998
4	Cecil Field Naval Air Station - OU 08	FL	8/27/1998
4	Cecil Field Naval Air Station - OU 2	FL	6/24/1996
4	Cecil Field Naval Air Station (Site 8) OU 3	FL	8/25/1999
4	Cecil Field Naval Air Station OU 7	FL	5/12/1999
4	Cedartown Industries	GA	5/7/1993
4	Cedartown Municipal Landfill	GA	11/2/1993
4	Cherry Point Marine Corps Air Station	NC	10/24/2000
4	Cherry Point Marine Corps Air Station OU 2	NC	9/29/1999
4	Cherry Point Marine Corps Air Station OU 4	NC	9/14/2005
4	Cherry Point Marine Corps Air Station OU 13	NC	9/14/2005
4	Chevron Chemical Company	FL	5/22/1996
4	Coleman-Evans Wood Preserving Co., OU1	FL	9/20/2005
4	Davie Landfill	FL	8/11/1994
4	Davis Park Road TCE - OU 01	NC	9/29/1998
4	Davis Park Road TCE Site	NC	9/27/2000
4	Diamond Shamrock Corp. Landfill	GA	5/3/1994
4	Dubose Oil Products	FL	3/29/1990
4	FCX, Inc. (Statesville Plant) - OU 3	NC	9/30/1996
4	FCX, Inc. (Washington Plant)	NC	9/8/2005
4	Flanders Filters Inc - OU 01	NC	9/18/1998
4	Florida Petroleum Reprocessors	FL	3/1/2001
4	Geiger (C & M Oil) - OU 01	SC	9/9/1998
4	Hercules 009 Landfill	GA	3/25/1993
4	Hipps Road Landfill, OU1	FL	7/28/2004
4	Homestead Air Force Base OUs 18, 26, 28, & 29	FL	3/15/1999
4	Interstate Lead (ILCO)	AL	9/30/1991
4	Interstate Lead Co. (ILCO) - OU 3	AL	9/29/1995
4	Jacksonville Naval Air Station	FL	9/28/2000
4	Jacksonville Naval Air Station - OU 01	FL	8/3/1998
4	Jacksonville Naval Air Station - OU 05	FL	9/22/2005
4	Jacksonville Naval Air Station - OU 07	FL	9/22/2005
4	Marine Corps Logistics Base	GA	9/19/2001
4	Memphis Defense Depot (DLA), OU1	TN	4/12/2004
4	Murray-Ohio Dump	TN	6/17/1994
4	National Starch & Chemical Corp.	NC	10/6/1994
4	Naval Air Station (NAS) Cecil Field	FL	4/24/2001
4	Naval Air Station (NAS) Cecil Field	FL	1/11/2000
4	Naval Air Station (NAS) Cecil Field, OU 9	FL	9/14/2005
4	Naval Air Station (NAS) Cecil Field, OU 10	FL	9/29/2004
4	Naval Air Station (NAS) Cecil Field, OU 10	FL	9/14/2005
4	Naval Air Station (NAS) Cecil Field, OU 11	FL	11/13/2003
4	Normandy Park Apartments	FL	5/11/2000
4	Peak Oil Co./Bay Drum Co., OU2	FL	1/7/2005
4	Potter's Septic Tank Service Pits	NC	9/27/2000
4	Redwing Carriers/Saraland	AL	12/15/1992
4	Reeves Southeastern Galvanizing - OU 2	FL	9/9/1993
4	Robins Air Force Base (Landfill #4/Sludge Lagoon), OU3	GA	9/30/2004
4	Ross Metals, Inc.	TN	9/17/2002
4	Sanford Gasification Plant	FL	6/12/2001
4	Savannah River Site (USDOE)	SC	6/22/2001
4	Savannah River Site (USDOE) - OU 24	SC	3/29/2005
4	Savannah River Site (USDOE) - OU 25	SC	3/10/2004
4	Savannah River Site (USDOE) - OU 27	SC	8/14/1998
4	Savannah River Site (USDOE) - OU 56	SC	1/10/2003
4	Solitron Microwave	FL	11/1/2000
4	Standard Auto Bumper Corp.	FL	12/10/1993
4	Taylor Road Landfill	FL	9/29/1995
4	Townsend Saw Chain Co.	SC	12/19/1996
4	Whitehouse Oil Pits - OU 01	FL	9/24/1998
4	Wingate Road Municipal Incinerator Dump and Landfill	FL	5/14/1996

RODs Selecting Monitored Natural Attenuation (continued)

Region	Site Name	State	ROD Date
4	Yellow Water Road Dump	FL	6/30/1992
4	Zellwood Ground Water Contamination Site	FL	8/23/2000
5	A & F Materials Reclaiming	IL	8/14/1986
5	Adams County Quincy Landfill #2 & #3	IL	9/30/1993
5	Agate Lake Scrapyard	MN	1/13/1994
5	Albion Sheridan Township Landfill	MI	3/28/1995
5	Alsco Anaconda	OH	9/30/1992
5	American Chemical Service, Inc., OU 1	IN	9/15/2004
5	Beloit Corp., OU 1	IL	9/27/2004
5	Bendix Corp/Allied Automotives Site	MI	9/30/1997
5	Charlevoix Municipal Well Field	MI	9/30/1985
5	Cliff/Dow Dump	MI	9/27/1989
5	Dakhue Sanitary Landfill	MN	6/30/1993
5	Dupage County Landfill/Blackwell Forest -OU 01	IL	9/30/1998
5	Electro-Voice OU 2	MI	9/21/1999
5	Fadrowski Drum Disposal	WI	6/10/1991
5	Galen Meyer's Dump/Drum Salvage	IN	9/29/1995
5	H.O.D. Landfill - OU 01	IL	9/28/1998
5	Hechimovich Sanitary Landfill	WI	9/6/1995
5	Industrial Excess Landfill	OH	3/1/2000
5	Ionia City Landfill	MI	9/28/2000
5	K&L Avenue Landfill, OU 1	MI	9/12/2005
5	Kohler Company Landfill	WI	6/26/1996
5	Metamora Landfill	MI	9/27/2001
5	Mig/Dewane Landfill	IL	3/30/2000
5	Mound Plant (USDOE), OU 14	OH	7/29/2003
5	Nease Chemical, OU 2	OH	9/29/2005
5	Oak Grove Sanitary Landfill	MN	12/21/1990
5	Outboard Marine Company/Waukegan Coke Plant	IL	9/30/1999
5	Penta Wood Products - OU 01	WI	9/29/1998
5	Petoskey Municipal Well Field - OU 01	MI	9/30/1998
5	Prestolite Battery Division	IN	8/23/1994
5	Rasmussen's Dump	MI	7/20/2001
5	Reilly Tar and Chemical (Indianapolis Plant) - OU 5	IN	6/30/1997
5	Roto-Finish Co, Inc.	MI	3/31/1997
5	Sangamo Electric Dump/Crab Orchard National Wildlife Refuge Site	IL	6/23/2000
5	Seymour Recycling Corp., OU 2	IN	12/24/2002
5	South-East Rockford Groundwater Contamination	IL	6/11/2002
5	Tippecanoe Sanitary Landfill, Inc.	IN	9/30/1997
5	Tomah Municipal Sanitary Landfill, OU 2	WI	9/24/2003
5	Twin Cities AF Reserve (SAR Landfill)	MN	3/31/1992
5	U.S. Aviex, OU 1	MI	9/29/2004
5	Wheeler Pit	WI	9/28/1990
5	Woodstock Municipal Landfill - OU 01	IL	7/15/1998
5	Wright-Patterson Air Force Base - OU 2, Spill Sites 2, 3 & 10	OH	9/30/1997
6	Arkwood	AR	9/28/1990
6	Brio Refining	TX	3/31/1988
6	City of Perryton Well No. 2	TX	9/26/2002
6	Combustion, Inc., OU 1	LA	5/28/2004
6	Conroe Creosoting Co.	TX	9/29/2003
6	Dutchtown Treatment Plant	LA	6/20/1994
6	Fourth Street Abandoned Refinery	OK	9/30/1993
6	French Limited	TX	3/24/1988
6	Gulf Coast Vacuum Services - OU 1	LA	9/30/1992
6	Gulf States Utilities - North Ryan Street Site	LA	9/27/2000
6	Hardage/Criner (Amendment)	OK	11/22/1989
6	Koppers (Texarkana Plant)	TX	9/23/1988
6	Koppers (Texarkana Plant) (Amendment)	TX	3/4/1992
6	Koppers Company, Inc (Texarkana Plant)	TX	8/20/2002
6	Lee Acres Landfill (USDOI), OU 1	NM	7/23/2004
6	Many Diversified Interests, Inc., OU 1	TX	7/30/2004
6	Monroe Auto Pit (Finch Road Landfill)	AR	9/26/1996
6	Mosley Road Sanitary Landfill	OK	6/29/1992
6	Ouachita Nevada Wood Treater, OU 1	AR	9/28/2005
6	Petro-Chemical Systems, (Turtle Bayou) - OU 02	TX	4/30/1998
6	Sikes Disposal Pit	TX	9/18/1986
6	Sol Lynn/Industrial Transformers, OU 2	TX	9/30/2004
6	South 8th Street Landfill - OU 01, 02	AR	7/22/1998
6	United Creosoting	TX	9/30/1986
7	Bee Cee Manufacturing	MO	9/30/1997
7	Chemical Commodities, Inc., OU 1	KS	9/28/2005
7	Cleburn Street Well	NE	6/7/1996
7	Cornhusker Army Ammunition Plant	NE	12/14/1999
7	Cornhusker Army Ammunition Plant (CHAAP)	NE	9/26/2001
7	Farmers' Mutual Cooperative	IA	9/29/1992
7	Fort Riley, OU 4	KS	8/10/2005
7	Hastings Groundwater Contamination Site	NE	9/28/2000
7	Iowa Army Ammunition Plant, OU 3	IA	8/8/2005
7	Mason City Coal Gasification Site	IA	9/19/2000
7	Missouri Electric Works, OU 2	MO	9/28/2005

RODs Selecting Monitored Natural Attenuation (continued)

Region	Site Name	State	ROD Date
7	Newton County Wells, OU 1	MO	9/30/2004
7	Ogallala Ground Water Contamination OU 1	NE	4/23/1999
7	Quality Plating	MO	9/28/1999
7	Railroad Avenue Groundwater Contamination Site, OU 1	IA	9/19/2005
7	Ralston	IA	9/30/1999
7	Weldon Spring Former Army Ordnance Works, OU 2	MO	9/30/2004
7	Weldon Spring Quarry/Plant/Pits (USDOE/Army), OU 6	MO	2/20/2004
8	Anaconda Co. Smelter - OU 04	MT	9/29/1998
8	Chemical Sales Company Superfund Site	CO	3/27/2000
8	Denver Radium - OU 8	CO	1/28/1992
8	F.E. Warren Air Force Base, OU 3	WY	6/21/2004
8	F.E. Warren Air Force Base, OU 11	WY	11/8/2004
8	Hill Air Force Base - OU 1	UT	9/29/1998
8	Hill Air Force Base - OU 6	UT	9/30/1997
8	Hill Air Force Base - OU 8	UT	8/5/2005
8	Kennecott South Zone Site	UT	12/13/2000
8	Milltown Reservoir Sediments, OU 2	MT	12/15/2004
8	Monticello Mill Tailings (USDOE), OU 3	UT	6/2/2004
8	Murray Smelter - OU 00	UT	4/1/1998
8	Mystery Bridge at Highway 20	WY	9/24/1990
8	Portland Cement (Kiln Dust 2 & 3) - OU 03	UT	8/17/1998
8	Rocky Mountain Arsenal - Offpost OU	CO	12/19/1995
8	Rocky Mountain Arsenal - Onpost OU	CO	6/11/1996
8	Smeltertown Site - OU 02	CO	6/4/1998
8	Utah Power & Light/American Barrel	UT	7/7/1993
9	Andersen Air Force Base - OU 03	GU	6/16/1998
9	Apache Powder Co., OU 1	AZ	9/30/2005
9	Beckman Instruments (Porterville Plant), OU 1	CA	9/27/2005
9	Camp Pendleton Marine Corps Base, Site 9-41 Area - OU 1	CA	12/7/1995
9	Del Monte Corp. (Oahu Plantation), OU 1	HI	9/25/2003
9	Del Norte County Pesticide Storage Superfund Site	CA	8/29/2000
9	El Toro Marine Corps Air Station, OU 9	CA	8/16/2003
9	George Air Force Base OU 3	CA	10/5/1998
9	Indian Bend Wash Area - OU 03	AZ	9/30/1998
9	Indian Bend Wash Area - OU 03	AZ	6/24/2004
9	Lawrence Livermore National Laboratory	CA	2/23/2001
9	Operating Industries, Inc. Landfill	CA	9/30/1996
9	Pemaco Maywood, OU 1	CA	1/13/2005
9	Travis Air Force Base - OU 01	CA	12/3/1997
9	Travis Air Force Base West/ Annexes/Basewide OU (WABOU)	CA	3/16/1999
9	Yuma Marine Corps Air Station	AZ	9/8/2000
10	Adak Naval Air Station	AK	3/31/2000
10	Eielson Air Force Base - OU 03, 04, 05	AK	9/29/1998
10	Eielson Air Force Base - OU 6	AK	9/27/1994
10	Elmendorf Air Force Base - OU 4	AK	9/26/1995
10	Elmendorf Air Force Base - OU 5	AK	12/28/1994
10	Elmendorf Air Force Base - OU 9	AK	7/22/2004
10	Fairchild Air Force Base - OU Priority 2 Sites	WA	12/20/1995
10	Fort Richardson - OU A & B	AK	9/15/1997
10	Fort Richardson - OU 5	AK	9/30/2005
10	Fort Wainwright - OU 1	AK	6/27/1997
10	Fort Wainwright - OU 2	AK	3/27/1997
10	Fort Wainwright - OU 3	AK	4/9/1996
10	Fort Wainwright - OU 4	AK	9/24/1996
10	Hanford 1100-Area (DOE)	WA	9/24/1993
10	Idaho National Engineering and Environmental Laboratory Test Area North (TAN)	ID	9/19/2001
10	Monsanto Chemical Company	ID	4/30/1997
10	Naval Air Station, Whidbey Island - Ault Field - OU 5, Areas 1, 52, and 31	WA	7/10/1996
10	Naval Undersea Warfare Station (4 Areas) - OU 01	WA	9/28/1998
10	North Market Street	WA	12/14/1999
10	Northwest Pipe and Casing Company/ Hall Process Company	OR	9/27/2001
10	U.S. Naval Submarine Base Bangor - OU 8	WA	9/27/2000
10	Wyckoff/Eagle Harbor (Amendment) - OU West Harbor	WA	12/8/1995

Appendix F

Identification of Remedy and Record of Decision Types for Superfund Remedial Actions

F.1 BACKGROUND

On December 11, 1980, Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), which is known as the "Superfund" act. The act created the Superfund program, which was established to clean up abandoned hazardous waste sites around the United States. Section 105(a)(8)(B) of CERCLA, as amended, requires that the U.S. Environmental Protection Agency (EPA) prepare a list of national priorities among the known sites throughout the United States at which releases or threatened releases of hazardous substances, pollutants, or contaminants may occur. This list is known as the National Priorities List (NPL).

The remedies selected for an NPL site are documented in a record of decision (ROD). Remedies implemented at NPL sites or NPL equivalent sites in accordance with RODs are known as Superfund remedial actions, and such sites are known as Superfund remedial action sites. Because selected remedies vary in the type of media addressed and the methods used to address those media, confusion can arise when assigning a type to a particular remedy. Categorizing remedies by types can facilitate the transfer of experience and technology by making it easier to identify sites at which similar remedies are applicable. Establishing and applying a methodology for classifying remedy types can provide a consistent and comprehensive approach for reviewing and comparing remedies used in RODs. In addition, use of such an approach can lead to more consistent data collection and reporting and assist remedial project managers (RPMs), On-Scene Coordinators (OSCs), and other regulatory and remediation professionals in the transfer of experience and technology among Superfund sites and in identifying sites implementing similar remedies. This Appendix describes the approach used to classify remedies and RODs for the ASR.

Remedies were classified by reviewing the remedies selected in RODs. Although RODs are written using an overall format that is consistent, RODs are prepared by individual RPMs and other staff of the 10 EPA regions. In addition, the management practices and techniques used to remediate sites have evolved over time and continue to evolve. Therefore, the words, phrases, and descriptions applied to the same or similar remedies may differ from ROD to ROD. To facilitate the identification of remedy types, this appendix includes both descriptive definitions of remedy types and lists of key words and phrases that may be used to refer to each remedy type.

The definitions of remedy types provided in this document are based on a review of definitions and lists of media, remedies, and technologies provided in the following resources:

- The CERCLA Information System (CERCLIS 3) database
- ROD Annual Reports for fiscal years (FY) 1989 through 2005
- The Federal Remediation Technologies Roundtable (FRTR) Technology Screening Matrix
- Treatment Technologies for Site Cleanup: Annual Status Report (Twelfth Edition) (ASR)

The remedy type definitions were reviewed and augmented by a working group of personnel of the EPA Office of Solid Waste and Emergency Response (OSWER) who are experienced in site remediation and ROD preparation and review.

F.2 CLASSIFYING REMEDIES AND RODs

Remedy types were identified by first dividing remedies into three categories (source control, groundwater, and no action) based on the media treated and the type of action. Within each of these categories, the remedies were then further divided into the following 10 specific remedy types:

Source Control Remedies:

1. Source control treatment
2. Source control containment
3. Source control other
4. Source control monitored natural attenuation

Groundwater Remedies:

5. Groundwater *in situ* treatment
6. Groundwater pump and treat
7. Groundwater containment barriers
8. Groundwater other
9. Groundwater monitored natural attenuation

No Action Remedies:

10. No action or no further action (NA/NFA)

RODs were classified using the 10 remedy types listed above. When more than one remedy type was selected in the same ROD, the ROD was assigned all of the remedy types that are identified.

The definitions that were used to identify each remedy type are provided in the "Definitions" section below. When definitions include specific technologies and those technologies commonly are referred to by more than one word or phrase, the most commonly used word or phrase is listed first, followed by synonyms in parentheses.

F.3 DEFINITIONS USED TO IDENTIFY REMEDY TYPES

F.3.1 General Definitions

The definitions of treatment technology and the different types of treatment technologies (physical, chemical, thermal, and biological treatment) apply to both source control and groundwater remedies.

Treatment Technology - Any unit operation or series of unit operations that alters the composition of a hazardous substance, pollutant or contaminant through chemical, biological, or physical means so as to reduce toxicity, mobility, or volume of the contaminated materials being treated. Treatment technologies are an alternative to land disposal of hazardous wastes without treatment (Federal Register, volume 55, page 8819, 40 CFR 300.5: Definitions). Treatment technologies are grouped into five categories. The definitions for four of the categories (physical treatment, chemical treatment, thermal treatment, and biological treatment) are based on definitions provided in the FRTR Technology Screening Matrix. The fifth category, other or unspecified treatment, includes those technologies that do not fit into the first four categories. The five treatment technology categories are:

Physical Treatment - Uses the physical properties of the contaminants or the contaminated medium to separate or immobilize the contamination.

Chemical Treatment - Chemically converts hazardous contaminants to non-hazardous or less toxic compounds or compounds that are more stable, less mobile, and/or inert. Even though a chemical reaction is not always involved in chemical precipitation, chemical precipitation is typically included in this category.

Thermal Treatment - Uses heat to: separate contaminants from contaminated media by increasing their volatility; destroy contaminants or contaminated media by burning, decomposing, or detonating the contaminants or the contaminated media; or immobilize contaminants by melting and solidifying the contaminated media.

Biological Treatment - Includes adding or stimulating the growth of microorganisms, which metabolize contaminants or create conditions under which contaminants will chemically convert to non-hazardous or less toxic compounds or compounds that are more stable, less mobile, and/or inert. Phytoremediation, the use of plants to remove, stabilize, or destroy contaminants, is included within the definition of biological treatment.

Other or Unspecified Treatment - Treatment that cannot be classified as physical treatment, chemical treatment, thermal treatment, or biological treatment. For example, some RODs select physical/chemical treatment of a source without specifying the particular physical/chemical treatment. In such cases, the ROD was not definitively classified as physical or chemical treatment and was classified as other or unspecified treatment, unspecified physical/chemical treatment.

F.3.2 Source Control Remedies

Source Media - A source medium is defined as a material that acts as a reservoir, either stationary or mobile, for hazardous substances. Source media include or contain hazardous substances, pollutants, or contaminants that may migrate to the groundwater, to surface water, to air, (or to other environmental media) or act as a source for direct exposure. Contaminated groundwater generally is not considered to be a source material although nonaqueous phase liquids (NAPLs [occurring either as residual- or free-phase]) may be viewed as source materials. (A Guide to Principal Threat and Low Level Threat Wastes, Superfund publication 9355.3-02FS, USEPA OSWER 1991). Source media include soil, sediment, sludge, debris, solid-matrix wastes, surface water, NAPLs, equipment, drums, storage tanks, leachate, landfill gas, and any other contaminated media other than groundwater that can act as a potential source of contamination.

Source Control Remedy - any removal, treatment, containment, or management of any contaminant source or contaminated medium other than groundwater.

1. Source Control Treatment

Any process meant to separate and remove, destroy, or bind contaminants in a source medium. Key words used in RODs to identify these processes are listed below. Additional detail about these technologies can be found in the ASR at *http://clu-in.org/asr* or on the Federal Remediation Technologies Roundtable Web site at *http://www.frtr.gov*.

Physical Treatment

- Acid extraction
- Air stripping
- Carbon adsorption (liquid-phase carbon adsorption)
- Clarification (sedimentation)
- Decontamination
- Dewatering
- Electrical separation (electrokinetic separation)
- Evaporation
- Filtration
- Flushing (soil flushing and surfactant flushing)
- Ion exchange
- Magnetic separation
- Membrane filtration (microfiltration, nanofiltration, reverse osmosis, ultrafiltration)
- Multi-phase extraction (free product recovery)
- Oil/water separation (free product recovery)
- Physical separation (component separation and materials handling)
- Soil vapor extraction (vacuum extraction and vapor extraction)
- Soil washing
- Solidification/stabilization (asphalt batching, immobilization, and microencapsulation)
- Solid-phase extraction
- Solvent extraction (chemical stripping)
- Steam stripping
- Super-critical fluid extraction
- Volatilization (aeration, mechanical soil aeration, and tilling)

Chemical Treatment

- Chemical oxidation (cyanide oxidation, oxidation, and peroxidation)
- Chemical reduction (reduction)
- Chemical treatment (chemical reduction/oxidation and remedy type not further specified)
- Dehalogenation (dechlorination)
- Flocculation
- Metals precipitation
- Neutralization (pH neutralization)
- Permeable reactive barrier (chemical reactive barrier, chemical reactive wall, leachate reactive wall, and passive treatment wall)
- Ultraviolet (UV) oxidation

Thermal Treatment

- Flaring (gas flaring)
- High energy corona
- Open burning/open detonation
- Plasma high-temperature recovery (fuming gasification and high-temperature metals recovery)
- Thermal desorption
- Thermal destruction (incineration and pyrolysis)
- Thermal treatment (remedy type not further specified)
- *In situ* thermal treatment (conductive heating, Contained Recovery of Oily Wastes [CROW®], dynamic underground stripping, electrical resistance heating, hot air injection, *in situ* thermal desorption, microwave heating, radio frequency heating, steam injection, and thermally enhanced soil vapor extraction)
- Vitrification (slagging)

Biological Treatment

- Aeration (for purpose of bioremediation, tilling)
- Biopile
- Bioreactor
- Bioremediation (biological treatment, remedy type not further specified)
- Bioslurping
- Bioventing
- Co-metabolic treatment
- Composting
- Controlled solid phase
- Fixed film reactors
- Landfarming
- Microbial injection (addition of microorganisms)
- Nitrate enhancement
- Nutrient injection
- Oxygen enhancement with air sparging (biosparging)

Biological Treatment (continued)

- Oxygen enhancement with hydrogen peroxide (H_2O_2)
- Permeable treatment bed (for purpose of bioremediation)
- Phytoremediation
- Slurry-phase bioremediation (bioslurry, activated sludge)
- White rot fungus

Other or Unspecified Treatment

- Air emission treatment
- Fracturing (pneumatic fracturing, hydraulic fracturing)
- Gas collection and treatment (off-gas treatment)
- Hot gas decontamination
- Leachate treatment
- Publicly owned treatment works (POTW)
- Recycling
- Surface water treatment
- Treatment of residuals
- Unspecified physical/chemical treatment
- Unspecified treatment

2. Source Control Containment

Any process or structure designed to prevent contaminants from migrating from a source media into groundwater, to surface water, to air, (or to other environmental media) or acting as a source for direct exposure. Key words used in RODs to identify source control containment remedies are listed below:

Capping and Cover

- Cap (impermeable barrier)
- Cover material
- Evapotranspiration cover

Bottom Liner

- Clay
- Geosynthetic material
- Liner (impermeable barrier)

Drainage and Erosion Control

- Engineering control (remedy type not further specified)
- Hydraulic control
- Impermeable barrier
- Revegetation
- Slope stabilization
- Subsurface drain (leachate control)
- Surface water control (dike, berm, drainage controls, drainage ditch, erosion control, flood protection, and levee)

On-Site Landfilling

- On-site consolidation
- On-site disposal
- On-site landfilling (remedy type not further specified)

Off-Site Landfilling

- Off-site consolidation
- Off-site disposal
- Off-site landfilling (remedy type not further specified)

Vertical Engineered Barrier

(When used as a remedy for a source medium [including subsurface NAPLs]. Vertical subsurface engineered barriers used to control or contain groundwater should not be considered source control containment.)

- Grout (grout curtain)
- Impermeable barrier
- Sheet piling
- Slurry wall
- Subsurface barrier
- Vertical barrier

Other or Unspecified Containment

- Containment (consolidation, disposal, landfilling, and removal)
- Encapsulation (overpacking)
- Leachate control (leachate collection, leachate discharge, leachate recovery wells, leachate reinjection)
- Liquid waste management (liquid waste collection, liquid waste discharge, liquid waste recovery wells, liquid waste reinjection)
- Permanent storage
- Repair (pipe repair, sewer repair, and tank repair)
- Surface water management (surface water collection, surface water discharge, surface water recovery wells, surface water reinjection)

3. Source Control Other

Source control remedies that do not fall into the categories Source Control Treatment or Source Control Containment.

Institutional Control

The classification of institutional controls has been revised based on Institutional Controls: A Site Manager's Guide to Identifying, Evaluating, and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups, OSWER 9355.0-74FS-P, EPA 540-F-00-005, September 2000. The remedy definitions outlined in this guidance differ from those historically used to classify institutional control remedies. This classification system groups institutional controls into 4 categories. Listed below are these four categories. Beneath each category, the terms historically applied to institutional controls that are most likely to fall under the categories are listed. The list below also adds a fifth category, "Institutional control (remedy type not further specified)" for cases where the particular institutional control selected is not recorded in a ROD.

1. **Governmental control**
   - Access restriction
   - Drilling restriction
   - Fishing restriction
   - Guard (security)
   - Recreational restriction
   - Surface water restriction
   - Swimming restriction
   - Water supply use restriction
2. **Proprietary control**
   - Deed notification
   - Deed restriction
   - Land use restriction
3. **Enforceable agreement**
   - Access agreement
4. **Informational device**
5. **Institutional control (remedy type not further specified)**

Engineering Control

- Dust suppression
- Engineering control (remedy type not further specified)
- Fencing
- Water table adjustment
- Wetland replacement

Source Monitoring

- Monitoring
- Sampling

Population Relocation

- Population relocation

Surface Water Supply Remedies

- Alternate water supply (alternate drinking water and bottled water)
- Carbon at tap
- Well-head treatment

4. Source Control Monitored Natural Attenuation (MNA)

The reliance on natural attenuation processes (within the context of a carefully controlled and monitored approach to site cleanup) to achieve site-specific remediation objectives within a timeframe that is reasonable, compared with that offered by other, more active methods. The "natural attenuation processes" that are at work in such a remediation approach include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. These *in situ* processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants (Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites, USEPA, Office of Solid Waste and Emergency Response, Directive Number 9200.4-17P, 1999).

A remedy should be considered source control MNA if it includes "natural attenuation" or "monitored natural attenuation" for a source (e.g., contaminated soil).

F.3.3. Groundwater Remedies

Groundwater Remedy - Management of groundwater. Groundwater remedies can include *in situ* treatment, pump and treat, containment using vertical engineered barriers, MNA, and other measures to address groundwater.

Groundwater Media - One or more aquifers beneath or proximal to a source medium, contaminated by migration of contaminants, such as leachate, or by other sources.

5. Groundwater In Situ Treatment

Treatment of groundwater without extracting it from the ground. Key words used in RODs to identify groundwater *in situ* treatment remedies are listed below:

Physical Treatment

- Air sparging
- Electrical separation (electrokinetic separation)
- In-well air stripping (well aeration and air stripping)
- Multi-phase extraction (free product recovery)
- Surfactant flushing
- Vapor extraction

Chemical Treatment

- Chemical oxidation (cyanide oxidation, oxidation, and peroxidation)
- Chemical reduction (reduction)
- Chemical treatment (chemical reduction/ oxidation and remedy type not further specified)
- Dehalogenation (dechlorination)
- Permeable reactive barrier (chemical reactive barrier, chemical reactive wall, and passive treatment wall)

Biological Treatment

- Aeration (for purpose of bioremediation)
- Bioremediation (biological treatment, remedy type not further specified)
- Bioslurping
- Bioventing
- Co-metabolic treatment
- Microbial injection (addition of microorganisms)
- Nitrate enhancement
- Nutrient injection
- Oxygen enhancement with air sparging (biosparging)
- Oxygen enhancement with hydrogen peroxide (H_2O_2)
- Phytoremediation

Other or Unspecified Treatment

- Fracturing (pneumatic fracturing, hydraulic fracturing)
- Treatment of residuals
- Unspecified physical/chemical treatment
- Unspecified treatment

6. Groundwater Pump and Treat

Extraction of groundwater from an aquifer followed by treatment above ground. Key words used in RODs to identify groundwater pump and treat remedies are listed below:

Physical Treatment

- Aeration (air stripping)
- Carbon adsorption (liquid phase carbon adsorption)
- Clarification (sedimentation)
- Coagulation
- Component separation
- Equalization
- Evaporation
- Filtration
- Ion exchange
- Membrane filtration (microfiltration, nanofiltration, reverse osmosis, ultrafiltration)
- Oil/water separation (free product recovery)

Chemical Treatment

- Chemical oxidation (cyanide oxidation, oxidation, and peroxidation)
- Chemical reduction
- Chemical treatment (chemical reduction/ oxidation and remedy type not further specified)
- Flocculation
- Metals precipitation
- Neutralization (pH neutralization)
- Ultraviolet (UV) oxidation

Biological Treatment

- Biological treatment (remedy type not further specified)
- Bioreactors
- Fixed film reactors
- Oxygen enhancement with hydrogen peroxide (H_2O_2)
- Wetlands treatment

Other or Unspecified Treatment

- Centralized waste treatment facility
- Fracturing (pneumatic fracturing, hydraulic fracturing)
- Publicly owned treatment works (POTW)
- Pumping and unspecified ex-situ treatment
- Treatment of residuals
- Unspecified ex-situ physical/chemical treatment
- Unspecified treatment

Groundwater Extraction

The process of removing groundwater from beneath the ground surface, including the following methods of groundwater extraction:

- Directional well (horizontal well)
- Pumping (recovery well, vertical well)
- Recovery trench (horizontal drain)
- Subsurface drain

Groundwater Discharge and Management

A method of discharging or otherwise managing extracted groundwater, including the following discharge methods and receptors:

- Deep well injection (Class I well)
- Recycling
- Reuse as drinking water
- Reuse as irrigation water
- Reuse as process water
- Surface drain reinjection (infiltration basin, infiltration trench)
- Surface water discharge (National Pollutant Discharge Elimination System [NPDES] discharge)
- Vertical well reinjection (into contaminated aquifer)

7. Groundwater Containment

Containment of groundwater, typically through the use of vertical engineered barriers. Key words used in RODs to identify groundwater containment remedies are listed below:

Vertical Engineered Barrier

- Deep soil mixing (barrier installation technique)
- Geosynthetic wall
- Grout (grout curtain)
- High-density polyethylene (HDPE) wall
- Impermeable barrier
- Sheet piling
- Slurry wall
- Subsurface vertical engineered barrier (subsurface barrier, subsurface vertical barrier)

Other or Unspecified Containment

- Plume containment (hydraulic containment of plume, plume management, plume migration control)

8. Groundwater Other

Groundwater remedies that do not fall into the categories Groundwater *In situ* Treatment, Groundwater Pump and Treat, Groundwater Containment, or Groundwater Monitored Natural Attenuation.

Institutional Control

The classification of institutional controls has been revised based on Institutional Controls: A Site Manager's Guide to Identifying, Evaluating, and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups, OSWER 9355.0-74FS-P, EPA 540-F-00-005, September 2000. The remedy definitions outlined in this guidance differ from those historically used to classify institutional control remedies. This classification system groups institutional controls into 4 categories. Listed below are these four categories. Beneath each category, the terms historically applied to institutional controls that are most likely to fall under the categories are listed. The list below also adds a fifth category, "Institutional control (remedy type not further specified)" for cases where the particular institutional control selected is not recorded in a ROD.

1. **Governmental control**
   - Access restriction
   - Drilling restriction
   - Fishing restriction
   - Groundwater restriction
   - Guard (security)
   - Recreational restriction
   - Surface water restriction
   - Swimming restriction
   - Water supply use restriction
2. **Proprietary control**
   - Deed notification
   - Deed restriction
   - Land use restriction
3. **Enforceable agreement**
   - Access agreement
4. **Informational device**
5. **Institutional control (remedy type not further specified)**

Engineering Control

- Engineering control (berm, dike, drainage ditch, levee)
- Water table adjustment
- Wetland replacement

Groundwater Monitoring

- Monitoring
- Sampling

Population Relocation

- Population Relocation

Water Supply Remedies

- Alternate water supply (alternate drinking water and bottled water)
- Carbon at tap
- Extend piping to existing water main
- Install new surface water intake
- Install new water supply wells
- Seal well (close well)
- Treat at use location
- Well-head treatment

9. Groundwater MNA

The reliance on natural attenuation processes (within the context of a carefully controlled and monitored approach to site cleanup) to achieve site-specific remediation objectives within a time frame that is reasonable, compared with that offered by other, more active methods. The "natural attenuation processes" that are at work in such a remediation approach include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. These *in situ* processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants (Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites, USEPA, Office of Solid Waste and Emergency Response, Directive Number 9200.4-17P, 1999).

A remedy should be considered groundwater MNA if it includes "natural attenuation" or "monitored natural attenuation" of groundwater.

F.3.4 No Action Remedies

10. NA/NFA

The designation used for remedies that indicate no action or no further action will be taken. When determining overall ROD type, the designation was used only for RODs under which NA/NFA is the only remedy selected. If a ROD selected NA/NFA for only part of a site and another remedy for another part of a site, the ROD was given the classification corresponding to that selected remedy and was not given an NA/NFA designation.

F.4 SPECIAL CASES

This subsection provides a list of some special cases and descriptions of how remedy types should be assigned in those cases:

Decontamination

- The remedy type for decontamination of buildings, equipment, tanks, debris, boulders, rocks, or other objects was considered source control treatment. For example, abrasive blasting or scarifying a concrete pad to remove the contaminated surface layer of the pad was identified as source control treatment.
- Decontamination of equipment used to clean up a Superfund site is a normal activity that occurs at many Superfund sites and was not considered a remedy. For example, high-pressure water washing of a front end loader used to excavate contaminated soil was not considered a remedy and was not given a remedy type.

Phytoremediation

- Phytoremediation involves the use of macroscopic plants to destroy, remove, immobilize, or otherwise treat contaminants. While this technology may include the use of microorganisms in conjunction with plants, it is distinguished from bioremediation in that bioremediation does not use macroscopic plants. Remedies that used microorganisms without macroscopic plants were identified as bioremediation.
- The use of plants to control surface water drainage at a site is not phytoremediation. Such remedies were identified as engineering controls (source control other or groundwater other).

Remedies Based on Site Characteristics - If a ROD indicates that a certain remedy be implemented based on certain site characteristics, the ROD should be considered to have selected the remedy. For example, a ROD may specify that if soils exceed a certain level of contamination they will be incinerated, but if they do not exceed that level, no further action will be taken. In such a case, the ROD was considered to have selected incineration and therefore was considered a source control treatment ROD.

Vertical Engineered Barriers - Some of the technologies used for vertical engineered barriers are also used to control surface water and surface drainage (for example, slurry walls and sheet piles). Where these remedies were used to contain groundwater, they were identified as groundwater containment.

Solidification/Stabilization - Some of the technologies used for solidification/stabilization can be used for either treatment or containment. For example, "encapsulation" of a waste in plastic drums is source control containment. "Encapsulation" of a waste by mixing with a monomer and then causing it to polymerize, resulting in microencapsulation, is source control treatment. In general, containment involves isolating bulk wastes, while solidification/stabilization involves incorporating the contaminants into a matrix so that their leachability is reduced.

Water Table Adjustment - Where water table adjustment is used to prevent the groundwater from coming into contact with a contaminated source medium, it was identified as source control other, engineering control. Where water table adjustment was used to treat groundwater, it was classified as groundwater other, engineering control.

Subsurface Drain - When a subsurface drain was used in order to prevent contact of precipitation runoff with a source or to prevent erosion, it was considered source control containment, drainage and erosion control. When a subsurface drain was used to extract groundwater prior to treatment of the groundwater, it was classified as groundwater pump and treat, groundwater extraction.

Treatment of Residuals - Residuals are the matter that results from a treatment process. For example, the residuals from incineration of soil can include ash, off-gasses, and scrubber blowdown from off-gas treatment. In the preceding example, treatment of off-gasses using a scrubber was classified as treatment of residuals. Where treatment of residuals was specified in a ROD, the existence of residuals treatment was identified, but additional information on the treatment of residuals was not collected.

Air Media - Air media include sources that are in a gaseous form, such as landfill gas or hazardous gasses stored in compressed gas cylinders. When remedies for air media were selected in a ROD they were identified as source control remedies. For example, collection and treatment of landfill gas was classified as source control treatment. Air emissions from equipment used to treat sources or groundwater are not air media. For example, a ROD may specify that groundwater will be extracted and treated by air stripping, and the off-gas generated by the air stripping must be treated by activated carbon adsorption. In such a case, the ROD was classified as groundwater pump-and-treat (both physical treatment, aeration [air stripping]; and other or unspecified treatment, treatment of residuals), but was not classified as a source control treatment ROD.

Appendix G

Reasons for Shut Down of 73 Groundwater Pump and Treat Systems

Reasons for Shut Down of 73 Groundwater Pump and Treat Systems

EPA Region	Site Name, State	Reasons for Shut Down
1	Hocomonco Pond, MA	Due to technical/operational problems
1	McKin Co., ME	Replaced with MNA
1	Naval Station Newport, RI	Met project goals (either restoration or containment)
1	Norwood PCBs, MA	Met project goals (either restoration or containment)
1	Pinette's Salvage Yard, ME	Replaced with institutional controls
1	Sylvester Dump, NH	Met project goals (either restoration or containment)
1	Tinkham Garage, NH	Replaced with MNA
1	Union Chemical Co Inc., ME	Replaced with in situ treatment
1	Winthrop Landfill, ME	Shutdown for evaluation/monitoring
2	Fulton Terminals, NY	Met project goals (either restoration or containment)
2	Mannheim Avenue Dump, NJ	Met project goals (either restoration or containment)
2	Tabernacle Drum Dump, NJ	Met project goals (either restoration or containment)
2	Universal Oil Products, NJ	Met project goals (either restoration or containment)
3	Old City of York Landfill, PA	Replaced with MNA
3	Southern Maryland Wood Treating, MD	Met project goals (either restoration or containment)
4	Celanese Fiber Corp., NC	Due to technical/operational problems and to investigate MNA
4	Gold Coast Oil Corp., FL	Met project goals (either restoration or containment)
4	Harris Corp. (Palm Bay Plant) (OU 1), FL	Replaced with MNA
4	Harris Corp. (Palm Bay Plant) (OU 2), FL	Replaced with MNA
4	Hipps Road Landfill, FL	Replaced with MNA
4	Hollingsworth Solderless, FL	Due to technical/operational problems
4	Palmetto Wood Preserving, SC	Replaced with MNA
4	Sydney Mine Sludge Pond, FL	Replaced with MNA
4	Townsend Saw Chain Company, SC	Replaced with in situ treatment
5	Avenue "E" Groundwater Contamination, MI	Met project goals (either restoration or containment)
5	Belvidere Municipal Landfill, IL	Met project goals (either restoration or containment)
5	Big D Campground, OH	Replaced with MNA
5	Burrows Sanitation, MI	Met project goals (either restoration or containment)
5	Cross Brothers Pail Recycling (Pembroke), IL	Met project goals (either restoration or containment)
5	Delavan Municipal Well #4 (Chip Storage Extraction System), WI	Due to technical/operational problems
5	Delavan Municipal Well #4 (Southeast Extraction System), WI	Due to technical/operational problems
5	Hagen Farm, WI	Replaced with in situ treatment
5	Lehillier/Mankato Site, MN	Met project goals (either restoration or containment)
5	Lemberger Transport & Recycling Inc., WI	Replaced with MNA
5	New Brighton/Arden Hills (OU 3), MN	Met project goals (either restoration or containment)
5	New Lyme Landfill, OH	Due to technical/operational problems
5	Oconomowoc Electroplating, WI	Replaced with MNA
5	Onalaska Muncipal Landfill, WI	Replaced with MNA
5	Rasmussens Dump, MI	Replaced with in situ treatment
5	Roto-Finish Co, Inc., MI	Replaced with MNA
5	Seymour Recycling Corp., IN	Replaced with MNA
5	Spiegelberg Landfill, MI	Met project goals (either restoration or containment)
5	Tri-State Plating, IN	Met project goals (either restoration or containment)
5	U.S. Aviex, MI	Replaced with in situ treatment and MNA
5	University of Minnesota (Rosemount Research Center), MN	Met project goals (either restoration or containment)
5	Waite Park Wells (EM Site), MN	Shutdown for evaluation/monitoring

MNA = Monitored natural attenuation

Reasons for Shut Down of 73 Groundwater Pump and Treat Systems (continued)

EPA Region	Site Name, State	Reasons for Shut Down
5	Whittaker Corp., MN	Due to technical/operational problems
5	Windom Dump, MN	Met project goals (either restoration or containment)
6	Cimarron Mining Corporation, NM	Due to technical/operational problems
6	French Limited, TX	Replaced with MNA
6	Geneva Industries/Fuhrmann Energy, TX	Due to technical/operational problems
6	Odessa Chromium #1, TX	Replaced with in situ treatment
6	Odessa Chromium #2 (Andrews Highway) (North Plume), TX	Replaced with in situ treatment
6	Odessa Chromium #2 (Andrews Highway) (South Plume), TX	Replaced with in situ treatment
6	Sol Lynn/Industrial Transformers, TX	Replaced with in situ treatment and MNA
7	Fairfield Coal Gasification Plant, IA	Met project goals (either restoration or containment)
8	Intermountain Waste Oil Refinery (OU 2), UT	Met project goals (either restoration or containment)
8	Marshall Landfill, CO	Met project goals (either restoration or containment)
8	Mystery Bridge Road/Highway 20 (DOW/DSI), WY	Due to technical/operational problems
8	Mystery Bridge Road/Highway 20 (Kinder/Morgan), WY	Met project goals (either restoration or containment)
8	Ogden Defense Depot (DLA) (OU 2), UT	Replaced with in situ treatment
8	Rocky Flats Plant (881 Hillside, OU 1), CO	Met project goals (either restoration or containment)
9	Barstow Marine Corps Logistics Base - OU 02 Nebo North, CA	Shutdown for evaluation/ monitoring
9	Coast Wood Preserving, CA	Replaced with in situ treatment
9	Del Norte County Pesticide Storage Area, CA	Due to technical/operational problems
9	Fairchild Semiconductor (South San Jose), CA	Met project goals (either restoration or containment)
9	Firestone Tire & Rubber Co. (Salinas Plant), CA	Met project goals (either restoration or containment)
9	Norton AFB (Base Boundary Area), CA	Met project goals (either restoration or containment)
9	Norton AFB (Central Base Area), CA	Shutdown for evaluation/ monitoring
9	Sola Optical USA, Inc., CA	Replaced with MNA
9	Southern California Edison, Visalia Pole Yard, CA	Shutdown for evaluation monitoring
9	U.S. DOE Lawrence Livermore National Laboratory - TFF, CA	Met project goals (either restoration or containment)
9	Western Pacific Railroad Co., CA	Replaced with in situ groundwater and source control treatment

MNA = Monitored natural attenuation

Appendix H

On-Site Containment Remedies

On-Site Containment Remedies: Cover Systems

Site (Operable Unit), State	Site Classification	Cover System Type	Type of Media Contained by Barrier	Source of Contaminants Contained by Barrier	Cover System Layers	Status	Date Constructed or Functional	Primary Goal of Containment	Secondary Goals of Cover system	Functioning as Designed?
A.L. Taylor (Valley of Drums), KY	Landfill/disposal	Conventional	Solid Waste Material, Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier	Constructed and functional	July 1987	Source Containment	Prevent direct contact	Yes
American Creosote Works, Inc., FL	Contamination	Conventional	Soil	Hazardous Waste	Not documented	Predesign/design	N/A	Source Containment	None	Not Constructed
Arkansas City Dump (OU 2), KS	Landfill/disposal	Soil	Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Foundation Layer, Other	Constructed and functional	September 1992	Source Containment	Provide erosion control, Prevent direct contact	Yes
Asbestos Dump (OU 1), NJ	Landfill/disposal	Soil	Solid Waste Material	Hazardous Waste	Surface/Protection Layer	Constructed and functional	June 2000	Source Containment	None	Yes
Asbestos Dump (OU 2), NJ	Landfill/disposal	Conventional	Solid Waste Material, Soil	Hazardous Waste, Solidified/Stabilized Waste Material, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	October 1995	Source Containment	None	Yes
Asbestos Dump (OU 3), NJ	Landfill/disposal	Conventional	Solid Waste Material, Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Not documented	Constructed and functional	November 1998	Source Containment	None	Not Available
Bayou Bonfouca (OU 1), LA	Contamination	Conventional	Soil	Hazardous Waste, Construction Debris, Ash/Dust	Surface/Protection Layer, Gas Collection Layer	Constructed and functional	Not Available	Source and Groundwater Containment	Prevent source migration (including DNAPL or LNAPL), Collect DNAPL/LNAPL, Prevent direct contact	Yes
Berkley Products Co. Dump (OU 1), PA	Landfill/disposal	Conventional	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Gas Collection Layer	Constructed and functional	September 2001	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Bio-Ecology Systems, Inc., TX	Contamination	Not Specified	Solid Waste Material, Leachate, Soil	Municipal Solid Waste (MSW), Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Drainage Layer, Foundation Layer	Constructed and functional	August 1988	Source Containment	Minimize infiltration, Collect leachate	Yes
Bowers Landfill, OH	Landfill/disposal	Conventional	Solid Waste Material	Municipal Solid Waste (MSW), Hazardous Waste	Surface/Protection Layer, Hydraulic Barrier, Gas Collection Layer	Constructed and functional	September 1993	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Brown & Bryant, Inc. (Arvin Plant) (OU1), CA	Contamination	Asphalt/Concrete	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Foundation Layer	Constructed and functional	August 1999	Source and Groundwater Containment	Minimize infiltration, Prevent migration of contaminated groundwater, Prevent direct contact	Yes
Brown & Bryant, Inc. (Arvin Plant) (OU1), CA	Contamination	Conventional	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier, Foundation Layer	Constructed and functional	August 1999	Source Containment	Prevent direct contact	Yes
Bruin Lagoon (OU 1), PA	Landfill/disposal	Conventional	Leachate, Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Gas Collection Layer	Constructed and functional	March 1992	Source and Groundwater Containment	Minimize infiltration, Prevent migration of contaminated groundwater, Prevent direct contact	Yes
Bunker Hill Mining & Metallurgical Complex (OU 3), ID	Mining	Conventional	Solid Waste Material, Soil	Hazardous Waste, Contaminated Soil (not including NAPL), Other (mine tailings)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier	Constructed and functional	2000	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Central City, Clear Creek (OU 3), CO	Mining	Soil	Solid Waste Material	Other - Mine Tailings	Not documented	Constructed and functional	2000	Source Containment	None	Yes
Central City, Clear Creek (OU 3), CO	Mining	Soil	Solid Waste Material	Other - Mine Waste	Not documented	Constructed and functional	2005	Source Containment	Provide erosion control	Not Available
Central City, Clear Creek (OU 3), CO	Mining	Not specified	Solid Waste Material	Other - Mine Waste	Not documented	Predesign/design	N/A	Source Containment	Provide erosion control	Not Constructed

On-Site Containment Remedies: Cover Systems (continued)

Site (Operable Unit), State	Site Classification	Cover System Type	Type of Media Contained by Barrier	Source of Contaminants Contained by Barrier	Cover System Layers	Status	Date Constructed or Functional	Primary Goal of Containment	Secondary Goals of Cover system	Functioning as Designed?
Central City, Clear Creek (OU 3), CO	Mining	Soil	Solid Waste Material	Solidified/Stabilized Waste Material, Other (mine tailings)	Not documented	Constructed and functional	1998	Source Containment	None	Yes
Central City, Clear Creek (OU 3), CO	Mining	Soil	Solid Waste Material	Other - Mine Tailings	Not documented	Constructed and functional	1999	Source Containment	None	Yes
Central City, Clear Creek (OU 3), CO	Mining	Soil	Solid Waste Material, Soil	Contaminated Soil (not including NAPL), Other (mine tailings)	Not documented	Constructed and functional	1995	Source Containment	None	Yes
Central City, Clear Creek (OU 2), CO	Mining	Not specified	Solid Waste Material	Other - Mine Waste	Not documented	Predesign/design	N/A	Source Containment	None	Not Constructed
Charles-George Reclamation Trust Landfill (OU 1), MA	Landfill/disposal	Conventional	Solid Waste Material, Leachate	Municipal Solid Waste (MSW), Hazardous Waste	Surface/Protection Layer, Hydraulic Barrier, Gas Collection Layer	Constructed and functional	October 1990	Source Containment	Minimize infiltration, Prevent migration of contaminated groundwater, Collect leachate, Prevent direct contact, Minimize gas migration	Yes
Chemical Insecticide Corp. (OU 1), NJ	Contamination	Not specified	Soil	Hazardous Waste	Not documented	Removed	September 1994	Source Containment	None	Removed
Combe Fill North Landfill (OU 1), NJ	Landfill/disposal	Conventional	Solid Waste Material	Municipal Solid Waste (MSW)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Foundation Layer	Constructed and functional	July 1991	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Combe Fill South Landfill (OU 1), NJ	Landfill/disposal	Conventional	Solid Waste Material	Municipal Solid Waste (MSW), Hazardous Waste	Gas Collection Layer, Not documented	Constructed and functional	Not Available	Source Containment	Minimize infiltration, Prevent direct contact, Minimize gas migration	Not Available
Crystal City Airport (OU 1), TX	Contamination	Conventional	Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier	Constructed and functional	July 1990	Source Containment	Prevent direct contact	Yes
Dakhue Sanitary Landfill (OU 1), MN	Landfill/disposal	Conventional	Solid Waste Material, Soil	Municipal Solid Waste (MSW), Contaminated Soil (not including NAPL)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Gas Collection Layer	Constructed and functional	October 1992	Source Containment	Prevent source migration (including DNAPL or LNAPL), Prevent direct contact	Yes
Delaware Sand & Gravel Landfill (OU 1), DE	Landfill/disposal	Conventional	Solid Waste Material, Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Foundation Layer	Constructed and functional	June 1991	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Delaware Sand & Gravel (OU 3), DE	Landfill/disposal	Conventional	Solid Waste Material, Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Foundation Layer	Constructed and functional	September 1997	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Delaware Sand & Gravel (OU 5), DE	Landfill/disposal	Conventional	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	Not Available	Source Containment	Minimize infiltration	Not Available
Denver Radium Site (OU 8), CO	Mining	Conventional	Soil	Radioactive Waste, Solidified/Stabilized Waste Material	Surface/Protection Layer, Hydraulic Barrier	Other - Removed per 2000 AMD	June 1998	Source Containment	Prevent direct contact	Removed
Douglas Road/Uniroyal, Inc., Landfill (OU 1), IN	Landfill/disposal	Conventional	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	December 1999	Source Containment	Prevent source migration (including DNAPL or LNAPL), Prevent direct contact	Yes
Drake Chemical (OU 3), PA	Contamination	Not specified	Leachate, Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Not documented	Constructed and functional	September 2000	Source and Groundwater Containment	Minimize infiltration, Prevent migration of contaminated groundwater, Prevent direct contact	Yes
Duell & Gardner Landfill (OU 1), MI	Landfill/disposal	Conventional	Solid Waste Material	Municipal Solid Waste (MSW), Hazardous Waste	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	April 2001	Source Containment	Prevent direct contact	Not Available

On-Site Containment Remedies: Cover Systems (continued)

Site (Operable Unit), State	Site Classification	Cover System Type	Type of Media Contained by Barrier	Source of Contaminants Contained by Barrier	Cover System Layers	Status	Date Constructed or Functional	Primary Goal of Containment	Secondary Goals of Cover system	Functioning as Designed?
East Mount Zion (OU 1), PA	Landfill/disposal	Conventional	Solid Waste Material	Municipal Solid Waste (MSW)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Gas Collection Layer	Constructed and functional	February 1999	Source Containment	Prevent migration of contaminated groundwater, Prevent direct contact	Yes
Enterprise Avenue (OU 1), PA	Landfill/disposal	Conventional	Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	September 1997	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Eureka Mills (OU 2), UT	Mining	Soil	Soil	Ash/Dust, Contaminated Soil (not including NAPL)	Surface/Protection Layer	Being Constructed	N/A	Source Containment	Prevent direct contact	Not Constructed
Florence Land Recontouring, Inc., Landfill (OU1), NJ	Landfill/disposal	Conventional	Solid Waste Material	Municipal Solid Waste (MSW), Hazardous Waste	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Gas Collection Layer, Foundation Layer	Constructed and functional	August 1994	Source Containment	Prevent source migration (including DNAPL or LNAPL), Prevent direct contact	Yes
Forest Waste Products (OU 2), MI	Landfill/disposal	Conventional	Solid Waste Material, Soil	Municipal Solid Waste (MSW), Hazardous Waste	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Gas Collection Layer, Other	Constructed and functional	1997	Source Containment	Minimize infiltration, Collect leachate, Provide erosion control, Prevent direct contact	Yes
Gallaway Pits (OU 1), TN	Landfill/disposal	Conventional	Soil, Sediment	Hazardous Waste	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier	Removed	Not Available	Source Containment	Minimize infiltration	Removed
Gems Landfill (OU 1), NJ	Landfill/disposal	Conventional	Solid Waste Material	Municipal Solid Waste (MSW), Hazardous Waste	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier	Constructed and functional	August 1994	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Geneva Industries/Fuhrmann Energy (OU 1), TX	Contamination	Conventional	Groundwater, Soil	Contaminated Groundwater (not including NAPL), Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier, Foundation Layer	Constructed and functional	September 1990	Source and Groundwater Containment	Minimize infiltration, Prevent migration of contaminated groundwater, Prevent direct contact	Yes
Gilt Edge Mine (OU 3), SD	Mining	Conventional	Other - waste rock	Other - waste rock, acid mine drainage	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier	Constructed and functional	Not Available	Source Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL), Provide erosion control	Not Available
Gurley Pit (OU 1), AR	Landfill/disposal	Conventional	Soil, Other	Solidified/Stabilized Waste Material	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier	Constructed and functional	August 1994	Source Containment	Collect leachate, Prevent direct contact	Yes
Helen Kramer Landfill (OU 1), NJ	Landfill/disposal	Conventional	Solid Waste Material, Groundwater, Leachate	Municipal Solid Waste (MSW), Hazardous Waste	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Gas Collection Layer, Foundation Layer	Constructed and functional	1993	Source Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL), Prevent migration of contaminated groundwater, Prevent direct contact	Yes
Heleva Landfill (OU 2), PA	Landfill/disposal	Not Specified	Solid Waste Material	Municipal Solid Waste (MSW), NAPL, Contaminated Soil (not including NAPL)	Gas Collection Layer	Constructed and functional	April 2000	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Hellertown Manufacturing Co. (OU 1), PA	Contamination	Asphalt/Concrete	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer	Constructed and functional	September 1996	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Independent Nail Co. (OU 1), SC	Contamination	Soil	Soil, Sediment	Contaminated Soil (not including NAPL), Contaminated Sediment	Surface/Protection Layer	Constructed and functional	May 1988	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Jacksonville Municipal Landfill (OU 1), AR	Landfill/disposal	Soil	Soil, Other (debris)	Municipal Solid Waste (MSW), Other (industrial waste)	Surface/Protection Layer	Constructed and functional	September 1995	Source Containment	None	Yes
Kane & Lombard Street Drums (OU 1), MD	Landfill/disposal	Conventional	Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier	Constructed and functional	1990	Source Containment	Minimize infiltration, Collect leachate, Prevent direct contact	Yes

On-Site Containment Remedies: Cover Systems (continued)

Site (Operable Unit), State	Site Classification	Cover System Type	Type of Media Contained by Barrier	Source of Contaminants Contained by Barrier	Cover System Layers	Status	Date Constructed or Functional	Primary Goal of Containment	Secondary Goals of Cover system	Functioning as Designed?
Kummer Sanitary Landfill (OU 2), MN	Landfill/disposal	Conventional	Solid Waste Material	Municipal Solid Waste (MSW)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Gas Collection Layer	Constructed and functional	December 1992	Source Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL), Prevent direct contact	Yes
Lackawanna Refuse (OU 1), PA	Landfill/disposal	Conventional	Solid Waste Material, Soil	Municipal Solid Waste (MSW), Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Gas Collection Layer, Foundation Layer	Constructed and functional	1991	Source Containment	Prevent source migration (including DNAPL or LNAPL), Prevent direct contact, Minimize gas migration	Yes
LaGrand Sanitary Landfill (OU 1), MN	Landfill/disposal	Conventional	Solid Waste Material	Municipal Solid Waste (MSW)	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	August 1995	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Lee's Lane Landfill (OU 1), KY	Landfill/disposal	Conventional	Solid Waste Material, Soil	Municipal Solid Waste (MSW), Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	1987	Source Containment	Minimize infiltration	Yes
Lipari Landfill (OU 1), NJ	Landfill/disposal	Conventional	Solid Waste Material	Hazardous Waste	Hydraulic Barrier	Constructed and functional	1984	Source Containment	Minimize infiltration, Prevent direct contact, Minimize gas migration	Yes
Lorentz Barrel & Drum Co. (OU 1), CA	Contamination	Conventional	Solid Waste Material, Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier, Gas Collection Layer	Constructed and functional	Sept 1998	Source Containment	Provide erosion control	Yes
Love Canal (OU 9), NY	Landfill/disposal	Conventional	Solid Waste Material, Leachate	Hazardous Waste	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	1985	Source Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL), Minimize gas migration	Yes
MacGillis & Gibbs Co./Bell Lumber & Pole Co. (OU 1), MN	Contamination	Conventional	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	November 2001	Source Containment	Allow future land use	Not Available
McCormick & Baxter Creosoting Co. (OU 1), CA	Contamination	Asphalt/Concrete	Soil, Other (oily waste)	NAPL, Contaminated Soil (not including NAPL)	Surface/Protection Layer	Constructed and functional	Not Available	Source Containment	Prevent direct contact	Not Available
McCormick & Baxter Creosoting Co. (OU 3), CA	Sediment	Soil	Sediment	Contaminated Sediment	Surface/Protection Layer	Being Constructed	N/A	Source Containment	Prevent source migration (including DNAPL or LNAPL), Provide erosion control, Prevent direct contact	Not Constructed
McCormick & Baxter Creosoting Co. (OU 1), CA	Contamination	Asphalt/Concrete	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Foundation Layer	Predesign/design	N/A	Source Containment	Prevent direct contact	Not Constructed
McCormick & Baxter Creosoting Co. (Portland Plant) (OU 2), OR	Contamination	Soil	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer	Constructed and functional	September 2005	Source Containment	Prevent direct contact	Not Available
McCormick & Baxter Creosoting Co. (Portland Plant) (OU 2), OR	Contamination	Conventional	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Foundation Layer	Constructed and functional	September 2005	Source Containment	Minimize infiltration	Not Available
McCormick & Baxter Creosoting Co. (Portland Plant) (OU 4), OR	Sediment	Conventional	Sediment	Contaminated Sediment	Surface/Protection Layer, Foundation Layer	Constructed and functional	September 2005	Source Containment	None	Not Available
Mid-America Tanning Co. (OU 1), IA	Contamination	Soil	Soil, Sediment, Other (sludge)	Contaminated Soil (not including NAPL), Contaminated Sediment, Other (contaminated sludge)	Surface/Protection Layer	Constructed and functional	August 2000	Source Containment	Prevent direct contact	Yes
Midvale Slag (OU 1), UT	Mining	Soil	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer	Being Constructed	N/A	Source Containment	Prevent direct contact	Not Constructed
Midvale Slag (OU 2), UT	Mining	Soil	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer	Being Constructed	N/A	Source Containment	Prevent direct contact	Not Constructed
Mottolo Pig Farm (OU 1), NH	Landfill/disposal	Conventional	Soil	Contaminated Soil (not including NAPL)	Hydraulic Barrier	Constructed and functional	September 1993	Source Containment	Prevent direct contact, Other	Yes

On-Site Containment Remedies: Cover Systems (continued)

Site (Operable Unit), State	Site Classification	Cover System Type	Type of Media Contained by Barrier	Source of Contaminants Contained by Barrier	Cover System Layers	Status	Date Constructed or Functional	Primary Goal of Containment	Secondary Goals of Cover system	Functioning as Designed?
Mountain View Mobil Home Estates (OU 1), AZ	Contamination	Soil	Other (asbestos)	Other (asbestos tailings)	Surface/Protection Layer, Foundation Layer	Constructed and functional	June 1983	Source Containment	Prevent direct contact	Yes
Mowbray Engineering Co. (OU 1), AL	Contamination	Conventional	Soil	Hazardous Waste, Solidified/Stabilized Waste Material	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier	Constructed and functional	August 1987	Source and Groundwater Containment	Prevent source migration (including DNAPL or LNAPL), Provide erosion control, Prevent direct contact	Yes
Moyers Landfill (OU 1), PA	Landfill/disposal	Conventional	Solid Waste Material	Municipal Solid Waste (MSW), Mixed Waste (Radioactive and Hazardous Waste)	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	May 1996	Source Containment	Minimize infiltration, Collect leachate, Provide erosion control	Yes
New Lyme Landfill (OU 1), OH	Landfill/disposal	Conventional	Solid Waste Material	Municipal Solid Waste (MSW), Hazardous Waste, Construction Debris	Surface/Protection Layer, Hydraulic Barrier, Gas Collection Layer	Constructed and functional	December 1992	Source Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL), Prevent direct contact	Yes
Newport Dump (OU 1), KY	Landfill/disposal	Conventional	Solid Waste Material, Leachate, Soil	Municipal Solid Waste (MSW), Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	Not Available	Source Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL), Prevent direct contact	Yes
NL Industries/Taracorp Lead Smelter (OU 1), IL	Contamination	Conventional	Solid Waste Material, Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Not documented	Constructed and functional	September 1999	Source Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL)	Yes
Northwest Pipe & Casing/Hall Process Company (OU 1), OR	Contamination	Not Specified	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Foundation Layer	Constructed and functional	June 2004	Source Containment	Minimize infiltration, Prevent migration of contaminated groundwater, Prevent direct contact	Yes
Norwood PCBs (OU 1), MA	Contamination	Asphalt/Concrete	Soil	Hazardous Waste	Surface/Protection Layer	Constructed and functional	August 1998	Source Containment	Prevent direct contact	Yes
Nyanza Chemical Waste Dump (OU 1), MA	Landfill/disposal	Conventional	Soil	Hazardous Waste, Contaminated Soil (not including NAPL), Contaminated Sediment	Not documented	Constructed and functional	1991	Source Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL), Prevent direct contact	Yes
Onalaska Municipal Landfill (OU 1), WI	Landfill/disposal	Conventional	Soil	Municipal Solid Waste (MSW), Hazardous Waste	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Foundation Layer	Constructed and functional	July 1994	Source Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL), Prevent direct contact	Yes
Pacific Sound Resources (OU 2), WA	Sediment	Asphalt/Concrete	Sediment	Hazardous Waste	Surface/Protection Layer	Constructed and functional	February 2005	Source Containment	Collect DNAPL/LNAPL, Prevent direct contact	Not Available
Pemaco Maywood (OU 1), CA	Contamination	Soil	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Foundation Layer, Other (non-woven geotextile layer between the soil cover and the native soil)	Predesign/design	N/A	Source Containment	Allow future land use	Not Constructed
Penta Wood Products (OU 1), WI	Contamination	Soil	Solid Waste Material	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Drainage Layer, Gas Collection Layer	Constructed and functional	September 2000	Source and Groundwater Containment	Collect DNAPL/LNAPL, Provide erosion control, Prevent direct contact	Not Available
Pesses Chemical Co. (OU 1), TX	Contamination	Conventional	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier, Foundation Layer	Constructed and functional	September 1993	Source Containment	Prevent direct contact, Other	Yes
Pollution Abatement Services (OU 3), NY	Contamination	Conventional	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	1994	Source Containment	Prevent direct contact	Yes

On-Site Containment Remedies: Cover Systems (continued)

Site (Operable Unit), State	Site Classification	Cover System Type	Type of Media Contained by Barrier	Source of Contaminants Contained by Barrier	Cover System Layers	Status	Date Constructed or Functional	Primary Goal of Containment	Secondary Goals of Cover system	Functioning as Designed?
Pownal Tannery (OU 1), VT	Contamination	Conventional	Leachate, Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier, Gas Collection Layer	Constructed and functional	September 2004	Source and Groundwater Containment	Prevent source migration (including DNAPL or LNAPL), Collect leachate, Provide erosion control, Prevent direct contact, Allow future land use	Not Available
Raymark Industries (OU 1), CT	Contamination	Conventional	Solid Waste Material, Soil	Construction Debris, NAPL, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Drainage Layer, Hydraulic Barrier, Gas Collection Layer	Constructed and functional	November 1997	Source Containment	Prevent source migration (including DNAPL or LNAPL), Prevent direct contact	Yes
Rockwool Industries Inc. (OU 1), TX	Contamination	Conventional	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	September 2005	Source Containment	Minimize infiltration, Prevent migration of contaminated groundwater, Prevent direct contact	Not Available
Rogers Road Municipal Landfill (OU 1), AR	Landfill/disposal	Soil	Soil, Other (debris)	Municipal Solid Waste (MSW), Other (industrial waste)	Surface/Protection Layer	Constructed and functional	September 1995	Source Containment	None	Yes
Saco Tannery Waste Pits (OU 1), ME	Landfill/disposal	Not Specified	Groundwater, Soil	Hazardous Waste	Surface/Protection Layer, Drainage Layer	Constructed and functional	September 1993	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Salem Acres (OU 1), MA	Landfill/disposal	Conventional	Solid Waste Material	Municipal Solid Waste (MSW), Hazardous Waste, Other	Not documented	Removed	Not Available	Source Containment	None	Removed
Schmalz Dump (OU 2), WI	Landfill/disposal	Conventional	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	September 1993	Source Containment	Prevent source migration (including DNAPL or LNAPL)	Yes
Selma Treating Co. (OU 1), CA	Contamination	Asphalt/Concrete	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer	Constructed and functional	May 2004	Source Containment	Minimize infiltration, Prevent direct contact	Not Available
Selma Treating Co. (OU 1), CA	Contamination	Conventional	Soil	Solidified/Stabilized Waste Material	Surface/Protection Layer, Hydraulic Barrier	Constructed and functional	November 2003	Source Containment	Minimize infiltration, Prevent direct contact	Not Available
Sharon Steel Corp. (Midvale Tailings) (OU 1), UT	Mining	Conventional	Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier, Drainage Layer, Foundation Layer	Constructed and functional	October 1996	Source and Groundwater Containment	Minimize infiltration, Prevent migration of contaminated groundwater, Provide erosion control, Prevent direct contact, Allow future land use	Not Available
Silresim Chemical Corp. (OU 1), MA	Contamination	Conventional	Soil	Solidified/Stabilized Waste Material, Contaminated Soil (not including NAPL)	Not documented	Being Constructed	N/A	Source Containment	Prevent direct contact	Not Constructed
Silver Mountain Mine (OU 1), WA	Mining	Conventional	Groundwater, Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Not documented	Constructed and functional	August 1992	Source and Groundwater Containment	Minimize infiltration, Collect leachate, Provide erosion control, Prevent direct contact	Yes
Stoughton City Landfill (OU 1), WI	Landfill/disposal	Conventional	Groundwater	Municipal Solid Waste (MSW)	Surface/Protection Layer, Drainage Layer, Gas Collection Layer	Constructed and functional	December 1998	Source Containment	Minimize infiltration	Yes
Summitville Mine (OU 1), CO	Mining	Not specified	Solid Waste Material, Leachate, Soil	Hazardous Waste	Not documented	Constructed and functional	Not Available	Source Containment	Minimize infiltration, Prevent direct contact	Not Available
Sylvester (OU 1), NH	Landfill/disposal	Conventional	Soil	Contaminated Soil (not including NAPL)	Not documented	Constructed and functional	December 1982	Source Containment	Minimize infiltration	Yes
Syntex Facility (OU 1), MO	Contamination	Asphalt/Concrete	Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer	Constructed and functional	1995	Source Containment	Prevent source migration (including DNAPL or LNAPL), Prevent direct contact	Yes
Syntex Facility (OU 1), MO	Contamination	Not Specified	Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer	Constructed and functional	1989	Source Containment	Prevent source migration (including DNAPL or LNAPL), Prevent direct contact	Not Available

On-Site Containment Remedies: Cover Systems (continued)

Site (Operable Unit), State	Site Classification	Cover System Type	Type of Media Contained by Barrier	Source of Contaminants Contained by Barrier	Cover System Layers	Status	Date Constructed or Functional	Primary Goal of Containment	Secondary Goals of Cover system	Functioning as Designed?
Taylor Lumber and Treating (OU 1), OR	Contamination	Asphalt/Concrete	Groundwater, Soil	NAPL, Contaminated Soil (not including NAPL)	Surface/Protection Layer	Constructed and functional	2000	Source and Groundwater Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL), Prevent migration of contaminated groundwater, Prevent direct contact	Yes
Taylor Lumber and Treating (OU 1), OR	Contamination	Asphalt/Concrete	Groundwater, Soil	NAPL, Contaminated Soil (not including NAPL)	Surface/Protection Layer	Predesign/design	N/A	Source and Groundwater Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL), Prevent migration of contaminated groundwater, Prevent direct contact	Not Constructed
Tenth Street Dump/Junkyard (OU 1), OK	Landfill/disposal	Conventional	Soil	Municipal Solid Waste (MSW), Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Hydraulic Barrier, Foundation Layer	Constructed and functional	January 1996	Source Containment	Prevent source migration (including DNAPL or LNAPL), Prevent direct contact	Yes
Torch Lake (OU 1), MI	Mining	Not Specified	Soil, Sediment, Other (copper tailings)	Contaminated Soil (not including NAPL), Contaminated Sediment, Other (copper tailings)	Surface/Protection Layer	Constructed and functional	2004	Source Containment	Prevent direct contact	Yes
Troy Mills Landfill (OU 1), NH	Landfill/disposal	Soil	Soil	Hazardous Waste, Contaminated Soil (not including NAPL)	Surface/Protection Layer, Foundation Layer, Other (permeable geotextile)	Constructed and functional	September 2005	Source Containment	Prevent direct contact	Not Available
Petro-Chemical Systems, Inc. (Turtle Bayou) (OU 2), TX	Contamination	Conventional	Groundwater, Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer	Being Constructed	N/A	Source and Groundwater Containment	Minimize infiltration, Prevent migration of contaminated groundwater, Prevent direct contact	Not Constructed
Upper Tenmile Creek Mining Area (OU 4), MT	Mining	Not specified	Other - waste rock, tailings, mine shafts	Other - waste rock, tailings	Not documented	Predesign/design	N/A	Source Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL), Prevent direct contact, Other	Not Constructed
Woolfolk Chemical Works, Inc. (OU 3), GA	Contamination	Conventional	Soil	Contaminated Soil (not including NAPL)	Not documented	Predesign/design	N/A	Source Containment	Minimize infiltration, Prevent direct contact	Not Constructed
Woolfolk Chemical Works, Inc. (OU 3), GA	Contamination	Asphalt/Concrete	Soil	Contaminated Soil (not including NAPL)	Surface/Protection Layer	Predesign/design	N/A	Source Containment	Minimize infiltration, Prevent direct contact	Not Constructed
Wyckoff Co./Eagle Harbor (OU 1), WA	Sediment	Soil	Sediment	Contaminated Sediment	Surface/Protection Layer	Constructed and functional	2002	Source Containment	Prevent direct contact	Yes
Wyckoff Co./Eagle Harbor (OU 3), WA	Sediment	Soil	Sediment	Contaminated Sediment	Surface/Protection Layer	Constructed and functional	1997	Source Containment	Minimize infiltration, Prevent direct contact	Yes
Wyckoff Co./Eagle Harbor (OU 3), WA	Contamination	Asphalt/Concrete	Solid Waste Material, Soil	Construction Debris, Solidified/Stabilized Waste Material, Contaminated Soil (not including NAPL)	Surface/Protection Layer	Constructed and functional	1997	Source Containment	Minimize infiltration, Prevent direct contact	Yes

On-Site Containment Remedies: Vertical Engineered Barriers

Site (Operable Unit), State	Site Classification	VEB Type	Type of Media Contained by Barrier	Source of Contaminants Contained by Barrier	VEB Layers	Status	Date Constructed or Functional	Primary Goal of Containment	Secondary Goals of VEB	Functioning as Designed?
Broderick Wood Products (OU 2), CO	Contamination	Slurry Wall	Groundwater, Soil	Hazardous Waste	Soil - bentonite	Constructed and functional	September 1996	Source and Groundwater Containment	Prevent source migration (including DNAPL or LNAPL), Collect DNAPL/LNAPL, Prevent direct contact	Yes
Delaware Sand & Gravel (OU 5), DE	Landfill/disposal	Slurry Wall	Groundwater	NAPL, Contaminated Groundwater (not including NAPL)	Soil - bentonite	Constructed and functional	February 1995	Source and Groundwater Containment	Prevent source migration (including DNAPL or LNAPL), Prevent migration of contaminated groundwater	Yes
Florence Land Recontouring, Inc., Landfill (OU1), NJ	Landfill/disposal	Slurry Wall	Solid Waste Material	Municipal Solid Waste (MSW), Hazardous Waste	Soil - bentonite	Constructed and functional	August 1994	Source Containment	Prevent source migration (including DNAPL or LNAPL), Prevent direct contact	Yes
Geneva Industries/Fuhrmann Energy (OU 2), TX	Contamination	Slurry Wall	Groundwater, Soil	Contaminated Groundwater (not including NAPL), Contaminated Soil (not including NAPL)	Not Available	Constructed and functional	September 1990	Source and Groundwater Containment	Minimize infiltration, Prevent migration of contaminated groundwater	Yes
Helen Kramer Landfill (OU 1), NJ	Landfill/disposal	Slurry Wall	Solid Waste Material, Groundwater, Leachate	Municipal Solid Waste (MSW), Hazardous Waste	Not Available	Constructed and functional	1993	Source Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL), Prevent migration of contaminated groundwater, Prevent direct contact	Yes
Kane & Lombard Street Drums (OU 1), MD	Landfill/disposal	Slurry Wall	Groundwater, Soil	Hazardous Waste, Contaminated Groundwater (not including NAPL), Contaminated Soil (not including NAPL)	Soil - bentonite	Constructed and functional	1990	Groundwater Containment	Minimize infiltration, Prevent migration of contaminated groundwater, Collect leachate, Prevent direct contact	Yes
Lipari Landfill (OU 1), NJ	Landfill/disposal	Slurry Wall	Groundwater, Leachate	Hazardous Waste, Contaminated Groundwater (not including NAPL)	Soil - clay	Constructed and functional	1984	Source and Groundwater Containment	Prevent source migration (including DNAPL or LNAPL), Prevent migration of contaminated groundwater	Yes
McCormick & Baxter Creosoting Co. (OU 1), CA	Contamination	Sheet Pile	Other (oily waste seeps)	NAPL	Not Available	Constructed and functional	1997	Source Containment	Prevent source migration (including DNAPL or LNAPL)	Yes
McCormick & Baxter Creosoting Co. (Portland Plant) (OU 1), OR	Contamination	Slurry Wall	Groundwater	NAPL, Contaminated Groundwater (not including NAPL)	Soil - bentonite	Constructed and functional	2003	Groundwater Containment	Prevent source migration (including DNAPL or LNAPL), Collect DNAPL/LNAPL	Yes
Pacific Sound Resources (OU 2), WA	Contamination	Slurry Wall	Groundwater	Hazardous Waste, NAPL	Not Available	Constructed and functional	Not Available	Groundwater Containment	Prevent source migration (including DNAPL or LNAPL), Collect DNAPL/LNAPL, Prevent direct contact	Yes
Salem Acres (OU 1), MA	Landfill/disposal	Slurry Wall	Solid Waste Material	Municipal Solid Waste (MSW), Hazardous Waste, Ash/Dust	Not Available	Other - Removed as part of a subsequent remedial excavation	1988	Source Containment	None	Removed
Savage Municipal Water Supply (OU 1), NH	Contamination	Slurry Wall	Groundwater	NAPL, Contaminated Groundwater (not including NAPL)	Not Available	Constructed and functional	March 1999	Groundwater Containment	Prevent source migration (including DNAPL or LNAPL), Prevent migration of contaminated groundwater	Yes
Sylvester (OU 1), NH	Landfill/disposal	Slurry Wall	Groundwater	Contaminated Groundwater (not including NAPL)	Not Available	Constructed and functional	November 1982	Groundwater Containment	Prevent migration of contaminated groundwater	Yes
Taylor Lumber and Treating (OU 1), OR	Contamination	Not Documented	Groundwater, Soil	NAPL, Contaminated Soil (not including NAPL)	Not Available	Constructed and functional	2000	Source and Groundwater Containment	Minimize infiltration, Prevent source migration (including DNAPL or LNAPL), Prevent migration of contaminated groundwater, Prevent direct contact	Not Available
Woolfolk Chemical Works, Inc. (OU 3), GA	Contamination	Not Documented	Soil	Contaminated Soil (not including NAPL)	N/A	Predesign/design	N/A	Source Containment	Prevent source migration (including DNAPL or LNAPL)	Not Constructed
Wyckoff Co./Eagle Harbor (OU 2), WA	Contamination	Sheet Pile	Groundwater	NAPL, Contaminated Groundwater (not including NAPL)	Not Available	Constructed and functional	February 2001	Groundwater Containment	Prevent source migration (including DNAPL or LNAPL)	Yes

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