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INNOVATIVE TREATMENT TECHNOLOGIES: ANNUAL STATUS REPORT (Fifth Edition)

U.S. Environmental Protection Agency
Office of Solid Waste and Emergency Response
Technology Innovation Office
Washington, DC 20460

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**INNOVATIVE TREATMENT TECHNOLOGIES:
ANNUAL STATUS REPORT
EPA 542-R-93-003**

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FOREWORD

In April 1990, the U.S. Environmental Protection Agency's (EPA) Office of Solid Waste and Emergency Response (OSWER) established the Technology Innovative Office (TIO) to promote the use of innovative treatment technologies for contaminated site cleanup. TIO's mission is to encourage government and industry to increase the use of innovative treatment technology to mitigate contaminated waste sites, soils and ground water. One of TIO's goals is the removal of regulatory and institutional barriers to the development and use of innovative technologies. Another is the provision of richer technology and market information to target audiences, including federal agencies, states, consulting engineering firms, responsible parties, technology developers, technology vendors and the investment community.

This report documents the status of innovative treatment technology use in the Superfund program. To a lesser extent, the report presents information on innovative treatment projects at non-Superfund sites under the jurisdiction of the Department of Defense and the Department of Energy. We have changed the format of the report this year by breaking it into three chapters presenting Superfund remedial actions, removal actions, and non-Superfund sites, respectively. We have also expanded the report to include many new innovative projects selected by EPA in fiscal year 1992 and numerous graphics and tables to assist the reader in understanding the data. We hope that this information will allow better communication between experienced technology users and those who are considering innovative technologies to clean up contaminated sites, as well as enabling technology vendors to evaluate the market for innovative treatment technologies in Superfund for the next several years.

The use of innovative treatment technologies in Superfund and other EPA waste programs is addressed by a directive, *Furthering the Use of Innovative Treatment Technologies in OSWER Programs* (OSWER Directive 9380.0-17, June 10, 1991). This directive sets forth seven initiatives to remove impediments from and create incentives for the use of innovative treatment technologies for Superfund, corrective action under the Resource Conservation and Recovery Act (RCRA), and underground storage tank cleanups. It is hoped that efforts such as the directive and this document will increase the reliance on new, less costly, or more effective technologies to address the problems associated with Superfund and other hazardous waste sites, and petroleum contamination.

Walter W. Kovalick, Jr. Ph.D.
Director, Technology Innovation Office

ACKNOWLEDGEMENTS

This document was prepared under the direction of Ms. Linda Fiedler, work assignment manager for the U.S. Environmental Protection Agency's Technology Innovation Office.

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

ABSTRACT

This yearly report (formerly published twice a year) documents and analyzes the selection and use of innovative treatment technologies in the U.S. EPA Superfund Program and at some non-Superfund sites under the jurisdiction of the Departments of Defense (DoD) and Energy (DOE). The status of every project has been updated, and projects selected in fiscal year 1992 Superfund Records of Decision (ROD) are included. The information will allow better communication between experienced technology users and those who are considering innovative technologies to clean up contaminated sites. In addition, the information will enable technology vendors to evaluate the market for innovative technologies in Superfund for the next several years. It also will be used by EPA's Technology Innovation Office to track progress in the application of innovative treatment technologies.

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

- Bioremediation (Ex Situ)
- Bioremediation (In Situ)
- Chemical treatment
- Dechlorination
- In situ flushing
- In situ vitrification
- Soil vapor extraction
- Soil washing
- Solvent extraction
- Thermal desorption
- Other technologies (air sparging, contained recovery of oil wastes, limestone barriers and fuming gasification)

The document includes information on 263 applications of innovative treatment technologies for remedial actions, 33 applications for removal actions, and 28 applications under other federal programs. Chapters 1, 2, and 3 contain detailed, site-specific information for Superfund remedial and removal sites, at which innovative treatment has been selected or used. The information for these chapters was collected through analyses of RODs, review of OSWER tracking systems, and interviews with EPA regional, DoD, and DOE staff. Chapters 1, 2, and 3 also contain performance and operating data on the 14 remedial, 19 removal, and 7 non-Superfund innovative projects that have been completed.

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LIST OF ABBREVIATIONS

| | | | |
|--------------|---|---------------|---|
| AM | Action Memorandum | NPL | National Priorities List |
| APC | Air pollution control | OERR | Office of Emergency and Remedial Response |
| APEG | Alkaline metal hydroxide/polyethylene glycol | OSC | On-scene coordinator |
| ARCS | Alternative remedial contracts strategy | OSWER | Office of Solid Waste and Emergency Response |
| ATTIC | Alternative Treatment Technology Information Center | OU | Operable unit |
| BCD | Base catalyzed dechlorination | PAH | Polynuclear aromatic hydrocarbon |
| BTEX | Benzene, toluene, ethylbenzene, and xylene | PCB | Polychlorinated biphenyl |
| BTX | Benzene, toluene, and xylene | PCE | Perchloroethylene (tetrachloroethylene) |
| cy | Cubic yards | PCP | Pentachlorophenol |
| DCA | Dichloroethane | PRP | Potentially responsible party |
| DCE | Dichloroethylene | RA | Remedial action |
| DEHP | Di(2-ethylhexyl phthalate) | RCRA | Resource Conservation and Recovery Act |
| DLA | Defense Logistics Agency | RD | Remedial design |
| DNT | Dinitrotoluene | ROD | Record of Decision |
| EECA | Engineering Evaluation/Cost Analysis | RPM | Remedial project manager |
| ESD | Explanation of significant differences | RSKERL | Robert S. Kerr Environmental Research Laboratory, Ada, Oklahoma (EPA) |
| FAA | Federal Aviation Administration | SARA | Superfund Amendment and Reauthorization Act of 1986 |
| ft | Feet | SACM | Superfund Accelerated Cleanup Model |
| FUDS | Formerly used defense sites | SVOC | Semivolatile organic compound |
| FY | Fiscal year | S/S | Solidification and stabilization |
| gw | Ground water | TCA | Trichloroethane |
| IRP | Installation Restoration Program | TCE | Trichloroethylene |
| KPEG | Potassium hydroxide/polyethylene glycol | TIO | Technology Innovation Office |
| MEK | Methyl ethyl ketone | USACE | U.S. Army Corps of Engineers |
| MBOCA | 4,4' -Methylenebis(2-chloroaniline) | USDA | U.S. Department of Agriculture |
| NAPL | Nonaqueous phase liquids | VOC | Volatile organic compound |
| NFEC | Navy Facilities Engineering Command | | |

OVERVIEW

Introduction

The Technology Innovation Office (TIO) of the U.S. Environmental Protection Agency's (EPA) Office of Solid Waste and Emergency Response (OSWER) has prepared this *Innovative Treatment Technologies: Annual Status Report* to document the use of innovative treatment technologies to remediate both Superfund and non-Superfund sites. The report contains site-specific information on Superfund sites (both remedial and removal actions) and non-Superfund sites (sites addressed under other federal programs) at which innovative treatment technologies are being used. Site managers can use this report in evaluating cleanup alternatives. Innovative technology vendors can use it in identifying potential markets. TIO also uses the information to track progress in the application of innovative treatment technologies.

The report is now updated annually. This September 1993 issue of the report updates and expands information provided in the October 1992 report. Information added to this update includes 59 innovative treatment technologies selected for remedial actions in fiscal year (FY) 1992 Superfund records of decision (ROD)—a ROD is the decision document used to specify the way a site, or part of a site, will be remediated—and information on 3 other completed projects. The report also includes 15 additional innovative treatment technologies selected for removal actions and 6 additional applications under other federal programs.

What Are Alternative and Innovative Treatment Technologies?

Alternative treatment technologies are alternatives to land disposal. The most frequently used alternative technologies are incineration and solidification/stabilization. Innovative treatment technologies are alternative treatment technologies for which applications at Superfund and similar sites are inhibited by lack of data on performance

and cost. In general, a treatment technology is considered innovative if it has had limited full-scale application. Often, it is the application of a technology or process to soils, sediments, sludge, and solid-matrix waste (such as mining slag) that is innovative. Groundwater treatment after the water has been pumped to the surface often resembles traditional water treatment technologies; thus, in general, pump-and-treat or ex situ groundwater remedies are considered established. In situ bioremediation and other in situ treatment of groundwater, however, are considered innovative technologies.

This report documents the use of the following innovative treatment technologies to treat soils, sediments, sludge, and solid-matrix waste:

- | | |
|----------------------------|------------------------|
| • Bioremediation (Ex Situ) | • Solvent extraction |
| • Bioremediation (In Situ) | • Thermal desorption |
| • Chemical treatment | • Other technologies |
| • Dechlorination | (e.g., air sparging, |
| • In situ flushing | contained recovery of |
| • In situ vitrification | oily wastes, limestone |
| • Soil vapor extraction | barriers, and fuming |
| • Soil washing | gasification) |

In addition, the 12 remedial sites that are using in-situ bioremediation for groundwater remediation are included with the in situ bioremediation projects.

Sources of Information for This Report

EPA initially used RODs from individual sites to compile information on remedial actions and pollution reports, on-scene coordinators' reports, and the OSWER Removal Tracking System to compile data

on emergency response actions. The U.S. Army Corps of Engineers Hazardous, Toxic, Radioactive Waste (HTRW) Mandatory Center of Expertise (Omaha, Nebraska) and the *Synopses of Federal Demonstrations of Innovative Site Remediation Technologies*, Second Edition (EPA/542/B-40/003) were consulted to compile information on projects under other federal programs. EPA then verified and updated the draft information through interviews with remedial project managers (RPM) and on-scene coordinators (OSC) and other contacts for each site. The data concerning project status do not duplicate data in CERCLIS, EPA's Superfund tracking system. This report provides more detailed information specifically on the portion of the remedy pertaining to an innovative technology. In addition, information about technologies and sites identified here might differ from information found in the ROD annual reports and the RODs database. These differences are the result of design changes in the treatment trains used at sites that may or may not require official documentation (that is, a ROD amendment or an explanation of significant differences (ESD)).

Definitions of Specific Innovative Treatment Technologies

The innovative treatment technologies reported in the following chapters treat hazardous wastes in very different ways. The following paragraphs define the technologies as they are represented in this document and provide summary statistics on some of the technologies.

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

In applications of **IN SITU BIOREMEDIATION**, nutrients and an oxygen source are pumped under pressure into the soil or aquifer through wells, or they are spread on the surface for infiltration to the contaminated material.

In **CHEMICAL TREATMENT** the contaminants are converted to less hazardous compounds through chemical reactions. The technology is most often used to reduce a contaminant (hexavalent chromium to the trivalent form) or oxidize a contaminant (cyanide, for example). Neutralization is considered an available technology and is not included in this report.

DECHLORINATION (another type of chemical treatment) results in the removal or replacement of chlorine atoms bonded to hazardous compounds.

For **IN SITU FLUSHING**, large volumes of water, at times supplemented with treatment compounds, are introduced to soil, waste, or groundwater to flush hazardous contaminants from a site. This technology is predicated on the assumption that the injected water can be isolated effectively within the aquifer and recovered.

IN SITU VITRIFICATION treats contaminated soil in place at temperatures of approximately 3000°F (1600°C). Metals are encapsulated in the glass-like structure of the melted silicate compounds. Organics may be treated by combustion.

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

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

For **THERMAL DESORPTION**, the waste is heated in a controlled environment to cause organic compounds to volatilize from the waste. The operating temperature for thermal desorption is usually less than 1000°F (550°C). The volatilized contaminants usually require further control or treatment.

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

OTHER TECHNOLOGIES include air sparging and the contained recovery of oily wastes (CROW), limestone barriers, and fuming gasification technologies. Air sparging involves injecting air into the aquifer to strip or flush volatile contaminants as the air percolates up through the groundwater and is captured by a vapor extraction

system. The CROW process displaces oil wastes with steam and hot water. The contaminated oils and groundwater are swept into a more permeable area and are pumped out of the aquifer. Limestone barriers act like chemical slurry walls. Contaminated groundwater comes into contact with the barrier and pH increases. The increase in pH effectively immobilizes dissolved metals and neutralizes the soil. Fuming gasification is a thermal treatment process that purges contaminants from solids and soils as metal fumes and organic vapors. The organic vapors can be burned as fuel and the metal fumes can be recovered and recycled.

The following chapters contain detailed information and analysis on sites at which innovative treatment technologies are being or have been applied. Chapter 1 covers all Superfund sites implementing an innovative treatment technology under a remedial action. These actions are usually documented in a ROD. Chapter 2 provides information on Superfund removal action sites. Removals are conducted in response to an immediate threat caused by a release of hazardous substances.* Chapter 3 covers non-Superfund sites or sites being addressed under other federal programs.

* *Historically, remedial and removal actions operate under different procedural guidelines. The EPA currently is revising the Superfund process under the Superfund Accelerated Cleanup Model (SACM). Under SACM, EPA will adopt a continuous process for assessing site specific conditions and the need for action. Risks will be reduced quickly through early remedial or removal action.*

Chapter 1

Superfund Remedial Actions

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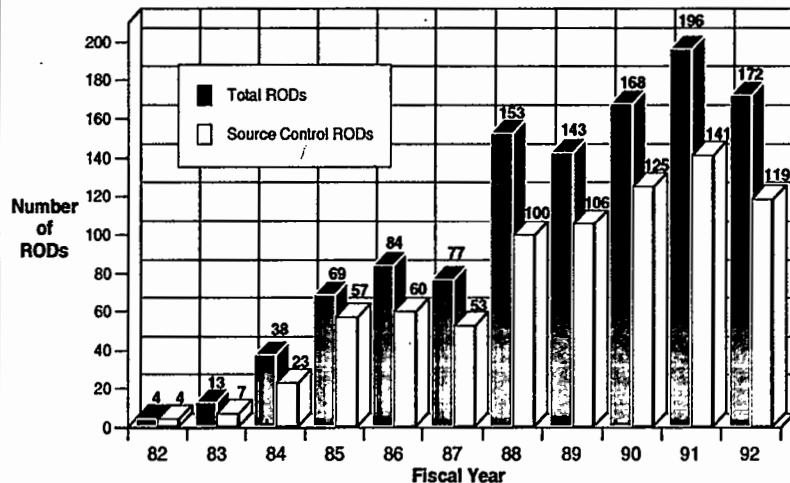
SUPERFUND REMEDIAL ACTIONS

Frequency of Technology Selection

ROD Statistics As of September 30, 1992, EPA has listed 1,275 sites on the National Priorities List (NPL). Through Fiscal Year (FY) 1992 ending September 30, 1992, 1,117 RODs (including ROD Amendments) had been signed. Most RODs for remedial actions address the source of contamination, such as soil, sludge, sediments, solid-type wastes, and nonaqueous phase liquids (NAPL). These RODs are referred to as "source control" RODs. Other RODs address ground water only or specify that no action is necessary. Figure 1-1 shows the number of source control RODs compared with the total number of RODs for each fiscal year.

**FIGURE 1-1
SUPERFUND REMEDIAL ACTIONS: RODS SIGNED
BY FISCAL YEAR**

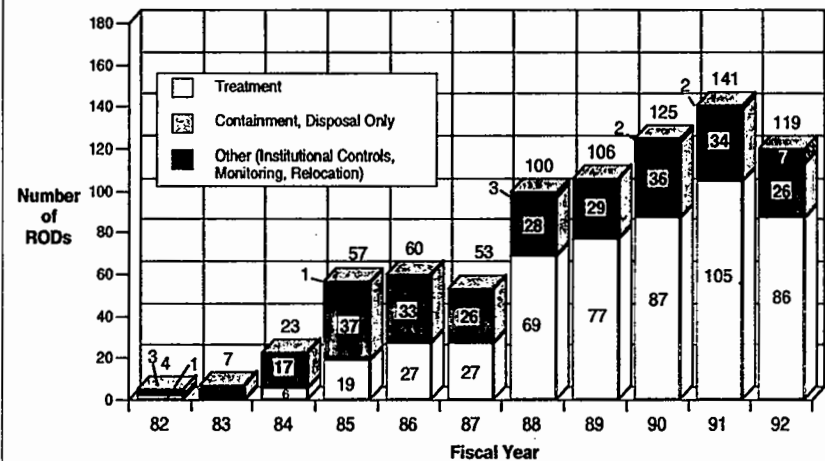
(Total Number of RODs = 1,117)



The difference between the total number of RODs and the number of source control RODs is the number of "groundwater remedy only" or "no action needed" RODs.
Source: USEPA Office of Emergency and Remedial Response.

An analysis of source control RODs allows a comparison of the frequency of selection of treatment with that of selection of containment or disposal to remedy contamination at sites. Source control RODs are classified by the general type of technology selected: (1) RODs specifying some alternative treatment, (2) RODs specifying containment or disposal only, and (3) RODs specifying other action (such as land use restrictions, monitoring, or relocation). Figure 1-2 shows the number of source control RODs that fall under each category. RODs in which some treatment is selected may include containment of treatment residuals or of waste from another part of the site.

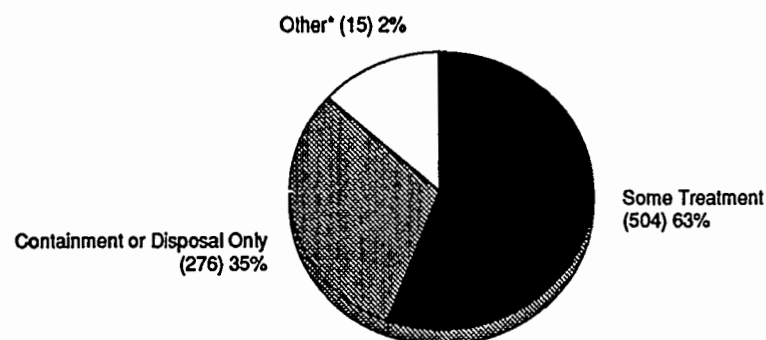
**FIGURE 1-2
SUPERFUND REMEDIAL ACTIONS: SOURCE
CONTROL RODS BY FISCAL YEAR**



Source: USEPA Office of Emergency and Remedial Response.

Overall, 63 percent of source control RODs have selected at least one treatment technology for source control (Figure 1-3). The Superfund Amendments and Reauthorization Act of 1986 (SARA) required that EPA favor permanent remedies (that is, alternative treatment) over containment or disposal to remediate Superfund sites. In each year following the passage of SARA, more than 70 percent of the RODs contain provisions for the treatment of wastes. The increase is most

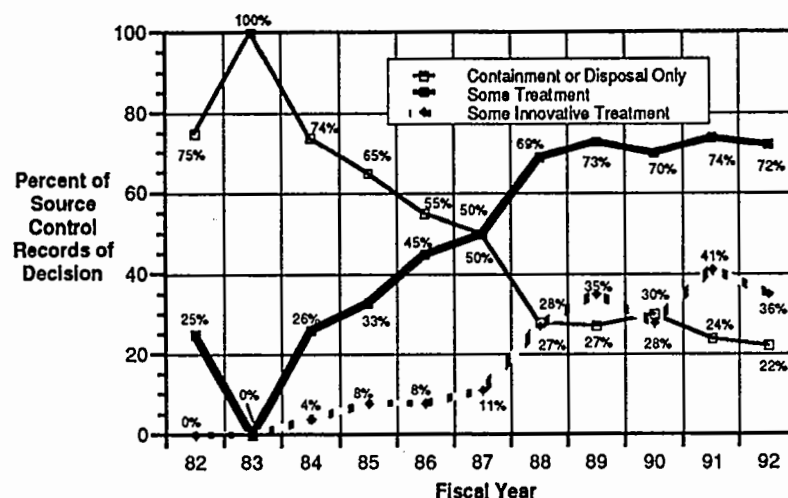
FIGURE 1-3
SUPERFUND REMEDIAL ACTIONS: OVERVIEW OF SOURCE CONTROL RODS THROUGH FISCAL YEAR 1992



* Includes institutional controls, monitoring, and relocation.
() Number of RODs
Source: USEPA Office of Emergency and Remedial Response.

dramatic in FY1988. Fifty percent of RODs in FY 1987 selected some treatment for source control, whereas 69 percent of RODs in FY 1988 selected some treatment (Figure 1-4). The percentage was 72 percent in FY 1992. Figure 1-4 also illustrates the percentage of RODs selecting at least one *innovative technology*, as updated by current project status information. Out of a total of 795 source control RODs signed through FY 1992, innovative technologies were selected and are still being considered or used for approximately 27 percent of source control RODs. Overall, 19 percent of all RODs have included innovative technologies.

FIGURE 1-4
SUPERFUND REMEDIAL ACTIONS: TREATMENT AND DISPOSAL DECISIONS FOR SOURCE CONTROL



Source: USEPA Office of Emergency and Remedial Response

Technology Statistics Another way of illustrating the greater use of treatment is by quantifying the number and kinds of treatment technologies selected and used. Most of the remainder of the information contained in this chapter focuses on technologies, rather than RODs. In each ROD in which treatment was specified, several alternative treatment technologies may have been selected.

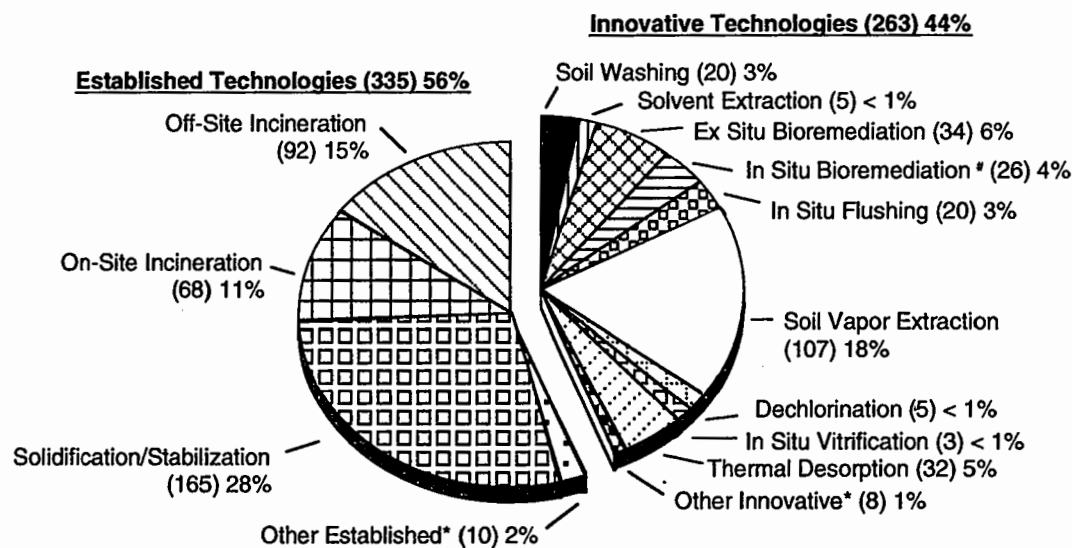
Through FY 1992, 586 treatment technologies have been selected in 504 source control RODs specifying some treatment. In addition, EPA has selected in situ bioremediation of ground water for 11 remedial sites for a total 597 treatment technologies. EPA selected in

situ bioremediation of groundwater for four remedial sites in FY 1992. The selection of multiple technologies results from the use of treatment trains or from the treatment of different wastes or areas of the site. For the 504 RODs specifying treatment for source control, Figure 1-5 lists each type of treatment technology selected and how often it has been selected or used for source control. Figure 1-5 illustrates that, through FY 1992, 44 percent of the 598 treatment technologies selected

were innovative and 56 percent were established. Tables 1-1, 1-2, and 1-3, appearing at the end of this section, contain summary information on the innovative treatment technology projects at remedial sites. Table 1-4 lists sites using established technologies. Information on the established treatment technologies is based on a review by the Office of Emergency and Remedial Response (OERR) rather than interviews of Regional or State staff.

FIGURE 1-5
SUPERFUND REMEDIAL ACTIONS: SUMMARY OF ALTERNATIVE TREATMENT TECHNOLOGIES
SELECTED THROUGH FISCAL YEAR 1992

(Total Number of Technologies = 598)



Note: Data are derived from 1982 – 1992 Records of Decision (RODs) for fiscal years and anticipated design and construction activities as of June 1993. More than one technology per site may be used.

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

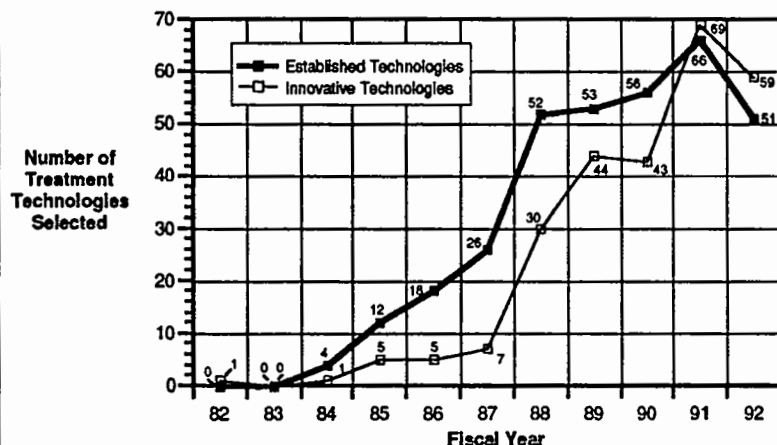
** "Other" established technologies are soil aeration, in situ flaming, and chemical neutralization. "Other" innovative technologies are air sparging, contained recovery of oily wastes, limestone barriers, and fuming gasification.*

Includes 11 in situ groundwater treatment remedies.

Figure 1-6 compares the numbers of established and innovative technologies by fiscal year. The figure indicates that more innovative technologies than established technologies have been selected in RODs in the previous two years (FY 1991 and FY 1992). Figure 1-7 compares the number of innovative technologies selected with the number of sites. This graph illustrates that some sites are using more than one innovative technology, often together in "treatment

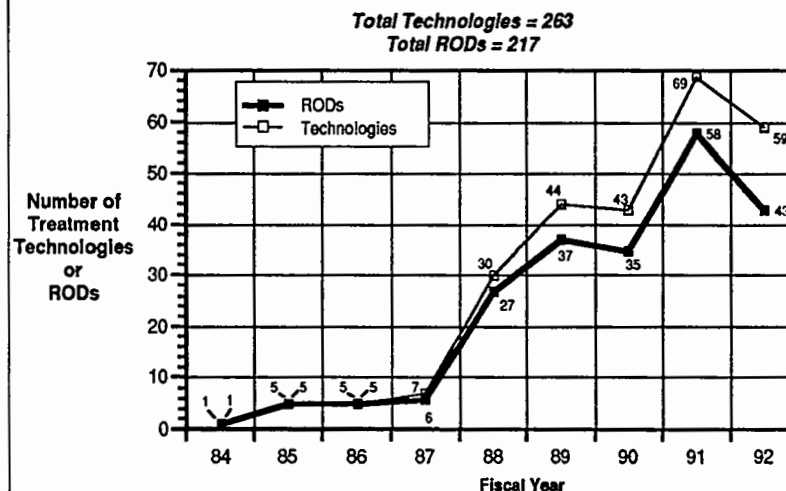
trains." The figure also indicates that the ratio of innovative technologies to sites has increased every year since FY 1986. Figure 1-8 gives the frequency of selection for each innovative technology by fiscal year. Figure 1-9 shows the frequency of selection for the four most frequently selected innovative treatment technologies, including soil vapor extraction by fiscal year.

**FIGURE 1-6
SUPERFUND REMEDIAL ACTIONS: NUMBER OF
ESTABLISHED VERSUS INNOVATIVE TREATMENT
TECHNOLOGIES**



Note: Data for innovative technologies are derived from Records of Decision (RODs) for fiscal years 1982 – 1992 and anticipated design and construction activities as of June 1993. More than one technology per site may be used.

**FIGURE 1-7
SUPERFUND REMEDIAL ACTIONS: NUMBER OF
INNOVATIVE TREATMENT TECHNOLOGIES
VERSUS CORRESPONDING RODs**



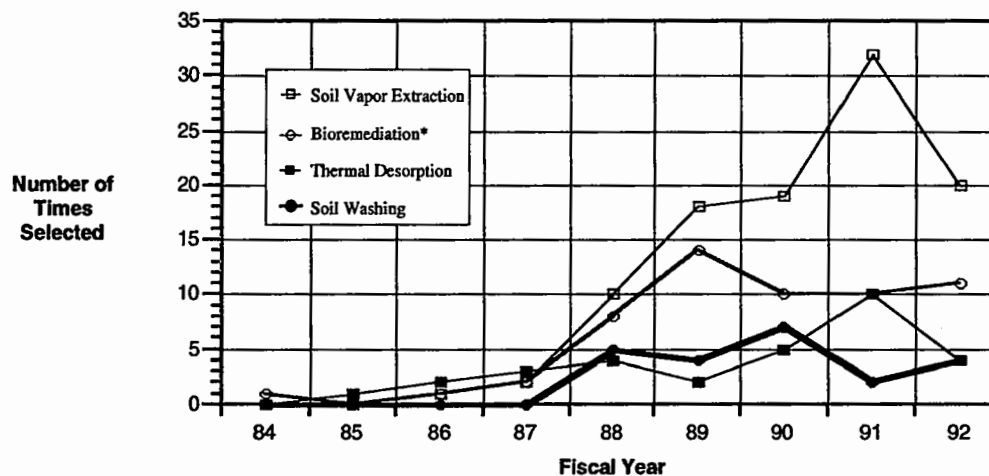
Note: Data derived from 1982 – 1992 Records of Decision (ROD) and anticipated design and construction activities as of June 1993. Number of RODs in a fiscal year usually equals the number of sites.

FIGURE 1-8
SUPERFUND REMEDIAL ACTIONS: INNOVATIVE TREATMENT TECHNOLOGIES BY YEAR

| | Fiscal Year | | | | | | | | | |
|--------------------------|-------------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|------------|
| | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | TOTAL |
| Soil Vapor Extraction | 0 | 2 | 1 | 1 | 10 | 19 | 19 | 34 | 20 | 107 |
| Bioremediation (Ex Situ) | 1 | 0 | 1 | 0 | 5 | 8 | 4 | 4 | 1 | 34 |
| Thermal Desorption | 0 | 1 | 2 | 3 | 4 | 2 | 6 | 11 | 4 | 32 |
| Bioremediation (In Situ) | 0 | 0 | 0 | 2 | 3 | 3 | 4 | 6 | 8 | 26 |
| Soil Washing | 0 | 0 | 0 | 0 | 5 | 3 | 6 | 2 | 4 | 20 |
| In Situ Flushing | 0 | 1 | 1 | 0 | 3 | 3 | 2 | 4 | 6 | 20 |
| Other | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 4 | 8 |
| Dechlorination | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 5 | 5 |
| Solvent Extraction | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 1 | 0 | 5 |
| Chemical Treatment | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 |
| Vitrification | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 3 |
| TOTAL | 1 | 5 | 5 | 7 | 30 | 44 | 43 | 69 | 59 | 263 |

NOTE: Data derived from Fiscal Year 1982 – 1992 Records of Decision (RODs) and anticipated design and construction activities as of June 1993

FIGURE 1-9
SUPERFUND REMEDIAL ACTIONS: TRENDS IN THE SELECTION OF FOUR INNOVATIVE TREATMENT TECHNOLOGIES



* Also includes in situ groundwater treatment.

NOTE: Data derived from Fiscal Year 1982 – 1992 Records of Decision (RODs) and anticipated design and construction activities as of June 1993

Status of Innovative Technology Implementation

Many of the innovative technologies documented in this report have been selected in the last several years. The design of such projects typically takes one to three years; therefore, relatively few innovative technologies have been contracted for and installed, and even fewer have been completed (Figure 1-10). In the next several years, though, many projects now in design should become operational. Table 1-3 summarizes remedial action sites using innovative treatment technologies by status and specific technology. Table 1-6 presents detailed information on remedial projects that have been completed.

FIGURE 1-10
SUPERFUND REMEDIAL ACTIONS: PROJECT
STATUS OF INNOVATIVE TREATMENT
TECHNOLOGIES AS OF JUNE 1993

| Technology | Predesign/ In Design | Design Complete/ Being Installed/ Operational | Project Completed | Total |
|----------------------------|-------------------------|---|----------------------|------------|
| Soil Vapor Extraction | 69 | 32 | 6 | 107 |
| Ex Situ Bioremediation | 22 | 11 | 1 | 34 |
| Thermal Desorption | 20 | 8 | 4 | 32 |
| In Situ Bioremediation* | 16 | 9 | 1 | 26 |
| Soil Washing | 17 | 3 | 0 | 20 |
| In Situ Flushing | 16 | 4 | 0 | 20 |
| Dechlorination | 3 | 1 | 1 | 5 |
| Solvent Extraction | 5 | 0 | 0 | 5 |
| In Situ Vittrification | 3 | 0 | 0 | 3 |
| Chemical Treatment | 7 | 1 | 0 | 3 |
| Other Innovative Treatment | 2 | 0 | 1 | 8 |
| TOTAL | 180 (69%) | 69 (26%) | 14 (5%) | 263 |

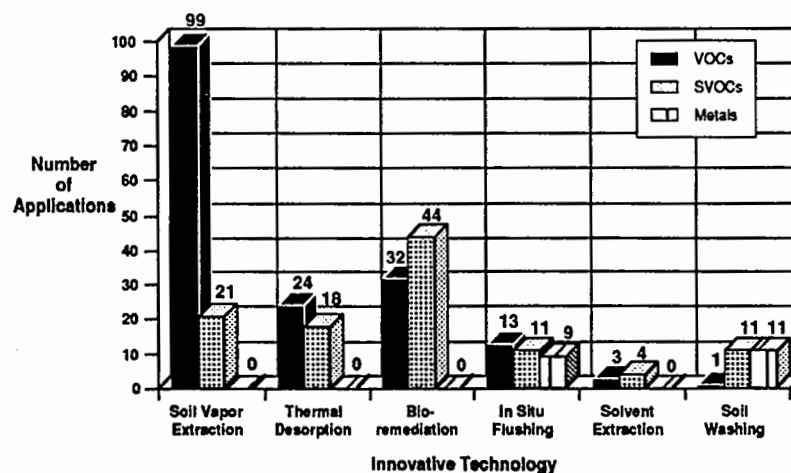
Note: Data are derived from 1982 – 1992 Records of Decision (RODs) and anticipated design and construction activities as of June 1993.

Also includes in situ groundwater treatment.

Contaminants Addressed by Innovative Treatment Technologies

The data collected for this report form the basis for an analysis of the classes of contaminants treated by each technology type at remedial action sites. Figure 1-11 provides this information, by technology, for three major contaminant groups: volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and metals. For this report, compounds are categorized as VOCs or SVOCs, according to the lists provided in EPA's SW-846 Test Methods 8240 and 8270, respectively.

FIGURE 1-11
SUPERFUND REMEDIAL ACTIONS: APPLICATION
OF INNOVATIVE TREATMENT TECHNOLOGIES



Quantity of Soil Addressed

EPA analyzed the quantity of soil treated at 183 sites using innovative treatment technologies, and for which quantity data were available (Figure 1-12). This analysis provides an indication of the scale of the projects involved.

Treatment Trains

Innovative treatment technologies in this report may be used with established or other innovative treatment technologies in treatment trains. Technologies may be combined to reduce the volume of material requiring further treatment, to prevent the emission of volatile contaminants

during excavation and mixing, or to address multiple contaminants in a single medium. Figure 1-13 presents the data on treatment trains contained within this report. Table 1-5 lists the sites at which treatment trains are being used.

FIGURE 1-12
SUPERFUND REMEDIAL ACTIONS: QUANTITIES OF SOIL TO BE TREATED BY INNOVATIVE TECHNOLOGIES

| Technology | Number Of Sites With Data (Without Data) | Quantity (Cubic Yards) | | |
|--------------------------|---|------------------------|---------|------------------|
| | | Range | Average | Total |
| In Situ Flushing | 12 (20) | 130 - 650,000 | 86,000 | 1,035,330 |
| Soil vapor extraction | 75 (107) | 62 - 2,000,000 | 76,000 | 5,729,315 |
| Bioremediation (in situ) | 10 (26) | 5,000 - 258,000 | 72,000 | 720,900 |
| Soil washing | 18 (20) | 1,800 - 200,000 | 38,000 | 686,900 |
| Sovent extraction | 5 (5) | 15,000 - 67,000 | 32,500 | 162,500 |
| Bioremediation (ex situ) | 27 (34) | 1,000 - 120,000 | 30,000 | 810,695 |
| Thermal desorption | 27 (32) | 2,000 - 130,000 | 24,000 | 650,900 |
| Dechlorination | 3 (5) | 16,000 - 49,000 | 22,000 | 65,000 |
| Vitrification | 3 (3) | 3,600 - 5,000 | 4,400 | 13,200 |
| Chemical treatment | 2 (3) | 800 - 12,700 | 400 | 800 |
| Other | 1 (8) | 200 - 200 | 200 | 200 |
| TOTAL | 183 (263) | - | | 9,800,470 |

FIGURE 1-13
SUPERFUND REMEDIAL ACTIONS: TREATMENT TRAINS WITH INNOVATIVE TREATMENT TECHNOLOGIES
TOTAL TREATMENT TRAINS = 38

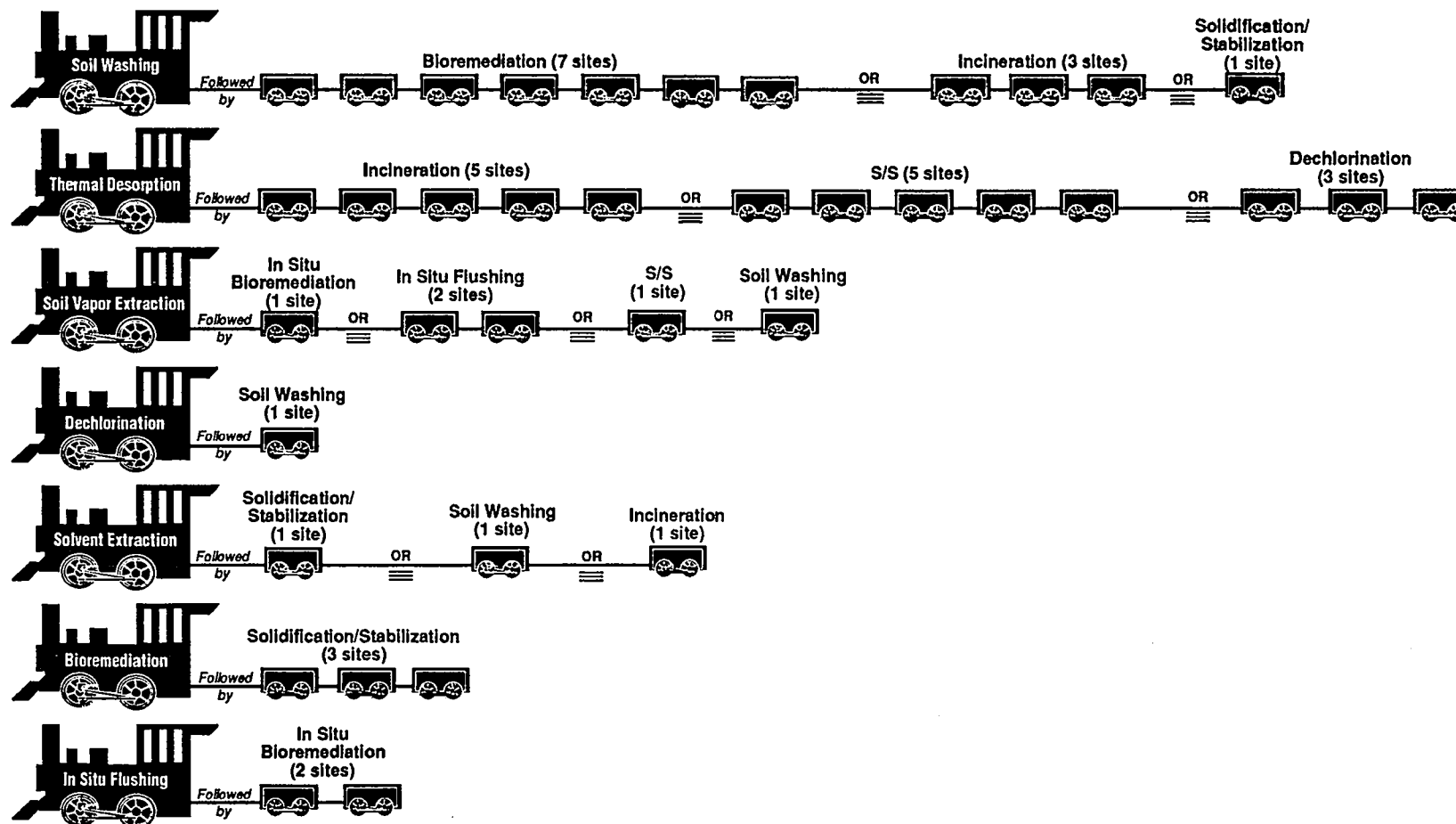


TABLE 1-1

REMEDIAL ACTIONS: SITE-SPECIFIC INFORMATION BY INNOVATIVE TREATMENT TECHNOLOGY

Table 1-1 is the principal part of this chapter. It contains the most detailed, site-specific information for remedial sites for which an innovative treatment has been selected. The columns of Table 1-1 present the following information:

Region

This column indicates the EPA Region in which the site is located.

Site Name, State, ROD Date

This column identifies the site and the operable unit for which an innovative treatment technology was selected.

A Record of Decision (ROD) documents the selection of remedy in the remedial program. The date shown in this column is the date on which a ROD was signed by an EPA official.

An asterisk (*) in this column indicates that a treatability study has been completed for this technology at the particular site.

Specific Technology

The second column describes the specific technology selected within a general category of innovative treatment. For example, within the general category of bioremediation, the specific technologies of land treatment or slurry-phase bioremediation may be chosen.

Site Description

This column provides information on the industrial source of the contamination at the site and allows analysis of the selection of innovative technologies by site type. For example, by using the information in this column, one may determine the most frequently selected innovative technology for wood preserving sites.

Media (quantity)

This column provides information on the media and quantity of material to be treated. If a treatment is used in situ, an effort has been made to include the maximum depth of the treatment to provide the reader with another parameter significant to the application.

TABLE 1-1 (Continued)

Key Contaminants Treated

The major contaminants or contaminant groups targeted by the treatment technology are shown in this column. Other contaminants may also be listed that may be treated. Other contaminants that may be present, but that are not to be addressed by the listed technology, are not included.

Status

This column indicates the status of the application of the innovative treatment technology. **Predesign** indicates that the ROD has been signed but design has not begun. During predesign, EPA may be negotiating with the potentially responsible parties, procuring the services of a design firm, or collecting information (such as conducting a treatability study) needed in the design stage. If a project is in **design**, the engineering documents needed to contract for and build the remedy are being prepared. If a remedy is **being installed**, the lead agency has signed a contract for the construction work needed to set up the remedy. The remedy is **operational** if it is completely installed and it is now being operated as a treatment system; the remedy is **completed** if the goals of the ROD or decision document for that treatment technology have been met and treatment has ceased.

One purpose of this column is to identify opportunities for vendors to become involved in the next phase of the project. Whenever possible, the season and year in which the current phase will end is given. The information is identified as the "completion planned" date.

Lead Agency, Treatment Contractor

The "lead" indicates whether federal dollars are to be used to implement the remedy (Fund lead) or the potentially responsible parties will conduct the remedy with oversight by EPA or the State (PRP lead). If a remedy is Fund lead, EPA may manage the design/construction through its contractors, the state may manage the project with Superfund dollars, or the U.S. Army Corps of Engineers (USACE) may act for EPA to manage the design or construction. No matter what agency or organization is responsible for managing the remedy, the contractor responsible for the actual installation and operation of the innovative technology also is identified, if the lead organization has selected a contractor.

Contacts/Phone

This final column provides the names and telephone numbers of useful contacts for the site or technology. The first name listed is usually the EPA remedial project manager (RPM) responsible for the site. If a remedy is being managed by the state, the name and phone number of the state RPM also is provided. Information on other useful contacts may also be provided.

Remedial Actions: Site-Specific Information By Innovative Treatment Technology

June 1993

Bioremediation (Ex situ)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|--|--|--------------------------------|--|--|--------------------------------|
| 1 | Iron Horse Park*, MA (09/15/88) | Land treatment | Industrial and railyard waste | Sludge (25,000 cy) | VOCs, PAHs | Operational; Completion planned Summer 1995 | PRP lead/Federal oversight; ENSR Consulting | Don McElroy 617-223-5571 |
| 2 | General Motors/Central Foundry Division, OU 1, NY (12/17/90) | Slurry phase | Machine shops, Engine casting facility | Soil (100,000 cy), Sludge (91,000 cy), Sediments (62,000 cy) | PCBs | Predesign; PD Completion planned Summer 1994 | PRP lead/Federal oversight | Lisa Carson 212-264-6857 |
| 2 | General Motors/Central Foundry Division, OU 2, NY (03/31/92) | Slurry phase | Aluminum casting plant | Soil (59,000 cy) | PCBs | Predesign; PD Completion planned Summer 1994; Final technology selection will take place after treatability study is complete in 12/93 | PRP lead/Federal oversight | Lisa Carson 212-264-6857 |
| 3 | Whitmoyer Laboratories, OU 3, PA (12/31/90) | Bioremediation (Ex Situ) To be used with iron based fixation | Other organic chemical manufacturing | Soil (5,600 cy), Sediments (quantity unknown) | VOCs (TCE), SVOCs (Aniline) | In design; Design completion planned Fall 1995 | PRP lead/Federal oversight; Environ | Chris Corbett 215-597-8186 |
| 3 | L.A. Clarke & Sons, Lagoon Sludge OU, VA (03/31/88) | Slurry phase in tanks | Wood preserving | Sludge (278 cy) | PAHs (Creosote) | In design; Design completion planned Winter 1993 | PRP lead/Federal oversight; ICF Kaiser | Andy Palestini 215-597-1286 |

Status as of June 1993. See Table 1-6 for performance and operational data on completed remedial projects.

Indicates that a treatability study has been completed.

Notes: Contacts listed are EPA regional staff unless otherwise noted.

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Bioremediation (Ex situ) (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|---|--------------------------------------|--|---|---|--|
| 3 | Ordnance Works Disposal Areas, WV (09/29/89) | Land treatment | Other organic chemical manufacturing, Other inorganic chemical manufacturing | Soil (13,500 cy) | PAHs (Carcinogenic PAHs) | Predesign; PD Completion planned Fall 1993 | PRP lead/Federal oversight; ABB Environmental | Melissa Whittington 215-597-1286 |
| 4 | Brown Wood Preserving*, FL (04/08/88) | Land treatment | Wood preserving, Drum storage/ disposal | Soil (7,500 cy) | PAHs (Creosote) | Completed; Operational from 10/88 to 12/91 | PRP lead/Federal oversight; Remediation Technology, Inc. | Martha Berry 404-347-2643 |
| 4 | Cabot Carbon/Koppers, FL (09/27/90) See also Bioremediation (In Situ), Soil Washing | Slurry phase (preceded by soil washing) | Wood preserving, Pine tar and turpentine manufacturing | Soil (quantity unknown) | SVOCs (PCP), PAHs | In design; Design completion planned Fall 1994 | PRP lead/Federal oversight McLaren-Hart | Martha Berry 404-347-2643 |
| 4 | Dubose Oil Products*, FL (03/29/90) | Solid phase Windrowing with aeration and irrigation in a barn | Petroleum refining and reuse | Soil (20,000 cy) | VOCs (TCE, DCE, Benzenes, Xylenes), SVOCs (PCP), PAHs | Being installed; Installation completion planned Summer 1993; Pilot scale work to begin in Sept. 1993. This will be Phase 1 of RA. | PRP lead/Federal oversight; Watech | Mark Fite 404-347-2643 George Linder (FL) 904-488-0190 |
| 4 | Whitehouse Waste Oil Pits (amended ROD)*, FL (06/16/92) See also Soil Washing | Slurry phase (preceded by soil washing) | Waste oil recycler | Soil/Sludge 56,930 cy Combined | VOCs, PCBs, PAHs BTEX | In design; Design completion planned Winter 1993 | Federal lead/Fund Financed | Tony Best 404-347-2643 |

Bioremediation (Ex situ) (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|--|---------------------------------------|--|--|--|---|
| 4 | Benfield Industries, NC (07/31/92) See also Bioremediation (In Situ), Soil Washing | Slurry phase preceded by soil washing | Bulk chemical mixing and repackaging plant. | Soil/Slurry (4,600 cy combined) | VOCs, SVOCs | Predesign | Federal lead/Fund Financed; CDM, F.I.P. Corporation | John Bornholm 404-347-7791 |
| 4 | Cape Fear Wood Preserving, NC (06/30/89) See also Soil Washing | Slurry phase may be followed by s/s | Wood preserving | Soil (24,000 cy) | VOCs, PAHs | Design completed but not installed; Project on hold due to capacity assurance issue. | Federal lead/Fund Financed | Jon Bornholm 404-347-7791 |
| 4 | Charles Macon Lagoon, Lagoon #10, NC (09/30/91) | Solid phase | Oil recycling and reuse | Soil (1,000 cy) | SVOCs (Fluoranthene), PAHs (Benzo(a)pyrene, Benzo(a) anthracene, Chrysene) | In design; Design completion planned Summer 1994; Currently negotiating with PRPs | PRP lead/Federal oversight; RMT | Jack Butler 919-733-2801 |
| 5 | Galesburg/Koppers, IL (06/30/89) | Land treatment | Wood preserving | Soil (15,200 cy) | SVOCs (PCP, Phenols), PAHs (Creosote) | Predesign; PD Completion planned Fall 1993 | PRP lead/State oversight; Remediation Technologies, Inc. | Brad Bradley 312-886-4742 Steve Davis (IL) 217-785-3913 |
| 5 | Cliffs/Dow Dump*, MI (09/27/89) | Bioremediation (Ex Situ) forced aeration biological treatment | Waste disposal for charcoal manufacturing plant | Soil (9,500 cy) | VOCs (TCE, BTEX), SVOCs (Phenol), PAHs (Naphthalene) | In design; Design to be completed in Summer 1994. | PRP lead/Federal oversight; ENSR | Ken Glatz 312-886-1434 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Bioremediation (Ex situ) (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|------------------------------|--|---|--|---|---|
| 5 | Burlington Northern Railroad Tie Treating Plant*, MN (06/04/86) | Land treatment | Wood preserving | Soil (9,500 cy), Sludge (9,600 cy) | SVOCs (Phenols), PAHs | Operational; Completion planned 1994 | PRP/State-Federal oversight; Remediation Technologies, Inc. | Tony Rutter 312-886-8961 Fred Jenness (MN) 612-297-8470 Richard Truax (RETEC) 303-493-3700 |
| 5 | Joslyn Manufacturing and Supply Co., MN | Land treatment Unlined treatment unit with irrigation and tilling | Wood preserving | Soil (75,000 cy) | SVOCs (PCP), PAHs | Operational; Completion planned Fall 1994 | PRP lead/State oversight; BARR Engineering/ GL Contracting Inc. | Kevin Turner 312-886-4444 Ann Bidwell (MN) 612-296-7827 |
| 5 | South Andover Salvage Yard OU 2, MN (12/24/91) | Solid phase | Salvage yard | Soil (11,400 cy) | PAHs | Predesign | Federal lead/Fund Financed | Bruce Sypniewski 312-886-6189 |
| 5 | Moss-American*, WI (09/27/90) See also Soil Washing | Slurry phase (preceded by soil washing) | Wood preserving | Soil (80,000 cy), Sediments (5,200 cy) | PAHs | Predesign; PD Completion planned 1994; Bench-scale study is underway | PRP lead/Federal oversight; Weston, Inc.(prime)/IT Corporation(sub contractor) | Bonnie Eleder 312-886-4885 |
| 6 | Old Inger Oil Refinery*, LA (09/25/84) | Land treatment | Petroleum refining and reuse | Soil (120,000 cy), Sludge (quantity unknown) | VOCs (Benzene, Ethylbenzene), PAHs (Petroleum hydrocarbons) | Operational; Completion planned Fall 2001 | State lead/Fund Financed; Westinghouse Haztech (installation), Operation to be awarded Spring, 1992 | Paul Sieminski 214-655-6710 Mike Hahn (LA) 504-765-0487 |

Bioremediation (Ex situ) (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|---------------------------------|--|--|---|--|---|
| 6 | Prewitt Abandoned Refinery, NM (09/30/92) See also Soil Vapor Extraction, Other Technologies | Bioremediation (Ex Situ) | Crude oil refinery | Soil (quantity unknown) | VOCs (BTEX), PAHs | Predesign | PRP lead/Federal oversight | Monica Chapa-Smith 214-655-6780 |
| 6 | Oklahoma Refining Co., OK (06/09/92) See also Bioremediation (In Situ) | Bioremediation (Ex Situ) followed by stabilization | Petroleum refining and reuse | Soil/Sludge (56,000 cy) Sediments (quantity unknown) | VOCs, Organics (LNAPLs) | Predesign | State lead/Fund Financed | Noel Bennett 214-655-8514 |
| 6 | North Cavalcade Street*, TX (06/28/88) | Land treatment | Wood preserving | Soil (5,500 cy) | PAHs (Creosote) | In design; Design completion planned Summer 1993 | State lead/Fund Financed | Glenn Celerier 214-655-8523 Stephen Chong 512-908-2441 |
| 6 | Sheridan Disposal Services*, TX (12/29/88) | Slurry phase | Industrial landfill | Soil (13,000 cy), Sludge (30,000 cy) | VOCs (Benzene, Toluene), SVOCs (Phenols), PCBs | Predesign; PD Completion planned 1991; Biotreatment pilot study conducted in 1991. Awaiting entry of consent decrees by court. | PRP lead/State oversight | Gary Baumgarten 214-655-6749 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Bioremediation (Ex situ) (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|------------------------|--------------------------|--|--|--|---|---|
| 7 | Vogel Paint & Wax, IA (09/20/89) | Land treatment | Paint/ink formulation | Soil (10,000 cy) | VOCs (Methyl Ethyl Ketone, BTX) | Operational; Completion planned 1997; One cell is constructed. 20 % of remediation is accomplished. | PRP lead/State oversight; Vogel | Jack Generaux 913-551-7690 Bob Drustrup (IA) 515-281-8900 |
| 8 | Broderick Wood Products OU 2, CO (03/24/92) See also Bioremediation (In Situ) | Land treatment | Wood preserving | Soil (59,000 cy), Sediments (120 cy) | VOCs, SVOCs (PCP), Dioxins, PAHs | Being installed; Installation completion planned Fall 1993; Currently conducting treatability tests | Federal lead/Fund Financed CH ₂ M Hill | Armando Saenz 303-293-1532 |
| 8 | Burlington Northern (Somers Plant)*, MT (09/27/89) See also Bioremediation (In Situ) | Land treatment | Wood preserving | Soil (40,000 cy) | PAHs (Creosote) | Operational; Completion planned Fall 1993; Operations began Spring 1993 | PRP lead/Federal oversight; Remediation Technologies, Inc. | Jim Harris 406-449-5414 |
| 8 | Idaho Pole Company*, MT (09/28/92) See also Bioremediation (In Situ), In situ Flushing | Land treatment | Wood preserving | Soil (19,000 cy), Sediments (2,683 cy) | SVOCs (PCP), PAHs | Predesign | In negotiation | Jim Harris 406-449-5414 |

Bioremediation (Ex situ) (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|--|--|-------------------------|---|--|---|---|
| 8 | Libby Groundwater Contamination*, MT (12/30/88) See also Bioremediation (In Situ) | Land treatment using two 1-acre cells, soil is excavated & mixed | Wood preserving | Soil (45,000 cy) | VOCs (Benzene), SVOCs (PCP), PAHs (Creosote) | Operational; Completion planned 1999 | PRP lead/Federal oversight; Woodward-Clyde | Jim Harris 406-449-5414 Bert Bledsoe (RSKERL) 405-332-2313 |
| 8 | Wasatch Chemical*, UT (03/29/91) See also In situ Vitrification | Land treatment on an asphalt pad | Pesticide manufacturing/use /storage, Other organic chemical manufacturing, Other inorganic chemical manufacturing | Soil (1,100 cy) | VOCs (Toluene, Xylene) | Operational; Completion planned Summer 1993 | PRP lead/Federal oversight; Harding/Lawson | Bert Garcia 303-293-1526 |
| 9 | J.H. Baxter*, CA (09/27/90) | Land treatment to be followed by fixation for metals | Wood preserving | Soil (12,500 cy) | SVOCs (PCP), Dioxins, PAHs | In design; Design completion planned September 1993 | PRP lead/Federal oversight; PRP-James L. Grant & Assoc.; Fed.- SAIC and Sub.-CDM Federal Programs | Cathy Setian 415-744-2254 |
| 9 | Jasco Chemical Co., CA (09/30/92) | Bioremediation (Ex Situ) may combine aerobic and anaerobic | Chemical blending and repacking | Soil (1,095 cy) | VOCs (DCA, Methylene chloride, Acetone, Xylene) | Pre-design; PD Completion planned Summer 1993 | PRP lead/Federal oversight | Rosemarie Carroway 415-744-2235 |
| 10 | McChord AFB Washrack Treatment Area, AK (09/28/92) | Bioremediation (Ex Situ) | Federal facility Airplane Maintenance Area | Soil (quantity unknown) | VOCs (Fuel related contaminants, Benzene) SVOCs | In design; Design completion planned Winter 1993; 30% of design completed 7/93 | Air Force/EPA oversight | Marie Jennings 206-553-1173 Michael Grenko 206-984-3913 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Bioremediation (Ex situ) (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|------------------------|--------------------|------------------|---|--|--|---|
| 10 | Umatilla Army Depot Activity, Soil Operable Unit*, OR (09/30/92) | Composting | Explosives washout | Soil (4,800 cy) | Explosives (TNT, RDX, 2,4,6-tr initzotoluene, Tri nitrobenzene, DNT, Nitrobenzene, HMX, N-tertyl) | In design; Design completion planned Fall 1993; Excavation (Phase I)-design completion Fall 1993; Bio-design (Phase II)-pre-design | Army lead/EPA and State oversight | Harry Craig 503-326-3689 Jeff Rodin 206-553-4497 Mark Dourghty (US Army) 503-564-5294 Mike Nelson (USACE Seattle) 206-764-3458 |

Bioremediation (In situ)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|---|----------------------------|--|---|--|--|
| 1 | Hocomonco Pond, ESD, MA (07/30/92) (ROD signed 09/30/85) | In situ ground water if bioremediation fails will try in situ flushing | Wood preserving | Groundwater | PAHs (Creosote), Organics (DNAPLs) | Being installed; Installation completion planned Spring 1994 | PRP lead/Federal oversight | Bob Leger 617-573-5734 |
| 2 | FAA Technical Center*, NJ (09/26/89) See also Soil Vapor Extraction | In situ ground water | Jet fuel tank farm | Groundwater | VOCs (JP-4) | Design completed but not installed; Design completed 8/92 | Federal facility, FAA lead | Carla Struble 212-264-4595 Keith Buch (FAA) 609-485-6644 |
| 2 | Swope Oil & Chem Co., OU 2, NJ (09/27/91) See also Soil Vapor Extraction | In situ soil Bioventing with soil vapor extraction | Chemical reclamation | Soil (258,000 cy) | SVOCs (Naphthalene, DEHP, 2-ethylhexyl- phthalate) | Predesign; PD Completion planned 1993 | PRP lead/Federal Oversight | Joseph Gowers 212-264-5386 |
| 2 | Applied Environmental Services (Groundwater), NY (06/24/91) | In situ ground water | Bulk petroleum and hazardous waste storage facility | Groundwater | VOCs (TEX) | In design; Design completion planned Winter 1993 | PRP lead/State oversight | Andrew English (NY) 518-457-0315 Jeff Tradd 518-457-1708 |
| 2 | Applied Environmental Services, OU 1, NY (06/24/91) See also Soil Vapor Extraction, Other Technologies | In situ soil | Bulk petroleum and hazardous waste storage facility | Soil (quantity unknown) | VOCs (BTEX), SVOCs (Naphthalene, Bis(2-ethylhexyl) phthalate, Benzo(b)) | In design; Design completion planned Winter 1993 | PRP lead/State oversight; Remediation Technologies, Inc.- Design Contractor | Andrew English (NY) 518-457-0315 Jeff Tradd 518-457-1708 |
| 3 | L. A. Clarke & Sons, OU 1 (Soils)*, VA (03/31/88) See also In situ Flushing | In situ soil follows creosote recovery and in situ flushing | Wood preserving | Soil (15,000 cy) | VOCs (Benzene), PAHs (Creosote, Carcinogenic PAHs) | Predesign; PD Completion planned Fall 1994 | PRP lead/Federal oversight; ICF Kaiser | Andy Palestini 215-597-1286 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Bioremediation (In situ) (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|---|-------------------|---|--|---|-------------------------------|
| 4 | Cabot Carbon/Koppers, FL (09/27/90) See also Bioremediation (Ex Situ), Soil Washing | In situ soil Treating above/below gw table by nutrient addition | Wood preserving, Pine tar and turpentine manufacturing | Soil (5,000 cy) | SVOCs (PCP), PAHs | In design; Design completion planned Spring 1994 | PRP lead/Federal oversight; McLaren-Hart (Design contractor) | Martha Berry 404-347-2643 |
| 4 | Cabot Carbon/Koppers (Groundwater), FL (09/27/90) | In situ ground water; treating above and below gw table with nutrients | Wood preserving, Pine tar and turpentine manufacturing | Groundwater | SVOCs (PCP), PAHs | In design; Design completion planned Spring 1994 | PRP lead/Federal oversight McLaren-Hart (Design Contractor) | Martha Berry 404-347-2643 |
| 4 | Benfield Industries, NC (07/31/92) See also Bioremediation (Ex Situ), Soil Washing | In situ ground water; treatment of aquifer soils incidental to gw remediation | Bulk chemical mixing and repackaging plant. | Groundwater | VOCs, SVOCs | Predesign | Federal lead/Fund Financed; CDM/F.I.P. Corporation | John Bornholm 404-347-7791 |
| 5 | Seymour Recycling, IN (09/30/87) See also Soil Vapor Extraction | In situ soil Nutrients plowed into soil | Chemical waste management and incineration | Soil (190,000 cy) | VOCs (TCA, Carbon Tetrachloride, TCE) | Completed; Operational, Summer 1990, August-October 1986, January- February 1987 | PRP lead/Federal oversight; ABB Environmental Services | Jeff Gore 312-886-6552 |
| 5 | Seymour Recycling (Groundwater), IN (09/30/87) | In situ ground water Gw treatment incidental to soil treatment | Chemical waste management and incineration | Groundwater | VOCs, SVOCs, PAHs | Operational; Gw treatment was not designed but appears to be occurring as a result of in situ soil treatment | PRP lead/Federal oversight; Geraghty Miller | Jeff Gore 312-886-6552 |

Bioremediation (In situ) (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|---|---|--|---|---|--------------------------------------|
| 5 | Allied Chem & Iron Coke, OH 2*, OH (12/28/90) | Bioremediation (In Situ) of lagoon sediments | Coke manufacturing | Sediments (457,000 cy) | PAHs | In design; Design completion planned Spring 1994 | PRP lead/Federal oversight; IT Corporation - Design, Black & Veatch - subcontractor | Jim Van der Kloot 312-353-9309 |
| 5 | Hagen Farm Site, Groundwater Control OU, WI (09/30/92) | In situ ground water | Industrial landfill, Municipal landfill | Groundwater | VOCs (Vinyl chloride, MEK, Tetrahydrofuran, Xylene) | In design; Design completion planned Spring 1995 | PRP lead/Federal oversight; Warzyn - Prime | Steve Padovani 312-353-6755 |
| 5 | Onalaska Municipal Landfill*, WI (08/14/90) | In situ soil Air injection but no nutrient or microbe addition | Municipal landfill | Soil (16,000 cy) | PAHs (Naphthalene) | Design completed but not installed; Completion planned Spring 1994; Completed 3 month column study with higher contamination. | Federal lead/Fund Financed; CH2M Hill-prime | Kevin Adler 312-886-7078 |
| 6 | Atchison/Santa Fe/Clovis, NM (09/23/88) | In situ soil | Railyard wastes (diesel spills) | Soil (28,600 cy), Sludge (quantity unknown) | PAHs (Petroleum hydrocarbons, diesel fuel) | Operational; Began in June 1992, will end when petroleum hydrocarbons are less than 1,000 ppm | PRP lead/Federal oversight; Radian Corporation | Ky Nichols 214-655-6783 |
| 6 | Oklahoma Refining Co., OK (06/09/92) See also Bioremediation (Ex Situ) | In situ soil | Petroleum refining and reuse | Soil (43,300 cy) | VOCs, Organics (LNAPLs) | Predesign | State lead/Fund Financed | Noel Bennett 214-655-8514 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Bioremediation (In situ) (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|--------------------|---|---|--|---|---|
| 6 | French Limited, TX (03/24/88) | Bioremediation (In Situ) In Situ Lagoon | Petrochemical | Sludge 300,000 cy) | VOCs, PAHs | Operational; Two 3.5 acre cells; First cell completed; second cell scheduled to be completed August 1993 | PRP lead/ Federal & State oversight | Judith Black 214-655-6739 |
| 7 | People's Natural Gas, IA (09/16/91) | In situ soil | Coal gasification | Soil (18,500 cy), Groundwater | VOCs (Benzene), PAHs | Predesign; PD Completion planned Spring 1994 | PRP lead/Federal oversight; BARR Engineering | Bill Bunn 913-551-7792 |
| 7 | Pester Burn Pond, KS (09/30/92) See also In situ Flushing | In situ soil preceded by in situ soil flushing | Refinery operation | Soil (70,000 cy) | PAHs (Benzo(a)anthracene, Chrysene) | Predesign | PRP lead/Federal oversight | Marvin Glottzbach (KS) 913-296-2783 |
| 8 | Broderick Wood Products OU 2, CO (03/24/92) See also Bioremediation (Ex Situ) | In situ soil Bioremediation | Wood preserving | Soil (59,000 cy) Sediments (120 cy) | VOCs, SVOCs (PCP), PAHs | Being installed; Installation completion planned Fall 1994; Currently conducting treatability tests | Federal lead/Fund Financed CH ₂ M Hill | Armando Saenz 303-293-1532 |
| 8 | Burlington Northern (Somers Plant)*, MT (09/27/89) See also Bioremediation (Ex Situ) | In situ ground water. | Wood preserving | Groundwater (2 Areas, 20 ft. deep and 30 ft. deep) | SVOCs (Phenols), PAHs (Creosote) | Being installed; Installation completion planned Fall 1993; Operational Fall 1993 | PRP lead/Federal oversight; Remediation Technologies, Inc. | Jim Harris 406-449-5414 |

Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1992

Bioremediation (In situ) (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|---|------------------------------|--|--|--|--|
| 8 | Idaho Pole Company*, MT (09/28/92) See also Bioremediation (Ex Situ), In situ Flushing | In situ ground water injection of oxygen and nutrients | Wood preserving | Groundwater | SVOCs (PCP) | Predesign | In negotiation | Jim Harris 406-449-5414 |
| 8 | Libby Groundwater Contamination*, MT (12/30/88) See also Bioremediation (Ex Situ) | In situ ground water Injection of H2O2 and Potassium tripolyphosphate | Wood preserving | Groundwater (40-80 ft. deep) | VOCs (Benzene), SVOCs (PCP), PAHs (Creosote) | Operational; Completion planned 2001; Operation began in September 1991 | PRP lead/Federal oversight; Woodward-Clyde | Jim Harris 406-449-5414 Bert Bledsoe (RSKRL) 405-332-2313 |
| 9 | Castle Air Force Base, OU 1, CA (09/30/91) | In situ ground water Treated gw to be reinjected w/ nutrients and H2O2 | Federal facility with contamination from multiple sources | Groundwater | VOCs (TCE, PCE, DCE, DCA, Carbon tetrachloride, Benzene) | In design; Design completion planned Fall 1992; 2 phases of construction; phase I-construction started, phase II-to begin within 2 years | Federal facility, U.S. Air Force lead; James Montgomery/PRC Environmental Management, Inc. | Michael Work 415-744-2392 Brad Hicks (USAF) 209-726-4841 |
| 9 | Koppers Company, Inc. (Oroville Plant), CA (04/04/90) See also Soil Washing | In situ soil Followed by fixation for soil containing metals | Wood preserving | Soil (100,000 cy) | SVOCs (Polychlorinated phenols), Dioxins | In design; Design completion planned Summer 1993 | PRP lead/Federal oversight | Fred Schaffler 415-744-2365 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Bioremediation (In situ) (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|----------------------------|---|----------------------------|--|--|--|---|
| 10 | Eielson Air Force Base*, AK (09/29/92) See also Soil Vapor Extraction | In situ soil Bioventing | Tactical air support installation | Soil (quantity unknown) | VOCs (JP-4), SVOCs, PAHs (Petroleum Hydrocarbons, Diesel) BTEX | In design; Design completion planned Summer 1993 | Federal Facility/EPA and State oversight; DERA; EA Engineering -Design | Mary Jane Nearman 206-553-6642 Rielle Markey (AK) 907-451-2117 Capt. Max Gandy (Eielson AFB) 907-377-4361 |

Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 199

Chemical Treatment

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|--|-------------------------------------|---------------------------------------|--|--|-------------------------------------|
| 4 | JFD Electronics/Channel Master, NC (09/10/92) | Oxidation using with hydrogen peroxide | Solvent recovery facility | Soil (800 cy), Sludge (2,200 cy) | Inorganic Cyanides | Pre-design; PD Completion planned Summer 1994 | In negotiation | McKenzie Mallory 404-347-7791 |
| 4 | Palmetto Wood Preserving*, SC (09/30/87) | Reduction of Cr(6) to Cr(3) using Sodium metaphosphate | Wood preserving | Soil (12,700 cy) | Metals (Chromium, Arsenic, Copper) | Completed; Operational from 9/88 to 2/89 | Federal lead/Fund Financed; Roy F. Weston | Al Cherry 404-342-7791 |
| 8 | Portland Cement Co. (Kiln Dust No.2 and No.3) OU 2, UT (03/31/92) | Chemical Treatment | Cement plant (waste chrome bearing bricks) | Solids (360 Tons of Brick) | Metals (Chrome VI) | In design; Design completion planned Summer 1994 | State lead/Fund Financed; URS Consultants | Mike McCeney 303-294-7169 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Dechlorination

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|--|--|---|---|---|--------------------------------|
| 2 | Myers Property, NJ (09/28/90) See also Soil Washing | Dechlorination followed by soil washing | Pesticide manufacturing/use /storage | Soil (49,000 cy), Sediments (1,000 cy) | SVOCs (Hexachlorobenzene), Biocides (DDT, DDE, DDD), Dioxins (2,3,7,8-TCDD) | In design; Design completion planned Winter 1994; Design initiated concurrently with treatability studies | PRP lead/Federal oversight; Metcalf & Eddy | John Prince 212-264-1213 |
| 2 | Wide Beach Development, NY (09/30/85) | Dechlorination with APEG | Contaminated road dust, driveways, ditches | Soil (40,000 cy) | PCBs | Completed; Operational from 10/90 to 6/91 | Federal lead/Fund Financed; Soiltech Inc. (subcontractor to Kimmins) | Herb King 212-264-1129 |
| 3 | Saunders Supply Co, OU 1, VA (09/30/91) See also Thermal Desorption | Dechlorination | Wood preserving | Sludge (700 cy) | Dioxins (TCDD equivalents) | Predesign; PD Completion planned Fall 1993 | Federal lead/Fund Financed; Ecology & Environment, no vendor yet | Andy Palestini 215-597-1286 |
| 4 | Smith's Farm Brooks, OU 1*, KY (09/30/91) See also Thermal Desorption | Dechlorination | Drum storage/ disposal | Soil (16,000 cy) | PCBs | Design completed but not installed; Completion planned Spring 1995 | PRP lead/Federal oversight Soiltech | Tony DeAngelo 404-347-7791 |
| 4 | Arlington Blending & Packaging Co., OU 1*, TN (06/28/91) See also Thermal Desorption | Dechlorination | Pesticide manufacturing/use /storage, Other organic chemical manufacturing | Liquid (quantity unknown) | VOCs (DCE), SVOCs (PCP), Biocides (Chlordane, Heptaclor) | In design; Design completion planned Winter 1993 | PRP lead/Federal oversight | Derek Matory 404-347-7791 |

Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

In Situ Flushing

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|--|---------------------------------|---|--|--|--|
| 1 | Tibbetts Road*, NH (09/29/92) See also Soil Vapor Extraction | Soil flushing | Illegal dumping site, primarily painting wastes and solvents. | Soil (50,000 cy) | VOCs (PCE, TCE), Metals (Arsenic, Chromium) | Predesign | Still in negotiation | Darryl Luce 617-573-5767 Mike Robinette (NH) 603-271-2014 |
| 2 | Lipari Landfill*, NJ (09/30/85) | Soil flushing Flushing of area within the slurry wall, including soil and wastes. | Industrial landfill, Municipal landfill | Soil (650,000 cy) | VOCs (Bis-2- chloroethylether, DCA, Dichloromethane), SVOCs (Phenol), Metals (Chromium, Lead, Nickel, Mercury) | Operational; Completion planned 1999 | Federal lead/Fund Financed; AWD, Inc. | Fred Cataneo 212-264-9542 |
| 2 | Naval Air Engineering Center OU 7, interim action, NJ (03/16/92) | Soil flushing | Federal facility- landfill, fire fighting training areas, and other disposal | Soil (quantity unknown) | VOCs (Vinyl chloride, TCE, PCE, and 1,2-DCE, BTEX), PAHs (Petroleum hydrocarbons) | In design; Interim remedial action to be implemented for 3 years. | U.S. Navy/EPA oversite; Aguilar | Jeff Gratz 212-264-6667 Robert Wing 212-264-8670 |
| 2 | Vineland Chemical, OU 1 and OU 2, NJ (09/29/89) See also Soil Washing | Soil flushing Flushing lagoons using treated gw | Pesticide manufacturing/use /storage | Soil (126,000 cy) | Metals (Arsenic) | In design; Design completion planned 1993 | Federal lead/Fund Financed EBASCO-Design | Matthew Westgate 212-264-3406 Steve Hadel (USACE-Kansas City) 816-426-5221 |
| 2 | Byron Barrel & Drum, NY (09/29/89) | Soil flushing | Drum storage/ disposal | Soil (5,200 cy), Groundwater | VOCs (TCE, DCE, TCA, MEK), Metals (Chromium, Lead) | Predesign; PD Completion planned Fall 1994 | PRP lead/Federal oversight; Dames and Moore | Eduardo Gonzales 212-264-5714 |
| 2 | Pasley Solvents and Chemicals, Inc., NY (04/24/92) See also Soil Vapor Extraction | Soil flushing | Tank farm and chemical distribution facility | Soil (13,000 cy) | SVOCs (Naphthalene) | In design | Federal lead/Fund Financed; Ebasco - Design contractor | Sherrel Henry 212-264-8675 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

In Situ Flushing (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|--|--------------------------------------|---|--|--|---|
| 3 | L. A. Clarke & Sons, OU 1 (Soils)*, VA (03/31/88) See also Bioremediation (In Situ) | Soil flushing with surfactants before in situ bioremediation | Wood preserving | Soil (15,000 cy) | VOCs (Benzene), PAHs (Creosote, carcinogenic PAHs) | In design; Design completion planned Fall 1994 | PRP lead/Federal oversight; ICF Kaiser | Andy Palestini 215-597-1286 |
| 3 | U.S. Titanium*, VA (11/21/89) | Dissolution of wastes (EPA is considering excavation and ex situ dissolution of wastes) | Titanium oxide production from ore digested with sulfuric acid | Soil (16,000 cy), Solids (16,000 cy) | Inorganics (Ferrous sulfate) | In design; Design completion planned Fall 1993 | PRP lead/State Enforcement lead; Scitech | Vance Evans 215-597-8485 Jeff Howard (VA) 804-225-3262 |
| 4 | Ciba-Geigy (MacIntosh Plant) OU 4, AL (07/14/92) See also Thermal Desorption | Soil flushing | Chemical Manufacturing | Soil 110 cy | Chlorinated pesticides, BHC Isomers, VOCs (Chloroform, Toluene, Xylenes), Biocides (Atrazine, Diazinon, Prometryn, Simazine), Metals (Copper, Lead, Arsenic, Chromium, Iron slurry) | Predesign; Design also will use treatability studies at OU-2 | PRP lead/Federal oversight | Charles King 404-347-2643 |
| 4 | Ciba-Geigy (MacIntosh Plant) OU 2, AL (09/30/91) See also Thermal Desorption | Soil flushing | Agriculture Applications, Pesticide manufacturing/use /storage, Other organic chemical manufacturing | Soil/Sludge (130 cy) | VOCs (BTEX) Chloroform, Biocides (DDD, DDT, DDE, BHCs, Diazinon, Chlorobenzilate) | Predesign; PD Completion planned Winter 1995; | PRP lead/Federal oversight; CDM/FPC (Demolition/ Design contractors) | Charles King 404-347-2643 |

Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

In Situ Flushing (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|---|----------------------------------|--|---|---|--|
| 4 | JADCO-Hughes, NC (09/27/90) See also Soil Vapor Extraction | Soil flushing Preceded by soil vapor extraction using the same horizontal wells | Plastics manufacturing, Other organic chemical manufacturing, Other inorganic chemical manufacturing, Drum storage/ disposal, Municipal water supply | Soil (6,000 cy) | VOCs (TCE, Vinyl chloride, Carbon Tetrachloride, Chloroform, BTX), SVOCs (Dichlorobenzene, Trichlorobenzene) | Being installed; Pilot study underway Completion of pilot planned Summer 1993 | PRP lead/Federal oversight; Conestoga- Rovers & Associates (Design contractor) | Micheal Townsend 404-347-7791 Bruce Nicholson (NC) 919-733-2801 |
| 5 | Ninth Avenue Dump, IN (06/30/89) | Soil flushing of area within slurry wall | Industrial landfill | Soil (64,000 cy), Groundwater | VOCs (TCE, BTEX) | In design; Design completion planned Summer 1996; | PRP lead/Federal oversight; Fluor-Daniel | Bernard Schorle 312-886-4746 |
| 5 | Rasmussen Dump, MI (03/28/91) | Soil flushing (flushing part of recycle of treated gw) | Industrial landfill, Paint/ink formation | Soil (quantity unknown) | VOCs (Vinyl chloride, Benzene) | In design; Design completion planned Fall 1994 | PRP lead/Federal oversight; Woodward Clyde - Prime | Ken Glatz 312-886-1434 |
| 6 | Koppers/Texarkana*, TX (09/23/88) See also Soil Washing | Soil flushing with reinjection of treated water to 1 ft below surface | Wood preserving | Soil (19,400 cy) | PAHs (Benzo(a)pyrene, Creosote), Metals (Arsenic) | Predesign; Design activity is on hold while EPA relocates the affected community. | PRP lead/Federal oversight; ENSR (Demolition contractor) | Ursula Lennox 214-655-6743 |
| 6 | South Cavalcade Street*, TX (09/26/88) See also Soil Washing | Soil flushing with the same surfactants used for the soils treated with soil washing | Wood preserving | Soil (20,000 cy) | SVOCs, PAHs (Benzo(a)pyrene, Benzo(a) anthracene, Chrysene) | In design; Design completion planned Summer 1994 | PRP lead/Federal oversight | Glan Celerier 214-655-8523 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

In Situ Flushing (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|--|---|---|---|---|--|
| 7 | Pester Burn Pond, KS (09/30/92) See also Bioremediation (In Situ) | Soil flushing followed by in situ bioremediation | Refinery operation | Soil (70,000 cy), Sludge (30,000 cy) | PAHs (Benzo(a)anthracene, Chrysene) | Predesign | PRP Lead/Federal oversight | Marvin Glottzbach (KS) 913-296-2783 |
| 7 | Lee Chemical, MO (03/21/91) | Soil flushing | Solvent recovery facility | Soil (quantity unknown) | VOCs (TCE) | Being installed; Installation completion planned Summer 1993 | PRP lead/State oversight; Clark Well and Equipment, Inc. | Steven Kinser 913-551-7728 Ron Redden (MO) 314-751-8393 |
| 8 | Idaho Pole Company*, MT (09/28/92) See also Bioremediation (Ex Situ), Bioremediation (In Situ) | Soil flushing | Wood preserving | Soil (6,500 cy) | SVOCs (PCP), PAHs | Predesign | In negotiation | Jim Harris 406-449-5414 |
| 10 | Union Pacific Railroad Sludge Pit, ID (09/10/91) | Soil flushing | Railroad operations, cleaning and fueling | Soil (quantity unknown) | VOCs (PCE,TCE), PAHs (Petroleum hydrocarbons), Metals (Arsenic,Cadmium) | Predesign; PD Completion planned Fall 1993 | PRP lead/Federal oversight | Rob Hanson 208-334-5860 Gordon Brown 208-236-6160 |
| 10 | United Chrome Products*, OR (09/12/86) | Soil flushing | Chrome plating facility | Soil (quantity unknown) | Metals (Chromium VI) | Operational; Operations began during Summer 1988 | PRP lead/EPA oversite.; CH2MHill & subcontractors | Al Goodman 503-326-3685 |

In Situ Vitrification

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|--------------------------|---|---|--|---|---|---------------------------------|
| 5 | Ionia City Landfill*, MI (09/29/89) | In situ Vitrification | Municipal landfill | Soil (5,000 cy) | VOCs (Methylene Chloride, TCA, Styrene, Toluene), Metals (Lead) | In design; Design completion planned Summer 1994 | PRP Lead/Federal oversight; Earth Technology Corporation | Michael Gifford 312-886-7257 |
| 8 | Rocky Mountain Arsenal, M-1 Basins (OU 16), CO (02/26/90) | In situ Vitrification | Federal Facility Basin which received miscellaneous wastes | Soil (4,600 cy), Sludge (5,800 cy) | Biocides, Metals (Arsenic, Mercury) | In design; Design completion planned 1993; On hold pending reentry of vendors into the market | U. S. Army (PRP) lead | Connally Mears 303-293-1528 |
| 8 | Wasatch Chemical*, UT (03/29/91) See also Bioremediation (Ex Situ) | In situ Vitrification | Pesticide manufacturing/use /storage, Other organic chemical manufacturing, Other inorganic chemical manufacturing | Soil (3,600 cy), Sludge (quantity unknown), Solids (quantity unknown) | SVOCs (Hexachlorobenzene, PCP), Biocides, Dioxins | In design; Design completion planned Summer 1993 | PRP Lead/Federal oversight; Geosafe | Bert Garcia 303-293-1526 |

Table 1-1
Remedial Actions: Site-Specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Soil Vapor Extraction

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|---|---------------------------------|---|--|--|---|
| 1 | Kellogg-Deering Well Field, CT (09/29/89) | Soil vapor extraction | Solvent recovery facility, Industrial Complex, Illegal dumping of solvent wastes | Soil (quantity unknown) | VOCs (TCE, PCE, DCE, TCA, DCA, Vinyl chloride, BTEX) | In design; Design completion planned Fall 1994 | PRP lead/Federal oversight; GZA Geoenvironmental | Leslie McVickar 617-573-9689 |
| 1 | Groveland Wells*, MA (09/30/88) | Soil vapor extraction (carbon absorption for air emissions) | Manufacturing | Soil (19,000 cy) | VOCs (TCE, Methylene Chloride, DCE) | Operational | PRP lead/Federal oversight; Terra Vac | Bob Leger 617-573-5734 |
| 1 | Silresim, MA (09/19/91) | Soil vapor extraction | Chemical waste reclamation | Soil (1,370 cy) | VOCs (TCE, TCA, Carbon Tetrachloride, Chloroform, Styrene) | In design; Design completion planned Winter 1994 | Federal lead/Fund Financed | Leslie McVikar 617-573-9689 |
| 1 | Wells G&H OU 1, MA (09/14/89) | Soil vapor extraction with air flushing | Drum storage/ disposal, Leaking UST and midnight dumping | Soil (7,400 cy) | VOCs (PCE, TCE) | Operational; OU 1 consists of 5 properties, the technology has become operational on some of the properties. | PRP lead/Federal oversight; Several contractors working on the site | Mary Garren 617-573-9613 Paula Fitzsimmons 617-223-5572 |
| 1 | Mottolo Pig Farm, NH (03/29/91) | Soil vapor extraction | Uncontrolled waste site | Soil (3,400 cy) | VOCs (TCE, TCA, Vinyl chloride, DCA, DCE, Toluene, Ethylbenzene) | Being installed; Construction to start summer 1993 | Federal lead/Fund Financed | Roger Duwart 617-573-9628 Michael Robinette (NH) 603-271-2014 |
| 1 | South Municipal Water Supply Well*, NH (09/27/89) See also Other Technologies | Soil vapor extraction; Air sparging of gw | Ball Bearing Manufacturing | Soil (7,500 cy), Groundwater | VOCs (PCE, TCA, TCE) | Being installed; Construction to start summer 1993 | PRP lead/Federal oversight | Roger Duwart 617-573-9628 Tom Andrews (NH) 603-271-2910 |

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|---|------------------|---|---|---|--|
| 1 | Tibbetts Road*, NH (09/29/92) See also In situ Flushing | Soil vapor extraction | Illegal dumping site, primarily painting wastes and solvents. | Soil (50,000 cy) | VOCs (PCE, TCE) | Predesign | In negotiation | Darryl Luce 617-573-5767 Mike Robinette (NH DES) 603-271-2014 |
| 1 | Tinkham Garage*, NH (09/30/86) | Soil vapor extraction (carbon adsorption for air emissions) | Illegal dumping site | Soil (9,000 cy) | VOCs (TCE, Chloroform, DCE, Vinyl chloride, Benzene) | In design; Operation scheduled to begin summer 1994 | PRP lead/Federal oversight; Terra Vac | Diana King 617-573-9676 |
| 1 | Stamina Mills, RI (09/28/90) | Soil vapor extraction | Textile Manufacturing | Soil (6,000 cy) | VOCs (DCE, TCE) | Predesign; PD Completion planned Fall 1993 | PRP lead/Federal oversight | Neil Handler 617-573-9636 Mark Dennen (RI DEN) 401-277-2797 |
| 2 | A O Polymer, Soil treatment phase, NJ (06/28/91) | Soil vapor extraction (carbon adsorption for air emissions) | Polymer manufacturing | Soil (7,500 cy) | VOCs (TCE, TCA, Trichlorofluoromethane, Toluene, Ethylbenzene), SVOCs (Naphthalene, 4-methylphenol) | In design; Design completion planned Winter 1993 | PRP lead/Federal oversight; Harding-Lawson | Rich Puvogel 212-264-9836 |
| 2 | FAA Technical Center*, NJ (09/26/89) See also Bioremediation (In Situ) | Soil vapor extraction | Jet fuel tank farm | Soil (33,000 cy) | VOCs (BTEX), SVOCs (Chlorophenol, Phenol) | Design completed but not installed; Design completed 8/92 | Federal facility, FAA lead | Carla Struble 212-264-4595 Keith Buch (FAA) 609-485-6644 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|---|----------------------------|---|--|---|--|
| 2 | Garden State Cleaners, NJ (09/26/91) | Soil vapor extraction | Dry cleaners | Soil (300 cy) | VOCs (PCE) | In design; Design completion planned Summer 1994; The USACE is doing the design for EPA | Federal lead/Fund Financed | Sharon Atkinson 212-264-1217 |
| 2 | South Jersey Clothing, NJ (09/26/91) | Soil vapor extraction | Dry-cleaners, Clothing manufacturer | Soil (1,400 cy) | VOCs (TCE) | In design; Design completion planned 1993; The USACE is doing the design for EPA. | Federal lead/Fund Financed | Sharon Atkinson 212-264-1217 |
| 2 | Swope Oil & Chem Co., OU 2, NJ (09/27/91) See also Bioremediation (In Situ) | Soil vapor extraction Vacuum extraction. Biove nating (Not planned yet) | Chemical reclamation | Soil (258,000 cy) | VOCs (TCE, PCE, Toluene, Ethylbenzene, Xylene) | Predesign; PD Completion planned 1993 | PRP lead/Federal oversight | Joseph Gowers 212-264-5386 |
| 2 | Applied Environmental Services, OU 1, NY (06/24/91) See also Bioremediation (In Situ), Other Technologies | Soil vapor extraction with air flushing with air sparging | Bulk petroleum and hazardous waste storage facility | Soil (quantity unknown) | VOCs (BTEX) | In design; Design completion planned Winter 1993 | PRP lead/State oversight; RETECH - Design Contractor | Andrew English (NY) 518-457-0315 Jeff Tradd 518-457-1708 |
| 2 | Circuitron Corporation, OU 1, NY (03/29/91) | Soil vapor extraction | Electroplating | Soil (900 cy) | VOCs (TCA, PCE, TCE, DCA) | In design; Design completion planned Fall 1993 | Federal lead/Fund Financed; ICF - Design Contractor | Miko Fayon 212-264-4706 |

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|---|-------------------------|-------------------------------------|--|--|---|
| 2 | Genzale Plating Company, OU 1, NY (03/29/91) | Soil vapor extraction precedes excavation for off-site solidification | Electroplating | Soil (275 cy) | VOCs (TCE, TCA) | In design; Design completion planned Spring 1994 | Federal lead/Fund Financed; CDM | Janet Cappelli 212-264-8679 |
| 2 | Mattiace Petrochemicals Company, OU 1, NY (06/27/91) | Soil vapor extraction | Organic chemicals blending | Soil (17,000 cy) | VOCs (PCE, TCE,, Benzene, Xylene) | Predesign; PD Completion planned Winter 1993 | Federal lead/Fund Financed; ARCR-PD | Edward Als 212-264-0522 |
| 2 | Pasley Solvents and Chemicals, Inc., NY (04/24/92) See also In situ Flushing | Soil vapor extraction | Tank farm and chemical distribution facility | Soil (13,000 cy) | VOCs (TCE, PCE, Benzene) | In design | Federal lead/Fund Financed; Ebasco - Design contractor | Sherrel Henry 212-264-8675 |
| 2 | SMS Instruments (Deer Park), NY (09/29/89) | Soil vapor extraction with catalytic combustor for vapors | Military aircraft component overhauler | Soil (1,250 cy) | VOCs (TCE), SVOCs (Dichlorobenzene) | Operational; Completion planned Summer 1993; Will be evaluated in Summer 1993 to determine if performance standards are achieved | Federal lead/Fund Financed; Four Seasons | Miko Fayon 212-264-4706 |
| 2 | Solvent Savers, NY (09/30/90) See also Thermal Desorption | Soil vapor extraction | Solvent recovery facility, Chemical reclamation | Soil (quantity unknown) | VOCs (DCE, TCE) | Predesign; PD Completion planned Winter 1993 | PRP lead/Federal oversight | Lisa Wong 212-264-9348 212-264-5712 |
| 2 | Vestal Water Supply 1-1, NY (09/27/90) | Soil vapor extraction | Industrial park | Soil (25,000 cy) | VOCs (DCA, TCA, TCE, DCE) | Predesign; PD Completion planned Winter 1993 | Area 2 - Fund lead; Area 4 - PRP lead | Ed Als 212-264-0522 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|--|---|---|---|--|---|-------------------------------|
| 2 | Upjohn Manufacturing Co., PR (09/30/88) | Soil vapor extraction | Industrial facility, chemical leak | Soil (quantity unknown) | VOCs (Carbon Tetrachloride, Acetonitrile) | Completed; Operational 1/83 to 3/88 | PRP lead/Federal oversight; Terra Vac | Alison Hess 212-264-6040 |
| 3 | Bendix OU 3, PA (09/30/88) | Soil vapor extraction with air flushing | Aircraft instrumentation manufacturing | Soil (33,000 cy) | VOCs (PCE, TCE, Vinyl chloride) | Predesign; PD Technology on hold pending review of Treatability Study | PRP lead/Federal oversight; ERM, Inc. | Humane Zia 215-597-0913 |
| 3 | Cryochem, OU 3, PA (09/30/91) | Soil vapor extraction | Machine shops, Metal fabrication | Soil (70 cy) | VOCs (TCA, TCE, PCE, DCA, DCE) | Predesign; PD Completion planned Fall 1993 | Federal lead/Fund Financed; CH2M Hill | Joe McDowell 215-597-8240 |
| 3 | Henderson Road*, PA (06/30/88) | Soil vapor extraction with air flushing (Treating unsaturated soil and bedrock) | Injection well | Soil (74,000 cy) | VOCs (DCA, TCA, Toluene) | Operational; Completion date unknown | PRP lead/Federal oversight; RT Environmental Services. | Joe McDowell 215-597-8240 |
| 3 | Lord-Shope Landfill*, PA (06/29/90) | Soil vapor extraction (method to be determined in design) | Industrial landfill | Soil (270,000 cy) | VOCs (PCE, TCE, Vinyl chloride, Alcohols, n-butanol), SVOCs (Ketones) | In design; Design completion planned Winter 1993 | PRP lead/Federal oversight; Eckenfelder | Dave Turner 215-597-3218 |
| 3 | Raymark*, PA (12/30/91) | Soil vapor extraction | Multi-source metal fabrication facility | Soil (quantity unknown), Solids (quantity unknown) | VOCs (TCE, PCE, 1,2-DCE) | Being installed; Installation completion planned Winter 1993 | Federal lead/Fund Financed | Harry Harbold 215-597-1101 |

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|---|---|--|---|---|---|
| 3 | Tyson's Dump*, PA (03/31/88) | Soil vapor extraction with air flushing (The system has been modified during operations) | Abandoned septic and chemical waste disposal site | Soil (30,000 cy) | VOCs (Benzene, Toluene, Xylene), SVOCs (Trichloropropane) | Operational Completion date unknown | PRP lead/Federal oversight; Terra Vac | Eugene Dennis 215-597-3153 |
| 3 | Arrowhead Associates/Scovill, OU 1, VA (09/30/91) | Soil vapor extraction with air flushing | Electroplating | Soil (1,000 cy) | VOCs (TCE, PCE) | Predesign; PD Completion planned Summer 1993 | PRP lead/Federal oversight; ICF Kaiser | Ron Davis 215-597-1727 |
| 3 | Defense General Supply Center, OU 5*, VA (03/25/92) | Soil vapor extraction | Cleaning and repainting of combat helmets and gas cylinders | Soil (1,000 cy) | VOCs (PCE, TCE) | In design; Design completion planned Summer 1993; 95% of design complete. | Federal Facility DLA Lead/Federal oversight; Engineering-Scie nce | Jack Potosnak 215-597-2317 Bill Sadington (DGSC) 804-279-3781 |
| 4 | Hollingsworth Solderless, FL (04/10/86) | Soil vapor extraction | Electroplating | Soil (62 cy) | VOCs (TCE, Vinyl chloride, DCE) | Completed; Operational from 1/91 to 7/91 | Federal lead/Fund Financed; Ebasco | John Zimmerman 404-347-2643 |
| 4 | Robins AFB, Landfill and Sludge Lagoon, OU 1, GA (06/28/91) | Soil vapor extraction | Federal facility, sludge from an industrial waste water treatment plant | Soil (15,000 cy), Sludge (quantity unknown) | VOCs (TCE, PCE, Vinyl chloride, Carbon Tetrachloride) | Predesign; PD Completion planned Summer 1992; PD completion planned Summer 1992 | Federal Facility, U.S. Air Force Lead/Federal Oves | Roseanne Rudd 404-347-7791 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 199:

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|---|--|---|---|--|--|
| 4 | Charles Macon Lagoon, Lagoon #7, OU 1, NC (09/30/91) | Soil vapor extraction with air flushing | Petroleum refining and reuse, Drum storage/disposal, Waste oil recycler | Soil (1,300 cy), Sludge (quantity unknown) | VOCs (PCE) | In design; Design completion planned Summer 1994 | PRP lead/Federal oversight; RMT | Giezelle Bennett (EPA) 404-347-7791 Patrick Watters (NC) 919-733-2801 |
| 4 | JADCO-Hughes, NC (09/27/90) See also In situ Flushing | Soil vapor extraction with horizontal wells Followed by in situ flushing with same ports | Plastics manufacturing, Other organic chemical manufacturing, Other inorganic chemical manufacturing, Drum storage/ disposal, Municipal water supply | Soil (6,000 cy) | VOCs (Carbon tetrachloride, Chloroform, Vinyl chloride, BTX), SVOCs (Dichlorobenzene, Trichlorobenzene) | In design; Design completion planned Winter 1993; Treatability study being conducted in design | PRP lead/Federal oversight | Micheal Townsend 404-347-7791 Bruce Nicholson (NC) 919-733-2801 |
| 4 | Medley Farm, OU 1, SC (05/29/91) | Soil vapor extraction | Other organic chemical manufacturing, Rubber manufacturing, Drum storage/ disposal | Soil (50,000 cy) | VOCs (DCA, DCE, TCA, Benzene, Toluene), SVOCs (Phthalates) | Predesign; Design completion planned for Summer 1993 | PRP lead/Federal oversight RMI, Inc. | Ralph Howard 404-347-7791 Richard Haynes (SC) 803-734-5487 |
| 4 | SCRDI Bluff Road, SC (09/12/90) | Soil vapor extraction with air flushing | Drum storage/ disposal, Solvent recovery facility | Soil (45,000 cy) | VOCs (TCA, TCE, PCA, PCE, DCA, DCE, MEK, Chlorobenzene, BTEX) | Predesign; PD Completion planned Fall 1993; Litigation from surrounding landowners has delayed progress. | PRP lead/Federal oversight ERM, DeMaximus | Steve Sandler 404-347-7791 |

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|---|----------------------------|---|---|--|--------------------------------|
| 4 | Carrier Air Conditioning*, TN (09/03/92) | Soil vapor extraction with air flushing | Manufacturer of heating and air conditioning units | Soil (76,500 cy) | VOCs (TCE) | Design completed but not installed; Completion planned Fall 1993 | PRP lead/Federal oversight; Environmental Safety & Designs, Inc. | Beth Brown 404-347-7791 |
| 5 | Acme Solvent Reclaiming, Inc. OU 2, IL (12/31/90) See also Thermal Desorption | Soil vapor extraction with air flushing | Industrial landfill, Municipal water supply | Soil (quantity unknown) | VOCs (DCA, TCA, DCE, TCE, PCE, Vinyl chloride, Benzene) | In design; Design completion planned Summer 1994 | PRP lead/Federal oversight; Harding/Lawson - Prime | Deborah Orr 312-886-7576 |
| 5 | American Chemical Services*, IN (09/30/92) See also Thermal Desorption | Soil vapor extraction with air flushing bioenhancement for SVOCs; air flushing w/vertical wells | Other organic chemical manufacturing, Solvent recovery facility | Soil (100,000 cy) | VOCs | Predesign; Schedule pending completion of negotiation | In negotiation | Wayde Hartwick 312-886-7067 |
| 5 | Enviro. Conservation and Chemical (ROD Amendment), IN (06/07/91) | Soil vapor extraction with air flushing | Industrial landfill, Municipal water supply | Soil (quantity unknown) | VOCs (Toluene, Ethylbenzene, Xylene), SVOCs (Dichlorobenzene, Phenol), Organics (BNAs) | In design | PRP lead/Federal oversight | Karen Vendl 312-886-4739 |
| 5 | Fisher Calo Chem, IN (08/07/90) | Soil vapor extraction | Municipal water supply | Soil (29,500 cy) | VOCs (PCE, DCA, TCA) | In design; Design completion planned Fall 1993 | PRP lead/Federal oversight; Connestoga Rovers - Prime | Jeff Gore 312-886-6552 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|---|-------------------|---|--|--|-------------------------------|
| 5 | MIDCO I, IN (06/30/89) | Soil vapor extraction | Industrial landfill | Soil (10,000 cy) | VOCs (TCE, Dichloromethane, Chlorobenzene, 2-Butanone, BTX), SVOCs (Phenols), PAHs | Predesign; PD Completion planned Winter 1994 | PRP lead/Federal oversight; ERM Northcentral- prime | Richard Boice 312-886-4740 |
| 5 | Main Street Well Field, IN (03/29/91) | Soil vapor extraction with air flushing | Solvent recovery facility, Water Supply Contamination from many sources | Soil (22,000 cy) | VOCs (TCE) | In design; East site (60% design completion by June 1, 1993)/ West site (95 % design in progress) | PRP lead/Federal oversight | Deborah Orr 312-886-7576 |
| 5 | MIDCO II, IN (06/30/89) | Soil vapor extraction | Drum storage/ disposal | Soil (12,200 cy) | VOCs (Methylene chloride, TCE, 2-Butanone, Toluene) | Predesign; PD Completion planned Winter 1994; Bench-scale treatability study is underway. | PRP lead/Federal oversight; ERM Northwest-prime | Rich Boice 312-886-4740 |
| 5 | Seymour Recycling, IN (09/30/87) See also Bioremediation (In Situ) | Soil vapor extraction (No emissions treatment) | Chemical waste management and incineration | Soil (200,000 cy) | VOCs (TCA, Carbon tetrachloride, PCE, TCE, Vinyl chloride, Benzene) | Operational; Completion planned Spring 1994 | PRP lead/Federal oversight; Canonie Engineering (installation), Geraghty & Miller (operation) | Jeff Gore 312-886-6552 |

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|--|--|-------------------|---|--|---|---|
| 5 | Wayne Waste Reclamation, IN (03/30/90) | Soil vapor extraction with air flushing | Municipal landfill, Oil reclamation | Soil (300,000 cy) | VOCs (TCE, DCE, Vinyl chloride, BTEX) | In design; Design completion planned Winter 1993; 30% design approved in March 1993 | PRP lead/Federal oversight; Warzyn, Inc. | Beverly Kush 312-886-6945 Duane Heaton 312-886-6399 |
| 5 | Chem Central, MI (09/30/91) | Soil vapor extraction (vapor treatment through carbon) | Chemical packaging and distribution | Soil (6,200 cy) | VOCs (DCE, TCE, TCA, BTEX), SVOCs (Naphthalene, 2-methyl naphthalene) | In design; Design completion planned Summer 1994; Predesign completed in May 1993 | PRP lead/Federal oversight; WW Engineering & Science | Colleen Hart 312-353-8752 |
| 5 | Clare Water Supply, MI (09/16/92) | Soil vapor extraction with air flushing air flushing with vertical wells | Industrial area with above/below ground tanks-- multisource groundwater site | Soil (54,800 cy) | VOCs (TCE, DCE, Vinyl chloride, BTEX) | Predesign; Schedule pending negotiation completion | In negotiation; Dames & Moore - Prime | Jon Peterson 312-353-1264 |
| 5 | Electro-Voice, OU 1, MI (06/23/92) | Soil vapor extraction | Audio equipment manufacturer | Soil (2,100 cy) | VOCs (TCE, PCE, Vinyl chloride), PAHs | Predesign; PD Completion planned Winter 1993 | PRP lead/Federal oversight; Geraghty & Miller | Beth Reiner 312-886-4783 |
| 5 | Kysor Industrial*, MI (09/29/89) | Soil vapor extraction | Machine shops, Truck parts manufacturing | Soil (13,200 cy) | VOCs (TCE, Xylene, Toluene, Ethylbenzene) | In design; Design completion planned Summer 1993 | PRP lead/Federal oversight | Mary L. Gustafson 312-886-6144 Julie Zacutansky 312-353-9660 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|--|------------------------------|----------------------------|---|---|---|--|
| 5 | Peerless Plating, MI (09/21/92) | Soil vapor extraction with horizontal wells | Electroplating | Soil (6,500 cy) | VOCs (1,2-DCE, TCE, Benzene, Ethylbenzene) | Predesign; PD Completion planned Fall 1993 | Federal lead/Fund Financed; PRC Environmental Management, Inc. | Tom Pay 312-886-5991 |
| 5 | Springfield Township Dump, MI (09/29/90) | Soil vapor extraction | Industrial landfill | Soil (100,000 cy) | VOCs (TCE, TCA, Chlorobenzene, Toluene) | Predesign; PD Completion planned Fall 1992; 60 % design on ground water, 60 % design on soil vapor extraction | PRP lead/Federal oversight | Mary Lou Martin 312-353-7446 |
| 5 | Sturgis Municipal Well Field, MI (09/30/91) | Soil vapor extraction with air flushing | Solvent recovery facility | Soil (quantity unknown) | VOCs (TCE, PCE, TCA) | Predesign; PD Completion planned 1993 | Federal lead/Fund Financed | Terese Van Donsel 312-353-6564 Steve Padovani 312-353-6755 |
| 5 | ThermoChem, Inc. OU 1, MI (09/30/91) | Soil vapor extraction with air flushing; May include biological enhancement | Municipal water supply | Soil (50,000 cy) | VOCs (PCE, TCE, Ethylbenzene, Xylene) | Predesign; PD Completion planned Winter 1993; A schedule is being negotiated with PRPs. | Federal lead/Fund Financed | Jim Hahnenberg 312-353-4213 |
| 5 | Verona Well Field (Thomas Solvent/Raymond Road)*, MI (08/12/85) | Soil vapor extraction (attempted Nitrogen sparging during part of operation) | Municipal water supply | Soil (35,000 cy) | VOCs (Dichloromethane, Chloroform, Carbon tetrachloride, BTEX, Vinyl chloride), SVOCs (Naphthalene) | Completed; Spring 1992 | Federal lead/Fund Financed; Terra Vac (subcontractor to CH2M Hill) | Margaret Guerriero 312-886-0399 Bill Haubal (temporary contact) |

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|---|---|---|--|--|--|
| 5 | Verona Well Field, OH 2, MI (06/28/91) | Soil vapor extraction Augmentation with air flushing is being considered | Machine shops, Municipal water supply | Soil (30,000 cy) | VOCs (PCE, TCA, Toluene) | Operational; PRP conducting air sparging pilot study for treating saturated soils. Study to start 9/93 | PRP lead/Federal oversight; Geraghty & Miller (Prime), Maumee Bay (Remedial subcontractor) | Margaret Guierro 312-886-0399 |
| 5 | Long Prairie Groundwater Contamination, MN (06/27/88) | Soil vapor extraction with air flushing followed by GAC for off-gas | Dry cleaners | Soil (3,600 cy) | VOCs (DCE, PCE, TCE, Vinyl chloride) | Design completed but not installed; Completion planned Spring 1994 | State lead/Fund Financed | Jan Bartlett 312-886-5438 Maureen Johnson (MN) 612-296-7353 |
| 5 | Miami County Incinerator, OH (06/30/89) | Soil vapor extraction with air flushing Treatment of off-gas determined in design | Municipal landfill, Surface impoundment | Soil (98,000 cy), Solids (quantity unknown) | VOCs (TCE, PCE, Toluene) | In design; Design completion planned Spring 1995; Design started in April 1993. | PRP lead/Federal oversight; Connestogo Roveis-Prime | Anthony Rutter 312-886-8961 |
| 5 | Pristine (ROD Amendment)*, OH (03/30/90) | Soil vapor extraction with horizontal wells | Industrial landfill, Drum storage/disposal | Soil (19,400 cy) | VOCs (Chloroform, DCA, PCE, TCE, Benzene), SVOCs (Phenol) | In design; Design completion planned Spring 1994; Pilot study completed | PRP lead/Federal oversight; Hydrogeo-Chem | Thomas Alcamo 312-886-7278 |
| 5 | Zanesville Well Field, OH (09/30/91) See also Soil Washing | Soil vapor extraction with horizontal wells followed by excavation and soil washing for metals | Solvent recovery facility, Auto parts manufacturing | Soil (36,000 cy) | VOCs (TCE, DCE) | Predesign; PD Completion planned Fall 1993 | PRP lead/Federal oversight; Geraghty & Miller - Prime | Dave Wilson 312-886-1476 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|---|----------------------------|--|---|---|---|
| 5 | City Disposal Corporation Landfill, WI (09/28/92) | Soil vapor extraction | Industrial landfill, Municipal landfill | Soil (quantity unknown) | VOCs (Tetrahydrofuran) | Predesign; PD Completion planned Spring 1994 | PRP lead/Federal oversight; Rust Environmental - Prime | Russ Hart 312-886-4841 Mike Schmoller (WDNR) 608-275-3303 |
| 5 | Hagen Farm, WI (09/17/90) | Soil vapor extraction with air flushing | Industrial and Municipal Waste Disposal | Soil (67,650 cy) | VOCs (Vinyl chloride, 2-Butanone, BTEX), Dioxins (Tetrahydrofuran) | In design; Design completion planned Summer 1993; Pilot test completed Fall 1992 | PRP lead/Federal oversight; Warzyn-Prime | Steve Padovani 312-353-6755 Don DiGulim (RSKERL) 405-332-8800 |
| 5 | Muskego Sanitary Landfill, Interim Action OU 1, WI (06/12/92) | Soil vapor extraction | Industrial landfill, Municipal landfill | Soil (24,200 cy) | VOCs (Vinyl chloride, 1,2-DCA, Methylene chloride, BTEX) | In design; Design completion planned Summer 1993; Operation scheduled to start in Summer 1993 | PRP lead/Federal oversight; Rust - Design | Bill Haubold 312-353-6261 |
| 5 | Wausau Groundwater Contamination, WI (09/29/89) | Soil vapor extraction with air flushing Soil vapor extraction | Machine shops, Bulk chemical distribution | Soil (1,300 cy) | VOCs (TCE, DCE, PCE) | Design completed but not installed; Installation to take place between June and September 1993 | PRP lead/Federal oversight; Hydrogeo-Chem (sub to Conestoga-Rovers & Associates) | Margaret Guerriero 312-886-0399 |
| 6 | Prewitt Abandoned Refinery, NM (09/30/92) See also Bioremediation (Ex Situ), Other Technologies | Soil vapor extraction With Air Sparging | Crude oil refinery | Soil (quantity unknown) | Organics (NAPLs) | Predesign | PRP lead/Federal oversight | Monica Chapa-Smith 214-655-6780 |

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|---|----------------------------|-------------------------------------|--|--|---|
| 6 | South Valley*, NM (09/30/88) | Soil vapor extraction | Aircraft Engine Manufacturing | Soil (quantity unknown) | VOCs (PCE, TCE, DCE, TCA) | Design completed but not installed; Completion planned Winter 1993; Installed Jan./March 1993 for north/south end. Pilot tests completed Nov. 1992. | PRP lead/Federal oversight; Canonie Environmental Services | Bert Gorrod 214-655-6779 |
| 6 | Tinker AFB (Soldier Creek Bldg. 3001), OK (08/16/90) | Soil vapor extraction | Maintenance Facility for Aircraft | Soil (quantity unknown) | VOCs (BTEX) | In design; Data on viability of SVE for the heavy fuel oil contamination being re-evaluated. Decision in Fall 1993 | Air Force lead/Federal Oversight | Susan Webster 214-655-6784 Major Richard Ashworth (USAF) 405-734-3058 |
| 6 | Petro-Chemical Systems, Inc., OU 2, TX (09/06/91) See also Other Technologies | Soil vapor extraction with air flushing and air sparging of ground water | Petroleum refining and reuse | Soil (300,000 cy) | VOCs (BTEX), SVOCs (Naphthalene) | Predesign | Federal lead/Fund Financed | Chris Villareal 214-655-6758 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--------------------------|--|----------------------------|--|---|---|---|
| 7 | Coleman Operable Unit 29th and Mead, KS (09/29/92) | Soil vapor extraction | Formerly vehicle manufacturing, currently heating, air conditioning equipment manufacturing | Soil (2,000,000 cy) | VOCs (TCE, 1,1,1-TCA, DCE, Vinyl chloride, Toluene) | Predesign; PD Completion planned Fall 1993; Soil vapor system already in place. ROD calls for expansion of the system | PRP lead/Federal oversight; Groundwater Technologies, Inc. | Ken Rapplean 913-551-7769 |
| 7 | Hastings GW Contamination (Colorado Ave)*, NE (09/28/88) | Soil vapor extraction | Industrial Metal Finishing/Cleaning | Soil (42,700 cy) | VOCs (PCE, TCE, DCE, TCA) | In design; Design completion planned Fall 1993 | PRP lead/Federal oversight; ENSR - Design Contractor | Darrel Sommerhauser 913-551-7711 Richard Schlenker (NE) 402-471-3388 |
| 7 | Hastings GW Contamination (Far-Mar Co.)*, NE (09/30/88) | Soil vapor extraction | Former Grain Storage Area (Fumigants) | Soil (quantity unknown) | VOCs (Carbon tetrachloride, Ethylene dibromide) | In design; Design completion planned Summer 1993 | PRP lead/Federal oversight; Burns & McDonald | Susan Hoff 913-551-7786 |
| 7 | Hastings GW Contamination, Well No. 3*, NE (09/26/89) | Soil vapor extraction | Former Grain Storage Area (Fumigants) | Soil (quantity unknown) | VOCs (Carbon tetrachloride, Chloroform) | Operational; Completion planned Fall 1993; SVE began operation on June 1, 1992. The State will take over the project in Fall 1993 if needed. | Federal lead/Fund Financed; Morrison Knudsen, EPA contractor | Diane Easley 913-551-7797 Steve Roe (Morrison Knudsen) 303-793-5054 Richard Schlenker (NE) 402-471-3388 |

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|---|----------------------------|---|---|--|---|
| 7 | Lindsay Manufacturing, NE (09/28/90) | Soil vapor extraction with air | Electroplating, Galvanized pipes for irrigation systems | Soil (quantity unknown) | VOCs (DCA, DCE, TCE, PCE) | In design; Design completion planned Fall 1993 | PRP lead/Federal oversight; Dames & Moore | Cecelia Tapla 913-551-7733 |
| 7 | Waverly Groundwater Contamination, NE (09/26/90) | Soil vapor extraction | Grain Storage (Fumigants) | Soil (160,000 cy) | VOCs (Carbon tetrachloride, Chloroform) | Operational; Completion planned 2001; This project began in February, 1988. | PRP lead/Federal oversight | Jeff Weatherford 913-551-7695 Mary Hansen (Argonne National Lab) 708-252-4938 |
| 8 | Chemical Sales Company, OU 1*, CO (06/27/91) | Soil vapor extraction with air flushing will recirculate treated emissions | Chemical sales and distribution, spillage at tank farm | Soil (360,000 cy) | VOCs (PCE, TCE) | In design; Design completion planned Winter 1993 | PRP lead/Federal oversight; ENSR | Jim Berkley 303-293-1817 |
| 8 | Martin Marietta (Denver Aerospace), CO (09/24/90) See also Thermal Desorption | Soil vapor extraction | Aerospace Equipment Manufacturer - Bulk storage facility and industrial landfill | Soil (quantity unknown) | VOCs (TCE) | In design; Design completion planned Fall 1993 | PRP/State oversite under RCRA; Geraghty & Miller | George Dancik 303-293-1506 Susan Chaki 303-331-4832 |
| 8 | Rocky Flats OU 2, Interim Remedial Action Plan, CO (08/10/92) | Soil vapor extraction | Former nuclear weapons research and development, production, and plutonium reprocessing complex | Soil (quantity unknown) | VOCs (TCE, PCE, Carbon tetrachloride) | Predesign; Pilot-scale is scheduled to start operation in December 1993 | DOE Lead/Federal Oversight DOE ERP; Woodward Clyde, Roy Weston, Layne Environmental | Bill Frazier 303-294-1081 Scott Grace (Rocky Flats) 303-966-7199 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|--|---|--|--|---|---|---|
| 8 | Rocky Mountain Arsenal OU 18, interim response, CO (02/26/90) | Soil vapor extraction | Motor Pool Area | Soil (100 ft radius down to 60 ft deep; approximately 70,000 cy) | VOCs (TCE) | Completed; March 1992 | U. S. Army (PRP) lead; Roy Weston, Ebasco, Harding Lawson, Woodward Clyde | Stacey Eriksen 303-294-1083 |
| 8 | Sand Creek Industrial OU 1*, CO (09/29/89) | Soil vapor extraction | Pesticide manufacturing/use /storage, Refinery | Soil (38,000 cy) | VOCs (TCE, PCE, Methylene chloride, Chloroform) | Operational; Completion planned Fall 1994 | Federal lead/Fund Financed; OHM | Erna Acheson 303-294-1971 |
| 9 | Hassayampa Landfill, AZ (08/15/92) | Soil vapor extraction | Municipal Landfill | Soil (quantity unknown) | VOCs (1,1-DCE, 1,1,1-TCA, 1,2-DCE, 1,1-DCA, TCE) | In design; Pilot-scale system is in operation | PRP lead/Federal oversight; Conestoga Rovers | Tom Dunkleman 415-744-2395 |
| 9 | Indian Bend Wash, South Area, OU 1, AZ (09/12/91) | Soil vapor extraction May vary technology at different units | Dry cleaners, Electroplating, Industrial landfill, Municipal landfill | Soil (quantity unknown) | VOCs (PCE, TCE, TCA) | Predesign; Pilot project under the SACM initiative, schedules for different units may vary. | PRP lead/Federal oversight; mixed funding | Jeff Dhont 415-744-2363 |
| 9 | Mesa Area Groundwater Contamination, AZ (09/27/91) | Soil vapor extraction | Semiconductor manufacturing | Soil (quantity unknown) | VOCs (TCE, PCE, 1,1-DCE) | Operational | PRP lead/State oversight | Richard Oln (AZ) 602-207-4176 |
| 9 | Motorola 52nd Street, AZ (09/30/88) | Soil vapor extraction | Manufacturing Facility | Soil (quantity unknown) | VOCs (TCA, TCE, DCE, PCE, Carbon tetrachloride, Ethylbenzene) | Predesign; A pilot system is operational but the full scale technology is still being evaluated. | PRP lead/State oversight; Dames and Moore | Mike Montgomery 415-744-2394 Jeff Kulon (AZ) 602-207-4181 Hotline 602-207-4360 |

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|--|-------------------------|--|--|--|---|
| 9 | Phoenix-Goodyear Airport Area (North & South Fac), AZ (09/26/89) | Soil vapor extraction | Defense related manufacturing | Soil (271,200 cy) | VOCs (DCE, TCE, MEK, Acetone) | Operational | PRP lead/Federal oversight; Metcalf & Eddy - South Area, Malcome Pirnie - North Area | Craig Cooper 415-744-2370 |
| 9 | Fairchild Semiconductor (San Jose)*, CA (03/20/89) | Soil vapor extraction with air flushing | Semiconductor manufacturing | Soil (1,933,488 cy) | VOCs (TCA, 1,1-DCE, Freon) | Completed; Fall 1990; Remedial efforts will be reevaluated in January 1994 | PRP lead/State oversight; Canonic Engineering | Helen McKinley 510-744-2236 Steve Hill (CA) 510-286-0433 |
| 9 | Fairchild Semiconductor/MTV-I*, CA (06/09/89) | Soil vapor extraction | Semiconductor manufacture and metal finisher | Soil (quantity unknown) | VOCs (TCE, PCE, Vinyl chloride, DCA, DCE, Freon), SVOCs (Phenol) | In design; Design completion planned 1993 | PRP lead/Federal oversight | Kelly McCarthy 415-744-2236 |
| 9 | Fairchild Semiconductor/MTV-II*, CA (06/30/89) | Soil vapor extraction | Semiconductor manufacturing, Metal Finishing Facility | Soil (50,000 cy) | VOCs (TCE, PCE, Vinyl chloride, DCA, DCE, Freon), SVOCs (Phenol) | In design; Design completion planned 1993 | PRP lead/Federal oversight; Canonic Engineering | Kelly McCarthy 415-744-2236 |
| 9 | IBM (San Jose)*, CA (12/15/88) | Soil vapor extraction | Computer Manufacture | Soil (24,000 cy) | VOCs (TCA, Acetone, Freon, Isopropyl Alcohol, Xylenes) | Operational; Completion planned Spring 2001 | PRP lead/State oversight; Terra Vac | Helen McKinley 415-744-2236 Steve Morris (CA) 510-286-0304 |
| 9 | Intel, Mountain View*, CA (06/09/89) | Soil vapor extraction | Semiconductor manufacturing, Metal Refinishing Facility Aircraft Maintenance | Soil (3,000 cy) | VOCs (TCE, PCE, Vinyl chloride, DCA, DCE, Freon), SVOCs (Phenol) | In design; Design completion planned 1993 | PRP lead/Federal oversight; Weiss Associates | Kelly McCarthy 415-744-2236 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--------------------------|---|----------------------------|---|--|---|---|
| 9 | Intersil/Siemens, CA (09/27/90) | Soil vapor extraction | Semiconductor manufacturing | Soil (quantity unknown) | VOCs (TCE, 1,1,1-TCA, Xylene) | Operational | State lead/Fund Financed; Levine-Fricke | Marie Lacey 415-744-2234 Steve Morse (CA) 510-286-0304 Steve Hill (CA) 510-286-0433 |
| 9 | Lawrence Livermore National Laboratory, CA (07/15/92) | Soil vapor extraction | Research and Development facility | Soil (quantity unknown) | VOCs (Fuel hydrocarbons) | Predesign | DOE lead/Federal oversight | Mike Gill 415-744-2383 |
| 9 | Monolithic Memories/AMD - Arques, Subunit 2, CA (09/11/91) | Soil vapor extraction | Semiconductor manufacturing | Soil (3,400 cy) | VOCs (PCE, TCE, TCA), PAHs | Operational; Started operation in Spring 1993 | State lead/Fund Financed; Pacific Environmental Group | Cecil Felix (CA) 510-464-1249 |
| 9 | National Semiconductor (Monolithic Memories), CA (09/11/91) | Soil vapor extraction | Semiconductor manufacturing | Soil (quantity unknown) | VOCs (PCE, DCE, Toluene, Ethylbenzene, Xylene), SVOCs | Operational; Completion planned Spring 1996 | State lead/Fund Financed; Harding Lawson & Associates | Cecil Felix (CA) 510-286-1249 |
| 9 | Pacific Coast Pipeline, CA (03/31/92) | Soil vapor extraction | Petroleum refining and reuse; petroleum pumping station | Soil (quantity unknown) | VOCs (Methylene chloride, DCA, Benzene, Toluene, Ethylbenzene) | In design | PRP lead/Federal oversight | Mike Montgomery 415-744-2403 |
| 9 | Purity Oil Sales OU 2, CA (09/30/92) | Soil vapor extraction | Petroleum refining and reuse | Soil (64,000 cy) | VOCs (TCE, PCE, Chlorobenzene, BTEX) | Predesign | Federal lead/Fund Financed | Martin Hausladen 415-744-2246 |
| 9 | Raytheon, Mountain View*, CA (06/09/89) | Soil vapor extraction | Semiconductor manufacturing, Metal Refinishing and Aircraft Maintenance | Soil (15,000 cy) | VOCs (TCE, PCE, Vinyl chloride, DCA, DCE, Freon), SVOCs (Phenol) | In design; Design completion planned 1993 | PRP lead/Federal oversight; Golder & Associates | Kelly McCarthy 415-744-2236 |

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|---------------------------------------|-------------------------|--|--|---|--|
| 9 | Sacramento Army Depot, Tank 2 OU, CA (12/09/91) | Soil vapor extraction with air flushing | Solvent storage tank at an Army Depot | Soil (150 cy) | VOCs (PCE, Ethylbenzene and Total Xylenes) | Completed; Operational from 11/91 to 4/93 | Army (USACE)/DoD Financed - IRP Program; Terra Vac | Marlin Mezquita 415-744-2393 George Siller (USACE, Sacramento) 916-557-7418 Dan Oburn (Sacramento Army Depot) 916-388-4344 |
| 9 | Signetics (AMD 901), TRW OU, CA (09/11/91) | Soil vapor extraction | Semiconductor manufacturing | Soil (8,000 cy) | VOCs (TCE, DCE, DCA) | Being installed; Installation completion planned Summer 1993; Operational by end of Summer 1993 | PRP lead/State oversight; Weiss & Associates | Joe Healy 415-744-2231 Kevin Graves (CA) 510-286-0435 |
| 9 | Signetics (Advanced Micro Devices 901), CA (09/11/91) | Soil vapor extraction | Semiconductor manufacturing | Soil (32,000 cy) | VOCs (TCE, DCE, DCA, TCA) | Operational; Although the ROD was signed in FY 91, the PRP has operated the remedy for several years | PRP lead/State oversight; M-Con Associates, Engineering-Science | Joe Healy 415-744-2231 Kevin Graves (CA) 510-286-0435 |
| 9 | Solvent Service, CA (09/27/90) | Soil vapor extraction with heat enhancement | Municipal water supply | Soil (quantity unknown) | VOCs (TCA, Acetone, Ethylbenzene, Xylene), SVOCs (Dichlorobenzene) | Operational | In negotiation; David Keith Todd Engineers | Marie Lacey 415-744-2234 Steve Morse (CA) 510-286-0304 Kevin Graves (CA) 510-286-0435 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 199

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|--|-------------------------|---|--|---|---|
| 9 | Spectra Physics, OU 1, CA (03/22/91) | Soil vapor extraction with horizontal wells | Semiconductor manufacturing, Laser manufacturing | Soil (7,200 cy) | VOCs (TCE) | Operational; Completion planned Winter 1997 | PRP lead/State oversight; Levine - Fricke | Sean Hogan 415-744-2233 Steve Hill (CA) 510-286-4833 |
| 9 | Teledyne Semiconductors, CA (03/22/91) | Soil vapor extraction with horizontal wells | Semiconductor manufacturing | Soil (quantity unknown) | VOCs (TCE) | Operational; Completion planned Winter 1997 | PRP lead/State oversight; Levine Fricke | Sean Hogan 415-744-2233 Carla Dube 510-286-1041 |
| 9 | Van Waters and Rogers, CA (09/30/91) | Soil vapor extraction | Chemical packaging facility | Soil (quantity unknown) | VOCs (PCE, TCE, TCA) | Operational | PRP lead/State oversight; Van Waters and Rogers | Marie Lacey 415-744-2234 Susan Gladstone (CA) 510-286-0840 |
| 9 | Watkins-Johnson*, CA (06/29/90) | Soil vapor extraction | Semiconductor manufacturing | Soil (quantity unknown) | VOCs (DCE, TCA, TCE) | In design; Design completion planned Summer 1993 | PRP lead/Federal oversight; Watkins | Kay Lawrence 415-744-2289 |
| 10 | Eielson Air Force Base*, AK (09/29/92) See also Bioremediation (In Situ) | Soil vapor extraction | Tactical air support installation | Soil (quantity unknown) | Floating Petroleum Products (VOCs, SVOCs, and Petroleum Hydrocarbons), BTEX, TPH-JP-4, Diesel | In design; Design completion planned Summer 1993 | Federal Facility Lead/Funded DERA EA Engineering | Mary Jane Nearman 206-553-6642 Capt. Max Gandy 907-377-4361 Rielle Markey 907-451-2117 |
| 10 | Commencement Bay/S. Tacoma Channel/Well 12A*, WA (05/03/85) | Soil vapor extraction with air flushing | Municipal water supply, Waste oil and solvent reclamation; paint and lacquer thinner manufacturing | Soil (100,000 cy) | VOCs (PCE, TCE, TCA) | Operational; Completion planned Fall 1998 | Federal lead/Fund Financed; AWD Technologies, Inc. | Kevin Rochlin 206-553-2106 |

Soil Washing

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|--|--|---|--|---|--|
| 2 | Ewan Property*, NJ (09/29/89) See also Solvent Extraction | Using water only preceded by solvent extraction | Industrial waste dumping | Soil (22,000 cy) | Metals (Chromium, Lead, Copper, Barium) | Predesign; PD Completion planned 1995; Start date contingent upon progress in OU 1. Completion planned 1995. | In negotiation | Dave Rosoff 212-264-5397 |
| 2 | King of Prussia, NJ (09/28/90) | Using water with washing agents as an additive residual sludges to be land disposed | Waste processing facility | Soil (20,000 cy), Sludge (quantity unknown), Sediments (quantity unknown) | Metals (Chromium, Copper, Nickel), DDT/DDD/DDE, Hexachloro- benzene, Dioxin (2,3,7,8), TCDD | Design completed but not installed; Completion planned Summer 1993 | PRP lead/Federal oversight; Alternative Remedial Technologies, Inc. | Gary Adamkiewicz 212-264-7592 |
| 2 | Myers Property, NJ (09/28/90) See also Dechlorination | Soil washing coupled with dechlorination | Pesticide manufacturing/use /storage | Soil (49,000 cy), Sediments (1,000 cy) | Metals (Cadmium, Lead, Arsenic, Copper) | In design; Design completion planned Winter 1994; Treatability studies underway | PRP lead/Federal oversight; Metcalf & Eddy | John Prince 212-264-1213 |
| 2 | Vineland Chemical, OU 1 and OU 2, NJ (09/29/89) See also In situ Flushing | Soil Washing | Pesticide manufacturing/use /storage | Soil (62,000 cy) | Metals (Arsenic) | In design; Design completion planned 1993 | Federal lead/Fund Financed EBASCO Design | Matthew Westgate 212-264-3406 Steve Hadel (USACE - Kansas City) 816-426-5221 |
| 2 | GE Wiring Devices, PR (09/30/88) | Using water with Potassium Iodide KI2 solution as an additive | Wiring services facility | Soil (5,500 cy), Sludge (quantity unknown) | Metals (Mercury) | In design; Design completion planned Spring 1994 | PRP lead/Federal oversight | Caroline Kwan 212-264-0151 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 19

Soil Washing (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|--|--|---|---|--|---|----------------------------|
| 4 | Cabot Carbon/Koppers, FL (09/27/90) See also Bioremediation (Ex Situ), Bioremediation (In Situ) | Soil washing followed by bioremediation of fines | Wood preserving, Pine tar and turpentine manufacturing | Soil (6,400 cy) | SVOCs (PCP), PAHs, Metals (Arsenic, Chromium) | In design; Design completion planned Fall 1994 | PRP lead/Federal oversight McLaren-Hart Design Contractor | Martha Berry 404-347-2643 |
| 4 | Whitehouse Waste Oil Pits (ROD Amendment)*, FL (06/16/92) See also Bioremediation (Ex Situ) | Soil Washing | Waste oil recycler | Soil (quantity unknown), Sludge (56,930 cy) | VOCs, PCBs, PAHs, BTEX | In design; Design completion planned Winter 1993 | Federal lead/Fund Financed | Tony Best 404-347-2643 |
| 4 | Benfield Industries, NC (07/31/92) See also Bioremediation (Ex Situ), Bioremediation (In Situ) | Soil Washing | Bulk chemical mixing and repackaging plant. | Soil (4,300 cy) | VOCs, SVOCs, Inorganics | Predesign | Federal lead/Fund Financed; CDM/F.I.P. Corporation | John Bornholm 404-347-7791 |
| 4 | Cape Fear Wood Preserving, NC (06/30/89) See also Bioremediation (Ex Situ) | Using water with sodium hydroxide or hydrochloric acid as an additive may be followed by s/s | Wood preserving | Soil (24,000 cy) | VOCs (Benzene), PAHs (Creosote), Metals (Copper, Chromium, Arsenic) | Design completed but not installed; Project on hold due to a capacity assurance issue. | Federal lead/Fund Financed | Jon Bornholm 404-347-7791 |
| 5 | United Scrap Lead/SIA, OH (09/30/88) | Soil Washing | Battery recycling/disposal | Soil (109,000 cy), Solids (55,000 cy), Sediments (quantity unknown) | Metals (Lead) | In design; Design completion planned Spring 1994 | Federal lead/Fund Financed | Anita Boseman 312-886-6941 |

Soil Washing (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|---|-----------------------------------|---|---|--|--------------------------------|
| 5 | Zanesville Well Field, OH (09/30/91) See also Soil Vapor Extraction | Soil washing ex situ preceded by soil vapor extraction | Solvent recovery facility, Auto parts manufacturing | Soil (1,800 cy) | Metals (Lead, Mercury) | Predesign; PD Completion planned Fall 1993 | PRP lead/Federal oversight; Geraghty & Miller - Prime | Dave Wilson 312-886-1476 |
| 5 | Moss-American*, WI (09/27/90) See also Bioremediation (Ex Situ) | Soil washing followed by slurry phase bioremediation of fines | Wood preserving | Soil (80,000 cy) | PAHs | Predesign; PD Completion planned 1994; Bench-scale study is underway. | PRP lead/Federal oversight; Weston, Inc.(prime)/Bergmann USA (subcontractor) | Bonnie Eleder 312-886-4885 |
| 6 | Arkwood, AR (09/28/90) | Soil washing (incineration of residuals) | Wood preserving | Soil (20,400 cy), Sludge (425 cy) | SVOCs (PCP), Dioxins, PAHs | In design; Design completion planned Fall 1995 | PRP lead/Federal oversight; ERM Southwest | Cynthia Kaleri 214-655-6772 |
| 6 | Koppers/Texarkana*, TX (09/23/88) See also In situ Flushing | Using water with a surfactant as an additive | Wood preserving | Soil (19,400 cy) | PAHs (Benzo(a)pyrene, Creosote), Organics (NAPLs), Metals (Arsenic) | Predesign; Soil washing project is on hold while EPA relocates community affected by the site | PRP lead/Federal oversight; ENSR (Demolition contractor) | Ursula Lennox 214-655-6743 |
| 6 | South Cavalcade Street*, TX (09/26/88) See also In situ Flushing | Using water with surfactants as an additive (followed by incineration of contaminated residual) | Wood preserving | Soil (11,000 cy) | PAHs (Benzo(a)pyrene, Benzo(a)anthracene, Chrysene) | In design; Design completion planned Summer 1994 | PRP lead/Federal oversight | Glenn Celerier 214-655-8523 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Soil Washing (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|--|--|---|--|---|--|
| 9 | FMC (Fresno)*, CA (06/28/91) | Soil washing followed by s/s | Pesticide manufacturing/use /storage | Soil (30,000 cy) | Biocides (DDT, EDB, Toxaphene, Chlordane) | Predesign; Completion of bench test scheduled for December 1993 | PRP lead/State oversight; Canonie Engineering | Tom Dunkelman 415-744-2395 Mike Pfister (FMC) 209-297-3934 |
| 9 | Koppers Company, Inc. (Oroville Plant), CA (04/04/90) See also Bioremediation (In Situ) | Soil washing Method un determined; fixation for metal, 19000 cy | Wood preserving | Soil (200,000 cy) | SVOCs (Polychlorinated phenols), Dioxins | In design; Design completion planned Summer 1993 | PRP lead/Federal oversight; Dames & Moore | Fred Schauffler 415-744-2365 |
| 9 | Sacramento Army Depot, Oxidation Lagoons OU, CA (09/30/92) | Soil Washing | Evaporation ponds for metal plating wastewater | Soil (15,000 cy) | Metals (Arsenic, Cadmium, Lead) | In design; 100% design completion planned for 6/93. Full-scale operation scheduled to start in September 1993 | Army (USACE)/DoD Financed - IRP Program; US PCI | Marlin Mezquita 415-744-2393 George Siller (USACE) 916-557-7418 Dan Oburn (Sacramento Army Depot) 916-388-4344 |
| 10 | Gould Battery, OR (03/31/88) | Soil washing Solids will be s/s | Battery recycling /disposal | Soil (11,000 cy), Solids (90,000 cy) | Metals (Lead) | Operational; Completion planned Summer 1995; Scheduled to be in operation from fall 1993 to 1995. | PRP lead/Federal oversight; Canonie Environmental | Jerry Balcom (Portland USACE) 503-326-4192 Chip Humphries (Oregon operations) 503-326-2678 |

Soil Washing (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|---|------------------|-------------------------------|--|--|---|
| 10 | Naval Submarine Base, Bangor Site A, OU 1, WA (12/06/91) | Soil washing with UV oxidation of ground water | Federal facility, ordnance detonation | Soil (7,100 cy) | Explosives (TNT, RDX, DNT) | Predesign; PD Completion planned Winter 1993; Design will begin after completion of a treatability study | Navy Lead/DoD Funded IRP; OHM, Remediation Services Corp. | Harry Craig 503-326-3689 Patti Kelly (DoD) 206-369-5099 Jeff Rodin 206-553-4497 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1991

Solvent Extraction

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|---|---|--|---|--|--|
| 1 | Norwood PCBs, MA (09/29/89) | Solvent Extraction | PCB capacitor manufacturing/ testing | Soil (35,000 cy), Sediments (5,000 cy) | VOCs (TCE), SVOCs (Trichlorobenzene), PCBs, PAHs | In design; Design completion planned Spring 1994 | Federal lead/Fund Financed; Metcalf & Eddy - Design Contractor | Robert Canciarulo 617-573-5778 |
| 1 | O'Connor*, ME (09/27/89) | Solvent extraction (may be followed by s/s for lead) | Salvage and electrical transformer recycling | Soil (23,500 cy), Sediments (quantity unknown) | PCBs, PAHs | In design; Design completion planned Winter 1995 | PRP lead/Federal oversight | Ross Gilleland 617-573-5766 |
| 2 | Ewan Property*, NJ (09/29/89) See also Soil Washing | Solvent extraction (followed by Soil Washing to treat inorganics) | Industrial waste dumping | Soil (22,000 cy) | VOCs (PCE, TCE, TCA, Methylene Chloride, BTX) | Predesign; PD Completion planned 1995; Start date contingent upon progress in OU-1. Completion estimate 1995. | In negotiation | Dave Rosoff 212-264-5397 |
| 4 | Carolina Transformer, NC (08/29/91) | Solvent extraction (may be followed by s/s) | Transformer repair | Soil (15,000 cy) | PCBs | In design; Design completion planned Spring 1994 | Federal lead/Fund Financed | Luise Flores 404-347-7791 |
| 6 | United Creosoting*, TX (09/29/89) | Solvent extraction (critical fluid extraction followed by incineration of fluids) | Wood preserving | Soil (67,000 cy) | VOCs, Dioxins | In design; Design completion planned Fall 1993 | State lead/Fund Financed; C.F. Systems, proprietor of propane cf extraction | Earl G. Hendrick 214-655-5519 LaReine Pound (TX) 512-467-7897 |

Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Thermal Desorption

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|--|---|--|--|---|---|
| 1 | Cannon Engineering/Bridgewater, MA (03/31/88) | Thermal aeration (vapors captured on carbon) | Chemical waste storage and incineration facility | Soil (11,000 cy) | VOCs (TCE, Vinyl chloride, Benzene, Toluene) | Completed; | PRP lead/Federal oversight; Canonic Engineering | Richard Goehlert 617-573-5742 |
| 1 | Re-Solve*, MA (09/24/87) | Thermal Desorption | Chemical reclamation facility | Soil (22,500 cy) | PCBs | Being installed; Operation planned summer 1993. | PRP lead/Federal oversight; ENSR | Joe Lemay 617-573-9622 |
| 1 | McKin*, ME (07/22/85) | Thermal aeration (vapors captured on carbon) | Industrial landfill | Soil (11,500 cy) | VOCs (TCE, BTX) | Completed; | PRP lead/Federal oversight; Canonic Engineering | Sheila Eckman 617-573-5784 |
| 1 | Union Chemical Co., OU 1, ME (12/27/90) | Low temperature thermal treatment | Solvent recovery facility, Paint stripping | Soil (10,000 cy) | VOCs (TCE, DCE, PCE, Xylene) | Design completed but not installed; Being installed in summer 1994 | PRP lead/Federal oversight | Ed Hathaway 617-573-5782 Christopher Rushton (ME DEP) 207-287-2651 |
| 1 | Ottati & Goss, NH (01/16/87) | Thermal aeration | Drum storage/disposal | Soil (16,000 cy) | VOCs (TCE, PCE, DCA, Benzene) | Completed; | PRP lead/Federal oversight; Canonic Engineering | Stephen Calder 617-573-9626 |
| 1 | Industrial Latex, OU 1, NJ (09/30/92) | Low temperature thermal treatment | Manufacturing of chemical adhesives and natural and synthetic rubber compounds | Soil (38,000 cy), Sludge (6 cy), Solids (quantity unknown), Soil (800 gl) | PCBs | Predesign | Federal lead/Fund Financed | Paola Pascetta 212-264-9001 Robert McKnight 212-264-1870 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Thermal Desorption (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|--|-----------------------|--|---|---|--|
| 2 | Lipari Landfill Marsh Sediment*, NJ (07/11/88) | Low temperature thermal treatment | Industrial landfill, Municipal landfill | Sediments (60,000 cy) | VOCs, SVOCs | Design completed but not installed; Completion planned Summer 1993 | In negotiation | Tom Graff (USACE, Kansas City) 816-426-2296 |
| 2 | Metaltec/Aerosystems, OU 1 - Soil Treatment*, NJ (06/30/86) | Low temperature thermal treatment (vapors captured on carbon) | Metal Manufacturing | Soil (9,000 cy) | VOCs (TCE) | Being installed; Installation completion planned Winter 1993; Design complete; Contractor being procured (Bids due June 1993) | Federal lead/Fund Financed; Army Corp of Engineers (Contractor)/ vendor unknown | Ron Rusin 212-264-1873 Mark Keast 816-426-5832 (x - 3032) |
| 2 | Reich Farms*, NJ (09/30/88) | Thermal desorption (vapors will be captured on carbon) | Drum storage/ disposal | Soil (6,000 cy) | VOCs (TCE, PCE, TCA), SVOCs (Phthalates) | Predesign | PRP lead/Federal oversight | Gary Adamkiewicz 212-264-7592 |
| 2 | Waldick Aerospace Devices*, NJ (09/29/87) | Low temperature thermal treatment (followed by offsite s/s and disposal) | Manufacture/ Electroplating of Plane Parts | Soil (3,000 cy) | VOCs (TCE, PCE) | Operational; Completion planned Fall 1993; Operational since June 1993 | Federal lead/Fund Financed; Chemical Waste Management | George Buc (USACE-NY District) 908-389-3040 Ron Ackerman (USACE-NY District) 908-389-3040 |

Table 1-1

Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Thermal Desorption (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|---|--------------------------------------|--|--|--|----------------------------------|
| 2 | American Thermostat, NY (06/29/90) | Low temperature thermal treatment | Thermostat Manufacturing | Soil (15,000 cy), Sediments (300 cy) | VOCs (PCE, TCE) | In design; Design completion planned August 1993 | Federal lead/Fund Financed; TAMS Consultants/ William Environmental Services. (Vendor) | Christos Tsiamis 212-264-5713 |
| 2 | Claremont Polychemical - Soil Remedy, NY (09/28/90) | Low temperature thermal treatment | Paint/ink formation | Soil (3,000 cy) | VOCs (PCE) | In design; Design completion planned Fall 1993 | State lead/Fund Financed; USACE/Rust Environmental | Dick Kaplin 212-264-3819 |
| 2 | Fulton Terminals, Soil Treatment, NY (09/29/89) | Low temperature thermal treatment | Former hazardous waste storage facility | Soil (4,000 cy) | VOCs (TCE, DCE, Benzene, Xylene) | In design; Design completion planned Summer 1993 | PRP lead/Federal oversight | Christos Tsiamis 212-264-5713 |
| 2 | Sarney Farm, NY (09/27/90) | Thermal desorption (followed by onsite incineration of organics) | Industrial landfill, Municipal landfill | Soil (quantity unknown) | VOCs (Chloroform, TCE, PCE, Toluene), SVOCs (Phthalates) | In design; Design completion planned Winter 1993 | Federal lead/Fund Financed | Kevin Willis 212-264-8777 |
| 2 | Solvent Savers, NY (09/30/90) See also Soil Vapor Extraction | Low temperature thermal treatment | Solvent recovery facility, Chemical reclamation | Soil (60,000 cy) | VOCs (DCE, TCE), PCBs | Predesign; PD Completion planned Winter 1993 | PRP lead/Federal oversight | Lisa Wong 212-264-5712 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Thermal Desorption (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|--|--|--|--|--|--|--|
| 3 | U.S.A. Letterkenny SE Area, OU1*, PA (06/28/91) | Low temperature thermal treatment (may need s/s for metals after thermal desorption) | Munitions manufacturing/storage, Drum storage | Soil (14,000 cy) | VOCs (TCE, Ethylbenzene, Xylene) | Design completed but not installed; Completion planned Summer 1993 | Federal facility; McLaren Hart | Denis Orenshare 215-597-7858 Georgette Myers (Letterkenny) 717-267-8483 |
| 3 | Saunders Supply Co, OU 1, VA (09/30/91). See also Dechlorination | Low temperature thermal treatment (Vapors will be captured on carbon) | Wood preserving | Soil (25,000 cy) | SVOCs (PCP) | Predesign; PD Completion planned Fall 1993 | Federal lead/Fund Financed; Ecology & Environment, no vendor yet | Andy Palestini 215-597-1286 |
| 4 | Ciba-Geigy (MacIntosh Plant) OU 4, AL (07/14/92) See also In situ Flushing | Thermal desorption Liquid injection incineration | Chemical Manufacturing | Soil (110 cy), Sludge (quantity unknown) | VOCs (Chloroform, Toluene, Xylene), Biocides (Atrazine, Diazinon, Prometryn, Simazine) | Predesign; Design will also use treatability studies being conducted at OU-2 | PRP lead/Federal oversight | Charles King 404-347-2643 |
| 4 | Ciba-Geigy Corp. (MacIntosh Plant) OU 2, AL (09/30/91) See also In situ Flushing | Low temperature thermal treatment to be evaluated during treatability study | Agriculture Applications, Pesticide manufacturing/use /storage, Other organic chemical manufacturing | Soil (130,000 cy), Sludge (quantity unknown) | VOCs, Biocides | In design; Design completion planned Winter 1995; Treatability studies ongoing | PRP lead/Federal oversight; CDM/FPC (Demolition /Design contractors) | Charles King 404-347-2643 |
| 4 | Smith's Farm Brooks, OU 1*, KY (09/30/91) See also Dechlorination | Low temperature thermal treatment | Drum storage/disposal | Soil (16,000 cy) | PCBs, PAHs (Carcinogenic PAHs) | Design completed but not installed; Completion planned Spring 1995 | PRP lead/Federal oversight | Tony DeAngelo 404-347-7791 |

Thermal Desorption (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|--|---|---|--|---|---|
| 4 | Aberdeen Pesticide Dumps, OU 4, NC (09/30/91) | Thermal desorption (treatment for organic vapors not yet determined) | Pesticide manufacturing/use /storage | Soil (124,000 cy) | Biocides (DDT, Toxaphene, Benzene Hexachloride) | Pre-design; PD Completion planned September 1993 | PRP lead/Federal oversight | Kay Crane 404-347-7791 Randy McElveen 919-733-2801 |
| 4 | Potter's Septic Tank Service Pits, NC (08/05/92) | Low temperature thermal treatment | Waste petroleum and septic tank sludge disposal pit | Soil (10,100 cy), Sludge (quantity unknown) | VOCs (BTEX), PAHs (Carcinogenic PAHs, Naphthalene) | In design; Design completion planned Summer 1994 | Federal lead/Fund Financed | Beverly Hudson 404-347-7791 |
| 4 | Sangamo/Twelve-Mile/Hartwell PCB, OU 1, SC (12/19/90) | Low temperature thermal desorption (vapors captured on carbon) | Capacitor manufacturer | Soil (80,000 cy) sludge (20,000 cy) | PCBs, VOCs | Design; Design Completion planned Fall 1993; | PRP lead/Federal oversight | Bernie Hayes 404-347-7791 Richard Haynes (SC) 803-734-5487 |
| 4 | Wamchem*, SC (06/30/88) | Thermal desorption (vapors captured on carbon) | Former Dye Manufacturing Plant | Soil (2,000 cy) | VOCs (BTX) | Being installed Four seasons | PRP lead/Federal oversight | Terry Tanner 404-347-7791 |
| 4 | Arlington Blending & Packaging Co., OU 1*, TN (06/28/91) See also Dechlorination | Thermal desorption; residual soil and vapor to be dechlorinated | Pesticide manufacturing/use /storage, Other organic chemical manufacturing | Soil (5,000 cy) | VOCs (DCE), SVOCs (PCP), Biocides (Chlordane, Heptachlor) | In design; Design completion planned Winter 1993 | PRP lead/Federal oversight | Derek Matory 404-347-7791 |
| 5 | Acme Solvent Reclaiming, Inc. OU 2, IL (12/31/90) See also Soil Vapor Extraction | Low temperature thermal treatment (followed by s/s for lead) | Industrial landfill, Municipal water supply | Soil (6,000 cy) | VOCs (TCA, DCE, DCA, TCE, PCE, Vinyl chloride, 4-methyl 2 pentanone,, Benzene), SVOCs (Naphthalene), PCBs | In design; Design completion planned Summer 1994 | PRP lead/Federal oversight; Harding Lawson - Prime | Deborah Orr 312-886-7576 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Thermal Desorption (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|--|--|--|---|--|---|
| 5 | Outboard Marine/Waukegan Harbor, OU 3*, IL (03/31/89) | Low temperature thermal treatment | Marine Products Manufacturing | Soil (16,000 cy), Sediments (quantity unknown) | PCBs | Completed; Summer 1992 | PRP lead/Federal oversight; Soiltech | Cindy Nolan 312-886-0400 |
| 5 | American Chemical Services*, IN (09/30/92) See also Soil Vapor Extraction | Low temperature thermal treatment | Other organic chemical manufacturing, Solvent recovery facility | Soil (quantity unknown), Sludge (quantity unknown), Solids (65,000 cy) | VOCs, PCBs | Predesign; Schedule pending completion of negotiation with PRPs | In negotiation | Wayde Hartwick 312-886-7067 |
| 5 | Anderson Development (ROD Amendment)*, MI (09/30/91) | Low temperature thermal treatment off-site disposal of residuals | Other organic chemical manufacturing | Soil (8,000 cy), Sludge (quantity unknown) | Organics (MBOCAs, 4, 4'- Methylene, Bis-2-chloroaniline) | Operational; Completion planned Summer 1993; Treatment began Jan. 5, 1992. In pilot test, MBOCAs reduced from 2,800 ppm in sludges to 1.6 ppm | PRP lead/Federal oversight; Weston Services, Inc | Jim Hahnenberg 312-353-4213 |
| 5 | Carter Industries*, MI (09/18/91) | Low temperature thermal treatment (followed by s/s of soils and incin. of PCB oil) | Scrap metal salvager | Soil (46,000 cy), Solids (quantity unknown) | PCBs | In design; Design completion planned Fall 1994 | PRP lead/Federal oversight; Connestoga-Rovers Associates | Jon Peterson 312-353-1264 |
| 8 | Martin Marietta (Denver Aerospace), CO (09/24/90) See also Soil Vapor Extraction | Low temperature thermal treatment (followed by s/s of soils and incin. of vapors) | Aerospace Equipment Manufacturer - Bulk storage facility and industrial landfill | Soil (2,300 cy) | VOCs (TCE), PCBs | In design | PRP lead/State oversight; under RCRA; Geraghty & Miller | George Dancik 303-293-1506 Susan Chaki (CO) 303-331-4832 |

Thermal Desorption (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|-----------------------------------|--------------------------------------|------------------|--------------------------|--|---|---------------------------|
| 8 | Sand Creek Industrial, OU 5*, CO (09/28/90) | Low temperature thermal treatment | Pesticide manufacturing/use /storage | Soil (8,000 cy) | Organics (Biocides) | Predesign; Prepared ROD amendment to change remedy from soil washing | Federal lead/Fund Financed | Erna Acheson 303-294-1971 |

Table 1-1
Remedial Actions: Site-specific Information By Innovative Treatment Technology Through FY 1992

June 1993

Other

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|--|---|---|---|--|---|--|
| 1 | South Municipal Water Supply Well*, NH (09/27/89) See also Soil Vapor Extraction | Air sparging | Ball Bearing Manufacturing | Groundwater | VOCs (PCE, TCA, TCE) | Being installed; Construction to start summer 1993 | PRP lead/Federal oversight | Roger Duwart 617-573-9628 Tom Andrews (NH) 603-271-2910 |
| 2 | Applied Environmental Services, OU 1, NY (06/24/91) See also Bioremediation (In Situ), Soil Vapor Extraction | Air sparging | Bulk petroleum and hazardous waste storage facility | Groundwater | VOCs (BTEX), SVOCs | In design; Design completion planned Winter 1993 | PRP lead/State oversight | Andrew English (NY) 518-457-0315 Jeff Tradd 518-457-1708 |
| 3 | Brodhead Creek, OU 1, PA (03/29/91) | CROW technology using hot water injection to mobilize coal tar | Coal gasification site | Soil (200 cy), Groundwater | PAHs, DNAPLs | Predesign; PD Completion planned Summer 1993 | PRP lead/Federal oversight; Remediation Technologies, Western Research Institute | John Banks 215-597-8555 |
| 3 | Brown's Battery Breaking Site, OU 2, PA (07/02/92) See also Other Technologies | Limestone barrier | Battery recycling/ disposal | Groundwater | Metals (Lead) | Predesign; PD Completion planned Winter 1993 | PRP lead/Federal oversight | Richard Watman 215-697-8996 |
| 3 | Brown's Battery Breaking Site, OU 2, PA (07/02/92) See also Chemical Treatment | Fuming Gasification | Battery recycling /disposal | Soil (quantity unknown), Solids (quantity unknown) | Metals (Lead), PCBs, PAHs, Chlorinated Pesticides, Phthalate esters | Predesign; PD Completion planned Winter 1993 | PRP lead/Federal oversight | Richard Watman 215-597-8996 |
| 3 | Tonolli Corporation, PA (09/30/92) | Limestone barrier | Battery recycling /disposal | Groundwater | Metals (Lead) | Predesign; PD Completion planned Summer 1993 | PRP lead/Federal oversight | Linda Dietz 215-597-6906 |

Other (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|------------------------|---------------------------------|------------------|--|-----------|--|---------------------------------------|
| 6 | Prewitt Abandoned Refinery, NM (09/30/92) See also Bioremediation (Ex Situ), Soil Vapor Extraction | Air Sparging | Crude oil refinery | Groundwater | Organics (NAPLs) | Predesign | PRP lead/Federal oversight | Monica Chapa-Smith 214-655-6780 |
| 6 | Petro-Chemical Systems, Inc., OU 2, TX (09/06/91) See also Soil Vapor Extraction | Air sparging | Petroleum refining and reuse | Groundwater | VOCs (BTEX), SVOCs (Naphthalene) | Predesign | Federal lead/Fund Financed; not chosen | Chris Villareal 214-655-6758 |

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TABLE 1-2

REMEDIAL ACTIONS: INNOVATIVE TREATMENT TECHNOLOGIES BY EPA REGION

Table 1-2 summarizes the innovative treatment technologies used at remedial action sites in each EPA region and within each region by state.

**TABLE 1-2. REMEDIAL ACTIONS: INNOVATIVE TREATMENT TECHNOLOGIES
BY EPA REGION**

June 1993

| <u>TECHNOLOGY</u> | <u>SITE NAME</u> | <u>STATE</u> | <u>TECHNOLOGY</u> | <u>SITE NAME</u> | <u>STATE</u> |
|--------------------------|------------------------------------|--------------|------------------------------------|-------------------------------------|--------------|
| <u>REGION 1</u> | | | <u>REGION 2 (continued)</u> | | |
| Soil Vapor Extraction | Kellogg-Deering Well Field | CT | Solvent Extraction | Ewan Property | NJ |
| Bioremediation (Ex situ) | Iron Horse Park | MA | Thermal Desorption | Industrial Latex, OU 1 | NJ |
| Bioremediation (In situ) | Hocomonco Pond, ESD | MA | Thermal Desorption | Lipari Landfill Marsh Sediment | NJ |
| Solvent Extraction | Norwood PCBs | MA | Thermal Desorption | Metaltec/Aerosystems, OU 1 | NJ |
| Thermal Desorption | Cannon Engineering/Bridgewater | MA | Thermal Desorption | Reich Farms | NJ |
| Thermal Desorption | Re-Solve | MA | Thermal Desorption | Waldick Aerospace Devices | NJ |
| Soil Vapor Extraction | Groveland Wells | MA | Soil Vapor Extraction | A O Polymer, Soil treatment phase | NJ |
| Soil Vapor Extraction | Silresim | MA | Soil Vapor Extraction | FAA Technical Center | NJ |
| Soil Vapor Extraction | Wells G&H OU 1 | MA | Soil Vapor Extraction | Garden State Cleaners | NJ |
| Solvent Extraction | O'Connor | ME | Soil Vapor Extraction | South Jersey Clothing | NJ |
| Thermal Desorption | McKin | ME | Soil Vapor Extraction | Swope Oil & Chem Co., OU 2 | NJ |
| Thermal Desorption | Union Chemical Co., OU 1 | ME | Bioremediation (Ex situ) | General Motors/Central Foundry OU 1 | NY |
| In situ Flushing | Tibbetts Road | NH | Bioremediation (Ex situ) | General Motors/Central Foundry OU 2 | NY |
| Thermal Desorption | Ottati & Goss | NH | Bioremediation (In situ) | Applied Environmental Services (GW) | NY |
| Soil Vapor Extraction | Mottolo Pig Farm | NH | Bioremediation (In situ) | Applied Environmental Services OU 1 | NY |
| Soil Vapor Extraction | South Municipal Water Supply Wells | NH | Dechlorination | Wide Beach Development | NY |
| Soil Vapor Extraction | Tibbetts Road | NH | In situ Flushing | Byron Barrel & Drum | NY |
| Soil Vapor Extraction | Tinkham Garage | NH | In situ Flushing | Pasley Solvents and Chemicals | NY |
| Air Sparging | South Municipal Water Supply Wells | NH | Thermal Desorption | American Thermostat | NY |
| Soil Vapor Extraction | Stamina Mills | RI | Thermal Desorption | Claremont Polychemical - Soil | NY |
| | | | Thermal Desorption | Fulton Terminals, Soil Treatment | NY |
| | | | Thermal Desorption | Sarney Farm | NY |
| | | | Thermal Desorption | Solvent Savers | NY |
| <u>REGION 2</u> | | | Soil Vapor Extraction | Applied Environmental Services OU 1 | NY |
| Bioremediation (In situ) | FAA Technical Center | NJ | Soil Vapor Extraction | Circuitron Corporation, OU 1 | NY |
| Bioremediation (In situ) | Swope Oil & Chem Co., OU 2 | NJ | Soil Vapor Extraction | Genzale Plating Company, OU 1 | NY |
| Dechlorination | Myers Property | NJ | Soil Vapor Extraction | Mattiace Petrochemicals Company | NY |
| In situ Flushing | Lipari Landfill | NJ | Soil Vapor Extraction | Pasley Solvents and Chemicals | NY |
| In situ Flushing | Naval Air Engineering Center OU 7 | NJ | Soil Vapor Extraction | SMS Instruments (Deer Park) | NY |
| In situ Flushing | Vineland Chemical, OU 1 and OU 2 | NJ | Soil Vapor Extraction | Solvent Savers | NY |
| Soil Washing | Ewan Property | NJ | Soil Vapor Extraction | Vestal Water Supply 1-1 | NY |
| Soil Washing | King of Prussia | NJ | Air Sparging | Applied Environmental Services OU 1 | NY |
| Soil Washing | Myers Property | NJ | Soil Washing | GE Wiring Devices | PR |
| Soil Washing | Vineland Chemical, OU 1 and OU 2 | NJ | Soil Vapor Extraction | Upjohn Manufacturing Co. | PR |

**TABLE 1-2. REMEDIAL ACTIONS: INNOVATIVE TREATMENT TECHNOLOGIES
BY EPA REGION (continued)**

June 1993

| TECHNOLOGY | SITE NAME | STATE | TECHNOLOGY | SITE NAME | STATE |
|--------------------------|--------------------------------------|-------|-----------------------------|--|-------|
| REGION 3 | | | REGION 4 (continued) | | |
| Bioremediation (Ex situ) | Whitmoyer Laboratories, OU 3 | PA | Soil Washing | Cabot Carbon/Koppers | FL |
| Thermal Desorption | U.S.A. Letterkenny SE Area, OU | PA | Soil Washing | Whitehouse Waste Oil Pits | FL |
| Soil Vapor Extraction | Bendix | PA | Soil Vapor Extraction | Hollingsworth Solderless | FL |
| Soil Vapor Extraction | Cryochem, OU 3 | PA | Soil Vapor Extraction | Robins AFB, Landfill and Sludge Lagoon | GA |
| Soil Vapor Extraction | Henderson Road | PA | Dechlorination | Smith's Farm Brooks, OU 1 | KY |
| Soil Vapor Extraction | Lord-Shope Landfill | PA | Thermal Desorption | Smith's Farm Brooks, OU 1 | KY |
| Soil Vapor Extraction | Raymark | PA | Bioremediation (Ex situ) | Benfield Industries | NC |
| Soil Vapor Extraction | Tyson's Dump | PA | Bioremediation (Ex situ) | Cape Fear Wood Preserving | NC |
| Limestone Barrier | Brown's Battery Breaking Site | PA | Bioremediation (Ex situ) | Charles Macon Lagoon, Lagoon # 10 | NC |
| Crow Technology | Brodhead Creek, OU 1 | PA | Bioremediation (In situ) | Benfield Industries | NC |
| Fuming Gasification | Brown's Battery Breaking Site | PA | Chemical Treatment | JFD Electronics/Channel Master | NC |
| Limestone Barrier | Tonolli Corporation | PA | In situ Flushing | JADCO-Hughes | NC |
| Bioremediation (Ex situ) | L.A. Clarke & Sons, Lagoon Sludge OU | VA | Soil Washing | Benfield Industries | NC |
| Bioremediation (In situ) | L. A. Clarke & Sons, OU 1 | VA | Soil Washing | Cape Fear Wood Preserving | NC |
| Dechlorination | Saunders Supply Co, OU 1 | VA | Solvent Extraction | Carolina Transformer | NC |
| In situ Flushing | L. A. Clarke & Sons, OU 1 | VA | Thermal Desorption | Aberdeen Pesticide Dumps, OU 4 | NC |
| In situ Flushing | U.S. Titanium | VA | Thermal Desorption | Potter's Septic Tank Service Pits | NC |
| Thermal Desorption | Saunders Supply Co, OU 1 | VA | Soil Vapor Extraction | Charles Macon Lagoon, Lagoon # 7 | NC |
| Soil Vapor Extraction | Arrowhead Associates/Scovill | VA | Soil Vapor Extraction | JADCO-Hughes | NC |
| Soil Vapor Extraction | Defense General Supply Center | VA | Chemical Treatment | Palmetto Wood Preserving | SC |
| Bioremediation (Ex situ) | Ordnance Works Disposal Areas | WV | Thermal Desorption | Sangamo/Twelve-Mile/Hartwell PCB | SC |
| | | | Thermal Desorption | Wamchem | SC |
| | | | Soil Vapor Extraction | Medley Farm, OU 1 | SC |
| | | | Soil Vapor Extraction | SCRDI Bluff Road | SC |
| | | | Dechlorination | Arlington Blending & Packaging | TN |
| | | | Thermal Desorption | Arlington Blending & Packaging | TN |
| | | | Soil Vapor Extraction | Carrier Air Conditioning | TN |
| REGION 4 | | | REGION 5 | | |
| In situ Flushing | Ciba-Geigy (MacIntosh Plant) OU 2 | AL | Bioremediation (Ex situ) | Galesburg/Koppers | IL |
| In situ Flushing | Ciba-Geigy (MacIntosh Plant) OU 4 | AL | Thermal Desorption | Acme Solvent Reclaiming, Inc. | IL |
| Thermal Desorption | Ciba-Geigy (MacIntosh Plant) OU 2 | AL | Thermal Desorption | Outboard Marine/Waukegan Harbor | IL |
| Thermal Desorption | Ciba-Geigy (MacIntosh Plant) OU 4 | AL | Soil Vapor Extraction | Acme Solvent Reclaiming, Inc. | IL |
| Bioremediation (Ex situ) | Brown Wood Preserving | FL | | | |
| Bioremediation (Ex situ) | Cabot Carbon/Koppers | FL | | | |
| Bioremediation (Ex situ) | Dubose Oil Products | FL | | | |
| Bioremediation (Ex situ) | Whitehouse Waste Oil Pits | FL | | | |
| Bioremediation (In situ) | Cabot Carbon/Koppers | FL | | | |
| Bioremediation (In situ) | Cabot Carbon/Koppers (Groundwater) | FL | | | |

TABLE 1-2. REMEDIAL ACTIONS: INNOVATIVE TREATMENT TECHNOLOGIES
BY EPA REGION (continued)

June 1993

| TECHNOLOGY | SITE NAME | STATE | TECHNOLOGY | SITE NAME | STATE |
|-----------------------------|------------------------------------|-------|-----------------------------|---------------------------------------|-------|
| <u>REGION 5 (continued)</u> | | | <u>REGION 5 (continued)</u> | | |
| Bioremediation (In situ) | Seymour Recycling | IN | Soil Vapor Extraction | Zanesville Well Field | OH |
| Bioremediation (In situ) | Seymour Recycling (Ground water) | IN | Bioremediation (Ex situ) | Moss-American | WI |
| In situ Flushing | Ninth Avenue Dump | IN | Bioremediation (In situ) | Hagen Farm Site, Ground Water OU | WI |
| Thermal Desorption | American Chemical Services | IN | Bioremediation (In situ) | Onalaska Municipal Landfill | WI |
| Soil Vapor Extraction | American Chemical Services | IN | Soil Washing | Moss-American | WI |
| Soil Vapor Extraction | Enviro. Conservation and Chemical | IN | Soil Vapor Extraction | City Disposal Corporation Landfill | WI |
| Soil Vapor Extraction | Fisher Calo Chem | IN | Soil Vapor Extraction | Hagen Farm | WI |
| Soil Vapor Extraction | MIDCO I | IN | Soil Vapor Extraction | Muskego Sanitary Landfill | WI |
| Soil Vapor Extraction | Main Street Well Field | IN | Soil Vapor Extraction | Wausau Groundwater Contamination | WI |
| Soil Vapor Extraction | MIDCO II | IN | | | |
| Soil Vapor Extraction | Seymour Recycling | IN | | | |
| Soil Vapor Extraction | Wayne Waste Reclamation | IN | | | |
| Bioremediation (Ex situ) | Cliffs/Dow Dump | MI | <u>REGION 6</u> | | |
| In situ Flushing | Rasmussen Dump | MI | Soil Washing | Arkwood | AR |
| In situ Vittrification | Ionia City Landfill | MI | Bioremediation (Ex situ) | Old Inger Oil Refinery | LA |
| Thermal Desorption | Anderson Development | MI | Bioremediation (Ex situ) | Prewitt Abandoned Refinery | NM |
| Thermal Desorption | Carter Industries | MI | Bioremediation (In situ) | Atchison/Santa Fe/Clovis | NM |
| Soil Vapor Extraction | Chem Central | MI | Soil Vapor Extraction | Prewitt Abandoned Refinery | NM |
| Soil Vapor Extraction | Clare Water Supply | MI | Soil Vapor Extraction | South Valley | NM |
| Soil Vapor Extraction | Electro-Voice, OU 1 | MI | Air Sparging | Prewitt Abandoned Refinery | NM |
| Soil Vapor Extraction | Kysor Industrial | MI | Bioremediation (Ex situ) | Oklahoma Refining Co. | OK |
| Soil Vapor Extraction | Peerless Plating | MI | Bioremediation (In situ) | Oklahoma Refining Co. | OK |
| Soil Vapor Extraction | Springfield Township Dump | MI | Soil Vapor Extraction | Tinker AFB (Soldier Creek Bldg. 3001) | OK |
| Soil Vapor Extraction | Sturgis Municipal Well Field | MI | Bioremediation (Ex situ) | North Cavalcade Street | TX |
| Soil Vapor Extraction | ThermoChem, Inc. OU 1 | MI | Bioremediation (Ex situ) | Sheridan Disposal Services | TX |
| Soil Vapor Extraction | Verona Well Field (Thomas Solvent) | MI | Bioremediation (In situ) | French Limited | TX |
| Soil Vapor Extraction | Verona Well Field, OU 2 | MI | In situ Flushing | Koppers/Texarkana | TX |
| Bioremediation (Ex situ) | Burlington Northern Railroad Tie | MN | In situ Flushing | South Cavalcade Street | TX |
| Bioremediation (Ex situ) | Joslyn Manufacturing and Supply | MN | Soil Washing | Koppers/Texarkana | TX |
| Bioremediation (Ex situ) | South Andover Salvage Yard OU 2 | MN | Soil Washing | South Cavalcade Street | TX |
| Soil Vapor Extraction | Long Prairie GW Contamination | MN | Solvent Extraction | United Creosoting | TX |
| Bioremediation (In situ) | Allied Chem & Iron-ton Coke, OU 2 | OH | Soil Vapor Extraction | Petro-Chemical Systems, Inc. OU 2 | TX |
| Soil Washing | United Scrap Lead/SIA | OH | Air Sparging | Petro-Chemical Systems, Inc. OU 2 | TX |
| Soil Washing | Zanesville Well Field | OH | | | |
| Soil Vapor Extraction | Miami County Incinerator | OH | | | |
| Soil Vapor Extraction | Pristine (ROD Amendment) | OH | | | |

**TABLE 1-2. REMEDIAL ACTIONS: INNOVATIVE TREATMENT TECHNOLOGIES
BY EPA REGION (continued)**

June 1993

| <u>TECHNOLOGY</u> | <u>SITE NAME</u> | <u>STATE</u> | <u>TECHNOLOGY</u> | <u>SITE NAME</u> | <u>STATE</u> |
|--------------------------|---------------------------------------|--------------|--------------------------|---|--------------|
| <u>REGION 7</u> | | | <u>REGION 9</u> | | |
| Bioremediation (Ex situ) | Vogel Paint & Wax | IA | Soil Vapor Extraction | Hassayampa Landfill | AZ |
| Bioremediation (In situ) | People's Natural Gas | IA | Soil Vapor Extraction | Indian Bend Wash, South Area | AZ |
| Bioremediation (In situ) | Pester Burn Pond | KS | Soil Vapor Extraction | Mesa Area Ground Water Contamination | AZ |
| In situ Flushing | Pester Burn Pond | KS | Soil Vapor Extraction | Motorola 52nd Street | AZ |
| Soil Vapor Extraction | Coleman Operable Unit 29th and | KS | Soil Vapor Extraction | Phoenix-Goodyear Airport Area | AZ |
| In situ Flushing | Lee Chemical | MO | Bioremediation (Ex situ) | J.H. Baxter | CA |
| Soil Vapor Extraction | Hastings GW Contamination (Col. Ave.) | NE | Bioremediation (Ex situ) | Jasco Chemical Co. | CA |
| Soil Vapor Extraction | Hastings GW Contamination (Far Marco) | NE | Bioremediation (In situ) | Castle Air Force Base, OU 1 | CA |
| Soil Vapor Extraction | Hastings GW Contamination, Well #3 | NE | Bioremediation (In situ) | Koppers Company, Inc. (Oroville) | CA |
| Soil Vapor Extraction | Lindsay Manufacturing | NE | Soil Washing | FMC (Fresno) | CA |
| Soil Vapor Extraction | Waverly Groundwater Contamination | NE | Soil Washing | Koppers Company, Inc. (Oroville) | CA |
| | | | Soil Washing | Sacramento Army Depot, Oxidation Lagoon | CA |
| <u>REGION 8</u> | | | Soil Vapor Extraction | Fairchild Semiconductor (San Jose) | CA |
| Bioremediation (Ex situ) | Broderick Wood Products OU 2 | CO | Soil Vapor Extraction | Fairchild Semiconductor/MTV-I | CA |
| Bioremediation (In situ) | Broderick Wood Products OU 2 | CO | Soil Vapor Extraction | Fairchild Semiconductor/MTV-II | CA |
| In situ Vitrification | Rocky Mountain Arsenal, M-1 Basins | CO | Soil Vapor Extraction | IBM (San Jose) | CA |
| Thermal Desorption | Martin Marietta (Denver Aerospace) | CO | Soil Vapor Extraction | Intel, Mountain View | CA |
| Thermal Desorption | Sand Creek Industrial, OU 5 | CO | Soil Vapor Extraction | Intersil/Siemens | CA |
| Soil Vapor Extraction | Chemical Sales Company, OU 1 | CO | Soil Vapor Extraction | Lawrence Livermore National Lab | CA |
| Soil Vapor Extraction | Martin Marietta (Denver Aerospace) | CO | Soil Vapor Extraction | Monolithic Memories/AMD - Arques | CA |
| Soil Vapor Extraction | Rocky Flats OU 2, Interim Action | CO | Soil Vapor Extraction | National Semiconductor (MM) | CA |
| Soil Vapor Extraction | Rocky Mountain Arsenal OU 18 | CO | Soil Vapor Extraction | Pacific Coast Pipeline | CA |
| Soil Vapor Extraction | Sand Creek Industrial OU 1 | CO | Soil Vapor Extraction | Purity Oil Sales OU 2 | CA |
| Bioremediation (Ex situ) | Burlington Northern (Somers Plant) | MT | Soil Vapor Extraction | Raytheon, Mountain View | CA |
| Bioremediation (Ex situ) | Idaho Pole Company | MT | Soil Vapor Extraction | Sacramento Army Depot, Tank 2 | CA |
| Bioremediation (Ex situ) | Libby Ground Water Contamination | MT | Soil Vapor Extraction | Signetics (AMD 901), TRW OU | CA |
| Bioremediation (In situ) | Burlington Northern (Somers Plant) | MT | Soil Vapor Extraction | Signetics (Advanced Micro Devices) | CA |
| Bioremediation (In situ) | Idaho Pole Company | MT | Soil Vapor Extraction | Solvent Service | CA |
| Bioremediation (In situ) | Libby Ground Water Contamination | MT | Soil Vapor Extraction | Spectra Physics, OU 1 | CA |
| In situ Flushing | Idaho Pole Company | MT | Soil Vapor Extraction | Teledyne Semiconductors | CA |
| Bioremediation (Ex situ) | Wasatch Chemical | UT | Soil Vapor Extraction | Van Waters and Rogers | CA |
| Chemical Treatment | Portland Cement Co. (Kiln Dust) | UT | Soil Vapor Extraction | Watkins-Johnson | CA |
| In situ Vitrification | Wasatch Chemical | UT | | | |

TABLE 1-2. REMEDIAL ACTIONS: INNOVATIVE TREATMENT TECHNOLOGIES
BY EPA REGION (continued)

June 1993

| <u>TECHNOLOGY</u> | <u>SITE NAME</u> | <u>STATE</u> | <u>TECHNOLOGY</u> | <u>SITE NAME</u> | <u>STATE</u> |
|--------------------------|-------------------------------------|--------------|-------------------|------------------|--------------|
| <u>REGION 10</u> | | | | | |
| Bioremediation (Ex situ) | McChord AFB Washrack Treatment Area | AK | | | |
| Bioremediation (In situ) | Eielson Air Force Base | AK | | | |
| Soil Vapor Extraction | Eielson Air Force Base | AK | | | |
| In situ Flushing | Union Pacific Railroad Sludge | ID | | | |
| Bioremediation (Ex situ) | Umatilla Army Depot Activity | OR | | | |
| In situ Flushing | United Chrome Products | OR | | | |
| Soil Washing | Gould Battery | OR | | | |
| Soil Washing | Naval Submarine Base, Bangor Site A | WA | | | |
| Soil Vapor Extraction | Commencement Bay/S. Tacoma Channel | WA | | | |

TABLE 1-3

REMEDIAL ACTIONS: PROJECT STATUS BY INNOVATIVE TREATMENT TECHNOLOGY

Table 1-3 lists the applications of innovative treatment technologies at NPL sites by technology and summarizes the status of the specific application. The symbols used in this table are:

- PD - **In predesign:** A site may be considered to be in predesign if EPA is negotiating the consent decree for the design with the responsible party, the lead agency is preparing the predesign report, the lead agency is contracting for the design firm, or the lead agency is conducting a treatability study or field investigation before beginning actual design work.
- D - **In design:** A site is considered to be in design after the design contractor has begun work.
- D/I - **Design completed but not installed:** This symbol is used if the **design** work had been completed but **installation** work has not yet begun at the time of publication of this report.
- I - **Being installed:** An innovative treatment technology is "being installed" from the time the construction contract has been awarded until the time the treatment system has begun operation. For some technologies, this is a relatively short phase of the project, because such projects are assembled quickly on site. For other technologies, the period of installation lasts several construction seasons.
- O - **Operational.** A treatment technology is operational once it has been constructed and is functional. The length of time required to complete the operation phase depends on such factors as the nature of the technology, the quantity of material to be treated, and the concentrations of the contaminants at the start of treatment.
- C - **Completed:** A treatment technology project is considered to be completed when the operation of the treatment technology ceases. Other site activities still may be planned or underway.

TABLE 1-3. REMEDIAL ACTIONS: PROJECT STATUS
BY INNOVATIVE TREATMENT TECHNOLOGY

June 1993

| <u>REGION</u> | <u>BIOREMEDIATION (EX SITU)</u> | <u>STATUS</u> | <u>REGION</u> | <u>BIOREMEDIATION (IN SITU)</u> | <u>STATUS</u> |
|---------------|--|---------------|---------------|---|---------------|
| 2 | General Motors/Central Foundry Division, OU 1, NY | PD | 2 | Swope Oil & Chem Co., OU 2, NJ | PD |
| 2 | General Motors/Central Foundry Division, OU 2, NY | PD | 3 | L. A. Clarke & Sons, OU 1 (Soils), VA | PD |
| 3 | Ordnance Works Disposal Areas, WV | PD | 4 | Benfield Industries, NC | PD |
| 4 | Benfield Industries, NC | PD | 6 | Oklahoma Refining Co., OK | PD |
| 5 | Galesburg/Koppers, IL | PD | 7 | Pester Burn Pond, KS | PD |
| 5 | Moss-American, WI | PD | 7 | People's Natural Gas, IA | PD |
| 5 | South Andover Salvage Yard OU 2, MN | PD | 8 | Idaho Pole Company, MT | PD |
| 6 | Prewitt Abandoned Refinery, NM | PD | 2 | Applied Environmental Services, OU 1, NY | D |
| 6 | Oklahoma Refining Co., OK | PD | 2 | Applied Environmental Services (Ground water), NY | D |
| 6 | Sheridan Disposal Services, TX | PD | 4 | Cabot Carbon/Koppers (Ground water), FL | D |
| 8 | Idaho Pole Company, MT | PD | 4 | Cabot Carbon/Koppers, FL | D |
| 9 | Jasco Chemical Co., CA | PD | 5 | Hagen Farm Site, Ground Water Control OU, WI | D |
| 3 | L.A. Clarke & Sons, Lagoon Sludge OU, VA | D | 5 | Allied Chem & Ironton Coke, OU 2, OH | D |
| 3 | Whitmoyer Laboratories, OU 3, PA | D | 9 | Castle Air Force Base, OU 1, CA | D |
| 4 | Cabot Carbon/Koppers, FL | D | 9 | Koppers Company, Inc. (Oroville Plant), CA | D |
| 4 | Charles Macon Lagoon, Lagoon #10, NC | D | 10 | Eielson Air Force Base, AK | D |
| 4 | Whitehouse Waste Oil Pits (amended ROD), FL | D | 2 | FAA Technical Center, NJ | D/I |
| 5 | Cliffs/Dow Dump, MD | D | 5 | Onalaska Municipal Landfill, WI | D/I |
| 6 | North Cavalcade Street, TX | D | 1 | Hocomonco Pond, ESD, MA | I |
| 9 | J.H. Baxter, CA | D | 8 | Broderick Wood Products OU 2, CO | I |
| 10 | Umatilla Army Depot Activity, Soil Operable Unit, OR | D | 8 | Burlington Northern (Somers Plant), MT | I |
| 10 | McChord AFB Washrack Treatment Area, AK | D | 5 | Seymour Recycling (Ground water), IN | O |
| 4 | Cape Fear Wood Preserving, NC | D/I | 6 | Atchison/Santa Fe/Clovis, NM | O |
| 4 | Dubose Oil Products, FL | I | 6 | French Limited, TX | O |
| 8 | Broderick Wood Products OU 2, CO | I | 8 | Libby Ground Water Contamination, MT | O |
| 1 | Iron Horse Park, MA | O | 5 | Seymour Recycling, IN | C |
| 5 | Burlington Northern Railroad Tie Treating Plant, MN | O | | | |
| 5 | Joslyn Manufacturing and Supply Co., MN | O | | | |
| 6 | Old Inger Oil Refinery, LA | O | | | |
| 7 | Vogel Paint & Wax, IA | O | | | |
| 8 | Burlington Northern (Somers Plant), MT | O | | | |
| 8 | Wasatch Chemical, UT | O | | | |
| 8 | Libby Ground Water Contamination, MT | O | | | |
| 4 | Brown Wood Preserving, FL | C | | | |
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**TABLE 1-3. REMEDIAL ACTIONS: PROJECT STATUS
BY INNOVATIVE TREATMENT TECHNOLOGY (continued)**

June 1993

| <u>REGION</u> | <u>DECHLORINATION</u> | <u>STATUS</u> | <u>REGION</u> | <u>SOIL VAPOR EXTRACTION</u> | <u>STATUS</u> |
|---------------|---|---------------|---------------|--|---------------|
| 3 | Saunders Supply Co, OU 1, VA | PD | 1 | Tibbetts Road, NH | PD |
| 2 | Myers Property, NJ | D | 1 | Stamina Mills, RI | PD |
| 4 | Arlington Blending & Packaging Co., OU 1, TN | D | 2 | Solvent Savers, NY | PD |
| 4 | Smith's Farm Brooks, OU 1, KY | D/I | 2 | Vestal Water Supply 1-1, NY | PD |
| 2 | Wide Beach Development, NY | C | 2 | Mattiace Petrochemicals Company, OU 1, NY | PD |
| | | | 2 | Swope Oil & Chem Co., OU 2, NJ | PD |
| | | | 3 | Cryochem, OU 3, PA | PD |
| | | | 3 | Bendix, PA | PD |
| | | | 3 | Arrowhead Associates/Scovill, OU 1, VA | PD |
| | | | 4 | Robins AFB, Landfill and Sludge Lagoon, OU 1, GA | PD |
| | | | 4 | Medley Farm, OU 1, SC | PD |
| | | | 4 | SCRDI Bluff Road, SC | PD |
| | | | 5 | MIDCO II, IN | PD |
| | | | 5 | Zanesville Well Field, OH | PD |
| | | | 5 | ThermoChem, Inc. OU 1, MI | PD |
| | | | 5 | City Disposal Corporation Landfill, WI | PD |
| | | | 5 | MIDCO I, IN | PD |
| | | | 5 | Clare Water Supply, MI | PD |
| | | | 5 | Peerless Plating, MI | PD |
| | | | 5 | Electro-Voice, OU 1, MI | PD |
| | | | 5 | Springfield Township Dump, MI | PD |
| | | | 5 | Sturgis Municipal Well Field, MI | PD |
| | | | 5 | American Chemical Services, IN | PD |
| | | | 6 | Prewitt Abandoned Refinery, NM | PD |
| | | | 6 | Petro-Chemical Systems, Inc., OU 2, TX | PD |
| | | | 7 | Coleman Operable Unit 29th and Mead, KS | PD |
| | | | 8 | Rocky Flats OU 2, Interim Remedial Action Plan, CO | PD |
| | | | 9 | Motorola 52nd Street, AZ | PD |
| | | | 9 | Indian Bend Wash, South Area, OU 1, AZ | PD |
| | | | 9 | Purity Oil Sales OU 2, CA | PD |
| | | | 9 | Lawrence Livermore National Laboratory, CA | PD |
| | | | 1 | Silresim, MA | D |
| | | | 1 | Kellogg-Deering Well Field, CT | D |
| | | | 1 | Tinkham Garage, NH | D |
| | | | 2 | Applied Environmental Services, OU 1, NY | D |
| | | | 2 | Garden State Cleaners, NJ | D |
| | | | 2 | Circuitron Corporation, OU 1, NY | D |
| | | | 2 | Pasley Solvents and Chemicals, Inc., NY | D |
| <u>REGION</u> | <u>IN SITU FLUSHING</u> | <u>STATUS</u> | | | |
| 1 | Tibbetts Road, NH | PD | | | |
| 2 | Byron Barrel & Drum, NY | PD | | | |
| 4 | Ciba-Geigy Corp. (MacIntosh Plant) OU 2, AL | PD | | | |
| 4 | Ciba-Geigy (MacIntosh Plant) OU 4, AL | PD | | | |
| 6 | Koppers/Texarkana, TX | PD | | | |
| 7 | Pester Burn Pond, KS | PD | | | |
| 8 | Idaho Pole Company, MT | PD | | | |
| 10 | Union Pacific Railroad Sludge Pit, ID | PD | | | |
| 2 | Vineland Chemical, OU 1 and OU 2, NJ | D | | | |
| 2 | Pasley Solvents and Chemicals, Inc., NY | D | | | |
| 2 | Naval Air Engineering Center OU 7, interim action, NJ | D | | | |
| 3 | L. A. Clarke & Sons, OU 1 (Soils), VA | D | | | |
| 3 | U.S. Titanium, VA | D | | | |
| 5 | Rasmussen Dump, MI | D | | | |
| 5 | Ninth Avenue Dump, IN | D | | | |
| 6 | South Cavalcade Street, TX | D | | | |
| 4 | JADCO-Hughes, NC | I | | | |
| 7 | Lee Chemical, MO | I | | | |
| 2 | Lipari Landfill, NJ | O | | | |
| 10 | United Chrome Products, OR | O | | | |
| <u>REGION</u> | <u>IN SITU VITRIFICATION</u> | <u>STATUS</u> | | | |
| 5 | Ionia City Landfill, MI | D | | | |
| 8 | Rocky Mountain Arsenal, M-1 Basins (OU 16), CO | D | | | |
| 8 | Wasatch Chemical, UT | D | | | |

TABLE 1-3. REMEDIAL ACTIONS: PROJECT STATUS
BY INNOVATIVE TREATMENT TECHNOLOGY (continued)

June 1993

| <u>REGION</u> | <u>SOIL VAPOR EXTRACTION (continued)</u> | <u>STATUS</u> | <u>REGION</u> | <u>SOIL VAPOR EXTRACTION (continued)</u> | <u>STATUS</u> |
|---------------|--|---------------|---------------|---|---------------|
| 2 | A O Polymer, Soil treatment phase, NJ | D | 1 | Mottolo Pig Farm, NH | I |
| 2 | Genzale Plating Company, OU 1, NY | D | 1 | South Municipal Water Supply Well, NH | I |
| 2 | South Jersey Clothing, NJ | D | 3 | Raymark, PA | I |
| 3 | Defense General Supply Center, OU 5, VA | D | 9 | Signetics (AMD 901), TRW OU, CA | I |
| 3 | Lord-Shope Landfill, PA | D | 1 | Groveland Wells, MA | O |
| 4 | Charles Macon Lagoon, Lagoon #7, OU 1, NC | D | 1 | Wells G&H OU 1, MA | O |
| 4 | JADCO-Hughes, NC | D | 2 | SMS Instruments (Deer Park), NY | O |
| 5 | Hagen Farm, WI | D | 3 | Tyson's Dump, PA | O |
| 5 | Fisher Calo Chem, IN | D | 3 | Henderson Road, PA | O |
| 5 | Kysor Industrial, MI | D | 5 | Verona Well Field, OU 2, MI | O |
| 5 | Wayne Waste Reclamation, IN | D | 5 | Seymour Recycling, IN | O |
| 5 | Acme Solvent Reclaiming, Inc. OU 2, IL | D | 7 | Hastings GW Contamination, Well No. 3, NE | O |
| 5 | Main Street Well Field, IN | D | 7 | Waverly Groundwater Contamination, NE | O |
| 5 | Enviro. Conservation and Chemical (ROD Amendment) | D | 8 | Sand Creek Industrial OU 1, CO | O |
| 5 | Chem Central, MI | D | 9 | IBM (San Jose), CA | O |
| 5 | Miami County Incinerator, OH | D | 9 | Intersil/Siemens, CA | O |
| 5 | Pristine (ROD Amendment), OH | D | 9 | Mesa Area Ground Water Contamination, AZ | O |
| 5 | Muskego Sanitary Landfill, Interim Action OU 1, WI | D | 9 | Phoenix-Goodyear Airport Area (North & South Fac), MI | O |
| 6 | Tinker AFB (Soldier Creek Bldg. 3001), OK | D | 9 | Spectra Physics, OU 1, CA | O |
| 7 | Hastings GW Contamination (Colorado Ave), NE | D | 9 | National Semiconductor (Monolithic Memories), CA | O |
| 7 | Hastings GW Contamination (Far-Mar Co.), NE | D | 9 | Solvent Service, CA | O |
| 7 | Lindsay Manufacturing, NE | D | 9 | Teledyne Semiconductors, CA | O |
| 8 | Martin Marietta (Denver Aerospace), CO | D | 9 | Signetics (Advanced Micro Devices 901), CA | O |
| 8 | Chemical Sales Company, OU 1, CO | D | 9 | Monolithic Memories/AMD - Arques, Subunit 2, CA | O |
| 9 | Hassayampa Landfill, AZ | D | 9 | Van Waters and Rogers, CA | O |
| 9 | Watkins-Johnson, CA | D | 10 | Commencement Bay/S. Tacoma Channel/Well 12A, WA | O |
| 9 | Pacific Coast Pipeline, CA | D | 2 | Upjohn Manufacturing Co., PR | C |
| 9 | Intel, Mountain View, CA | D | 4 | Hollingsworth Solderless, FL | C |
| 9 | Fairchild Semiconductor/MTV-I, CA | D | 5 | Verona Well Field (Thomas Solvent/Raymond Road), | C |
| 9 | Raytheon, Mountain View, CA | D | 8 | Rocky Mountain Arsenal OU 18, interim response, CO | C |
| 9 | Fairchild Semiconductor/MTV-II, CA | D | 9 | Fairchild Semiconductor (San Jose), CA | C |
| 10 | Eielson Air Force Base, AK | D | 9 | Sacramento Army Depot, Tank 2 OU, CA | C |
| 2 | FAA Technical Center, NJ | D/I | | MI | |
| 4 | Carrier Air Conditioning, TN** | D/I | | | |
| 5 | Long Prairie Groundwater Contamination, MN | D/I | | | |
| 5 | Wausau Groundwater Contamination, WI | D/I | | | |
| 6 | South Valley, NM | D/I | | | |

**TABLE 1-3. REMEDIAL ACTIONS: PROJECT STATUS
BY INNOVATIVE TREATMENT TECHNOLOGY (continued)**

June 1993

| <u>REGION</u> | <u>SOIL WASHING</u> | <u>STATUS</u> |
|---------------|---|---------------|
| 2 | Ewan Property, NJ | PD |
| 4 | Benfield Industries, NC | PD |
| 5 | Moss-American, WI | PD |
| 5 | Zanesville Well Field, OH | PD |
| 6 | Koppers/Texarkana, TX | PD |
| 9 | FMC (Fresno), CA | PD |
| 10 | Naval Submarine Base, Bangor Site A, OU 1, WA | PD |
| 2 | Myers Property, NJ | D |
| 2 | Vineland Chemical, OU 1 and OU 2, NJ | D |
| 2 | GE Wiring Devices, PR | D |
| 4 | Cabot Carbon/Koppers, FL | D |
| 4 | Whitehouse Waste Oil Pits (amended ROD), FL | D |
| 5 | United Scrap Lead/SIA, OH | D |
| 6 | Arkwood, AR | D |
| 6 | South Cavalcade Street, TX | D |
| 9 | Koppers Company, Inc. (Oroville Plant), CA | D |
| 9 | Sacramento Army Depot, Oxidation Lagoons OU, CA | D |
| 2 | King of Prussia, NJ | D/I |
| 4 | Cape Fear Wood Preserving, NC | D/I |
| 10 | Gould Battery, OR | 0 |

| <u>REGION</u> | <u>SOLVENT EXTRACTION</u> | <u>STATUS</u> |
|---------------|---------------------------|---------------|
| 2 | Ewan Property, NJ | PD |
| 1 | Norwood PCBs, MA | D |
| 1 | O'Connor, ME | D |
| 4 | Carolina Transformer, NC | D |
| 6 | United Creosoting, TX | D |

| <u>REGION</u> | <u>THERMAL DESORPTION</u> | <u>STATUS</u> |
|---------------|---------------------------|---------------|
| 2 | Reich Farms, NJ | PD |
| 2 | Solvent Savers, NY | PD |

| <u>REGION</u> | <u>THERMAL DESORPTION (continued)</u> | <u>STATUS</u> |
|---------------|---|---------------|
| 2 | Industrial Latex, OU 1, NJ | PD |
| 3 | Saunders Supply Co, OU 1, VA | PD |
| 4 | Ciba-Geigy (MacIntosh Plant) OU 4, AL | PD |
| 4 | Sangamo/Twelve-Mile/Hartwell PCB, OU 1, SC | PD |
| 4 | Aberdeen Pesticide Dumps, OU 4, NC | PD |
| 5 | American Chemical Services, IN | PD |
| 8 | Sand Creek Industrial, OU 5, CO | PD |
| 2 | Sarney Farm, NY | D |
| 2 | Fulton Terminals, Soil Treatment, NY | D |
| 2 | American Thermostat, NY | D |
| 2 | Claremont Polychemical - Soil Remedy, NY | D |
| 4 | Potter's Septic Tank Service Pits, NC | D |
| 4 | Ciba-Geigy Corp. (MacIntosh Plant) OU 2, AL | D |
| 4 | Arlington Blending & Packaging Co., OU 1, TN | D |
| 4 | Wamchem, SC | D |
| 5 | Acme Solvent Reclaiming, Inc. OU 2, IL | D |
| 5 | Carter Industries, MI | D |
| 8 | Martin Marietta (Denver Aerospace), CO | D |
| 1 | Union Chemical Co., OU 1, ME | D/I |
| 2 | Lipari Landfill Marsh Sediment, NJ | D/I |
| 3 | U.S.A. Letterkenny SE Area, OU1, PA | D/I |
| 4 | Smith's Farm Brooks, OU 1, KY | D/I |
| 1 | Re-Solve, MA | I |
| 2 | Metaltec/Aerosystems, OU 1 - Soil Treatment, NJ | I |
| 2 | Waldick Aerospace Devices, NJ | O |
| 5 | Anderson Development (ROD Amendment), MI | O |
| 1 | Cannon Engineering/Bridgewater, MA | C |
| 1 | Ottati & Goss, NH | C |
| 1 | McKin, ME | C |
| 5 | Outboard Marine/Waukegan Harbor, OU 3, IL | C |

| <u>REGION</u> | <u>OTHER</u> | <u>STATUS</u> |
|---------------|---|---------------|
| 3 | Brown's Battery Breaking Site, OU 2, PA | PD |
| 3 | Brown's Battery Breaking Site, OU 2, PA | PD |
| 3 | Tonolli Corporation, PA | PD |

TABLE 1-3. REMEDIAL ACTIONS: PROJECT STATUS
BY INNOVATIVE TREATMENT TECHNOLOGY (continued)

June 1993

| <u>REGION</u> | <u>OTHER (continued)</u> | <u>STATUS</u> |
|---------------|--|---------------|
| 3 | Brodhead Creek, OU 1, PA | PD |
| 6 | Petro-Chemical Systems, Inc., OU 2, TX | PD |
| 6 | Prewitt Abandoned Refinery, NM | PD |
| 2 | Applied Environmental Services, OU 1, NY | D |
| 1 | South Municipal Water Supply Well, NH | I |

TABLE 1-4

REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

Table 1-4 shows NPL sites at which established treatment technologies have been selected as part of the remedy. Established treatment technologies include: incineration, solidification/stabilization, and others. The sites are ordered by fiscal year to give some initial information on the status of implementation: in general, earlier RODs have progressed furthest in design and construction.

TABLE 1-4
REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

June 1993

| <u>On-Site Incineration</u> | | | | <u>On-Site Incineration (continued)</u> | | | |
|-----------------------------|--------|------------------------------------|-------|---|--------|--------------------------------------|-------|
| FY | REGION | SITE NAME | STATE | FY | REGION | SITE NAME | STATE |
| 85 | 2 | Bog Creek Farm | NJ | 88 | 5 | Summit National Liquid Disposal | OH |
| 85 | 2 | Bridgeport Rental & Oil | NJ | 88 | 6 | Old Midland Products | AR |
| 85 | 5 | ACME Solvent | IL | 88 | 6 | Brio Refining | TX |
| 85 | 6 | MOTCO | TX | 88 | 7 | Times Beach | MO |
| | | | | 88 | 8 | Broderick Wood Products | CO |
| 86 | 1 | Baird & McGuire | MA | | | | |
| 86 | 4 | Mowbray Engineering | AL | 89 | 1 | Baird and McGuire | MA |
| 86 | 5 | LaSalle Electrical Utilities | IL | 89 | 1 | Wells G&H | MA |
| 86 | 5 | Arrowhead Refinery | MN | 89 | 2 | Bog Creek Farm | NJ |
| 86 | 5 | Fields Brook | OH | 89 | 2 | De Rewal Chemical* | NJ |
| 86 | 6 | Sikes Disposal Pit | TX | 89 | 3 | Douglasville Disposal | PA |
| | | | | 89 | 4 | Smith's Farm Brooks* | KY |
| 87 | 1 | Ottati & Goss | NH | 89 | 4 | Aberdeen Pesticide Dumps/ Fairway | NC |
| 87 | 1 | Davis Liquid Waste | RI | 89 | 4 | Celanese* | NC |
| 87 | 4 | Tower Chemical | FL | 89 | 4 | American Creosote Works | TN |
| 87 | 4 | Geiger/C&M Oil | SC | 89 | 5 | Ninth Avenue Dump | IN |
| 87 | 5 | Rose Township Dump | MI | 89 | 5 | New Brighton/Arden Hills | MN |
| 87 | 5 | Laskin/Poplar Oil | OH | 89 | 5 | Big D Campground | OH |
| 87 | 6 | Bayou Bonfouca | LA | 89 | 5 | Laskin/Poplar Oil | OH |
| 87 | 6 | Cleve Reber | LA | | | | |
| | | | | 90 | 1 | New Bedford* | MA |
| 88 | 1 | Rose Disposal Pit | MA | 90 | 2 | Sarney Farm | NY |
| 88 | 2 | Lipari Landfill | NJ | 90 | 3 | M.W. Manufacturing* | PA |
| 88 | 2 | Love Canal | NY | 90 | 5 | Sangamo/Crab Orchard* | IL |
| 88 | 3 | Delaware Sand & Gravel | DE | | | | |
| 88 | 3 | Southern Maryland Wood Treating | MD | 90 | 5 | National Wildlife Refuge | IN |
| 88 | 3 | Drake Chemical/Phase III | PA | 90 | 5 | Fisher Calo | MI |
| 88 | 3 | Ordnance Works Disposal | WV | 90 | 5 | Bofors Nobel | MI |
| 88 | 4 | Zellwood Groundwater | FL | 90 | 5 | Springfield Township Dump* | MI |
| 88 | 5 | LaSalle Electrical Utilities | IL | 90 | 5 | Pristine (Amendment) | OH |
| 88 | 5 | Fort Wayne Reduction | IN | 90 | 5 | University of Minnesota | MN |
| 88 | 5 | Forest Waste Products | MI | 90 | 6 | Vertac | AR |
| 88 | 5 | Pristine | OH | 90 | 6 | Texarkana Wood Preserving | TX |
| | | | | 90 | 7 | Missouri Electric Works | MO |

* Residuals to be treated with solidification/stabilization.

REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

On-Site Incineration (continued)

| FY | REGION | SITE NAME | STATE |
|----|--------|---|-------|
| 90 | 7 | Hastings Groundwater Contamination (East Industrial Park) | NE |
| 90 | 10 | FMC Yakima Pit | WA |

| | | | |
|----|---|----------------------------|----|
| 91 | 3 | Whitmoyer Labs, Inc. OU3 | PA |
| 91 | 3 | Eastern Diversified Metals | PA |
| 91 | 4 | Ciba Geigy Corp. | AL |
| 91 | 5 | Allied Chem & Ironton Coke | OH |

| | | | |
|----|---|---|----|
| 92 | 4 | Alabama Army Ammunition Plant (Operable Unit 1) | AL |
| 92 | 5 | Savanna Army Depot | IL |
| 92 | 6 | Gulf Coast Vacuum Services (Operable Unit 1) | LA |

Off Site Incineration

| FY | REGION | SITE NAME | STATE |
|----|--------|------------------------------------|-------|
| 84 | 5 | Berlin & Farro Liquid Incineration | MI |
| 84 | 5 | Laskin/Poplar Oil | OH |
| 84 | 10 | Western Processing Phase I | WA |

| | | | |
|----|---|----------------------------|----|
| 85 | 2 | Swope Oil & Chemical | NJ |
| 85 | 5 | Byron/Johnson Salvage Yard | IL |
| 85 | 6 | Triangle Chemical | TX |
| 85 | 8 | Woodbury Chemical | CO |
| 86 | 3 | Drake Chemical/Phase II | PA |

Off-Site Incineration (continued)

| FY | REGION | SITE NAME | STATE |
|----|--------|-----------------------|-------|
| 86 | 3 | Westline | PA |
| 86 | 5 | Metamora Landfill | MI |
| 86 | 5 | Spiegelberg Landfill | MI |
| 86 | 7 | Ellisville Area/Bliss | MO |

| | | | |
|----|---|------------------------------------|----|
| 87 | 2 | Williams Property | NJ |
| 87 | 4 | Sodyeco | NC |
| 87 | 6 | Sand Springs Petrochemical Complex | OK |

| | | | |
|----|---|----------------------------------|----|
| 88 | 1 | Cannon Engineering/Plymouth | MA |
| 88 | 2 | Ewan Property | NJ |
| 88 | 2 | Reich Farms | NJ |
| 88 | 2 | Brewster Well Field | NY |
| 88 | 3 | Wildcat Landfill | DE |
| 88 | 3 | Berks Sand Pit | PA |
| 88 | 3 | Douglassville Disposal | PA |
| 88 | 3 | Fike Chemical | WV |
| 88 | 5 | Belvidere Municipal Landfill #1 | IL |
| 88 | 6 | S. Calvacade St. | TX |
| 88 | 7 | Minker/Stout/Romaine Creek (R&S) | MO |
| 88 | 7 | Syntex | MO |

| | | | |
|----|---|---------------------------------|----|
| 89 | 1 | W.R. Grace (Acton Plant) | MA |
| 89 | 1 | O'Connor | ME |
| 89 | 1 | Pinette's Salvage Yard | ME |
| 89 | 2 | Claremont Polychemical | NY |
| 89 | 3 | M.W. Manufacturing | PA |
| 89 | 3 | Whitmoyer Laboratories | PA |
| 89 | 4 | Newsom Brothers Old Reichold | MS |
| 89 | 5 | Cross Brothers Pail | IL |
| 89 | 5 | Outboard Marine/Waukegan Harbor | IL |

* Residuals to be treated with solidification/stabilization.

TABLE I-4 (continued)
REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

June 1993

| <u>Off-Site Incineration (continued)</u> | | | | <u>Off-Site Incineration (continued)</u> | | | |
|--|--------|------------------------------------|-------|--|--------|------------------------------------|-------|
| FY | REGION | SITE NAME | STATE | FY | REGION | SITE NAME | STATE |
| 89 | 5 | Wedzeb | IN | 91 | 4 | Aberdeen Pesticide Dumps | |
| 89 | 5 | Cliff/Dow Dump | MI | | | (Amendment) | NC |
| 89 | 5 | Alsco Anaconda | OH | 91 | 4 | Wrigley Charcoal | TN |
| 89 | 6 | United Creosoting | TX | 91 | 5 | Acme Solvent Reclaiming Inc. | IL |
| 89 | 8 | Woodbury Chemical | CO | 91 | 5 | Main Street Wellfield | IN |
| | | | | 91 | 5 | Thermo Chem | MI |
| 90 | 1 | Beacon Heights Landfill | CT | 91 | 5 | Carter Industries | MI |
| 90 | 1 | Kearsarge Metallurgical | NH | 91 | 5 | Summit National Liquid Disposal | |
| 90 | 2 | FAA Technical Center | NJ | | | Service (Amendment) | OH |
| 90 | 2 | Hooker Chemical-Ruco Polymer | NJ | 91 | 6 | Petrochemical (Turtle-Bayou) | TX |
| 90 | 2 | Sayreville landfill | NJ | 91 | 7 | Peoples Natural Gas | IA |
| 90 | 2 | Mattiace Petrochemicals | NY | 91 | 7 | Ellisville Area Site | MO |
| 90 | 2 | Sealand Restoration | NY | 91 | 7 | Ellisville Area (Amendment) | MO |
| 90 | 3 | Greenwood Chemical* | VA | 91 | 7 | Kem-Pest Laboratories | MO |
| 90 | 6 | Arkwood | AR | 91 | 8 | Broderick Wood Products | CO |
| 90 | 6 | Jacksonville Municipal Landfill | AR | 91 | 8 | Hill AFB | UT |
| 90 | 6 | Rogers Road Municipal Landfill | AR | 91 | 9 | Advanced Micro Devices Inc. | CA |
| 90 | 6 | Hardage/Criner (Amendment) | OK | 91 | 10 | Commencement Bay - Nearshore/ | |
| 90 | 7 | Fairfield Coal Gasification | IA | | | Tideflats | WA |
| | | Plant | | 91 | 10 | Northwest Transformer - Mission | WA |
| 90 | 7 | Shenandoah Stables | MO | | | Pole | |
| 90 | 8 | Martin Marietta (Denver Aerospace) | CO | | | | |
| 90 | 8 | Sand Creek Industrial | CO | 92 | 2 | Ellis Property | NJ |
| 90 | 8 | Ogden Defense Depot | UT | 92 | 3 | Fike Chemical | WV |
| | | | | 92 | 5 | American Chemical Services | IN |
| 91 | 1 | Union Chemical | ME | 92 | 8 | Ogden Defense Depot (Operable | UT |
| 91 | 2 | Curcio Scrap Metal | NJ | | | Unit 3) | |
| 91 | 2 | Swope Oil | NJ | 92 | 9 | Westinghouse Electric (Sunnyvale | CA |
| 91 | 2 | Waldick Aerospace Devices, Inc. | NJ | | | Plant) | |
| 91 | 2 | Circuitron | NY | 92 | 10 | Pacific Hide & Fur Recycling | ID |
| 91 | 2 | Mattiace Petrochemical | NY | | | (Amendment) | |
| 91 | 3 | Brodhead Creek | PA | 92 | 10 | U.S. DOE Idaho National | ID |
| 91 | 3 | Eastern Diversified Metals | PA | | | Engineering Lab (Operable Unit 23) | |
| 91 | 3 | Dixie Cavern County Landfill | VA | | | | |

* Residuals to be treated with solidification/stabilization.

REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

Solidification/Stabilization

| FY | REGION | SITE NAME | STATE |
|----|--------|-----------------------------------|-------|
| 82 | 3 | Bruin Lagoon | PA |
| 84 | 6 | Bioecology Systems | TX |
| 85 | 4 | General Refining | GA |
| 85 | 4 | Davie Landfill | FL |
| 85 | 10 | Western Processing/Phase II | WA |
| 86 | 2 | Marathon Battery | NY |
| 86 | 3 | Bruin Lagoon | PA |
| 86 | 4 | Pepper's Steel & Alloy | FL |
| 86 | 4 | Sapp Battery Salvage | FL |
| 86 | 5 | Burrows Sanitation | MI |
| 86 | 5 | Forest Waste Products | MI |
| 87 | 1 | Davis Liquid Waste | RI |
| 87 | 2 | Chemical Control | NJ |
| 87 | 2 | Myers Property | NJ |
| 87 | 2 | Waldick Aerospace | NJ |
| 87 | 4 | Gold Coast | FL |
| 87 | 4 | Geiger/C&M Oil | SC |
| 87 | 4 | Independent Nail | SC |
| 87 | 4 | Palmetto Wood Preserving | SC |
| 87 | 5 | Liquid Disposal | MI |
| 87 | 5 | Northern Engraving | WI |
| 87 | 6 | Gurley Pit | AR |
| 87 | 6 | Mid-South Wood | AR |
| 87 | 6 | Cleve Reber | LA |
| 87 | 6 | Sand Spring Petrochemical Complex | OK |
| 88 | 1 | Charles George Land Reclamation | MA |

Solidification/Stabilization (continued)

| FY | REGION | SITE NAME | STATE |
|----|--------|--------------------------------------|-------|
| 88 | 2 | Love Canal | NY |
| 88 | 2 | Marathon Battery | NY |
| 88 | 2 | York Oil | NY |
| 88 | 3 | Alladin Plating | PA |
| 88 | 3 | Fike Chemical | WV |
| 88 | 4 | Brown Wood Preserving | FL |
| 88 | 4 | Flowood | MS |
| 88 | 4 | Chemtronics | NC |
| 88 | 5 | Velsicol Chemical | IL |
| 88 | 5 | Mid-State Disposal Landfill | WI |
| 88 | 6 | Industrial Waste Control | AR |
| 88 | 6 | Bailey Waste Disposal | TX |
| 88 | 6 | Brio Refining | TX |
| 88 | 6 | French Limited | TX |
| 88 | 7 | Midwest Manufacturing/ North Farm | IA |
| 88 | 9 | Selma Pressure Treating | CA |
| 88 | 10 | Pacific Hide & Fur Recycling | ID |
| 88 | 10 | Gould | OR |
| 88 | 10 | Commencement Bay/NTF | WA |
| 88 | 10 | Frontier Hard Chrome | WA |
| 89 | 1 | Sullivan's Ledge | MA |
| 89 | 1 | W.R. Grace (Acton Plant) | MA |
| 89 | 1 | O'Connor | ME |
| 89 | 2 | DeRewel Chemical | NJ |
| 89 | 2 | Marathon Battery | NY |
| 89 | 3 | Craig Farm | PA |
| 89 | 3 | Douglassville Disposal | PA |
| 89 | 3 | Hebelka Auto Salvage Yard | PA |
| 89 | 3 | Ordnance Works Disposal | WV |
| 89 | 4 | Kassouf-Kimerling Battery | FL |
| 89 | 4 | Smith Farm Brooks | KY |
| 89 | 4 | Cape Fear Wood Preserving | NC |
| 89 | 4 | Celanese | NC |
| 89 | 4 | Amnicola Dump | TN |

TABLE 1-4 (continued)
 REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

June 1993

| <u>Solidification/Stabilization (continued)</u> | | | | <u>Solidification/Stabilization (continued)</u> | | | |
|---|--------|------------------------------------|-------|---|--------|----------------------------------|-------|
| FY | REGION | SITE NAME | STATE | FY | REGION | SITE NAME | STATE |
| 89 | 5 | MIDCO I | IN | 90 | 8 | Rocky Mountain Arsenal (OU 17) | CO |
| 89 | 5 | MIDCO II | IN | 90 | 9 | J.H. Baxter | CA |
| 89 | 5 | Auto Ion Chemicals | MI | 90 | 10 | Teledyne Wah Chang Albany (TWCA) | OR |
| 89 | 6 | Pesses Chemical | TX | | | | |
| 89 | 6 | Sheridan Disposal Services | TX | | | | |
| 89 | 7 | Vogel Paint & Wax | IA | 91 | 1 | Silresin Chemical | MA |
| 89 | 9 | Koppers (Oroville Plant) | CA | 91 | 1 | Sullivan's Ledge | MA |
| 89 | 9 | Purity Oil Sales | CA | 91 | 1 | Union Chemical | MA |
| | | | | 91 | 2 | Asbestos Dump | NJ |
| 90 | 1 | New Bedford | MA | 91 | 2 | Nascolite Corp. | NJ |
| 90 | 2 | Roebbling Steel | NJ | 91 | 2 | NL Industries | NJ |
| 90 | 3 | M.W. Manufacturing | PA | 91 | 2 | Roebbling Steel | NJ |
| 90 | 3 | C&R Battery | VA | 91 | 2 | Waldick Aerospace Services Inc. | NJ |
| 90 | 3 | Greenwood Chemical | VA | 91 | 2 | White Chemical Corp. | NJ |
| 90 | 4 | 62nd Street Dump | FL | 91 | 3 | Halby Chemical | DE |
| 90 | 4 | Cabot/Koppers | FL | 91 | 3 | Mid-Atlantic Wood Preservers | MD |
| 90 | 4 | Coleman-Evans Wood Preserving | FL | 91 | 3 | Eastern Diversified Metals | PA |
| | | (Amendment) | | 91 | 3 | Hebelka Auto Salvage Yard | PA |
| 90 | 4 | Kassourf-Kimerling Battery | FL | 91 | 3 | Whitmoyer Lab (OU3) | PA |
| | | Disposal | | 91 | 3 | Whitmoyer Lab (OU2) | PA |
| 90 | 4 | Schuylkill Metal | FL | 91 | 3 | U.S.A. Letterkenny SE | PA |
| 90 | 4 | Yellow Wate Road | FL | 91 | 3 | First Piedmont Quarry 719 | VA |
| 90 | 4 | Zellwood Groundwater | FL | 91 | 3 | Saunders Supply | VA |
| | | Contamination (Amendment) | | 91 | 4 | Interstate Lead Co. | AL |
| 90 | 5 | Sangamo/Crab Orchard | IL | 91 | 4 | USAF Robins Air Force Base | GA |
| | | National Wildlife Refuge | | 91 | 4 | Maxey Flats Nuclear Disposal | KY |
| 90 | 5 | Wayne Waste Oil | IN | 91 | 4 | Golden Strip Septic Tank | SC |
| 90 | 5 | Springfield Township Dump | MI | 91 | 4 | Aberdeen Pesticide Dump | NC |
| 90 | 5 | Oconomowoc Electroplating | WI | | | (Amendment) | |
| 90 | 6 | Jacksonville Municipal Landfill | AR | 91 | 4 | Carolina Transformer | NC |
| 90 | 6 | Rogers Road Municipal Landfill | AR | 91 | 4 | Arlington Blending and | TN |
| 90 | 7 | Shenandoah Stables | MO | | | Packaging Co. | |
| 90 | 7 | Hastings Groundwater Contamination | NE | 91 | 4 | Oak Ridge OU3 | TN |
| | | (East Industrial Park) | | 91 | 4 | Wrigley Charcoal | TN |
| 90 | 8 | Martin Marietta (Denver | CO | 91 | 5 | Acme Solvents | IL |
| | | Aerospace) | | 91 | 5 | Carter Industries | MI |
| | | | | 91 | 6 | Cimarron Mining Corp. | NM |

TABLE 1-4 (continued)
REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

June 1993

| <u>Solidification/Stabilization (continued)</u> | | | |
|---|--------|---|-------|
| FY | REGION | SITE NAME | STATE |
| 91 | 7 | IE Dupont de Nemours & Co., Inc. | IA |
| 91 | 7 | Mid-America Tanning | IA |
| 91 | 7 | Shaw Avenue Dump | IA |
| 91 | 8 | Anaconda Co. Smelter | MT |
| 91 | 9 | FMC (Fresno Plant) | CA |
| 91 | 9 | Valley Wood Preserving | CA |
| | | | |
| 92 | 1 | PSC Resources | MA |
| 92 | 2 | Cosden Chemical Coatings | NJ |
| 92 | 2 | Facet Enterprises | NY |
| 92 | 2 | Preferred Plating | NY |
| 92 | 3 | Abex | VA |
| 92 | 3 | C & D Recycling | PA |
| 92 | 3 | Fike Chemical | WV |
| 92 | 3 | Paoli Rail Yard | PA |
| 92 | 3 | Rhinehart Tire Fire Dump | VA |
| 92 | 3 | Tonolli | PA |
| 92 | 4 | Agrico Chemical | FL |
| 92 | 4 | Ciba-Geigy (McIntosh Plant) | AL |
| 92 | 4 | Florida Steel | FL |
| 92 | 4 | JFD Electronics/Channel Masters | NC |
| 92 | 4 | Marine Corps Logistics Base | GA |
| 92 | 4 | Savannah River (USDOE) (Operable Unit 1) | SC |
| 92 | 4 | Whitehouse Waste Oil Pits (Amendment) | FL |
| 92 | 5 | Electrovoice | MI |
| 92 | 5 | H. Brown Company | MI |
| 92 | 5 | Peerless Plating | MI |
| 92 | 5 | Savanna Army Depot | IL |
| 92 | 5 | Spickler Landfill | WI |
| 92 | 5 | Tar Lake | MI |
| 92 | 6 | Cal West Metals | NM |
| 92 | 6 | Double Eagle Refinery | OK |
| 92 | 6 | Fourth Street Abandoned Refinery | OK |

| <u>Solidification/Stabilization (continued)</u> | | | |
|---|--------|---|-------|
| FY | REGION | SITE NAME | STATE |
| 92 | 6 | Gulf Coast Vacuum Services (Operable Unit 1) | LA |
| 92 | 6 | Oklahoma Refining | OK |
| 92 | 8 | Broderick Wood Products | CO |
| 92 | 8 | Denver Radium (Operable Unit 8) | CO |
| 92 | 8 | Portland Cement (Kiln Dust #2 & #3) | UT |
| 92 | 8 | Rocky Flats (USDOE) (Operable Unit 4) | CO |
| 92 | 8 | Silver Bow CreekButte Area | MT |
| 92 | 9 | Rhone-Poulenc/Zoecon | CA |
| 92 | 10 | Bunker Hill Mining and Metallurgical Complex | ID |
| 92 | 10 | Pacific Hide & Fur Recycling (Amendment) | ID |
| 92 | 10 | U.S. DOE Idaho National Engineering Lab (Operable Unit 22) | ID |

Other

| FY | REGION | SITE NAME | STATE | TECHNOLOGY |
|----|--------|-------------------------------------|-------|-----------------|
| 85 | 6 | Triangle Chemical | TX | Soil Aeration |
| 87 | 3 | West Virginia Ordnance | WV | In situ Flammig |
| 88 | 3 | Bendix Flight System | PA | Soil Aeration |
| 88 | 7 | Arkansas City Dump | KS | Chemical |
| 89 | 9 | Intel, Mountain View | CA | Soil Aeration |
| 89 | 9 | Raytheon, Mountain View | CA | Soil Aeration |
| 90 | 4 | Howe Valley Landfill | KY | Soil Aeration |
| 92 | 3 | Fike Chemical | WV | Neutralization |
| 92 | 6 | Double Eagle Refinery | OK | Neutralization |
| 92 | 6 | Fourth Street Abandoned Refinery | OK | Neutralization |
| 92 | 6 | Oklahoma Refining | OK | Neutralization |

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TABLE 1-5

REMEDIAL ACTIONS: TREATMENT TRAINS WITH INNOVATIVE TREATMENT TECHNOLOGIES

Table 1-5 lists the sites at which innovative treatment technologies are used together with established or other innovative treatment technologies in treatment “trains.” Technologies may be combined to reduce the volume of material requiring further treatment, to prevent the emission of volatile contaminants during excavation and mixing, or to address multiple contaminants in a single medium.

TABLE 1-5. REMEDIAL ACTIONS: TREATMENT TRAINS WITH INNOVATIVE TECHNOLOGIES

June 1993

Dechlorination Followed by

| | | |
|--------------|----------------|----|
| Soil Washing | Myers Property | NJ |
|--------------|----------------|----|

Ex Situ Bioremediation Followed by

| | | |
|------------------------------|------------------------------|----|
| Solidification/Stabilization | Whitmoyer Laboratories, OU 3 | PA |
| Solidification/Stabilization | J. H. Baxter | CA |
| Solidification/Stabilization | Cape Fear Wood Preserving | NC |

In Situ Flushing Followed by

| | | |
|------------------------|------------------|----|
| In Situ Bioremediation | LA Clarke & Sons | VA |
| In Situ Bioremediation | Pester Burn Pond | KS |

Soil Vapor Extraction Followed by

| | | |
|------------------------------|-------------------------------------|----|
| In Situ Bioremediation | Swope Oil & Chemical Co. | NJ |
| In Situ Flushing | JADCO - Hughes | NC |
| In Situ Flushing | Pasley Solvents and Chemicals, Inc. | NY |
| Solidification/Stabilization | Genzale Plating Company, OU 1 | NY |
| Soil Washing | Zanesville Well Field | OH |

Soil Washing Followed by

| | | |
|----------------|---------------------------|----|
| Bioremediation | American Creosote | FL |
| Bioremediation | Cabot Carbon/Koppers | FL |
| Bioremediation | Whitehouse Waste Oil Pits | FL |
| Bioremediation | Benfield Industries | NC |
| Bioremediation | Cape Fear Wood Preserving | NC |
| Bioremediation | Moss-American | WI |
| Bioremediation | Koppers (Oroville) | CA |

Soil Washing Followed by (continued)

| | | |
|------------------------------|------------------------|----|
| Incineration | Arkwood | AR |
| Incineration | South Cavalcade Street | TX |
| Incineration | Sand Creek, OU 5 | CO |
| Solidification/Stabilization | FMC (Fresno) | CA |

Solvent Extraction Followed by

| | | |
|------------------------------|------------------|----|
| Incineration | United Cresoting | TX |
| Soil Washing | Ewan Property | NJ |
| Solidification/Stabilization | O'Connor | ME |

Thermal Desorption Followed by

| | | |
|--------------------------------|--|----|
| Dechlorination | Resolve | MA |
| Dechlorination | Arlington Blending & Packaging Co., OU 1 | TN |
| Dechlorination | Smith's Farm Brooks, OU 1 | KY |
| Incineration of Organic Vapors | Sarney Farm | NY |
| Incineration of Organic Vapors | Outboard Marine/Waukegan Harbor | IL |
| Incineration of Organic Vapors | Carter Industries | MI |
| Incineration of Organic Vapors | University of Minnesota | MN |
| Incineration of Organic Vapors | Martin Marietta (Denver Aerospace) | CO |
| Solidification/Stabilization | Waldick Aerospace Devices | NJ |
| Solidification/Stabilization | USA Letterkenny (SE Area, OU 1) | PA |
| Solidification/Stabilization | Acme Solvent Reclaiming, Inc., OU 2 | IL |
| Solidification/Stabilization | Carter Industries | MI |
| Solidification/Stabilization | Martin Marietta (Denver Aerospace) | CO |

TABLE 1-6

REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS

Table 1-6 provides summary information on the performance and operating parameters for applications of innovative treatment technologies that have been completed at remedial sites. It is intended to supplement, not replace, the information included in tables 1-1, 1-2, and 1-3.

TABLE 1-6
REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS

June 1993

| Region | Site Name, State, Dates of Operation | Technology/ Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|--|--|---|--|---|---|--|--|
| 1 | Cannon Engineering/MA 5/90 to 10/90 | Thermal soil aeration/ Canonie Environmental Services Corp., Porter, IN | Soil (11,300 tons) | Criteria: 0.1 ppm - TCE, DCE, PCE 0.2 ppm - Toluene, Xylene 0.5 ppm - Vinyl chloride SVOCs - 3ppm (total) Input 500 - 3,000 ppm (Total VOCs) Output - <0.025 ppm (Total VOCs) | Continuous operation 40 tons/hr 450 - 500° F Moisture content before treatment - 5% - 25% moisture Additives - dry soil (to reduce moisture content) | Excavation Screening Mixing Dewatering | Residuals from air pollution control - treated on site, disposed of off site Wastewater - treated on site, disposed of off site | The waste feed size limitation for the equipment, 1.875 inches, was an important consideration. More information is available in the RA report available from Region 1. |
| 1 | McKin, ME 7/86 to 2/87 | Thermal desorption/ Canonie Env. Services Corp., Porter, IN | Soil (11,500 cy to a depth of 10 ft.) | VOCs Criteria: 0.1 ppm TCE Input: up to 1,000 ppm TCE Output: 0.1 ppm | Continuous operation 6-8 minutes retention time 300°F | Excavation | Soils - Solidified and disposed onsite Vapors - Air carbon capture | |
| 1 | Ottati & Goss, NH 6/89 to 9/89 | Thermal desorption/ Canonie Engineering | Soil (6,000 cy) | TCE, PCE, DCA, Benzene Criteria: 1 ppm - Total VOCs and <100 ppb - Each individual VOC Output: <1ppm - Total VOCs | Batch process | Excavation Screening | Carbon from air pollution control unit regenerated offsite | For more information on this project, see the close out report available from Region 1. |

TABLE 1-6
REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1992

| Region | Site Name, State, Dates of Operation | Technology/Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|--|--|--|--|--|------------------------------------|--|--|
| 2 | Wide Beach Development, NY 9/90 to 9/91 | APEG dechlorination/ Soil Tech Denver, CO | Soil (40,000 cy) | Criteria: PCB - <10 ppm (1 composite sample/day) Input - 10 to 100 ppm PCB Output - 2 ppm PCB | Continuous process 8 tons/hour 200° - 580°C (450° - 1100°F) Ambient pH and moisture Additives - Alkaline polyethylene glycol (APEG) | Excavation Screening Staging | Treated soil - disposed of on site | If on-site disposal is planned, perform tests of the treated material appropriate to intended use. For further information on this dechlorination project, see the Demonstration Test Report produced by Region 2, EPA. |
| 2 | Upjohn Manufacturing Company, PR 1/83 to 3/88 | Soil Vapor Extraction Terra Vac, Inc. Costa Mesa, CA | Soil (16,000 sq ft to approximately 100 ft deep) | Criteria: Initially: Undefined, end point of treatment was subject to long debate. Final criteria: Carbon tetrachloride (in exhaust stacks) - nondetectable for three consecutive months Initial concentrations - 70 ppm (carbon tetrachloride to air) Final concentrations - nondetect (<0.002 ppm) | Ambient conditions | | Discharge of soil vapors through 30-ft stack | For further information on this application, see the Applications Analysis Report for the Terra Vac In situ Vacuum Extraction System (EPA/540/A5-89/003). |

TABLE 1-6
REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 199

| Region | Site Name, State, Dates of Operation | Technology/ Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|--|--|-------------------------------------|--|--|--|--|--|
| 4 | Brown Wood Preserving, FL 10/88 to 12/91 | Land treatment/ Remediation Technologies, Seattle, Washington | Soil/pond sediment (7,500 cy) | Criteria: 100 ppm total carcinogenic PAHs as sampled on 8 subplots on each lift Input - 800 to 2,000 ppm total creosote contaminants Output - 10 to 80 ppm total carcinogenic indicators | Retention time - 3 to 6 months Additives - water and nutrients | Excavation Screening Tilling | Treated material vegetated with grass (no cap) | Further information on this project is available from the <u>Remedial Action Close Out Report</u> . The vendor, RETEC, is expected to prepare a paper. |
| 4 | Palmetto Wood Preserving, SC 9/28/88 to 2/8/89 | Chemical treatment and soil washing Reduction of hexavalent chromium to trivalent chromium En-site (ERCS contractor) Atlanta, GA | Soil (13,000 cy) | Health-based criteria - Actual concentrations unknown Input: Arsenic - 2 to 6,200 ppm Chromium - 4 to 6,200 ppm Output: Arsenic - less than 1 ppm Chromium - 627 ppm | Soil - Batch process Treatment for aqueous waste from soil washing - 25 gallons per minute pH - 2 to 9 | Neutralization Mixing Dewatering | Soil - solidified and replaced on site Wastewater - permitted discharge to the sewer line Sludges - off site disposal | (1) Used sodium meta- phosphate to lower pH to 2.0 and wash the Chromium from the soil, (2) separated the soil and solution, (3) solidified the soils, and (4) used the ferrous ion method of reduction to precipitate the chromium from solution in trivalent form. This treatment system is unique in the method of generating ferrous ion for the reducing step. The waste stream passed through an electrolytic cell containing consumable steel electrodes where the ferrous ions were electrically introduced into the waste stream. |

REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 19

| Region | Site Name, State, Dates of Operation | Technology/ Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|--|---|--|---|--|------------------------------------|---|--|
| 4 # | Hollingsworth Solderless, FL 1/91 to 7/91 | Soil vapor extraction EBASCO | Soil 60 cy (down to 7 feet deep) | TCE, vinyl chloride Target: total VOCs 1 ppm | In situ | None required | Air emissions vented to atmosphere | Design specifications were very critical. Need to pay close attention to design specifications |
| 5 | Seymour Recycling, IN Summer - 1990 August-October, 1986 January-February, 1987 | In situ soil bioremediation ABB Environmental Services | Soil (12 acres to 10 ft deep, approximately 43,500 cy) | 54 contaminants present, including TCE, TCA, and Carbon Tetrachloride No standards or criteria for this OU in ROD | Additives - nitrogen, phosphorus, potassium, sulfur as fertilizer (200,000 gallons of nutrients added) | Tilling | Capping in place | The soil became saturated quickly during this project, creating surface pools. The specially designed tractor got stuck. |
| 5 | Outboard Marine/Waukegan Harbor (OU #3), IL 1/92 to 7/92 | Thermal Desorption Canonie Environmental Services Porter, IN | Soil/Sediments (16,000 cy) | PCBs Initial 20,000 - 10,000 ppm 99% removal | Continuous with a retention time of 15 minutes and throughput of 8-10 tons/hr. Temperature 1100°F Moisture content 20% or less Soda ash added to waste to meet DRE of 99.9999% | Excavation Mixing Dewatering | Cleaned soil and sediment stored in on- site containment cells. Waste water discharged to POTW. | Reduced PCB levels much more than expected. |

TABLE 1-6
REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1994

| Region | Site Name, State, Dates of Operation | Technology/Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|--|--|---|---|---|--|---|---|
| 5 | Verona Well field (Thomas Solvent/Raymond Road), MI March 1988 to May 1992 | Soil vapor extraction (attempted nitrogen sparging) Terra Vac, Inc. Costa Mesa, CA | Soil (35,000 cy, 1/2 acre to 18 ft. deep) | Initial soil concentration TCE 550,000 ppb; PCE 1.8 million ppb; Toluene 730,000 ppb; Xylene 500,000 ppb Criteria in all post remedial soil samples; Total Xylenes 6,000 ppb; Toluene 15,000 ppb; Benzene 20 ppb; Ethylbenzene 14,000 ppb; 1,1- DCE 10 ppb; trans-1,2-DCE 2,000 ppb; 1,1,1-TCA 4,000 ppb; Carbon tet., 10 ppb; 1,2-DCA 10 ppb; 1,1-DCA 20 ppb; Methylene chloride 100 ppb; cis-1,2 DCE 20 ppb; PCE 10 ppb; TCE 60 ppb | 60 - 160 cu ft/min of air Started >4,400 lbs/day removed Shut off 5 lbs/day removed Total removed 65,000 lbs | No materials handling; required installing extraction wells | Spent carbon was regenerated (and eventually incinerated) | Initial estimate of 7,000 lbs of VOCs product too low. Treatment equipment undersized. Needed better quantification of VOCs in soils to design appropriate size. Plan for enhancing system to deal with saturated soils and free product. Public information available includes performance report, and technical memo. |
| 8 # | Rocky Mountain Arsenal (OU 18) Interim Response, CO June 1991 to December 1991 | Soil vapor extraction Vapor phase carbon adsorption to capture vapors Woodward Clyde Denver, CO | Soil (100 ft radius down to 60 ft; approximately 70,000 cy) | TCE Initial extracted gas concentration 60 ppm Final extracted gas concentration 2 to 3 ppm | 250-300 cu. ft./min. of air Total removed 64 lbs. | No materials handling; required installing extraction wells | Vapors captured on carbon | Sampling indicated the presence of TCE mainly in the soil gas samples and not the soil samples |
| 9 | Fair Child Semiconductor San Jose, CA 1989 to June 1990 | Soil vapor extraction with air flushing Carbon canister air stripping for pump and treat | Soil (10,000 cy) | Initial concentration TCA 670,000 ppb; 1,1-DCE 6,400 ppb; freon 113 7,200 ppb Final concentrations unknown Target was 1 ppm | In situ | Excavation dewatering of soil where leaking UST was discovered | | Will re-evaluate the remediation in 1994. |

TABLE 1-3
REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1994

| Region | Site Name, State, Dates of Operation | Technology/ Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|--|--|--------------------------|--|----------------------|-----------------------------|---|----------|
| 9 # | Sacramento Army Depot Tank 2 Operable Unit, CA 11/91 to 4/93 | In-situ soil vapor extraction, extracted vapor treated with gas phase carbon adsorption, entrained (suspended) water treatment by the existing on-site UV-hydrogen peroxide treatment plant/Terra Vac, Inc. Costa Mesa, CA | Soil (150 cy) | VOCs (Ethylbenzene, PCE, MEK Total Xylenes) Initial concentration: MEK 0.011 - 15 mg/kg Ethylbenzene 0.006 - 2,100 mg/kg PCE 0.006 - 39 mg/kg Total Xylene 0.005 - 11,000 mg/kg Clean up goal 1.2 mg/kg MEK 6 mg/kg Ethylbenzene 23 mg/kg total Xylene 0.2 mg/kg PCE | 24 hours/day | None | Extracted vapor treated with gas phase carbon adsorption entrained (suspended) water treatment by the existing on-site UV-hydrogen peroxide treatment plant | |

Chapter 2

Superfund Removal Actions

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SUPERFUND REMOVAL ACTIONS

Superfund removal actions are conducted in response to an immediate threat caused by a release of hazardous substances. Removal action decisions are documented in an action memorandum. To date, innovative treatment technologies have been used in relatively few removal actions. The innovative technologies addressed in this report have been used 33 times in 28 removal actions (Figure 2-1). In addition, infrared incineration, no longer considered innovative, was first used at two removal actions.

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

EPA would like to increase the use of innovative treatment methods to address removal problems. One of the seven initiatives set forth in the EPA directive described in the foreword concerns removal actions. It is

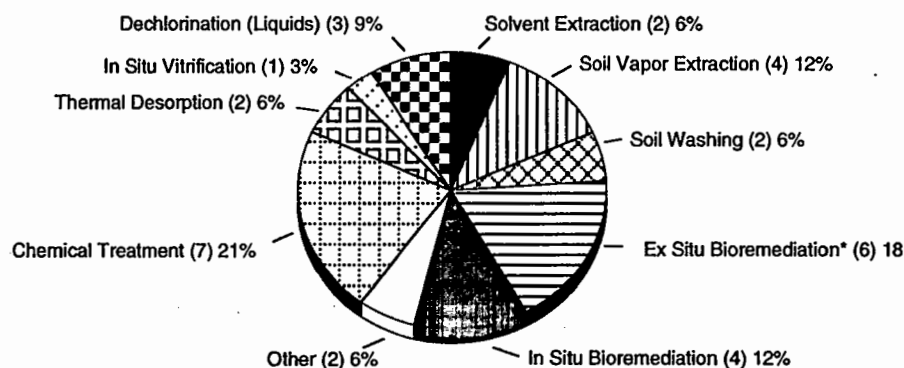
expected that innovative treatment technologies will be used more often in the future, for larger, and less time-critical removal actions.

Table 2-1 provides detailed information for each application of an innovative technology at a removal site. Tables 2-2 and 2-3 provide summaries by EPA Region and status for all applications of innovative technologies at removal sites. Table 2-4 lists removal sites using established treatment technologies.

Frequency of Technology Selection

Figure 2-1 lists each type of innovative treatment technology and indicates how often that technology has been selected as a remedy for removal actions. Figure 2-1 illustrates that chemical treatment was selected most often and represented 21 percent of all applications of innovative treatment technologies at removal sites. Bioremediation (ex situ) was chosen six times and represented 18 percent of all applications of innovative treatment technologies at removal sites.

FIGURE 2-1
SUPERFUND REMOVAL ACTIONS:
SUMMARY OF INNOVATIVE TECHNOLOGIES SELECTED/USED AS OF JUNE 1993
(Total = 33)



Note: Data from a survey of EPA Regional Removal Branch chiefs and On-Scene Coordinators.
* Includes one in situ groundwater treatment.

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

Status of Innovative Technology Implementation

Figure 2-2 indicates the status of innovative treatment technologies that are being applied at removal action sites. Since removals are responses to an immediate threat and often involve smaller quantities of hazardous wastes than remedials, the implementation of the technology may progress faster at a removal site than at a remedial site. The figure indicates that a large percentage, 58 percent, of removal

projects involving innovative treatment technologies have been completed. Table 2-3 summarizes removal action sites using innovative treatment technologies by status and specific technology. Table 2-5 provides detailed information on removal projects that have been completed.

FIGURE 2-2
SUPERFUND REMOVAL ACTIONS:
PROJECT STATUS OF INNOVATIVE TREATMENT TECHNOLOGIES AS OF JUNE 1993*

| Technology | Predesign/ In Design | Design Complete/Being Installed/ Operational | Project Completed | Total |
|-------------------------------------|-------------------------|---|-------------------|-----------|
| Soil Vapor Extraction | 0 | 1 | 3 | 4 |
| Thermal Desorption | 1 | 0 | 1 | 2 |
| Ex Situ Bioremediation | 1 | 3 | 2 | 6 |
| In Situ Bioremediation [#] | 0 | 2 | 2 | 4 |
| Soil Washing | 0 | 1 | 1 | 2 |
| In Situ Flushing | 0 | 0 | 0 | 0 |
| Dechlorination | 0 | 1 | 2 | 3 |
| Solvent Extraction | 0 | 0 | 2 | 2 |
| In Situ Vitrification | 0 | 1 | 0 | 1 |
| Other Innovative Treatment | 1 | 1 | 0 | 2 |
| Chemical Treatment | 0 | 1 | 6 | 7 |
| TOTAL | 3 (9%) | 11 (33%) | 19 (58%) | 33 |

* Data derived from a survey of EPA Superfund Removal Branch Chiefs and On-Scene Coordinators for each Region.

Includes one in situ groundwater treatment.

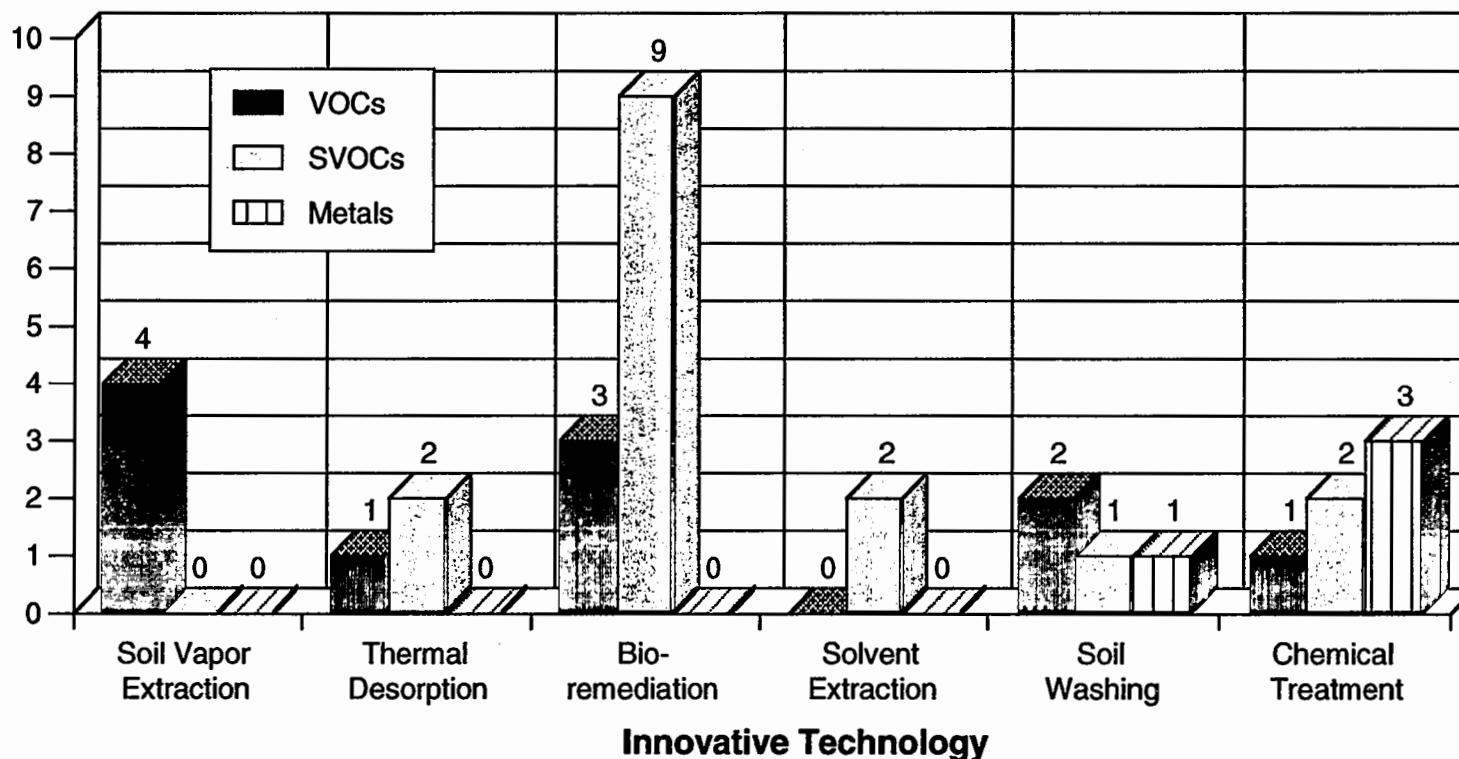
Contaminants Addressed by Innovative Treatment Technologies

Figure 2-3 provides information, by technology, for three major contaminant groups treated at removal action sites: volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and metals. For this report, compounds are categorized as VOCs or SVOCs, using the lists provided in EPA's SW-846 Test Methods 8240 and 8270, respectively.

Treatment Trains

Innovative treatment technologies in this report may be used together with established or other innovative treatment technologies in treatment trains. Technologies may be combined to reduce the volume of material requiring further treatment, to prevent the emission of volatile contaminants during excavation and mixing, or to address multiple contaminants in a single medium. Table 2-4 lists the sites at which such treatment trains are being used.

FIGURE 2-3
SUPERFUND REMOVAL ACTIONS: APPLICATION OF INNOVATIVE TREATMENT TECHNOLOGIES



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TABLE 2-1

REMOVAL ACTIONS: SITE-SPECIFIC INFORMATION BY INNOVATIVE TREATMENT TECHNOLOGY

Table 2-1 is the principal part of this chapter. It contains the most detailed, site-specific information for removal sites for which innovative treatment technology has been selected. The columns of Table 2-1 present the following information:

Region

This column indicates the EPA Region in which the site is located.

Site Name, State, Action Memo Date

This column identifies the site and the operable unit for which an innovative treatment technology was selected.

An action memorandum documents the selection of remedy in the removal program. The date shown in this column is the date on which an action memorandum was signed by an EPA official.

An asterisk (*) in this column indicates that a treatability study has been completed for this technology at the particular site.

Specific Technology

The second column describes the specific technology selected within a general category of innovative treatment. For example, within the general category of bioremediation, the specific technologies of land treatment or slurry-phase bioremediation may be chosen.

Site Description

This column provides information on the industrial source of the contamination at the site and allows analysis of the selection of innovative technologies by site type. For example, by using the information in this column, one may determine the most frequently selected innovative technology for wood preserving sites.

Media (quantity)

This column provides information on the media and quantity of material to be treated. If a treatment is used in situ, an effort has been made to include the maximum depth of the treatment to provide the reader with another parameter significant to the application.

TABLE 2-1 (Continued)

Key Contaminants Treated

The major contaminants or contaminant groups targeted by the treatment technology are shown in this column. There may be other contaminants as well that will be treated. Other contaminants that may be present, but that are not being addressed by the listed technology, are not included.

Status

This column indicates the status of the application of the innovative treatment technology. **Predesign** indicates that the ROD has been signed but design has not begun. During predesign, EPA may be negotiating with the potentially responsible parties, procuring the services of a design firm, or collecting information (such as conducting a treatability study) needed in the design stage. If a project is **in design**, the engineering documents needed to contract for and build the remedy are being prepared. If a remedy is **being installed**, the lead agency has signed a contract for the construction work needed to set up the remedy. The remedy is **operational** if it is completely installed and it is now being operated as a treatment system; the remedy is **completed** if the goals of the ROD or decision document for that treatment technology have been met and treatment has ceased.

One purpose of this column is to identify opportunities for vendors to become involved in the next phase of the projects. Whenever possible, the season and year that the current phase will end is given. This information is identified as the "completion planned" date.

Lead Agency, Treatment Contractor

The "lead" indicates whether federal dollars are to be used to implement the remedy (Fund lead) or the potentially responsible parties will conduct the remedy with EPA/State oversight (PRP lead). If a remedy is Fund lead, EPA may manage the design/construction through its contractors, the state may manage the project with Superfund dollars, or the U.S. Army Corps of Engineers (USACE) may act for EPA to manage the design or construction. Whichever agency or organization is responsible for managing the remedy, the contractor responsible for the actual installation and operation of the innovative technology also is identified, if the lead agency has selected a contractor.

Contacts/Phone

This final column provides the names and telephone numbers of useful contacts for the site or technology. The first name listed is usually the EPA on-scene coordinator (OSC) responsible for the site. If a remedy is being managed by the state, the name and phone number of the state RPM also is provided. Information on any other useful contacts is provided.

Table 2-1
Removal Actions: Site-Specific Information By Innovative Treatment Technology

June 1993

Bioremediation (Ex situ)

| Region | Site Name, State, (Action Memo Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|---|---------------------------------|--------------------------|--|---|--|--------------------------------|
| 2 | GCL Tie and Treating, NY (3/26/91) | Composting | Wood preserving | Soil (4,800 cy) | PAHs (Creosote) | In design; Pilot study currently in progress | Federal lead/Fund Financed; ERT/REAC | Joe Cosentino 908-906-6983 |
| 4 | Southeastern Wood Preserving, MS (09/30/90) See also Soil Washing | Slurry phase (preceded by soil washing) | Wood preserving | Soil (8,000 cy) | PAHs (Creosote) | Operational; Completion planned December 1993 | Federal lead/Fund Financed; OHM Remediation Services Corp | Don Rigger 404-347-3931 |
| 5 | Indiana Wood Treating, IN (10/11/92) | Composting | Wood preserving | Soil (18,000 cy) | PAHs (Creosote) | Operational; Completion planned Fall 1993; After 6 months 8 of 9 compost piles below treatment target levels. | PRP lead/Federal oversight; IT Corporation, CMC, Inc. - subcontractor | Steve Faryan 312-353-9351 |
| 6 | MacMillan Ring Free Oil Company*, AR (11/09/92) | Solid phase | Petroleum refining and reuse | Sediments (38,000 cy) | VOCs (BTEX), PAHs (DAF Float) | Design completed but not installed; Completion planned Fall 1993; Waiting for contractor selection | Federal lead/Fund Financed | Charles Fisher 214-655-2224 |
| 7 | Scott Lumber, MO (07/10/87) | Land treatment | Wood preserving | Soil (16,000 cy) | SVOCs (Phenols), PAHs (Benzo(a)pyrene) | Completed; Operational from 1987 to Fall 1991 | Federal lead/Fund Financed; Remediation Technologies | Bruce Morrison 913-551-5014 |
| 9 | Poly-Carb, NV (05/14/87) See also Soil Washing | Land treatment | Commercial waste management | Soil (1,500 cy) | SVOCs (Phenols), PAHs (Cresol) | Completed; Operational from 7/87 to 8/88 | Federal lead/Fund Financed; Reidel Environmental Services | Bob Mandel 415-744-2290 |

Status as of June 1993. See Table 2-5 for performance and operational data on completed removal projects.

* Indicates that a treatability study has been completed.

Note: Contacts listed are EPA regional staff unless otherwise noted.

Table 2-1
Removal Actions: Site-Specific Information By Innovative Treatment Technology

June 1991

Bioremediation (In situ)

| Region | Site Name, State, (Action Memo Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|--|-------------------------------------|------------------|---|--|--|--------------------------------|
| 4 | CSX McCormick Emergency Response See also Soil Vapor Extraction | In situ ground water | Derailment (30,000 gallon spill) | Groundwater | VOCs (BETX) | Operational | PRP lead/Federal oversight; Kemron | Steve Spurlin 404-347-3931 |
| 6 | Baldwin Waste Oil, TX (07/01/92) | In situ soil | Waste oil recycler | Soil (550 cy) | VOCs (BTEX), PAHs (TPH) | Operational; Completion planned Fall 1993 | Federal lead/Fund Financed; Ecology & Environment, RSKERL (EPA), Reidel Environmental | Gary Guerra 214-665-6608 |
| 9 | Gila River Indian Reservation, AZ (07/31/84) See also Chemical Treatment | In situ soil Preceded by chemical treatment | Drum storage/ disposal | Soil (3,200 cy) | Biocides (Toxaphene, Ethyl and Methyl Parathion) | Completed; Operational from 6/85 to 10/85 | PRP lead/Federal oversight | Richard Martin 414-744-2288 |
| 9 | Roseville Drums, CA (03/03/88) | In situ soil | Midnight Dump on Dirt Road | Soil (14 cy) | SVOCs (Dichlorobenzene, Phenols) | Completed; Fall 1988; Operational from 2/88 to 11/88 | Federal lead/Fund Financed | Brad Shipley 415-744-2287 |

Removal Actions: Site-Specific Information By Innovative Treatment Technology

June 19

Chemical Treatment

| Region | Site Name, State, (Action Memo Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|---|------------------------------|---|--|---|--|
| 2 | Vineland Chemical, NJ (09/28/92) | Chemical Treatment | Pesticide manufacturing/use /storage | Solids (100 lb) | Metals (Mercury) | Completed; December 1992; Operation completed in one month | Federal lead/Fund Financed; Ensco | Don Graham 908-321-4345 Steve Brawley (Ensco) 706-278-1195 |
| 2 | Zhiegner Refining Company, NJ | Chemical Treatment | Precious metal recovery | Solids (100 lb) | Metals (Mercury) | Completed; Summer 1993; Operational from 2/93 to 6/93 | Federal lead/Fund Financed; Ensco | Dilshad Perera 908-321-4356 Steve Brawley (Ensco) 706-278-1195 |
| 3 | Avtex Fibers, VA (11/14/89) | Chemical Treatment | Rayon manufacturing facility/wastewate r treatment | Sludge 39,000 gl) | Organics (Carbon disulfide) | Completed; August 1991 | Federal lead/Fund Financed; OH Materials | Vincent Zenone 215-597-3038 |
| 5 | PBM Enterprises (Van Dusen Airport Service), MI (04/10/88) | Oxidation using Sodium Hypochlorite | Silver Recovery Facility | Solids (quantity unknown) | Organic Cyanides | Completed; Operational from 5/85 to 10/85 | Federal lead/Fund Financed; American Environmental Service, Inc. | Ross Powers 312-378-7661 |
| 8 | Mouat Industries*, MT (09/20/91) | Reduction using sulfuric acid and ferrous sulfate | Metal ore mining and smelting | Soil (47,000 cy) | Metals (Chromium IV) | Operational; Completion planned Spring 1994; Operation started June 1993 | PRP lead/Federal oversight; Baker Environmental | Tien Nguyen 303-297-7120 |
| 9 | Gila River Indian Reservation, AZ (07/31/84) See also Bioremediation (In Situ) | Reduction using sodium hydroxide | Drum storage/ disposal | Soil (3,200 cy) | Biocides (Toxaphene, Ethyl and Methyl Parathion) | Completed; Operational from 4/85 to 10/85 | Federal lead/Fund Financed | Richard Martin 414-744-2288 |

Table 2-1
Removal Actions: Site-Specific Information By Innovative Treatment Technology

June 199

Chemical Treatment (continued)

| Region | Site Name, State, (Action Memo Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|--|---|------------------|--------------------------------|---|--|---------------------------|
| 9 | Stanford Pesticide #1, AZ (04/20/87) | Chemical treatment- alkaline hydrolysis | Pesticide manufacturing/use /storage, Farm Equipment Storage | Soil (200 cy) | Biocides (Methyl Parathion) | Completed; Operational from 7/87 to 9/87 | Federal lead/Fund Financed; Crosby and Overton | Dan Shane 415-744-2286 |

Removal Actions: Site-Specific Information By Innovative Treatment Technology

June 1993

Dechlorination

| Region | Site Name, State; (Action Memo Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|------------------------|--|---------------------|---|---|---|--|
| 2 | Signo Trading/Mt. Vernon, NY (12/19/86) | Dechlorination | Waste Management Facility Warehouse | Sludge 15 gl) | Dioxins (2,3,7,8 TCDD-laden herbicides) | Completed; Operational during October, 1987 | Federal lead/Fund Financed; Galson Research Corp (subcontractor to OHM) | Charles Fitzsimmons 201-321-6608 |
| 6 | Fruitland Drum, NM (09/08/90) | Dechlorination | Operation/maintenance facility | Liquid (150 gl) | VOCs, Biocides, Dioxins (2,4,5-T), PAHs | Design completed but not installed; Completion planned Fall 1993; BCD was selected after APEG/KPEG was unsuccessful | Federal lead/Fund Financed; USEPA ERT/RREL | Craig Carlton 214-655-2220 |
| 7 | Crown Plating, MO (08/29/89) | Dechlorination | Electroplating | Liquid (55 gl) | Biocides (silvex; 2,4,5 TP) | Completed; Operational from 10/ 89 to 12/89 | Federal lead/Fund Financed | Mark Roberts 913-236-3881 |

Table 2-1
Removal Actions: Site-Specific Information By Innovative Treatment Technology

June 199

In Situ Vitrification

| Region | Site Name, State, (Action Memo Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|--------------------------|-----------------------------------|------------------|---|---|--|----------------------------|
| 5 | Parsons Chemical (ETM Enterprise), MI (09/21/90) | In situ Vitrification | Agricultural chemical facility | Soil (3,000 cy) | Biocides, Dioxins, Metals (Mercury) | Operational; Completion planned Fall 1993; First full-scale application of in situ vitrification at a hazardous waste site | Federal lead/Fund Financed; Geosafe Corp. | Len Zintak 312-886-4246 |

Table 2-1
Removal Actions: Site-Specific Information By Innovative Treatment Technology

June 199:

Soil Vapor Extraction

| Region | Site Name, State, (Action Memo Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|--|-------------------|---|--|---|-------------------------------|
| 4 | Basket Creek Surface Impoundment*, GA (04/11/91) | Soil vapor extraction ex situ, used on a soil pile | Surface impoundment used for disposal of solvents | Soil (2,000 cy) | VOCs (TCE, PCE, MEK, MIBK, Toluene, Xylene, Benzene) | Completed; Operational from 11/92 to 2/93 | Federal lead/Fund Financed; OHM | Don Rigger 404-347-3931 |
| 4 | CSX McCormick Derailment Site, SC See also Bioremediation (In Situ) | Soil vapor extraction with air flushing | Derailment (30,000 gallon spill) | Soil (200,000 cy) | VOCs (BETX) | Completed; | PRP lead/Federal oversight; Midwest Research Institute | Steve Spurlin 404-347-3931 |
| 4 | Hinson Chemical, SC (11/28/88) | Soil vapor extraction with air flushing | Waste Reclaiming Facility | Soil (60,000 cy) | VOCs | Completed; March 1992; Operational December 1988 through March 1992 | Federal lead/Fund Financed; OH Materials | Fred Stroud 404-347-3136 |
| 8 | Mystery Bridge Road/Highway 20, OU 2*, WY Emergency Response See also Other Technologies | Soil vapor extraction | Natural gas compressor station | Soil (160,000 cy) | VOCs (Benzene) | Operational | PRP lead/Federal oversight; Adrian Brown Consultants | Bert Garcia 303-293-1526 |

Table 2-1
Removal Actions: Site-Specific Information By Innovative Treatment Technology

June 1993

Soil Washing

| Region | Site Name, State, (Action Memo Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|--------------------------------|--|-----------------------------------|--|--|----------------------------|
| 4 | Southeastern Wood Preserving, MS 09/30/90) See also Bioremediation (Ex Situ) | Soil washing (sand removal, followed by bioremediation of fines | Wood preserving | Sludge quantity (unknown), Solids (8,000 cy) | SVOCs, PAHs (Creosote) | Operational; Completion planned Winter 1993 | Federal lead/Fund Financed; OHM Remediation Services Corp. | Don Rigger 404-347-3931 |
| 9 | Poly-Carb, NV (05/14/87) See also Bioremediation (Ex Situ) | Soil washing | Commercial waste management | Soil (1,500 cy) | SVOCs (Phenols), PAHs (Cresol) | Completed; Operational 7/87 to 8/88 | Federal lead/Fund Financed; Reidel Environmental Services | Bob Mandel 415-744-2290 |

**Table 2-1
Removal Actions: Site-Specific Information By Innovative Treatment Technology**

June 199

Solvent Extraction

| Region | Site Name, State, (Action Memo Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|------------------------|---------------------------------|--|-----------------------------|---|--|---------------------------------|
| 4 | General Refining*, GA (08/13/85) | Solvent extraction | Waste oil recycling facility | Sludge 2,700 cy), Solids (700 cy), Soil (6,600 gl) | PCBs | Completed; Operational from 8/86 to 2/87 | Federal lead/Fund Financed; Resource Conservation Co. | Shane Hitchcock 404-347-3136 |
| 6 | Traband Warehouse, OK (01/01/88) | Solvent Extraction | Storage Management Complex | Solids (quantity unknown) | PCBs | Completed; Project ended in February, 1989 | Federal lead/Fund Financed; Terra-Clean | Pat Hammack 214-655-2270 |

Table 2-1
Removal Actions: Site-Specific Information By Innovative Treatment Technology

June 199

Thermal Desorption

| Region | Site Name, State, (Action Memo Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|------------------------|--|------------------|---|---|--|-------------------------------|
| 4 | FCX-Washington Site, NC (12/04/91) | Thermal Desorption | Pesticide manufacturing/use /storage | Soil (5,000 cy) | Biocides (Chlordane, Methoxychlor, DDT, DDE) | Pre-design; Original action memo specified incineration; revised action memo will be completed in Fall 1993 | Federal lead/Fund Financed | Paul Peronard 404-347-3931 |
| 10 | Drexler - RAMCOR*, WA (09/30/91) | Thermal Desorption | Waste oil recycler | Soil (3,000 cy) | VOCs (BTEX), PAHs (Petroleum hydrocarbons) | Completed; Operational from 7/92 to 8/92 | Federal lead/Fund Financed; Four Seasons | Chris Field 206-553-1674 |

Removal Actions: Site-Specific Information By Innovative Treatment Technology

June 1993

Other

| Region | Site Name, State, (Action Memo Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|-----------------------------|-----------------------------------|--|-----------------------------|---|--|---------------------------------|
| 2 | Imperial Oil Company, NJ (09/29/92) | Viscous fluid extraction | Former Waste Oil Recycler | Soil (quantity unknown), Groundwater | VOCs, PCBs, PAHs | Being installed; Installation completion planned Fall 1993; Operational by Fall 1993 | Federal lead/Fund Financed; Environmental Technology of North America | Louis DiGuardia 908-906-6927 |
| 8 | Mystery Bridge Road/Highway 20, OU 2*, WY See also Soil Vapor Extraction | Air Sparging | Natural gas compressor station | Groundwater | VOCs (Benzene) | In design; Design completion planned Summer 1993; Pilot-scale is currently operating | PRP lead/Federal oversight; Adrian Brown Consultants | Bert Garcia 303-293-1526 |

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TABLE 2-2

REMOVAL ACTIONS: INNOVATIVE TREATMENT TECHNOLOGIES BY EPA REGION

Table 2-2 summarizes the innovative treatment technologies used at sites where removal actions were conducted in each EPA region.

**TABLE 2-2. REMOVAL ACTIONS: INNOVATIVE TREATMENT TECHNOLOGIES
BY EPA REGION**

June 1993

| <u>TECHNOLOGY</u> | <u>SITE NAME</u> | <u>STATE</u> | <u>TECHNOLOGY</u> | <u>SITE NAME</u> | <u>STATE</u> |
|-----------------------------|-------------------------------------|--------------|--------------------------|---------------------------------|--------------|
| <u>REGION 2</u> | | | <u>REGION 6</u> | | |
| Chemical Treatment | Vineland Chemical | NJ | Bioremediation (Ex situ) | MacMillan Ring Free Oil Company | AR |
| Chemical Treatment | Zhiegner Refining Company | NJ | Dechlorination | Fruitland Drum | NM |
| Viscous fluid extraction | Imperial Oil Company | NJ | Solvent Extraction | Traband Warehouse | OK |
| Bioremediation (Ex situ) | GCL Tie and Treating | NY | Bioremediation (In situ) | Baldwin Waste Oil | TX |
| Dechlorination | Signo Trading/Mt. Vernon | NY | | | |
| | | | <u>REGION 7</u> | | |
| | | | Bioremediation (Ex situ) | Scott Lumber | MO |
| | | | Dechlorination | Crown Plating | MO |
| | | | | | |
| <u>REGION 3</u> | | | <u>REGION 8</u> | | |
| Chemical Treatment | Avtex Fibers | VA | Chemical Treatment | Mouat Industries | MT |
| | | | Soil Vapor Extraction | Mystery Bridge Road/Highway 20 | WY |
| | | | Air Sparging | Mystery Bridge Road/Highway 20 | WY |
| | | | | | |
| <u>REGION 4</u> | | | <u>REGION 9</u> | | |
| Solvent Extraction | General Refining | GA | Bioremediation (In situ) | Gila River Indian Reservation | AZ |
| Soil Vapor Extraction | Basket Creek Surface Impoundme | GA | Chemical Treatment | Gila River Indian Reservation | AZ |
| Bioremediation (Ex situ) | Southeastern Wood Preserving | MS | Chemical Treatment | Stanford Pesticide #1 | AZ |
| Soil Washing | Southeastern Wood Preserving | MS | Bioremediation (In situ) | Roseville Drums | CA |
| Thermal Desorption | FCX-Washington Site | NC | Bioremediation (Ex situ) | Poly-Carb | NV |
| Bioremediation (In situ) | CSX McCormick Derailment Site | SC | Soil Washing | Poly-Carb | NV |
| Soil Vapor Extraction | CSX McCormick Derailment Site | SC | | | |
| Soil Vapor Extraction | Hinson Chemical | SC | | | |
| | | | <u>REGION 10</u> | | |
| <u>REGION 5</u> | | | Thermal Desorption | Drexler - RAMCOR | WA |
| Bioremediation (Ex situ) | Indiana Wood Treating | IN | | | |
| Chemical Treatment | PBM Enterprises (Van Dusen Airport) | MI | | | |
| In situ Vitrification | Parsons Chemical (ETM Enterprises) | MI | | | |

TABLE 2-3

REMOVAL ACTIONS: PROJECT STATUS BY INNOVATIVE TREATMENT TECHNOLOGY

Table 2-3 lists the applications of innovative treatment technologies at removal sites by technology and summarizes the status of the specific application. The symbols used in this table are:

- PD - **In predesign:** A site may be considered to be in predesign if EPA is negotiating the consent decree for the design with the responsible party, the lead agency is preparing the predesign report, the lead agency is contracting for the design firm, or the lead agency is conducting a treatability study or field investigation before beginning actual design work.
- D - **In design:** A site is considered to be in design after the design contractor has begun work.
- D/I - **Design completed but not installed:** This symbol is used if the **design** work has been completed but **installation** work had not yet begun at the time of publication of this report.
- I - **Being installed:** An innovative treatment technology is "being installed" from the time the construction contract has been awarded until the time the treatment system has begun operation. For some technologies, this is a relatively short phase of the project, because such projects are quickly assembled on site. For other technologies, the period of installation lasts several construction seasons.
- O - **Operational:** A treatment technology is operational once it has been constructed and has been proven to be functional. The length of time required to complete the operation phase depends on such factors as the nature of the technology, the quantity of material to be treated, and the concentrations of the contaminants at the start of treatment.
- C - **Completed:** A treatment technology project is considered to be completed when the operation of the treatment technology ceases. Other site activities still may be planned or ongoing.

**TABLE 2-3. REMOVAL ACTIONS: PROJECT STATUS
BY INNOVATIVE TREATMENT TECHNOLOGY**

June 1993

| <u>REGION</u> | <u>BIOREMEDIATION (EX SITU)</u> | <u>STATUS</u> | <u>REGION</u> | <u>IN SITU VITRIFICATION</u> | <u>STATUS</u> |
|---------------|---|---------------|---------------|--|---------------|
| 2 | GCL Tie and Treating, NY | D | 5 | Parsons Chemical (ETM Enterprise), MI | O |
| 6 | MacMillan Ring Free Oil Company, AR | D/I | | | |
| 4 | Southeastern Wood Preserving, MS | O | | | |
| 5 | Indiana Wood Treating, IN | O | | | |
| 7 | Scott Lumber, MO | C | | | |
| 9 | Poly-Carb, NV | C | | | |
| <u>REGION</u> | <u>BIOREMEDIATION (IN SITU)</u> | <u>STATUS</u> | <u>REGION</u> | <u>SOIL VAPOR EXTRACTION</u> | <u>STATUS</u> |
| 4 | CSX McCormick Derailment Site, SC | O | 8 | Mystery Bridge Road/Highway 20, OU 2, WY | O |
| 6 | Baldwin Waste Oil, TX | O | 4 | Basket Creek Surface Impoundment, GA | C |
| 9 | Gila River Indian Reservation, AZ | C | 4 | CSX McCormick Derailment Site, SC | C |
| 9 | Roseville Drums, CA | C | 4 | Hinson Chemical, SC | C |
| <u>REGION</u> | <u>CHEMICAL TREATMENT</u> | <u>STATUS</u> | <u>REGION</u> | <u>SOIL WASHING</u> | <u>STATUS</u> |
| 8 | Mouat Industries, MT | O | 4 | Southeastern Wood Preserving, MS | O |
| 2 | Vineland Chemical, NJ | C | 9 | Poly-Carb, NV | C |
| 2 | Zhiegner Refining Company, NJ | C | | | |
| 3 | Avtex Fibers, VA | C | | | |
| 5 | PBM Enterprises (Van Dusen Airport Service), MI | C | | | |
| 9 | Gila River Indian Reservation, AZ | C | | | |
| 9 | Stanford Pesticide #1, AZ | C | | | |
| <u>REGION</u> | <u>DECHLORINATION</u> | <u>STATUS</u> | <u>REGION</u> | <u>SOLVENT EXTRACTION</u> | <u>STATUS</u> |
| 6 | Fruitland Drum, NM | D/I | 4 | General Refining, GA | C |
| 2 | Signo Trading/Mt. Vernon, NY | C | 6 | Traband Warehouse, OK | C |
| 7 | Crown Plating, MO | C | | | |
| <u>REGION</u> | <u>OTHER</u> | <u>STATUS</u> | <u>REGION</u> | <u>THERMAL DESORPTION</u> | <u>STATUS</u> |
| 8 | Mystery Bridge Road/Highway 20, OU 2, WY | D | 4 | FCX-Washington Site, NC | PD |
| 2 | Imperial Oil Company, NJ | I | 10 | Drexler - RAMCOR, WA | C |

TABLE 2-4

REMOVAL ACTIONS: TREATMENT TRAINS WITH INNOVATIVE TREATMENT TECHNOLOGIES

Table 2-4 lists the at which innovative treatment technologies are used together with established or other innovative treatment technologies in treatment “trains.” Technologies may be combined to reduce the volume of material requiring further treatment, to prevent the emission of volatile contaminants during excavation and mixing, or to address multiple contaminants in a single medium.

TABLE 2-4. REMOVAL ACTIONS: TREATMENT TRAINS WITH INNOVATIVE TECHNOLOGIES

June 1993

Chemical Treatment Followed by

| | | |
|------------------------|-------------------------------|----|
| In Situ Bioremediation | Gila River Indian Reservation | AZ |
|------------------------|-------------------------------|----|

In Situ Flushing Followed by

| | | |
|------------------------|----------|----|
| In Situ Bioremediation | Polycarb | NV |
|------------------------|----------|----|

Soil Washing Followed by

| | | |
|----------------|------------------------------|----|
| Bioremediation | Southeastern Wood Preserving | MS |
|----------------|------------------------------|----|

Solvent Extraction Followed by

| | | |
|------------------------------|------------------|----|
| Solidification/Stabilization | General Refining | GA |
|------------------------------|------------------|----|

TABLE 2-5

REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS

Table 2-5 provides summary information on the performance and operating parameters for applications of innovative treatment technologies that have been completed at removal sites. It is intended to supplement, not replace, the information included in tables 2-1, 2-2, and 2-3.

**TABLE 2-5
REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS**

June 199:

| Region | Site Name, State, Dates of Operation | Technology/ Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|--|--|-----------------------------|---|--|-----------------------------------|--|---|
| 2 | Signo Trading International, Inc., NY 10/20/87 to 10/21/87 (Removal) | KPEG dechlorination/ Galson Remediation, Syracuse, NY | Sludge (15 gallons) | Dioxin Input - 135 ppb Output - 1 ppb | Temperature: 150°C Time: Overnight | None | Incineration of residuals (without dioxin contamination) at treatment, storage, and disposal facility | |
| 2 # | Vineland Chemical Company, NJ 12/92 (Removal) | Mercury pretreatment precipitated mercury salts into mercury sulfide so that the mercury can be recovered and recycled. ENSCO | Solid 100 lbs | Mercury initial concentration >10% mercury Final concentration of mercury in recyclable precipitate was greater than 80%. Less than 260 ppm if mercury in thatn nonrecycled salt. | Added salt to precipitate the mercury | None | Residual salts containing less than 260 pm mercury were incinerated off-site | First known Superfund site where this process has been applied |
| 2 # | Zhiegner Refining Company (Removal) 2/93 - 6/93 | Mercury pretreatment precipitated mercury salts into mercury sulfide so that the mercury can be recovered and recycled. ENSCO | Solid 100 lbs | Mercury initial concentration >10% mercury Final concentration of mercury in recyclable precipitate was greater than 80%. Less than 260 ppm if mercury in thatn nonrecycled salt. | Added salt to precipitate the mercury | None | Residual salts containing less than 260 pm mercury were incinerated off-site | No comments |

TABLE 2-3
REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1993

| Region | Site Name, State, Dates of Operation | Technology/ Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|--|---|---|--|---|---|--|---|
| 3 | Avtex Fibers, VA 4/90 to 8/91 (Removal) | Chemical treatment (oxidation using NaClO) OH Materials, Findlay, OH (ERCS Contractor) | Sludge/water from storage unit (2 million gallons) | Carbon disulfide Criteria: ≤ 10 ppm - Carbon disulfide in the effluent Input: 50-200,000 ppm Carbon disulfide Output: ≤ 10 ppm Carbon disulfide | Batch operation average retention time - 1 hour pH - 10 Additives: Sodium hypochloride. The retention time and reagent feed rates increased with increasing concentration of sludge in the contaminated water. | Pumping | Salts from the reaction were removed with flocculation and clarifi- cation at existing treatment plant, pH adjustment | Carbon disulfide is unstable and will be found with other contaminants in aqueous waste stream. For additional information on this project, see the Removal Close Out Report available from EPA - Region III or OH Materials. |
| 4 | General Refining Company, GA August-October, 1986 January-February, 1987 (Removal) | Solvent extraction Resource Conservation Technology Company, Bellevue, WA | Sludge (3,448 tons) | Input: PCB - 5.0 ppm Lead - 10,000 ppm Output: PCB - insignificant Lead - concentrated in solids | Continuous operation Time: 2 hours pH: 10 Temp: 20°C Rate: 27 tons/day Moisture content - 60% Additives: Sodium hydroxide Triethylamine | Excavation Screening Neutralization Size Reduction Mixing | Oil - used as fuel for kiln Water - treated, discharged off site Solids - solidified and disposed of on site | The oil recovered from the extractions process could not be sold because of an elevated metals content. The solvent could not be recovered due to leaks in system seals. The unit required a relatively uniform material so materials handling of the sludges proved difficult in the beginning of the project. The lead- bearing solids produced by the dryer also required special handling. Finally, detergents in the sludge hindered oil/water separation. |

TABLE 2-5
REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1993

| Region | Site Name, State, Dates of Operation | Technology/ Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|---|---|--|---|---|--|--|--|
| 4 | Hinson Chemical, SC 12/88 to 3/92 (Removal) | Soil vapor extraction OH Materials Atlanta, GA | Soil (60,000 cy, up to 50 ft deep) | Benzene, TCE, PCE, DCA, MEK At completion: <10 ppm Total VOCs (In all samples); average <1 ppm Total VOCs | In situ; continuous operation (except for occasional shut downs to allow soil gas to reach equilibrium in the pore spaces) | | Air emissions captured on vapor phase carbon No cap needed | |
| 4 # | CSX McCormick Derailment Site, S.C. (Removal) | Soil vapor extraction with air flushing MWRI | Soil (200,000 cy) | Benzene-toluene- ethylbenzene-xylene (BTEX) 130,000 gallon spill | Used a system of extraction and injection wells. 1,000 separate PVC wells. Injection wells 7 to 8 feet deep. Extraction wells 2-3 feet deep. Vapors captured and put through a knock out pot and incinerated. | Brought in clay to cover the area, to prevent air from infiltrating | Residual wastewater sent off-site for treatment | System was successful in decreasing concen- tration to cleanup goals. Had difficulties due to fluctuation of shallow ground water. Did not anticipate the change in ground water to be as drastic as it was. It decreased the efficiency, less vapors and more water. Now need to address ground water. Could have used the soil vapor extraction in a more limited area. |

REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1993

| Region | Site Name, State, Dates of Operation | Technology/ Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|--|---|-----------------------------------|---|---|--|--|---|
| 4 # | Basket Creek Surface Impoundment, GA 11/92 - 2/93 (Removal) | Vacuum extraction of soil pile with horizontal wells (ex-situ) OHM | Soil (2,000 cy) | VOCs TCE, PCE, MEK, MIBK, BTEX High 33% VOCs Average 1-5% Criteria: TCE - 0.5 mg/L TCLP PCE - 0.7 mg/L TCLP All VOCs met TCLP limits | Vacuum pressure monitored. 1,300 CFM/Manifold 3 manifold 6-7 wells/manifold | Surface impoundment used for disposal of waste solvents. Built an enclosure over the site. Excavated the soil and screened it with a power screen. Stacked on PVC extraction wells. Recovered VOCs with duct work and fan. Vapors incinerated. | Residual soils and rejects from screening met TCLP limits and were disposed as nonhazardous as on RCRA Subtitle D landfill. Incinerated 70,000 lbs of VOCs | \$2,000,000 total costs. Permeability in-situ soil was not good at first. Excavation and ex-situ treatment improved permeability. Shouldn't rule out if you can't do in situ. |
| 5 | PBM Enterprises, MI 3/25/85 to 10/28/85 (Removal) | Neutralization with hypochlorite process Mid-American Environmental Service, Riverdale, IL | Film chips (464 tons or 1,280 cy) | Cyanide Input: 200 ppm Output: 20 ppm | Time: 2-3 hours Additives: sodium hydroxide | Agitation | Rinse water, runoff and waste hypochlorite - treated off site Treated chips - landfilled (Subtitle D) | |
| 6 | Traband Warehouse PCBs, OK (Removal) 2/90 to 9/90 | Solvent Extraction/ Terra Kleen | Solids | PCBs Initial: 7,500 ppm | | | | |

TABLE 2-5
REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1993

| Region | Site Name, State, Dates of Operation | Technology/ Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|---|--|-----------------------------|---|---|-----------------------------------|--|----------|
| 7 | Crown Plating, MO 10/1/89 to 12/31/89 (Removal) | Dechlorination using the KPEG process EPA removal contractor | Liquid (5 gallons) | Criteria: Dioxin - <1 ppb Input: Silvex - 10,000 ppm Dioxin equivalents - 24.18 ppb Output: Silvex - 32 ppb Dioxin equivalents - 0.068 ppb | Batch operation Retention time - 36 hours (including time of equipment breakdown) Temperature - 72°C pH - 13 Moisture content - 100% | | Built an on- site vacuum for emissions control Contaminated residual oil incinerated off-site | |
| 7 | Scott Lumber, MO 8/87 - Fall, 91 (Removal) | Land Treatment RETEC Chapel Hill, NC | Soil (16,000 cy) | Criteria: 500 ppm - Total PAH 14 ppm - Benzo(a)pyrene Output: 160 ppm Total PAH 12 ppm Benzo(a)pyrene | Additives: Water phosphates | Tilling | None | |

REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1991

| Region | Site Name, State, Dates of Operation | Technology/ Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|---|--|--------------------------|--|--|-----------------------------|----------------------|---|
| 9 | Gila River Indian Reservation, AZ 3/28/85 to 6/24/85 (Removal) | In situ chemical treatment (followed by anaerobic bio-remediation) EPA removal contractor | Soil (3,220 cy) | Input: Toxaphene - 1,470 ppm Ethyl parathion - 86 ppm Methyl parathion - 24 ppm Output: Toxaphene - 470 ppm Ethyl parathion - 56 ppm Methyl parathion - 3 ppm | pH: 10.2 to 11.8 Moisture: wet Additives to soil: Sodium hydroxide, Water | | Bioremediation | |
| 9 | Gila River Indian Reservation, AZ 6/24/85 to 10/23/85 (Removal) | In situ anaerobic biological treatment (preceded by chemical treatment) EPA removal contractor | Soil (3,220 cy) | Toxaphene Input: 470 ppm Output: 180 ppm | pH: 8.3 to 9.8 Additives to soil: Sulfuric acid, manure, sludge | Tilling | Capped in place | The biological treatment would have been more successful if the neutralization after the chemical treatment had been more complete. The tearing of the plastic sheets covering the soils allowed air in and prevented anaerobic activity. |
| 9 | Roseville Drums, CA 2/12/88 to 11/9/88 (Removal) | In situ Bioremediation EPA removal contractor | Soil (14 cy) | Input: Dichlorobenzene - 4,000 ppm Phenol - 12,000 ppm Output: Dichlorobenzene - 140 ppm Phenol - 6 ppm | Additives to soil: manure, water | Tilling | | |

TABLE 2-5
REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1991

| Region | Site Name, State, Dates of Operation | Technology/ Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|---|---|--|---|--|---|--|--|
| 9 | Stanford Pesticide Site #1, AZ 3/20/87 to 11/4/87 (Removal) | Chemical treatment - alkaline hydrolysis EPA removal contractor | Soil (200 cy) | Methyl parathion Input: 24.2 ppm Output: 0.05 ppm | pH: 9.0 Moisture: wet Additives to soil: soda ash, water, activated carbon | Tilling (in situ, 3 times per week) | | |
| 9 | Poly-Carb, Inc., NV 7/22/87 to 8/16/88 (Removal) | Land treatment and soil washing EPA removal contractor | Soil (1,500 cy) | Input: Phenol 1,020 ppm o-cresol - 100 ppm m- and p-cresol - 409 ppm Output: Phenol - 1 ppm o-cresol - 1 ppm m- and p-Cresol - 0.92 ppm | Additives: water | Excavation Placement in double-lined pit Irrigation Tilling | Leachate collection and treatment with granular activated carbon | This treatment used both bioremediation and soil flushing in one step. |
| 10 # | Drexler-RAMCOR, WA 7/92 to 8/92 (removal) | Low temperature thermal desorption treatment. Thermally treat 3,000 tons of soil on-site up to 700°F. Four Seasons | Soil 3,000 tons (approximately 3,000 cy) | Petroleum hydrocarbons Polynuclear Aromatics, BTEX (Benzene, Toluene, Ethylbenzene, Xylene 200 ppm TPH was target. Initial TPH was 70,000 ppm - (high) 15,000 - 20,000 ppm (average). | 16 hours/day 12 to 15 tons/hr Operating temperature up to 700°F | Excavation screening Removed material greater than 2 inches. Rock washing station for particles greater than 2 inches. Steam cleaned large rocks. | Treated soil was backfilled back into the excavated areas on-site. Soil that did not meet the targets was re-treated. Wastewater was treated on-site through carbon filters. | Total cost approximately \$250,000. |

Chapter 3

Actions Under Other Federal Programs

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ACTIONS UNDER OTHER FEDERAL PROGRAMS

This chapter contains available information on projects conducted under other federal programs that are not part of the Superfund program (non-Superfund sites). Many of these projects take place at DoD and DOE facilities. Many of the DoD projects are funded by the Defense Environmental Restoration Program (DERP), which includes the installation restoration program (IRP) and the formerly used defense sites (FUDS) program in DoD. These sites were identified through various sources of information, including discussions with DoD and DOE personnel. However, this list of sites should not be considered comprehensive.

This chapter contains information on the application of innovative technologies at 28 non-Superfund sites. Figure 3-1 lists each type of innovative treatment technology and the number of times it has been selected as a remedy at a non-Superfund site. Figure 3-2 indicates the status of innovative technologies being applied at non-Superfund sites. Table 3-1 provides detailed information on each application. Tables 3-2 and 3-3 present summaries of each application by status and EPA Region. Table 3-4 lists details on completed applications.

FIGURE 3-1
SAMPLE OF PROJECTS UNDER OTHER FEDERAL PROGRAMS:
STATUS OF INNOVATIVE TREATMENT TECHNOLOGIES AS OF JUNE 1993*

| Technology | Predesign/ In Design | Design Complete/Being Installed/ Operational | Project Completed | Total |
|----------------------------|-------------------------|---|-------------------|-----------|
| Soil Vapor Extraction | 4 | 4 | 1 | 9 |
| Thermal Desorption | 0 | 0 | 0 | 0 |
| Ex Situ Bioremediation | 1 | 1 | 3 | 5 |
| In Situ Bioremediation* | 2 | 5 | 2 | 9 |
| Soil Washing | 1 | 0 | 1 | 2 |
| In Situ Flushing | 0 | 0 | 0 | 0 |
| Dechlorination | 0 | 1 | 0 | 1 |
| Solvent Extraction | 0 | 0 | 0 | 0 |
| In Situ Vitrification | 0 | 0 | 0 | 0 |
| Other Innovative Treatment | 1 | 1 | 0 | 2 |
| Chemical Treatment | 0 | 0 | 0 | 0 |
| TOTAL | 9 (32%) | 12 (33%) | 7 (58%) | 28 |

* Data derived from a survey of EPA Superfund Removal Branch Chiefs and On-Scene Coordinators for each Region.

* Also includes in situ groundwater treatment.

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TABLE 3-1

OTHER FEDERAL PROGRAMS: SITE-SPECIFIC INFORMATION BY INNOVATIVE TREATMENT TECHNOLOGY

Table 3-1 is the principal part of this chapter. It contains the most detailed, site-specific information for removal sites for which an innovative treatment technology has been selected. The columns of Table 3-1 present the following information:

Region

This column indicates the EPA Region in which the site is located.

Site Name, State

This column identifies the site and the operable unit for which an innovative treatment technology was selected.

An asterisk (*) in this column indicates that a treatability study has been completed for this technology at the particular site.

Specific Technology

The second column describes the specific technology selected within a general category of innovative treatment. For example, within the general category of bioremediation, the specific technologies of land treatment or slurry-phase bioremediation may be chosen.

Site Description

This column provides information on the industrial source of the contamination at the site and allows analysis of the selection of innovative technologies by site type. For example, by using the information in this column, one may determine the most frequently selected innovative technology for wood preserving sites.

Media (quantity)

This column provides information on the media and quantity of material to be treated. If a treatment is used in situ, an effort has been made to include the maximum depth of the treatment to provide the reader with another important parameter regarding the application.

TABLE 3-1 (Continued)

Key Contaminants Treated

The major contaminants or contaminant groups targeted by the treatment technology are shown in this column. There may be other contaminants as well that will be treated. Other contaminants that may be present, but that are not being addressed by the listed technology, are not included.

Status

This column gives the status of the application of the innovative treatment technology. **Predesign** indicates that the ROD has been signed but design has not begun. During predesign, EPA may be negotiating with the potentially responsible parties, procuring the services of a design firm, or collecting information (such as conducting a treatability study) needed in the design stage. If a project is in **design**, the engineering documents needed to contract for and build the remedy are being prepared. If a remedy is **being installed**, the lead agency has signed a contract for the construction work needed to set up the remedy. The remedy is **operational** if it is complete and it is now being operated as a treatment system; the remedy is **completed** if the goals of the ROD or decision document for that treatment technology have been met and treatment has ceased.

One purpose of this column is to identify opportunities for vendors to become involved in the next phase of the projects. Whenever possible, the season and year that the current phase will end is given. This information is identified as the "completion planned" date.

Lead Agency, Treatment Contractor

The "lead" indicates whether federal dollars are to be used to implement the remedy (Fund lead) or the potentially responsible parties will conduct the remedy with EPA/State oversight (PRP lead). If a remedy is Fund lead, EPA may manage the design/construction through its contractors, the state may manage the project with Superfund dollars, or the U.S. Army Corps of Engineers (USACE) may act for EPA to manage the design or construction. Whichever agency or organization is responsible for managing the remedy, the contractor responsible for the actual installation and operation of the innovative technology also is identified, if the lead agency has selected a contractor.

Contacts/Phone

This final column gives the names and telephone numbers of useful contacts for the site or technology. The first name listed is usually the project manager or point of contact responsible for the site. If a remedy is being managed by the state, the name and phone number of the state project manager also is provided. Information on any other useful contacts is provided.

Table 3-1
Other Federal Programs: Site-Specific Information By Innovative Treatment Technology

June 1993

Bioremediation (Ex situ)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|--|--|------------------|--|--|--|--|
| | Matagorda Island AF Range, TX | Solid phase | Federal Facility | Soil (500) | VOCs (BTEX), PAHs (TPH, Tar) | Completed; Operational from 10/92 to 3/93 | Army (USACE)/DoD Financed - IRP Program; CCC, Inc. | Vic Heister 918-669-7222 |
| 8 | Former Glasgow AFB, MT | Land treatment | UST removal site | Soil (2,000 cy) | VOCs, PAHs (Petroleum hydrocarbons) | In design; Design completion planned Fall 1993; Contractor will be selected in Fall 1993 | ARMY (USACE)/DoD Financed FUDS Program | Martin Rasmussen (USACE, Omaha) 402-221-3827 Steve Ott (USACE, Omaha) 402-221-7670 |
| 9 | Ft. Ord Marina, Fritzche AAF Fire Drill Area, CA | Land treatment | Fire Drill Area | Soil (4,000 cy) | VOCs (TCE, MEK), PAHs (Petroleum hydrocarbons) | Completed; Winter 1991 | Army (USACE)/DoD Financed - IRP Program | Gail Youngblood 408-242-8017 |
| 9 | Marine Corps., Mountain Warfare Center, Bridgeport, CA | Bioremediation (Ex Situ) Heap pile bioreactor with aeration and irrigation | Federal Facility | Soil (7,000 cy) | PAHs (Petroleum hydrocarbons, Diesel) | Completed; 1989; Pilot-scale project | State Lead/Western Division of NFEC; ENSR | Bill Major 805-982-1808 |
| 0 | Ft. Wainwright*, AK | Land treatment | Federal Facility, fuel pipeline, aboveground storage tank | Soil (4,500 cy) | PAHs (Diesel) | Being installed; Installation completion planned Fall 1993 | Army (USACE)/DoD Financed - IRP Program; Laidlaw | Diane Soderland 907-753-3425 David Williams (USACE) 907-753-5657 |

Status as of June 1993. See Table 3-4 for performance data on completed projects under other Federal programs.

Indicates that a treatability study has been completed.

oe: Contacts listed are EPA regional staff unless otherwise noted.

Table 3-1
Other Federal Programs: Site-Specific Information By Innovative Treatment Technology

June 1993

Bioremediation (In situ)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|--|----------------------------|---|---|---|--|
| 4 | Savannah River DOE, M Area Settling Basin, SC See also Soil Vapor Extraction, Other Technologies | In situ ground water | Leaking solvent line | Groundwater | VOCs (TCE, PCE), PAHs (DNAPLs) | Operational; Operation began in 1990 | DOE Lead/DOE funding; Westinghouse Savannah River Company | Nate Ellis (DOE) (803)-952-4846 Brian Loony (WSRC) (803)-752-5181 |
| 6 | Holloman AFB, Main POL Area, NM See also Soil Vapor Extraction, Other Technologies | In situ ground water injecting air and nutrients | Former above ground fuel storage tank area (JP-4 and AV Gas spill) | Groundwater | VOCs (Benzene), PAHs (Petroleum Hydrocarbons) | In design; Design completion planned Fall 1993; Construction scheduled to start Fall 1993 | USACE/Air Force IRP Program | Ron Stirling (USACE) 402-221-7664 |
| 6 | Kelly AFB, Site 1100*, TX See also Soil Vapor Extraction | In situ soil Bioventing | Federal Facility (hazardous waste facility) | Soil (37,000 cy) | VOCs (JP-4) | Operational; Completion planned 1994 | Army (USACE)/Air Force Funded; IT Corporation | Joe Laird (USACE, Omaha) 402-221-7772 |
| 8 | Ft. Carson*, CO | In situ soil Bioventing | UST Remediation | Soil (quantity unknown) | VOCs (JP-4) | Being installed; Installation completion planned Summer 1993 | Army (USACE)/DoD Financed - IRP; Woodward Clyde | Mike Steffensmeier (USACE) 402-342-7163 |
| 9 | Aua Fuel Farm, Aua Village, American Samoa, | Bioremediation (In Situ) | Fuel Farm | Soil (quantity unknown) | PAHs (Diesel fuel) | Operational | Army (USACE)/DoD Financed - FUDS Program | Helene Takemoto (USACE, pac div) 808-438-6931 |
| 9 | Davis Monthan AFB, AZ | In situ soil | Federal Facility | Soil (440 cy) | PAHs (Petroleum hydrocarbons) | Completed; Operational from 7/91 to 3/92 | USACE/Air Force | Mike Steffansmeyer (USACE, Omaha) 402-221-7163 |

Other Federal Programs: Site-Specific Information By Innovative Treatment Technology

June 1993

Bioremediation (In situ) (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|----------------------------|--|----------------------------|--|--|--|--|
| 9 | Davis Monthan AFB, Site 35, AZ See also Soil Vapor Extraction | In situ soil Bioventing | JP-4 Pump House | Soil (63,000 cy) | VOCs (JP-4), PAHs | In design; Design completion planned Fall 1993 | USACE/ Air Force Funded | Mike Steffanmeyer (USACE, Omaha) 402-221-7163 |
| 9 | Seal Beach Navy Weapons Station, CA See also Soil Vapor Extraction | Anaerobic | Federal Facility Naval weapons station | Soil (1,700 cy) | VOCs (BTEX), PAHs (Petroleum hydrocarbons) | Operational; Operations started in 1989 | Navy/DoD Financed - IRP Program; Jacobs Engineering | Jeff Kidwell (Navy) 619-532-2058 Steve McDonald (Navy) 310-594-7655 |
| | Naval Communication Station, Scotland, | In situ soil | Diesel fuel storage tanks and piping | Soil (quantity unknown) | SVOCs (No.2 Diesel) | Completed; Fall 1985 | Nave Civil Engineering Lab/DoD Federal; Polybac | Deh Bin Chan 805-982-4191 |

Table 3-1
Other Federal Programs: Site-Specific Information By Innovative Treatment Technology

June 1993

Dechlorination

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|------------------------------------|------------------------|------------------|------------------|-----------------------------|--|--|---------------------------|
| 9 | U. S. Public Works Center, Guam | Dechlorination | Federal Facility | Soil (5,500 cy) | PCBs | Operational; Completion planned Summer 1994 | Navy; IT Corp | D.B. Chan 805-982-4191 |

Table 3-1
Other Federal Programs: Site-Specific Information By Innovative Treatment Technology

June 1993

Soil Vapor Extraction

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|--|--|-----------------------------------|---|---|--|---|
| 3 | Langley AFB, IRP Site 28, VA | Soil vapor extraction with air flushing | Federal Facility | Soil (quantity unknown) | VOCs (Gasoline) | Being installed; Installation completion planned Summer 1994 | USACE/Air Force Funded | Tom Zink (USACE, Omaha) 402-342-6051 Dan Musell (Langley) 804-764-3987 |
| 4 | Savannah River DOE, M Area Settling Basin, SC See also Bioremediation (In Situ), Other Technologies | Soil vapor extraction with air flushing with ground water sparging | Leaking solvent line | Soil (450,000 lb), Groundwater | VOCs (TCE, PCE) | Operational; Operation of the SVE system began in 1990 | DOE Lead/DOE Funding; Westinghouse Savannah River Company | Nate Ellis (DOE) 803-952-4846 Brian Looney (WSRC) 803-725-5181 |
| 6 | Holloman AFB, BX Service Station, NM | Soil vapor extraction may supplement with air injection | Service Station | Soil (quantity unknown) | VOCs (Benzene), PAHs (Petroleum Hydrocarbons) | In design; Design completion planned Winter 1993; Currently conducting pilot test. | USACE/Air Force IRP Program; Geraghty & Miller - Prime, Walk Haydel & Associates - Sub | Ron Stirling (USACE) 402-221-7664 |
| 6 | Holloman AFB, Main POL Area, NM See also Bioremediation (In Situ), Other Technologies | Soil vapor extraction with air flushing | Former above ground fuel storage tank area (JP-4 and AV Gas spill) | Soil (quantity unknown) | VOCs (Benzene), PAHs (Petroleum Hydrocarbons) | In design; Design completion planned Fall 1993; Construction scheduled to start Fall 1993 | USACE/Air Force IRP Program | Ron Stirling (USACE) 402-221-7664 |

Table 3-1
Other Federal Programs: Site-Specific Information By Innovative Treatment Technology

June 1993

Soil Vapor Extraction (continued)

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|---|---|----------------------------|---|---|---|--|
| 6 | Kelly AFB, Site 1100*, TX See also Bioremediation (In Situ) | Soil vapor extraction | Federal Facility (hazardous waste facility) | Soil (37,000 cy) | VOCs (JP-4) | Operational; Vacuum extraction done before with bioventing, information the same. | Army (USACE)/Air Force Funded | Joe Laird (USACE, Omaha) 402-221-7772 |
| 9 | Davis Monthan AFB, Site 35, AZ See also Bioremediation (In Situ) | Soil vapor extraction with bioventing | JP-4 Pump House | Soil (63,000 cy) | VOCs (JP-4, Benzene) | In design; Design completion planned Fall 1993 | USACE/Air Force Funded; Montgomery Watson - Design Contractor | Mike Steffansmeier (USACE, Omaha) 402-221-7163 |
| 9 | Luke AFB, AZ | Soil vapor extraction with air flushing and thermal oxidation of off gases | Air Force fire training pits | Soil (35,000 cy) | VOCs (2-hexanone, 2-butanone, 4-methyl 2-pentanone, BTEX) | Completed; Operational from 11/91 to 5/92. Will conduct long-term monitoring afterward | USACE Lead/State Oversight; Envirocon | Jerome Stolinsky (USACE) 402-221-7170 Dan McCafferty (Envirocon) 406-523-1150 |
| 9 | McClellan AFB, CA | Soil vapor extraction | Former fuel and solvent disposal site | Soil (12,000 cy) | VOCs (TCE, DCE, Vinyl chloride, Toluene, Chlorobenzene) | Being installed; Installation completion planned Fall 1993; Pilot-scale test to be complete in Fall 1993 | Air Force; CH2M Hill | Steve Hodge (McClellan AFB) 916-643-0830 Jerry Styles (McClellan AFB) 916-643-0533 Joseph Danko (CH2M Hill) 503-752-4271 |
| 9 | Seal Beach Navy Weapons Station, CA See also Bioremediation (In Situ) | Soil vapor extraction with combustion of air emissions | Federal Facility Naval weapons station | Soil (quantity unknown) | VOCs (BTEX) | In design; Operation to start in 1994 | Navy/DoD Financed - IRP Program; Jacobs Engineering | Jeff Kidwell (Navy) 619-532-2058 Steve McDonald (Navy) 310-594-7655 |

Table 3-1
Other Federal Programs: Site-Specific Information By Innovative Treatment Technology

June 1993

Soil Washing

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|---|------------------------|--|----------------------------|-----------------------------|---|---|--|
| 5 | Saginaw Bay Confined Disposal Facility, MI | Soil Washing | Confined disposal island | Sediments (150 cy) | PCBs | Completed; Summer 1992 | COE lead/Federal Oversite; Bergmann, USA | Jim Galloway (USACE) 313-226-6760 Rick Traver (Bergmann) 202-684-6844 |
| 5 | Twin Cities Army Ammunition Plant, MN | Soil Washing | Munitions manufacturing/ storage | Soil (quantity unknown) | Metals (Lead, Mercury) | Predesign; PD Completion planned Fall 1993 | Federal Facility/State oversight; Wenck Associates, Inc. | Peter Rissel (US Army Env. Center) Martin McCleery (Twin Cities AAP) |

Table 3-1
Other Federal Programs: Site-Specific Information By Innovative Treatment Technology

June 1993

Other

| Region | Site Name, State, (ROD Date) | Specific Technology | Site Description | Media (Quantity) | Key Contaminants Treated | Status# | Lead Agency and Treatment Contractor (if available) | Contacts/Phone |
|--------|--|------------------------|--|------------------|---|---|---|---|
| 4 | Savannah River DOE, M Area Settling Basin, SC See also Bioremediation (In Situ), Soil Vapor Extraction | air sparging | Leaking solvent line | Groundwater | VOCs (TCE, PCE) | Operational; Operational since 1990 | DOE lead/DOE funding; Westinghouse Savannah River Company | Nate Ellis (DOE) 803-952-4846 Brian Looney (WSRC) 803-725-5181 |
| 6 | Holloman AFB, Main POL Area, NM See also Bioremediation (In Situ), Soil Vapor Extraction | Air Sparging | Former above ground fuel storage tank area (JP-4 and AV Gas spill) | Groundwater | VOCs (Benzene), PAHs (Petroleum Hydrocarbons) | In design; Design completion planned Fall 1993; Construction scheduled to start Fall 1993 | USACE/Air Force IRP Program | Ron Stirling (USACE) 402-221-7664 |

TABLE 3-2
OTHER FEDERAL PROGRAMS: INNOVATIVE TREATMENT TECHNOLOGIES
BY EPA REGION

Table 3-2 summarizes the innovative treatment technologies used at sites under other federal programs in each EPA region.

**TABLE 3-2. OTHER FEDERAL PROGRAMS: INNOVATIVE TREATMENT TECHNOLOGIES
BY EPA REGION**

June 1993

| <u>TECHNOLOGY</u> | <u>SITE NAME</u> | <u>STATE</u> | <u>TECHNOLOGY</u> | <u>SITE NAME</u> | <u>STATE</u> |
|--------------------------|--|--------------|-----------------------------|--|--------------|
| <u>REGION 3</u> | | | <u>REGION 8 (continued)</u> | | |
| Soil Vapor Extraction | Langley AFB, IRP Site 28 | VA | Bioremediation (Ex situ) | Former Glasgow AFB | MT |
| <u>REGION 4</u> | | | <u>REGION 9</u> | | |
| Bioremediation (In situ) | Savannah River DOE, M Area Basin | SC | Bioremediation (In situ) | Aua Fuel Farm, Aua Village, American Samoa | AZ |
| Soil Vapor Extraction | Savannah River DOE, M Area Basin | SC | Bioremediation (In situ) | Davis Monthan AFB | AZ |
| Air Sparging | Savannah River DOE, M Area Basin | SC | Bioremediation (In situ) | Davis Monthan AFB, Site 35 | AZ |
| <u>REGION 5</u> | | | Soil Vapor Extraction | Davis Monthan AFB, Site 35 | AZ |
| Soil Washing | Saginaw Bay Confined Disposal Facility | MI | Soil Vapor Extraction | Luke AFB | AZ |
| Soil Washing | Twin Cities Army Ammunition Plant | MN | Bioremediation (Ex situ) | Ft. Ord Marina, Fritzche AAF F | CA |
| <u>REGION 6</u> | | | Bioremediation (Ex situ) | Marine Corps., Mountain Warfare | CA |
| Bioremediation (In situ) | Holloman AFB, Main POL Area | NM | Bioremediation (In situ) | Seal Beach Navy Weapons Station | CA |
| Soil Vapor Extraction | Holloman AFB, BX Service Station | NM | Soil Vapor Extraction | McClellan AFB | CA |
| Soil Vapor Extraction | Holloman AFB, Main POL Area | NM | Soil Vapor Extraction | Seal Beach Navy Weapons Station | CA |
| Air Sparging | Holloman AFB, Main POL Area | NM | Dechlorination | U. S. Public Works Center, Guam | GU |
| Bioremediation (Ex situ) | Matagorda Island AF Range | TX | <u>REGION 10</u> | | |
| Bioremediation (In situ) | Kelly AFB, Site 1100 | TX | Bioremediation (Ex situ) | Ft. Wainwright | AK |
| Soil Vapor Extraction | Kelly AFB, Site 1100 | TX | <u>OTHER</u> | | |
| <u>REGION 8</u> | | | Bioremediation (In situ) | Naval Communication Station | Scotland |
| Bioremediation (In situ) | Ft. Carson | CO | | | |

TABLE 3-3

OTHER FEDERAL PROGRAMS: PROJECT STATUS BY

INNOVATIVE TREATMENT TECHNOLOGY

Table 3-3 lists the applications of innovative treatment technologies at other federal program sites by technology and summarizes the status of the specific application. The symbols used in this table are:

- PD - **In predesign:** A site may be considered to be in predesign if EPA is negotiating the consent decree for the design with the responsible party, the lead agency is preparing the predesign report, the lead agency is contracting for the design firm, or the lead agency is conducting a treatability study or field investigation before beginning actual design work.
- D - **In design:** A site is considered to be in design after the design contractor has begun work.
- D/I - **Design completed but not installed:** This symbol is used if the **design** work had been completed but **installation** work has not yet begun at the time of publication of this report.
- I - **Being installed:** An innovative treatment technology is "being installed" from the time the construction contract has been awarded until the time the treatment system has begun operation. For some technologies, this is a relatively short phase of the project, because such projects are assembled quickly on site. For other technologies, the period of installation lasts several construction seasons.
- O - **Operational:** A treatment technology is operational once it has been constructed and has been proven to be functional. The length of time required to complete the operation phase depends on such factors as the nature of the technology, the quantity of material to be treated, and the concentrations of the contaminants at the start of treatment.
- C - **Completed:** A treatment technology project is considered to be completed when the operation of the treatment technology ceases. Other site activities still may be planned or underway.

TABLE 3-3. OTHER FEDERAL PROGRAMS: PROJECT STATUS BY INNOVATIVE TREATMENT TECHNOLOGY

| REGION BIOREMEDIATION (EX SITU) | | STATUS | REGION SOIL VAPOR EXTRACTION | | STATUS |
|---------------------------------|--|--------|------------------------------|---|--------|
| 8 | Former Glasgow AFB, MT | D | 6 | Holloman AFB, Main POL Area, NM | D |
| 10 | Ft. Wainwright, AK | I | 6 | Holloman AFB, BX Service Station, NM | D |
| 6 | Matagorda Island AF Range, TX | C | 9 | Seal Beach Navy Weapons Station, CA | D |
| 9 | Ft. Ord Marina, Fritzche AAF Fire Drill Area, CA | C | 9 | Davis Monthan AFB, Site 35, AZ | D |
| 9 | Marine Corps., Mountain Warfare Center, Bridgeport, CA | C | 3 | Langley AFB, IRP Site 28, VA | I |
| | | | 9 | McClellan AFB, CA | I |
| | | | 4 | Savannah River DOE, M Area Settling Basin, SC | O |
| | | | 6 | Kelly AFB, Site 1100, TX | O |
| | | | 9 | Luke AFB, AZ | C |
| REGION BIOREMEDIATION (IN SITU) | | STATUS | | | |
| 6 | Holloman AFB, Main POL Area, NM | D | REGION SOIL WASHING | | STATUS |
| 9 | Davis Monthan AFB, Site 35, AZ | D | 5 | Twin Cities Army Ammunition Plant, MN | PD |
| 8 | Ft. Carson, CO | I | 5 | Saginaw Bay Confined Disposal Facility, MI | C |
| 4 | Savannah River DOE, M Area Settling Basin, SC | O | | | |
| 6 | Kelly AFB, Site 1100, TX | O | REGION OTHER | | STATUS |
| 9 | Seal Beach Navy Weapons Station, CA | O | 6 | Holloman AFB, Main POL Area, NM | D |
| 9 | Aua Fuel Farm, Aua Village, American Samoa | O | 4 | Savannah River DOE, M Area Settling Basin, SC | O |
| 9 | Davis Monthan AFB, AZ | C | | | |
| | Naval Communication Station, Scotland | C | | | |
| REGION DECHLORINATION | | STATUS | | | |
| 9 | U. S. Public Works Center, Guam, GU | O | | | |

TABLE 3-4

OTHER FEDERAL PROGRAMS: PERFORMANCE DATA ON COMPLETED PROJECTS

Table 3-4 provides summary information on the performance and operating parameters for applications of innovative treatment technologies that have been completed at non-Superfund sites. It is intended to supplement, not replace the information included in tables 3-1, 3-2, and 3-3.

TABLE 3-4
OTHER FEDERAL PROGRAMS: PERFORMANCE DATA ON COMPLETED PROJECTS

June 1993

| Region | Site Name, State, Dates of Operation | Technology/ Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|---|--|-----------------------------|---|---|---|--|--|
| 5 | Saginaw Bay Confined Disposal Facility, MI October 1991 to June 4, 1992 (Army) | Soil washing; Water with flocculant and surfactant as an additive Bermann USA Stafford Springs, CT | Sediment (150 cy) | PCBs | 30 cy of sediment treated per day | Dredging Screening Size Reduction | Residuals were left at the facility Wastewater discharged to confined disposal facility | Forced cold-weather shut down is a limitation |
| 6 # | Matagorda Island Af Range, TX 10/92 to 2/28/93 | Ex situ bioremediation; solid phase All constructed on abandoned runway. Bacteria added and mechanically mixed. Four USTs found contamination under one UST. CCC, Inc. San Antonio, TX | Soil (500 cy) | TPH, PAHs benzene-toluene-ethylbenzene-xylene (BTEX) TPH - 3,400 ppm BTEX - 41.3 ppm Criteria: Texas water commission standards 100 ppm for TPH 30 ppm for combined BTEX | Batch process Retention time: 3 months 9 inch layers treated. Ambient temperature bacterial added to waste | Excavated approximately 40 by 60 ft area. Constructed on poly barrier and clean sand base. Did some mixing. | Backfilled the soil into the excavation | Island is now a wildlife refuge, has an endangered species. |
| 9 | Ft. Ord Marina, Fritzsche AAF Fire Drill Area, CA Winter 1991 (Army) | Land farming | Soil (4,000 cy) | TCE, MEK, TPH, BTEX | Initial concentration > 1,000 ppm End concentration < 200 ppm | None | None | Gail Youngblood 408-242-8017 |
| 9 | Marine Corps. Mountain Warfare Center Bridgeport, CA 8/89 to 11/89 (Navy) | Bioremediation (ex situ); heap pile bioreactor | Soil (7,000 cy) | PAHs (petroleum hydrocarbons, diesel), Metals (Lead) After 2 months of operation the TPH levels were 120 ppm | | Excavation | | Temperature, pressure and moisture content are monitored Bill Major (DoD) 805-982-1808 |

TABLE 3-4
OTHER FEDERAL PROGRAMS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1995

| Region | Site Name, State, Dates of Operation | Technology/ Vendor | Media Treated (Quantity) | Key Contaminants Treated | Operating Parameters | Materials Handling Required | Residuals Management | Comments |
|--------|--|--|--|---|---|-------------------------------------|--------------------------------|---|
| 9 # | Luke AFB, AZ 11/92 to 5/9 | Soil vapor extraction with air flushing and thermal oxidation of off-gases Jacobs Engineering | Soil (35,000 cy) | VOCs (2-hexanone, 2-butanone, 4-methyl 2-pentanone, BTEX) Removed approximately 11,000 lbs of vapors and 4,000 lbs of condensate | In situ down to 100 feet | None | Vapors were thermally oxidized | Total petroleum hydrocarbons were present but were too heavy to volatilize. Would recommend combining SVE with in situ bioremediation to treat contaminants that could not be extracted with the SVE. |
| | Naval Communication Station, Scotland February to October 1985 (Navy) | Bioremediation In situ soil, in situ ground water | Soil, Groundwater Soil quantity approximately 800 m ² in area, depth unknown | TPH (No. 2 diesel fuel) | Microorganisms function best between 20°C and 35°C. | Run-off water collected in a trench | None | The contaminated area had considerable slope, and the contaminated soil was a thin layer over a relatively impermeable rock substrate. |

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Appendix A
Summary of Status Report Updates, Changes,
and Deletions

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Each edition of this report has added new information on the applications of innovative technologies at Superfund sites and has updated the status of existing innovative projects. The information added from ROD's from previous fiscal years that was deleted, or changed in each edition (from the first edition of the report published in January 1991 through this 5th edition) is described below to allow tracking of specific projects from edition to edition.

Additions, Changes, and Deletions from the 1st edition report (January 1991) to the 2nd edition report (September 1991).

| Region | Site Name, State (ROD Date) | Technology (Listed in 1st Edition) | 2nd Edition | | | Comments | Contacts/Phone |
|--------|---|------------------------------------|-------------|---|----------------|---|---|
| | | | Added | Deleted | Changed to | | |
| 3 | Leetown Pesticides, WV (03/31/86) | Bioremediation | | Yes | | No further action. Risk re-evaluated and was determined that risk was not sufficient for remedial action. | Andy Palestini 215-597-1286 Philip Rotstein 215-597-9023 |
| 3 | Harvey-Knott Drum, DE (09/30/85) | In Situ Soil Flushing | | Yes | | During remedial design, sampling indicated VOCs were no longer present in the soils. Heavy metals remained at the surface. An ESD was issued on 12/92. Remedy will consist of capping the site. | Kate Lose 215-597-0910 |
| 2 | SMS Instruments (Deer Park), NY (09/29/89) | Thermal Desorption | | Yes (changed to soil vapor extraction in 3rd edition) | | Misinterpretation of ROD during ROD analysis | Miko Fayon 212-264-4706 |
| 1 | Re-Solve, MA (09/24/87) | Chemical Treatment | | | Dechlorination | Reclassified technology | Lorenzo Thantu 617-223-5500 |
| 2 | GE Wiring Services, PR (09/30/88) | Chemical Extraction | | | Soil Washing | Reclassified technology | Caroline Kwan 212-264-0151 |
| 6 | Sol Lynn/Industrial Transformers, TX (03/25/88) | Chemical Treatment | | | Dechlorination | Reclassified technology | John Meyer 214-655-6735 |
| 10 | Northwest Transformer, WA (09/15/89) | In Situ Vittrification | | Yes | | Technology dropped because commercial availability was delayed | Christine Psyk 206-553-6519 |

Note: The 2nd edition report also added information on 45 innovative treatment technologies selected for remedial actions in FY 1990 RODs and 18 innovative treatment technologies used in removal actions.

Additions, Changes, and Deletions from the 2nd edition report (September 1991) to the 3rd edition report (April 1992).

| 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 NY state standards. GW monitoring will continue. | Pam Tames 212-264-1036 |
| 2 | Goose Farm, NJ (09/27/85) | In Situ Soil Flushing | | Yes | | Incorrectly classified. Actually conducting pump and treat with treated water being reinjected | 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 212-264-0151 |
| 4 | Coleman-Evans Wood Preserving, FL (09/26/90) | Soil Washing | | Yes | | Problems due to the presence of furans. Incineration likely | Tony Best 404-347-2643 |
| 5 | Sangamo/Crab Orchard National Wildlife Refuge, IL (08/01/90) | In Situ Vittrification | | Yes | Incineration | ROD specified the remedy as in situ vittrification <u>or</u> incineration. Incineration was chosen | Nan Gowda 312-353-9236 |
| 5 | Anderson Development, MI (09/28/90) | In Situ Vittrification | | | Thermal Desorption | Because of concern by the community the remedy was changed. ROD amendment signed 9/30/91, and ESD was signed 10/2/92 | Jim Hahnenberg 312-353-4213 |
| 5 | U.S. Aviex, MI (09/07/88) | In Situ Flushing | | Yes | | Cleanup levels 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 Vittrification | | Yes | | Remedy reconsidered after delay in commercial availability of technology. Vittrification considered for hot spots only. Revised remedy will consist of capping and off-site disposal/consolidation of soils. | Lisa Price 214-655-6735 |

Note: The 3rd edition report also added information on 70 innovative treatment technologies selected for remedial actions in FY 1991 RODs.

| Region | Site Name, State (ROD Date) | Technology (Listed in 2nd Edition) | 3rd Edition | | | Comments | Contacts/Phone |
|--------|--------------------------------|------------------------------------|-------------|---------|--------------------------|--|--|
| | | | Added | Deleted | Changed to | | |
| 9 | Solvent Service, CA (09/27/90) | Bioremediation (in situ) | | Yes | | ROD was misinterpreted during ROD analysis | Kevin Graves 510-286-0435 Steve Morse (CA) 570-286-0304 |
| 9 | Poly Carb, NV (Removal) | Bioremediation (ex situ) | | | Bioremediation (in situ) | Reclassified technology | Bob Mandel 415-744-2290 |

Additions, Changes, and Deletions from the 3rd edition report (April 1992) to the 4th edition report (October 1992).

| Region | Site Name, State (ROD Date) | Technology (Listed in 3rd Edition) | 4th Edition | | | Comments | Contacts/Phone |
|--------|--|------------------------------------|--------------------|---------|-----------------------------|---|--------------------------------|
| | | | Added | Deleted | Changed to | | |
| 2 | Lipari Landfill Marsh Sediment, NJ (07/11/88) | None | Thermal Desorption | | | Missed during original ROD analysis | Tom Graff 816-426-2296 |
| 2 | GE Wiring Services PR (09/30/88) | Thermal Desorption | | | Soil Washing | | Caroline Kwan 212-264-0151 |
| 5 | University of Minnesota, MN (06/11/90) | Thermal Desorption | | Yes | Incineration in 5th edition | Issued an ESD in August 1991 to change remedy to Thermal Desorption <u>or</u> Incineration. Incineration was chosen because it was less expensive | Darrel Owens 312-886-7089 |
| 6 | Sol Lynn/Industrial Dechlorination Transformers, TX (03/25/88) | Dechlorination | | Yes | | Discontinued due to implementation difficulties | John Meyer 214-655-6735 |
| 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 (03/31/88) | Soil Washing | Soil Washing | | | Missed during original ROD analysis | Chip Humphries 503-326-2678 |

Note: The 4th edition report also added information on 10 innovative treatment technologies selected for remedial action in FY 1992 RODs, and 21 innovative treatment technologies at non-Superfund sites.

Additions, Changes, and Deletions from the 4th edition report (October 1992) to the 5th edition report (September 1993).

| Region | Site Name, State (ROD Date) | Technology Listed in 4th Edition | 5th Edition | | | Comments | Contacts/Phone |
|--------|--|----------------------------------|-------------|---------|------------|---|---|
| | | | Added | Deleted | Changed to | | |
| 1 | Re-Solve, MA (09/24/87) | Dechlorination | | Yes | | Pilot study showed that dechlorination increased the volume and that the waste still needed to be incinerated. 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 Warfare Center, OU 1, NJ (02/04/91) | In Situ Flushing | | Yes | | Remedy involves pump and treat with on-site discharge. Soil is not being targeted. | Jeff Gratz 212-264-6667 |
| 2 | Naval Air Warfare Center, OU 2, NJ (02/04/91) | In Situ Flushing | | Yes | | Remedy involves pump and treat with on-site discharge. Soil is not being targeted. | Jeff Gratz 212-264-6667 |
| 2 | Naval Air Warfare Center, OU 4, NJ (02/04/91) | In Situ Flushing | | Yes | | Remedy involves pump and treat with on-site discharge. Soil is not being targeted. | Jeff Gratz 212-264-6667 |
| 2 | Caldwell Trucking, NJ (09/25/86) | Thermal Desorption | | Yes | | Thermal desorption not needed because highly contaminated soil will be incinerated off-site instead. Remainder will be stabilized. ESD issued. | Ed Finnerty 212-264-3555 |
| 3 | Tobylanna 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 |

Note: The 5th edition report also adds information on 49 innovative treatment technologies selected for remedial actions in FY 1992 RODs, and 15 innovative treatment technologies used in removal actions.

Additions, Changes, and Deletions from the 4th edition report (October 1992) to the 5th edition report (September 1993). (continued)

| Region | Site Name, State (ROD Date) | Technology Listed in 4th Edition | 5th Edition | | | Comments | Contacts/Phone |
|--------|---|----------------------------------|-----------------------|---------|------------|--|--------------------------------|
| | | | Added | Deleted | Changed to | | |
| 4 | Smith's Farm Brooks (09/30/91) | Dechlorination | Thermal Desorption | | | Will alter chemistry to achieve dechlorination during thermal desorption. | Tony DeAngelo 404-347-7791 |
| 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 adequately reduced. Also discovered dioxins at much higher concentrations | Mark Fite 404-347-2643 |
| 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 adequately reduced. Also discovered dioxins at much higher concentrations | Mark Fite 404-347-2643 |
| 4 | Hollingsworth Solderless, FL (04/10/86) | None | Soil Vapor Extraction | | | Listed as soil aeration in 3rd edition | John Zimmerman 404-347-2643 |
| 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 implementation difficulties and escalating cost. Cost doubled from cost projected in ROD. Issuing ROD amendment to cap in place. | 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 be able to achieve cleanup levels. | Bruce Morrison 913-551-7755 |

Additions, Changes, and Deletions from the 4th edition report (October 1992) to the 5th edition report (September 1993). (continued)

| Region | Site Name, State (ROD Date) | Technology Listed in 4th Edition | 5th Edition | | | Comments | Contacts/Phone |
|--------|---|----------------------------------|-----------------------|---------|--------------------|--|---|
| | | | Added | Deleted | Changed to | | |
| 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 issued early September 1993. | Erna Acheson 303-294-1971 |
| 9 | Koppers Company (Oroville), CA (04/04/90) | Bioremediation (Ex Situ) | | Yes | | Misinterpretation of ROD during ROD analysis | Fred Schlauffler 415-744-2365 |
| 9 | Signetics (AMD 901) TRW OU, CA (09/11/91) | None | Soil Vapor Extraction | | | Remedy added | Joe Healy 415-744-2331 Kevin Graves (CA) 510-286-0435 |
| 9 | Teledyne Semiconductors, CA (09/30/91) | None | Soil Vapor Extraction | | | Dropped by mistake from 4th edition | Sean Hogan 415-744-2233 |
| 10 | IDEL Warm Waste Pond, ID (12/05/91) | Acid Extraction | | Yes | | Treatability study of acid extraction did not achieve good extraction rates. Did not reduce the volume of waste. Will excavate, consolidate and cap. | Linda Meyer 206-553-6636 Nolan Jenson (DOE) 208-526-0436 |
| 10 | IDEL Warm Waste Pond, ID (12/05/93) | Soil Washing | | Yes | | Treatability study of soil washing did not achieve results. Did not reduce the volume of waste. Will excavate, consolidate and cap. | Linda Meyer 206-553-6636 Nolan Jenson (DOE) 208-526-0436 |