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Progress Toward Implementing Superfund Fiscal Year 1991

Report To Congress

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February 1994

Progress Toward Implementing SUPERFUND

Fiscal Year 1991

REPORT TO CONGRESS

Required by
Section 301(h) of the
Comprehensive Environmental Response,
Compensation and Liability Act (CERCLA) of 1980,
as amended by the Superfund Amendments and
Reauthorization Act (SARA) of 1986

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Notice

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Foreword

The Environmental Protection Agency (EPA) continued its progress in protecting public health, welfare, and the environment through the Superfund program in fiscal year 1991 (FY91). As it completed the eleventh year of the program, the Agency reported clean-up work progress or completion at 93 percent of the 1,207 sites on the National Priorities List. The FY91 accomplishments reflect activities initiated by the 30-Day Task Force and continued success in implementing *A Management Review of the Superfund Program* (the FY89 90-Day Study). EPA is pleased to submit this report documenting the fiscal year's achievements.

Section 301(h) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund), as amended by the Superfund Amendments and Reauthorization Act of 1986, requires the Agency to report annually on response activities and accomplishments and to compare remedial and enforcement activities with those undertaken in previous fiscal years. As a result of emphasis on remedial construction, the Agency achieved remedial program records with a total of 196 records of decisions signed, and 161 remedial designs and 104 remedial actions started by EPA and potentially responsible parties during the fiscal year. This represents an increase of more than 26 percent for each of these remedial activities over FY90. In addition, nine sites were deleted from the National Priorities List during FY91, which is nearly one-fourth of all sites deleted over the past 11 years.

EPA has continued its increasingly successful efforts to compel potentially responsible parties to clean up hazardous waste sites. Potentially responsible parties began 113, or 70 percent, of the 161 remedial designs started in FY91, compared to 76, or 59 percent, of the 128 remedial designs started in FY90. EPA entered into 263 enforcement agreements with a potential value of $1.4 billion; this is the second consecutive year in which Superfund enforcement agreements averaged over $1 billion. The Agency started its 2,000th Fund-financed removal action, one of 341 removals started during the fiscal year that were funded by potentially responsible parties or the Superfund Trust Fund. EPA also continued to encourage public involvement in the Superfund process, to enhance partnerships with states and Indian tribes, and to encourage the use and development of treatment technologies.

In addition to providing an overall perspective on progress in the past fiscal year, the report contains information Congress specifically requested in Section 301(h) of CERCLA, including an abstract of each record of decision that was signed in FY91; a report on the status of remedial actions, including enforcement activity in progress at the end of the fiscal year; and an evaluation of newly developed feasible and achievable treatment technologies. The report also includes a description of current minority firm participation in Superfund contracts and our efforts to encourage their increased participation, as required by Section 105(f).

Foreword (continued)

The report fulfills the requirement of Section 301(h)(1)(E) for an annual update on progress being made at sites subject to review under Section 121(c). Appendix D consists of a matrix that charts the progress of EPA and other government organizations in meeting Superfund-related statutory requirements. This report also satisfies other reporting requirements of Section 121(c); the *EPA Annual Report to Congress: Progress Toward Implementing CERCLA at EPA Facilities as Required by CERCLA Section 120(e)(5)* is included as Appendix E. The EPA Inspector General's report on the reasonableness and accuracy of the information in this report, as required by Section 301(h)(2), is included as Appendix F.

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Executive Summary

As the Superfund program reached its ten-year anniversary in December 1990, the U.S. Environmental Protection Agency (EPA or "the Agency") continued to achieve the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Superfund Amendments and Reauthorization Act of 1986 (SARA) for protecting public health, welfare, and the environment. To expedite hazardous site cleanups, the Agency embarked upon many new initiatives resulting from internal and external review of the Superfund program, as well as public response to the program.

Two major studies conducted by EPA task forces provided an in-depth evaluation of the program and recommendations for improvements. The 30-Day Study Task Force focused on identifying options for accelerating the rate of cleanups and evaluating the assumptions used in assessing and managing risk at Superfund sites. A second task force convened to assess and improve management of the Alternative Remedial Contracting Strategy (ARCS) contracts.

In addition, the Agency continued initiatives begun during FY89 pursuant to the *Management Review of the Superfund Program* (the 90-Day Study). The study outlined a Superfund strategy involving: the use of "enforcement first" to compel potentially responsible party (PRP) response; controlling acute threats immediately; addressing the worst problems at the worst sites first; and developing new technologies for more effective cleanups. FY90 efforts to implement the 90-Day Study formed a solid basis for Superfund progress achieved during FY91.

This report identifies the Agency's accomplishments during the ten years of the program, highlighting accomplishments of FY91. The statistics which support accomplishments cited in this report frequently include data that are over 10 years old. Over time, definitions of accomplishment categories have been refined to reflect changes and priorities as the program has evolved and data have been continuously reviewed to improve quality. Computer select logic has been revised to accommodate these definitional changes. The effect of these changes is some adjustments to previously reported numbers. For the 10-year period, FY80 to FY90, remedial investigation/feasibility study (RI/FS) starts and remedial design (RD) starts have each had a net increase of approximately 10 percent. Removal completions reported for the same period increased almost 4 percent, while records of decision (RODs) reported decreased 1 percent. We continue to make every effort to present the most accurate and up-to-date picture of progress toward implementing Superfund. We believe that the statistical data cited in this report are the most accurate we can provide.

Remedial and Enforcement Program Accomplishments

The Agency's accomplishments in remedial and enforcement activities reflect continuing implementation of the recommendations of the 90-Day Study, as well as ongoing implementation of the more recent 30-Day Study. The principal goal of the 30-Day Study is to accelerate the rate of cleanups at all sites on the National Priorities List (NPL). By the

end of FY91, construction to implement clean-up remedies was completed at 61 sites including 38 sites deleted from the NPL. Action had been taken at 93 percent of the 1,207 sites on the NPL.

The acceleration toward construction completion has lead to a dramatic increase in later-stage remedial activities [RODs signed and RDs and remedial actions (RAs) started]. This increase also reflects the Agency's response commitment to meeting statutory targets for RA starts. Exhibit ES-1 summarizes FY91 program accomplishments; Exhibit ES-2 provides a comparison of FY91 accomplishments with previous years.

- During FY91, 104 RAs were started, a 32 percent increase over RA starts in FY90.
- A total of 161 RDs were started in FY91, a 26 percent increase over RD starts in FY90.
- A total of 196 RODs were signed, including 175 RODs financed by Superfund and 21 financed by other federal agencies at federal facility sites.
- Seventy-four remedial investigations/feasibility studies (RI/FSs) were begun in FY91, representing a decrease of approximately 55 percent from FY90. This reduction in the number of RI/FS starts is a result of the Agency's decision to maximize the number of RAs and construction completions.

  EPA's FY91 enforcement achievements directly reflect the success of the Agency's commitment to "enforcement first." The Agency achieved 263 total enforcement agreements with PRPs, valued at $1.4 billion in estimated value of response work. Settlements have averaged $1 billion annually for the past two years.

Program Initiatives

In the wake of success in improving the Superfund program through implementing recommendations of the 90-Day Study Task Force, the EPA Administrator ordered the formation of task forces throughout the program to study and make further recommendations to improve the program. During the fiscal year, the Agency launched several significant initiatives to enhance Superfund progress based on these recommendations.

The 30-Day Study

The 30-Day Task Force was tasked with recommending methods for accelerating cleanup and managing risks at Superfund sites. Key recommendations of the 30-Day Study Task Force include:

Setting Aggressive Clean-Up Targets: EPA proposed the commitment of additional resources to complete remedial construction at Superfund sites. Targets for construction completion at sites on the NPL are:

- 130 total site completions by the end of 1992;
- 200 total site completions by the end of 1993; and
- 650 total site completions by the year 2000.

To formulate policies necessary to achieve these targets, EPA established a workgroup of Headquarters and regional representatives.

Streamlining the Superfund Process: EPA examined each stage of the Superfund process to identify opportunities for accelerating cleanups. The 30-Day Study Task Force recommended improvements in each phase of remedial activity.

Elevating Site-Specific Issues: In cases where a delay requires resolution of an issue involving a state, the Department of Justice, or another agency, EPA will expedite action by elevating the issue to upper federal and state management levels.

Accelerating Private-Party Cleanups: EPA developed a final policy statement intended to accelerate private party cleanup by limiting "midstream" private party takeovers. Policy will also be issued to stress accelerated cleanups by emphasizing start of RD prior to entry of a consent decree.

Communicating Superfund Success: EPA is developing a strategy to increase public awareness of Superfund accomplishments by broadening the scope of public information and outreach to encompass all aspects of the program.

Exhibit ES-1
Summary of Fiscal Year 1991 Superfund Program Activities

REMEDIAL PROGRAM ACTIVITIES	
Percentage of National Priorities List Sites Where Work Has Begun	93%
Sites Where All Construction Work to Implement Cleanup Was Completed by September 30, 1991	61
Sites with Remedial Activities in Progress on September 30, 1991	912
Records of Decision Signed [1]	196
Remedial Investigation/Feasibility Study Starts	74
Fund-financed	*22*
Potentially Responsible Party-financed	*52*
Remedial Investigations/Feasibility Studies in Progress on September 30, 1991	889
Remedial Design Starts	161
Fund-financed	*48*
Potentially Responsible Party-financed	*113*
Remedial Designs in Progress on September 30, 1991	374
Remedial Action Starts	104
Fund-financed	*39*
Potentially Responsible Party-financed	*65*
Remedial Actions in Progress on September 30, 1991	307
REMEDIAL PROGRAM ACTIVITIES	
Removal Completions	265
Fund-financed	*210*
Potentially Responsible Party-financed	*55*
Removal Starts	341
Fund-financed	*238*
Potentially Responsible Party-financed	*103*

[1] **Includes all records of decision by the Agency, including federal facility records of decision.**

Sources: CERCLIS; EPA Office of Emergency and Remedial Response; EPA Office of Waste Programs Enforcement; *Federal Register* notices through September 30, 1991.

Exhibit ES-1 (continued)
Summary of Fiscal Year 1991 Superfund Program Activities

SITE ASSESSMENT PROGRAM ACTIVITIES[1]

National Priorities List[2] Sites to Date	1,207
Sites Proposed for Listing during FY91	*23*
Final Sites Listed during FY91	*7*
Sites Proposed for Deletion during FY91	*1*
Sites Deleted during FY91	*9*

ENFORCEMENT PROGRAM ACTIVITIES

Settlements for All Potentially Responsible Party Response Activities	263	($1.4 billion)[3]
Remedial Design/Remedial Action Settlements[4]	101	($1.12 billion)
Unilateral Administrative Orders Issued (all actions)	137	N/A
Remedial Design/Remedial Action Unilateral Administrative Orders in Compliance	30	($286 million)
Cost Recovery Dollars Collected	N/A	($83.4 million)

ACCOMPLISHMENTS AT FEDERAL FACILITIES SITES

Records of Decision Signed	21
Remedial Investigation/Feasibility Study Starts	115
Remedial Design Starts	23
Remedial Action Starts	15

1 Information on all site assessment accomplishments is not included in this report because of an ongoing OIG investigation, it will be included in the FY92 report.
2 Includes proposed and listed sites. Does not include 38 deleted sites.
3 Estimated value of work potentially responsible parties have agreed to undertake.
4 Remedial design/remedial action settlements include remedial design/remedial action consent decrees and unilateral administrative orders with which potentially responsible parties have stated their intention to comply.

Sources: CERCLIS; EPA Office of Emergency and Remedial Response; EPA Office of Waste Programs Enforcement; *Federal Register* notices through September 30, 1991.

Exhibit ES-2
Summary of Program Activity by Fiscal Year[1,2]

	FY80-86 Total	FY87	FY88	FY89	FY90	FY91	Total[3]	Total[4]
Removal Completions	811	232	320	255	294	265	2,177	2,215
National Priorities List Sites[5]	888	951	1,177	1,226	1,207	1,207	1,207	1,207
Remedial Investigation/Feasibility Study Starts	656	210	174	172	166	74	1,452	1,891
Records of Decision Signed	199	77	152	136	149	175	888	944
Remedial Design Starts	124	109	116	175	128	161	813	886
Remedial Action Starts	70	67	70	110	79	104	500	555
National Priorities List Deletions	13	0	4	11	1	9	38	38

1 Information on site assessment accomplishments is not included in this report because of an ongoing OIG investigation; it will be included in the FY92 report.
2 Historical numbers have been updated. See explanation on page xiii in the Executive Summary of this report.
3 **Includes only activities where Fund monies were spent.**
4 Includes activities conducted by federal facilities and states where no Superfund resources were used.
5 The figures reported in this row represent the cumulative total of proposed and final National Priorities List sites as of the end of each fiscal year. At the end of FY91, 22 sites were proposed for listing. Fourteen sites previously proposed for listing were removed from consideration for listing.

Sources: CERCLIS; EPA Office of Emergency and Remedial Response; *Federal Register* notices through September 30, 1991.

Segregating Federal Facilities on the National Priorities List: To indicate that cleanup of federal facilities on the NPL is not EPA's responsibility, the 30-Day Study Task Force recommended that federal facilities be listed on the NPL within a distinct category. In February 1992, Update 12 to the NPL was published with new language clearly distinguishing the roles of EPA and other federal agencies.

Reviewing Risk Assessment and Risk Management Policies: To promote more consistent and expeditious risk assessments in the Superfund program, the Agency developed the *Risk Assessment Guidance for Superfund*, and performed quality assurance review of site-specific risk assessment. Additionally, an Agency workgroup was established to identify and prioritize significant risk management issues, and facilitate the soundness and Regional consistency of risk management decisions.

Establishing a Superfund Revitalization Team: A National Superfund Director was appointed to implement the recommendations contained in the 30-Day Study. Responsibilities of the Director include overseeing all Superfund procurement and budgeting, and implementing measures to improve clean-up contracting and accelerate cleanups. At the end of FY91, a 20 to 30 member "trouble-shooting team" was being assembled to improve management and accountability of the Superfund program.

The Alternative Remedial Contracting Strategy Study

In response to published allegations concerning mismanagement of the Alternative Remedial Contracting Strategy (ARCS), the Administrator formed a task force to examine the ARCS contract management. At the close of FY91, the Agency had begun implementing recommendations made by the task force. Major recommendations for improving the program included:

- Setting a national goal of keeping program management costs to 20 percent or less of total contract expenditures;
- Issuing guidance that allows for broader use of ARCS contractors, reduces ARCS construction capacity by approximately $2 billion, and balances the use of ARCS contracts with the continuing remedial role of the Army Corps of Engineers;
- Taking corrective actions in the administration of contract controls, specifically in the area of work assignment management, invoice review, technical performance management, and independent government cost estimates;
- Requesting the Office of the Inspector General (OIG) to allocate funding for audits of the ARCS contractors;
- Using award fees to affect contractor performance; and
- Reviewing and updating procedures for coordinating activities with other agencies, states, regions, and contractors.

Remedial Initiatives

The Agency undertook several initiatives during the fiscal year to address technical problems that have been identified in dealing with site contamination. EPA began promoting the development and implementation of comprehensive state ground-water protection programs. To facilitate these programs, EPA provided national guidance and awarded increasing shares of grants to states demonstrating effective programs.

Similarly, EPA continued its efforts during FY91 to determine the treatability of contaminated soil and debris. EPA evaluated over 120 unpublished studies dealing with contaminated soil, and expects to generate further studies. EPA also created a technology transfer database that will enable EPA, state, local, and private parties to gain access to soil treatment records of various technologies.

Enforcement Initiatives

In response to Agency task force recommendations, the enforcement program has established initiatives to study recommendations aimed at accelerating completion of site cleanups. An additional focus of the enforcement program

during FY91 was the equitable allocation of response costs at Superfund sites. Significant EPA initiatives concerning this issue include:

- Taking a variety of steps to encourage more *de minimis* settlements, thus reducing transaction costs.
- Issuing a *Policy Toward Owners of Residential Property at Superfund Sites,* reinforcing EPA practice not to pursue enforcement actions that require owners of residential property to undertake response actions or pay response costs, unless the owner's activities lead to a release, or potential threat of release, of hazardous substances.

Other enforcement initiatives taken during the fiscal year included overall efforts to target and reduce lead exposure at Superfund sites, and publication of a final guidance on the policy and procedures governing the compilation of administrative records supporting the selection of remedial actions.

Removal Program Activities

EPA has taken appropriate actions to reduce immediate threats to human health and the environment at hazardous waste sites through removal actions. Superfund's emergency response program reached a significant milestone in FY91: the 2,000th Fund-financed removal action start. To date, EPA and PRPs have completed 2,177 removal actions at both NPL and non-NPL sites.

In FY91, the role of PRPs in funding removal efforts continued to expand. Of the 341 removal actions begun in FY91, 103 were financed by PRPs, compared with 95 in FY90. PRP funds also were used to finance 55 of the removal action completions.

Under the removal program, EPA manages the Emergency Response Team (ERT). Over the ten years of its existence, the team has been available to regional On-Scene Coordinators and Remedial Project Managers 24 hours a day, 365 days a year, to support removal and remedial actions at sites. During FY91, the ERT responded on-scene to 104 removal actions, 61 remedial actions, six oil spills, and six international actions. In addition, ERT provided 213 training courses in health and safety and other technical aspects of response.

Site Assessment

The Agency continued its progress in assessing potentially threatening sites in FY91. Due to an ongoing investigation by EPA's OIG, specific numerical totals for site assessment accomplishments are not included in this report. These accomplishments will be reported in the FY92 report.

During FY91, EPA began using the revised hazard ranking system (HRS). The revised HRS allows the Agency to rank hazardous sites more comprehensively, taking into account population risk and the potential for drinking water contamination, direct human contact, ecosystem destruction, damage affecting the food chain, and air contamination. To prepare EPA staff to work with the revised system, EPA conducted five HRS/Site Assessment Orientation Sessions in which it trained over 500 people. In addition, 241 people were trained at five HRS Package Preparation Sessions.

Using the revised HRS in FY91, EPA proposed 23 sites for the NPL. The Agency also listed seven proposed sites and deleted nine sites. At the end of the fiscal year, there were 22 proposed and 1,185 final NPL sites, bringing the total number of proposed and final sites to 1,207.

The contract laboratory program (CLP) is the Agency's major vehicle for obtaining laboratory chemical analyses of samples that are taken from Superfund sites and used in site assessment. In FY91, EPA implemented a series of improvements to the CLP.

The Agency also examined particular technical issues concerning both site and risk assessment. For instance, in an effort to better address problems associated with lead and radionuclide contamination commonly found at Superfund sites and in the urban environment, EPA has undertaken three initiatives:

(1) developing risk assessment procedures and tools, such as the EPA Uptake Biokinetic Model; (2) studying the effects of lead in residential soil or dust; and (3) developing guidance and technology directed toward the study of radionuclide contamination.

Federal Facility Compliance with Superfund Requirements

Also during FY91, the Agency increased its oversight of federal facility compliance with CERCLA requirements. In addition to the remedial projects carried on directly by EPA or PRPs under the Superfund program, other federal executive agencies and departments continued clean-up activities in compliance with CERCLA.

During FY91, three federal facilities were proposed for listing on the NPL, although none were finalized. Clean-up progress at federal sites included starting 115 RI/FSs, 23 RDs, and 15 RAs and signing 21 records of decisions.

EPA entered into 24 interagency agreements (IAGs) to accomplish required hazardous waste cleanups at federal facilities during FY91, bringing the total number of IAGs entered since the beginning of Superfund to 85. To assist the public in understanding that EPA is not the lead agency for all sites on the NPL, EPA began segregating federal facilities from other sites on the published lists of NPL sites.

Estimate of Resources Necessary to Implement Superfund

Since the enactment of CERCLA in 1980, Congress has provided Superfund with $10.7 billion in budget authority. This total includes $8.9 billion for the post-SARA period, FY87 through FY92, with an FY92 operating plan and budget estimate of $1.6 billion. The FY93 President's budget requests total resources of $1.75 billion targeted for:

- Site cleanup, which uses approximately 62 percent of Superfund resources;
- General support, which uses 25 percent of Superfund resources; and
- Enforcement, which uses 13 percent of Superfund resources.

EPA's estimate of long-term resource needs is based on the Outyear Liability Model (OLM). The OLM estimate of the cost to complete cleanup of current NPL sites is $16.5 billion for FY94 and beyond.

Use and Development of Treatment Technology

To promote the application of innovative clean-up technologies, EPA implemented a wide-ranging communication program, including:

- A Superfund Innovative Technology Evaluation (SITE) newsletter, a periodic technical journal, and site-specific status reports on treatment success.
- An "expert" conference attended by 750 representatives involved in innovative hazardous waste treatment technologies, andperiodic meetings of the Federal Remediation Technologies Roundtable.
- Technical assistance to EPA laboratories, On-Scene Coordinators, Remedial Project Managers, and Regional and state personnel.
- A new database clearinghouse (VISITT) containing on-line cost and performance information on innovative treatment technologies.

Through the SITE program, EPA accepted 13 technologies into the emerging technologies program and 23 technologies into the demonstration program, and completed seven new technology demonstrations. In addition, the Agency awarded 10 grants for Superfund-related research and development and nine contracts for small business innovation research.

Minority Firm Participation in Superfund Contracting

During FY91, EPA, other federal agencies, and states awarded contracts valued at approximately $31.9 million to minority firms to perform Superfund work. Of this total, $16.9 million was awarded through Small Business Administration 8(a) contracts, $11.2 million through minority subcontracts, $1.6 million through minority prime contracts, and the remaining through cooperative agreements and interagency agreements.

Report on Facilities Subject to Review Under CERCLA Section 121(c)

As required by CERCLA, EPA will conduct five-year reviews at all sites where, after completion of remedial activities, hazardous substances, pollutants, or contaminants remain above clean-up goals. To address this requirement, EPA issued a directive defining the scope of five-year reviews and examined the differences between statutory and policy reviews. Additionally, EPA examined its policy requiring five-year reviews prior to deleting sites from the NPL, and published notification whereby EPA no longer delays NPL site deletion until a five-year review is conducted. FY91 was the first year in which a site became eligible for the five-year review; accordingly, on June 21, 1991, the Agency issued its first five-year review report.

Public Participation

Three new directives issued early in the fiscal year, combined with FY90 guidance directives that had been issued in response to the 90-Day Study, laid the groundwork for expanded public involvement in Superfund. Accordingly, regions have enhanced two-way communication between the public and EPA throughout the year.

To continue facilitating public understanding and involvement in the Superfund process, EPA awarded 26 technical assistance grants (TAGs) to community groups in eight Regions. This brings the total number of TAGs nationwide to 69.

The Agency continued its five-year program to standardize and manage the extensive Superfund document collection and incorporate it into public information and outreach activities. To make Superfund publications more readily available to the public, EPA worked closely with the National Technical Information Service to consolidate current and historical publication collections and to expedite purchases of Superfund publications.

EPA Partnership with States and Indian Tribes

EPA, states, and Indian tribes continued to cooperate in the Superfund clean-up process during FY91. For example, in September of 1991, EPA, Region 6, and several federally-recognized Indian tribal governments signed Superfund agreements. During FY91, EPA awarded 46 new core program cooperative agreements to states and Indian tribes. To ensure the continuing involvement of states and tribes, EPA and the Association of State and Territorial Solid Waste Management Officials hosted a conference to initiate the exchange of information.

Introduction

Approach of the Report

This report documents the Agency's progress toward implementing Superfund during FY91. EPA's achievements during the fiscal year are characterized by increased clean-up work at NPL sites.

Accordingly, this report emphasizes the Agency's clean-up accomplishments and the steps the Agency took to continue accelerating the cleanup of sites. A key step in this effort is the Agency's implementation of the 90-Day Study and the more recent 30-Day Study strategies. In addition, the report highlights the expanding role that potentially responsible parties and federal facilities are taking in hazardous site cleanups, and the increased efforts the Agency has made toward developing and using innovative treatment technologies. Impacts of the Alternative Remedial Contracting Strategy Task Force recommendations on FY91 activities are also described throughout the report.

This report identifies the Agency's accomplishments under the program, highlighting accomplishments of FY91. The statistics which support accomplishments cited in this report frequently include data that are over 10 years old. Over time, definitions of accomplishment categories have been refined to reflect changes and priorities as the program has evolved and data have been continuously reviewed to improve quality. Computer select logic has been revised to accommodate these definitional changes. The effect of these changes is some adjustments to previously reported numbers. For the 10-year period, FY80 to FY90, remedial investigation/feasibility study starts and remedial design starts have each had a net increase of approximately 10 percent. Removal completions reported for the same period increased almost 4 percent, while records of decision reported decreased 1 percent. We continue to make every effort to present the most accurate and up-to-date picture of progress toward implementing Superfund. We believe that the statistical data cited in this report are the most accurate we can provide.

The sources of information illustrated in the report's exhibits are referenced, accordingly, in each exhibit. The primary source of data included in this report is the CERCLA Information System (CERCLIS). Unless otherwise noted, CERCLIS data retrieved on October 18, 1991, were used in preparing this report; this information covered Superfund activity status through September 30, 1991.

Organization of the Report

Throughout the report, for purposes of brevity and consistency, when the acronym "CERCLA" appears, it refers to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986.

Chapter 1, Major Program Accomplishments, describes remedial and enforcement processes and activities, summarizes the removal program accomplishments, and reports the initiatives undertaken to improve these phases of the Superfund program during the fiscal year.

Chapter 2, Response Initiatives, documents progress at the early stages of the remedial process, including assessing and inspecting sites, listing of sites on the National Priorities List (NPL), use of the

revised hazard ranking system, and improvements to the contract laboratory program. The chapter also describes specialized site assessment programs, guidance documents, and related rulemakings.

Chapter 3, Estimate of Resources Required to Implement Superfund, discusses resources required to complete implementation of the program for the sites currently on the NPL.

Chapter 4, Federal Facilities Program, is a new chapter that focuses on the increased role federal agencies are taking in cleaning up hazardous sites. The chapter describes federal facility responsibilities under Superfund, intra- and interagency initiatives within the federal government to accelerate cleanups at federal facilities, and the establishment of an Agency strategy for addressing federal facility compliance with environmental laws.

Chapter 5, Other Statutory Requirements for the report, contains a detailed discussion of the use and development of permanent clean-up technologies, including the increased activities in the newly formed Technology Innovation Office and continuing activities of the Office of Research and Development. The chapter also contains information on minority firm participation in Superfund contracting, and reports the Agency's policy for five-year review of sites where hazardous substances, pollutants, or contaminants remain above targeted clean-up goals following completion of all remedial activities.

Chapter 6, Program Implementation and Support Activities, addresses progress in all other program activities, including community involvement in the Superfund process, technical assistance grants under CERCLA Section 117(e), and EPA partnership with states and Indian tribes. The final section includes a discussion of steps taken to improve the efficiency of the Superfund program.

Appendix A illustrates the status of remedial investigations/feasibility studies and remedial actions in progress on September 30, 1991. Appendix B illustrates the status of remedial designs in progress at the end of FY91. Abstracts of all records of decision signed in FY91 are provided in Appendix C. Appendix D contains an update on the Agency's progress in meeting the statutory requirements imposed by SARA. Appendix D lists all relevant administrative and program implementation (rather than site-specific) requirements by statutory section, describes the mandated activity, indicates whether the requirement has been met, and provides a report on the status of an activity that has not been completed.

Appendix E serves as the Agency's annual report to Congress on progress toward implementing CERCLA at EPA facilities, as required by CERCLA Section 120(e)(5). The final report of the EPA Inspector General on the required review of this FY91 report to Congress is contained in Appendix F. A bibliography and list of sources used in compiling the report are provided in Appendix G.

Statutory Requirements for the Report

In addition to providing an overview of the Agency's FY91 progress in implementing CERCLA, this report includes the following information specifically required by CERCLA Sections 301(h)(1)(A) through (G), 105(f), and 301(h)(2):

- In response to the requirement of CERCLA Section 301(h)(1)(A) to include a detailed summary of each feasibility study, Appendix C contains an abstract of each record of decision signed during FY91.
- The status and estimated date of completion of each feasibility study and remedial action, required by CERCLA Sections 301(h)(1)(B) and (F), are provided in Appendix A. Additional requirements of Section 301(h)(1)(F) to provide the status of actions and a comparison of FY91 enforcement actions with those undertaken in previous years are included in Section 1.1.4. Appendix A also provides information required by CERCLA Section 301(h)(1)(C) concerning remedial actions that will not meet previously published schedules.

- The evaluation of newly developed technologies required by CERCLA Section 301(h)(1)(D) is described in Section 5.1 of this report.
- Section 5.3 contains information that complies with the requirements of CERCLA Section 121(c) to report to Congress.
- The resource estimates for completion of CERCLA implementation, required by CERCLA Section 301(h)(1)(G), are included in Chapter 3.
- Section 5.2 satisfies the CERCLA Section 105(f) requirement that EPA describe the participation of minority firms in contracts carried out under CERCLA.
- The report of the review conducted under CERCLA Section 301(h)(2) by the EPA Inspector General on the reasonableness and accuracy of this report to Congress is found in Appendix F.

Chapter 1
Major Program Accomplishments

The success of the Superfund program over the past year demonstrates that the agenda set by the *Management Review of the Superfund Program* (the 90-Day Study) is producing positive results. By the end of the fiscal year, action had been taken at 93 percent of the 1,207 sites on the National Priorities List (NPL). Construction had been completed at 61 sites, including 38 sites that had been deleted from the NPL. The Agency deleted nine sites from the NPL in FY91, nearly a quarter of the total sites deleted to date. Exhibit 1.0-1 shows the status of clean-up activity at all current and deleted NPL sites.

The enforcement program achieved 263 total enforcement settlements in FY91, worth an estimated $1.4 billion. The estimated value of enforcement settlements has averaged over $1 billion for each of the past two years.

The removal program began its 2,000th Fund-financed removal action during FY91, one of 341 Fund- or PRP-financed removal actions started in FY91. The Agency and PRPs also completed 265 removal actions during the fiscal year.

During the fiscal year, the agenda established by the 90-Day Study was reinforced by the Agency's 30-Day Study. Recommendations set forth in the 30-Day Study aim to accelerate the rate of clean-up activities at NPL sites. Another FY91 accomplishment was the establishment of the Alternative Remedial Contracting Strategy (ARCS) Task Force to evaluate the management of ARCS contracts and recommend ways to achieve the most efficient use of the contracts for site cleanups.

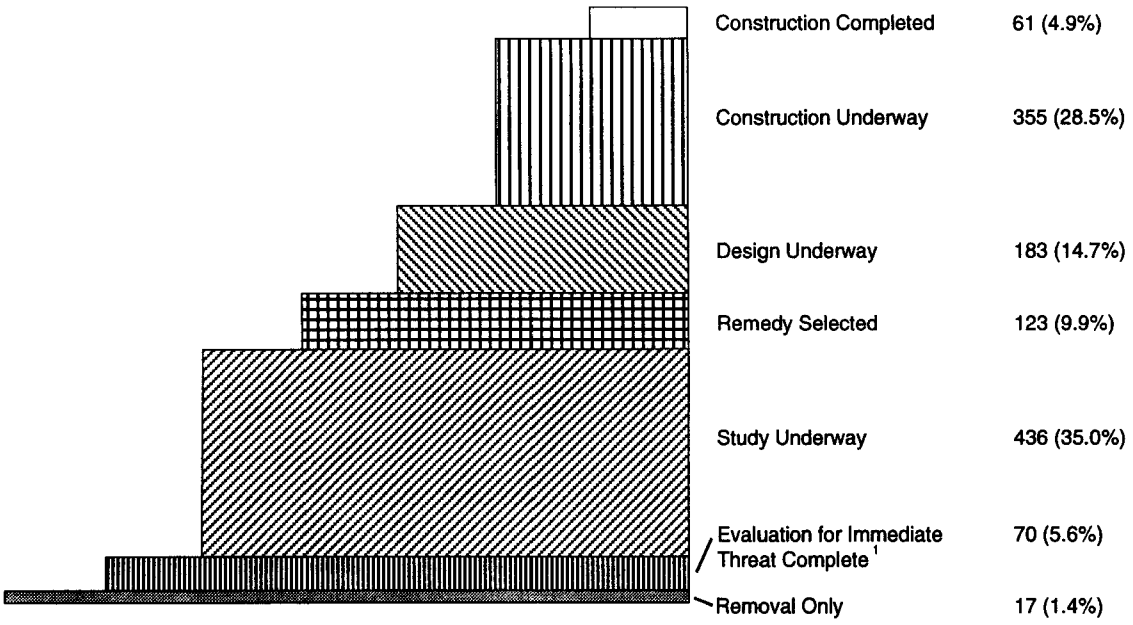
In addition to describing fiscal year remedial, enforcement, and removal accomplishments, this chapter reports on progress toward meeting statutory deadlines imposed by SARA.

1.1 Remedial and Enforcement Accomplishments

The accomplishments of Superfund remedial and enforcement programs during FY91 reflect implementation of the recommendations of the 90-Day Study and the more recently released 30-Day Study. A key recommendation of the 90-Day Study proposed the establishment of a site remediation timeline. This recommendation was implemented during the fiscal year, and has assured greater regional accountability for the duration of site cleanups. The timeline establishes goals for managers to use in planning site remediation and tracking delays in the remedial process.

In response to an Office of Inspector General (OIG) review of enforcement contracting practices, a number of strategies have been implemented to reduce delays associated with "post-settlement" activities. One example is the issuance of the publication entitled *PRP Compliance Monitoring and Tracking Requirements.* EPA is also increasing the use of total quality management efforts within Headquarters and the regions to improve productivity under enforcement contracts.

Exhibit 1.0-1
Status of Work at National Priorities List Sites as of September 30, 1991



[1] Action not begun at 15 proposed sites (1 2%) or at 55 final sites (4 4%) of the total 1,245 sites
[2] Includes 1,207 sites on the NPL and 38 sites deleted from the NPL as of September 30, 1991

Sources: CERCLIS; *Federal Register* notices through September 30, 1991

With increased emphasis on the completion of construction to implement site remedies, the Agency recognizes the need to carefully balance the mix of targets and resources each fiscal year, and to provide adequate resources for those activities critical to accelerating the pace of cleanups. (See Chapter 3, Estimate of Resources Required to Implement Superfund.)

1.1.1 The Remedial Process

The "remedial process" refers to cleanup of our nation's most hazardous waste sites. It is the second of a two-phase process. The first phase is the pre-remedial or site assessment phase, which consists of the following activities:

- Discovery or identification of a potential site;
- Preliminary assessment non-sampling research and review of waste handling operations and potential threat to human health and environment to determine whether further action is necessary; and
- Site inspection (SI) sampling investigation to collect analytical data to support a hazard ranking system score for possible listing on the NPL. The data collected during the SI also may indicate the need for a removal action at the site.
- If a site is listed on the NPL after the SI, it is eligible for Superfund Trust Fund financing for remedial actions. The remedial phase includes the following key components.
- The remedial investigation/feasibility study (RI/FS), used to determine the type andextent of contamination and to evaluate and develop remedial clean-up alternatives;

	Acronyms Referenced in Chapter 1
AOC	Administrative Order on Consent
ARCS	Alternative Remedial Contracting Strategy
ARAR	Applicable or Relevant and Appropriate Requirement
BDAT	Best Demonstrated Available Technology
CD	Consent Decree
CERCLIS	CERCLA Information Center
DNAPL	Dense Non-Aqueous Phase Liquid
DOI	Department of Interior
DOJ	Department of Justice
ERT	Emergency Response Team
NPL	National Priorities List
OARM	Office of Administration and Resources Management
OERR	Office of Emergency and Remedial Response
OIG	Office of Inspector General
ORD	Office of Research and Development
OSWER	Office of Solid Waste and Emergency Response
OSC	On-Scene Coordinator
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethylene
PCP	Pentachlorophenol
PRP	Potentially Responsible Party
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SI	Site Inspection
SSDMS	Superfund Soil Data Management System
TCE	Trichloroethylene
UAO	Unilateral Administrative Order
VOC	Volatile Organic Compound

- The record of decision (ROD) identifying the remedy selected, based on the results of the RI/FS and public comment on the clean-up alternatives;
- The remedial design (RD) phase used to develop plans and specifications needed for the construction of the selected remedy;
- The remedial action (RA) phase implementing the selected remedy, including construction and completion of construction; and,
- Operation and maintenance conducted for long-term response actions to maintain the effectiveness or integrity of the remedy.

A Remedial Project Manager (RPM) oversees all remedial and enforcement activities. To ensure that remediation is protective of human health and the environment, the RPM must be certain that the RA will attain all applicable or relevant and appropriate requirements (ARARs). ARARs are those substantive requirements of federal and more stringent state environmental laws that legally apply to the hazardous waste site cleanups. Regional coordinators at EPA Headquarters assist RPMs, as necessary, by reviewing program activities and answering technical or policy questions.

1.1.2 The Enforcement Process

A major goal of the Superfund enforcement program is to compel potentially responsible parties (PRPs) to remediate hazardous waste sites. The Superfund enforcement program uses the CERCLA provisions, as amended by SARA, to maximize PRP involvement in the clean-up process. This enforcement process includes the following steps.

- EPA attempts to identify PRPs as early as possible. EPA then notifies these parties of their potential liability for clean-up costs at the site.
- In the course of determining response work to be done, the Agency negotiates with PRPs to perform the work at a site.
- If PRPs are willing and capable of doing the work, the Agency enters into an enforcement agreement. The enforcement agreement may be a consent decree (CD) entered in court, or may be an administrative order on consent (AOC) issued out of court by an administrative law judge and signed by EPA and the PRPs. Both of these agreements are enforceable in a federal court. Under either agreement, EPA oversees the PRPs' work. PRPs who do settle may seek contribution toward the cleanup from non-settling PRPs through third-party litigation.
- If a settlement is not reached, CERCLA Section 106 provides EPA with the authority to issue a unilateral administrative order (UAO) requiring the PRPs to conduct the cleanup, or, through the Department of Justice (DOJ), litigate against the

PRPs to compel them to perform the work. If the Agency issues a UAO and the PRPs do not respond, the Agency has the option of filing a lawsuit to compel the performance specified in the order.

- If PRPs do not perform the response action and EPA undertakes the work using Trust-fund monies, EPA, through DOJ, will file suit, when practicable, to recover money it spent to clean up the site. The Agency also may seek treble damages. Any money recovered is returned to the Superfund Trust Fund.

1.1.3 FY91 Accomplishments

The remedial and enforcement accomplishments for FY91 reflect the Agency's efforts to respond to SARA's statutory requirements for RA starts, complete construction of clean-up remedies at sites, and to compel PRPs to undertake clean-up activities. During FY91, there was a dramatic increase in later-stage remedial planning and construction activities (RDs and RAs); earlier-stage remedial study activities (RI/FSs) declined, reflecting the Agency's determination to maximize the number of clean-up actions and construction completions. During FY91:

- PRPs financed 52 RI/FS starts, and the Agency financed 22 RI/FS starts, for a total of 74 RI/FS starts;
- PRPs financed 113 RD starts and the Agency financed 48 RD starts, for a total of 161 RD starts, a 26 percent increase over the total of 128 RD starts in FY90; and
- PRPs financed 65 RA starts, and the Agency financed 39 RA starts, for a total of 104 RA starts, a 32 percent increase over the total of 79 RA starts in FY90.

Exhibits 1.1-1, 1.1-2, and 1.1-3 illustrate historical RI/FS, RD, and RA accomplishments. Exhibit 1.1-4 illustrates the percentage of PRP response for each fiscal year since the enactment of SARA.

PRP response actions have increased significantly since the enactment of SARA, which provided the Agency with additional means of enforcement. During FY91:

- The Agency achieved a total of 263 enforcement settlements with PRPs, worth an estimated $1.4 billion in response work. Of this total, 101 RD/RA settlements (CDs, UAOs in compliance, or AOCs) were achieved for an estimated value of $1.12 billion.
- The Agency issued a total of 137 UAOs and entered into 132 AOCs and 119 CDs requiring PRPs to perform cleanup work.

Exhibit 1.1-5 illustrates the increase in estimated dollar value of settlements with PRPs since the enactment of SARA.

In addition, other federal agencies or departments and states assumed the lead for response activities. These accomplishments are discussed in Chapters 4 and 6, respectively.

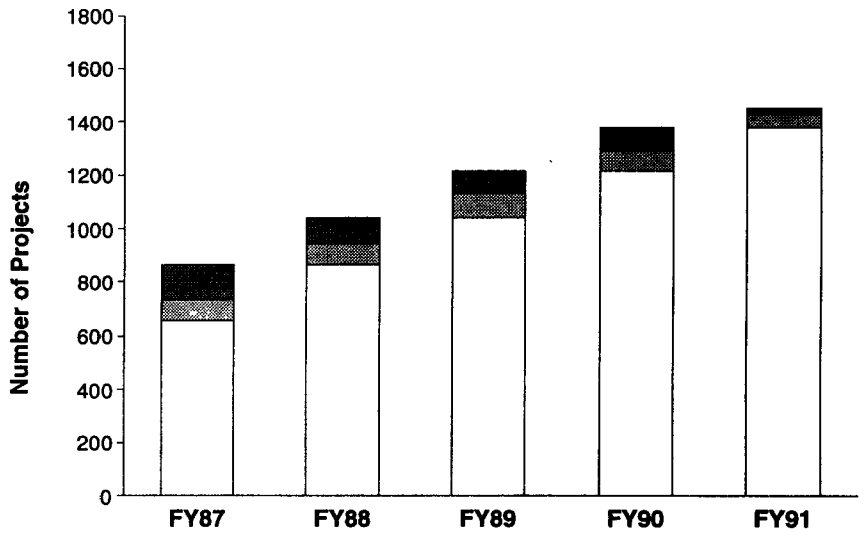
1.1.4 Status of Ongoing Remedial and Enforcement Activities

On September 30, 1991, 1,196 RA and RI/FS projects were ongoing at 750 NPL sites compared with 1,095 RI/FSs and RAs at 776 NPL sites at the end of FY90. FY91 projects include 889 RI/FSs and 307 RAs. These projects are listed in Appendix A, along with their completion status, as required by CERCLA Sections 301(h)(1)(B), (C), and (F). In addition, there were 374 RDs in progress at the end of the fiscal year, compared with 340 RDs at the end of FY90. All RDs in progress are listed in Appendix B.

Of the 1,196 RI/FS and RA projects ongoing at the end of the FY91, 193 were on schedule. In addition, 41 projects were ahead of schedule and 291 projects were begun during the fiscal year. Projects behind schedule totaled 591 and 80 projects had no previously published estimate of completion.

PRPs were conducting 465 of the ongoing RI/FS and RA projects, including 318 RI/FSs and 147 RAs. Of these 465 PRP-financed projects, 70 were on schedule and 15 were ahead of schedule. Additionally, 252 were behind schedule and 105 were started during the fiscal year. There were 23 projects which had no previously published estimate

Exhibit 1.1-1
Fiscal Year and Cumulative Remedial Investigation/Feasibility Study Starts[1]



	FY87	FY88	FY89	FY90	FY91
FY Fund-lead	130	98	83	86	22
FY PRP-lead	80	76	89	80	52
FY TOTAL	210	174	172	166	74
TOTAL for Previous Fiscal Years	656	866	1,040	1,212	1,378
CUMULATIVE TOTAL[2]	866	1,040	1,212	1,378	1,452

[1] Historical numbers have been updated. See explanation on page xiii in the Executive Summary of this report.

[2] Cumulative total includes pre-SARA RI/FS starts; there were 656 cumulative RI/FS starts, 145 of which were PRP-lead, and 511 of which were Fund-lead.

Source: CERCLIS.

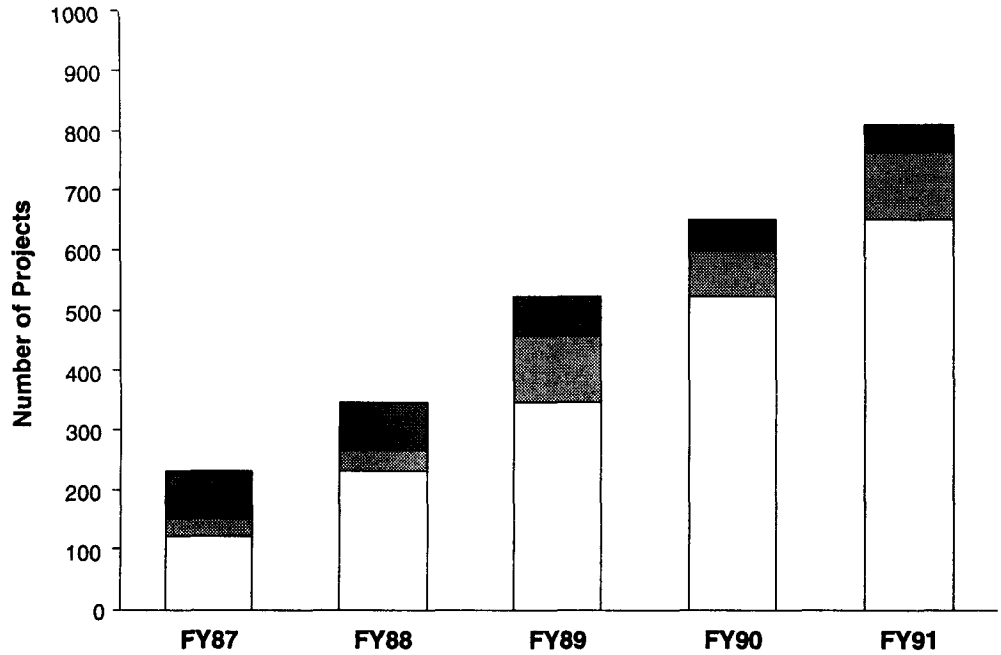
of completion. States and federal facilities also undertook or assumed the "lead" for ongoing remedial activities. Exhibit 1.1-6 identifies the number of ongoing projects at NPL sites by lead.

The status of ongoing RI/FSs and RAs is based on a comparison of each project's planned completion date in the CERCLA Information System (CERCLIS) at the end of FY90 with the planned completion schedule in CERCLIS at the end of FY91. An initial completion schedule is required to be included when a remedial activity is entered into CERCLIS. Minimal site-specific information is available when initially determining a completion date, and regions usually rely on standard planning assumptions (e.g., 12 quarters for an RI/FS). As work continues, schedules are adjusted to reflect actual site conditions.

1.1.5 Remedy Selection

The Agency signed 196 RODs in FY91, including 175 RODs financed by the Trust Fund (162 new RODs and 13 amendments) and 21 RODs financed by other federal agencies at federal facility sites. The Agency selected a variety of remedial methods, based on a careful analysis of characteristics unique to each site and the proximity of the site to people and sensitive environments. (Wetlands and endangered

Exhibit 1.1-2
Fiscal Year and Cumulative Remedial Design Starts[1]



	FY87	FY88	FY89	FY90	FY91
FY Fund-lead	79	80	63	52	48
FY PRP-lead	30	36	112	76	113
FY TOTAL	109	116	175	128	161
TOTAL for Previous Fiscal Years	124	233	349	524	652
CUMULATIVE TOTAL[2]	233	349	524	652	813

[1] Historical numbers have been updated. See explanation on page xiii in the Executive Summary of this report.

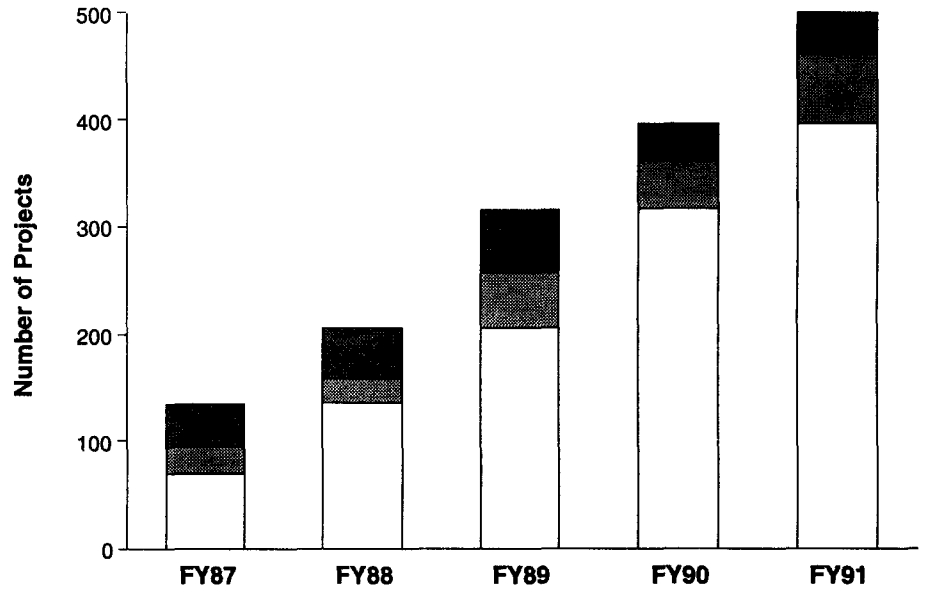
[2] In pre-SARA years, there were 124 cumulative RD starts; 39 of which were PRP-lead and 85 of which were Fund-lead.

Source: CERCLIS.

wildlife are examples of environmental resources that are taken into consideration when evaluating remedies). The ROD documents the results of all studies performed on the site, lists the remedy selected, and identifies each remedial alternative that the Agency considered. The ROD is written after completion of the RI/FS and after the public has had the chance to comment on the remedial alternatives being considered.

Congress, upon the passage of SARA, sent EPA a clear message to give preference to treatment rather than containment remedies. Exhibit 1.1-7 lists the number and types of source control treatment and containment remedies selected during FY91. It also identifies the number of occurrences of remedies for contaminated ground water. Exhibit 1.1-8 represents this same information as a percentage comparison for the fiscal year.

Exhibit 1.1-3
Fiscal Year and Cumulative Remedial Action Starts[1]



	FY87	FY88	FY89	FY90	FY91
FY Fund-Lead	41	48	58	35	39
FY PRP-Lead	26	22	52	44	65
FY TOTAL	67	70	110	79	104
TOTAL for Previous Fiscal Years	70	137	207	317	396
CUMULATIVE TOTAL[2]	137	207	317	396	500

[1] Historical numbers have been updated. See explanation on page xiii in the Executive Summary of this report.

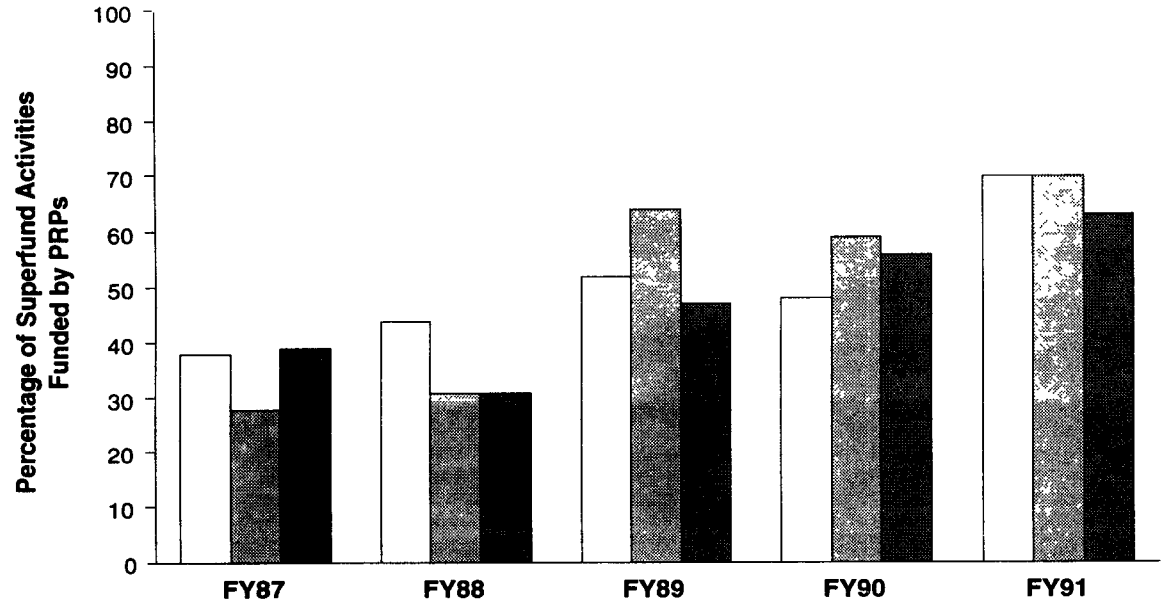
[2] Cumulative total includes pre-SARA RA starts; there were 70 cumulative RA starts, 18 of which were PRP-lead, and 52 of which were Fund-lead.

Source: CERCLIS.

1.2 Remedial Initiatives

During the fiscal year, the Agency launched significant initiatives, including: (1) the 30-Day Study to identify options for accelerating the rate of cleanups and evaluate the assumptions used in assessing and managing risk at Superfund sites; and (2) the ARCS Task Force to assess and improve management of the ARCS contracts. EPA also implemented initiatives to evaluate and develop strategies for solving certain technical problems involved with site cleanups.

Exhibit 1.1-4
Potentially Responsible Party Involvement as a Percentage of Superfund Remedial Activity Starts[1]



	FY87	FY88	FY89	FY90	FY91
RI/FSs	38%	44%	52%	48%	70%
RDs	28%	31%	64%	59%	70%
RAs	39%	31%	47%	56%	63%

[1] Historical numbers have been updated. See explanation on page xiii in the Executive Summary of this report.

Source: CERCLIS.

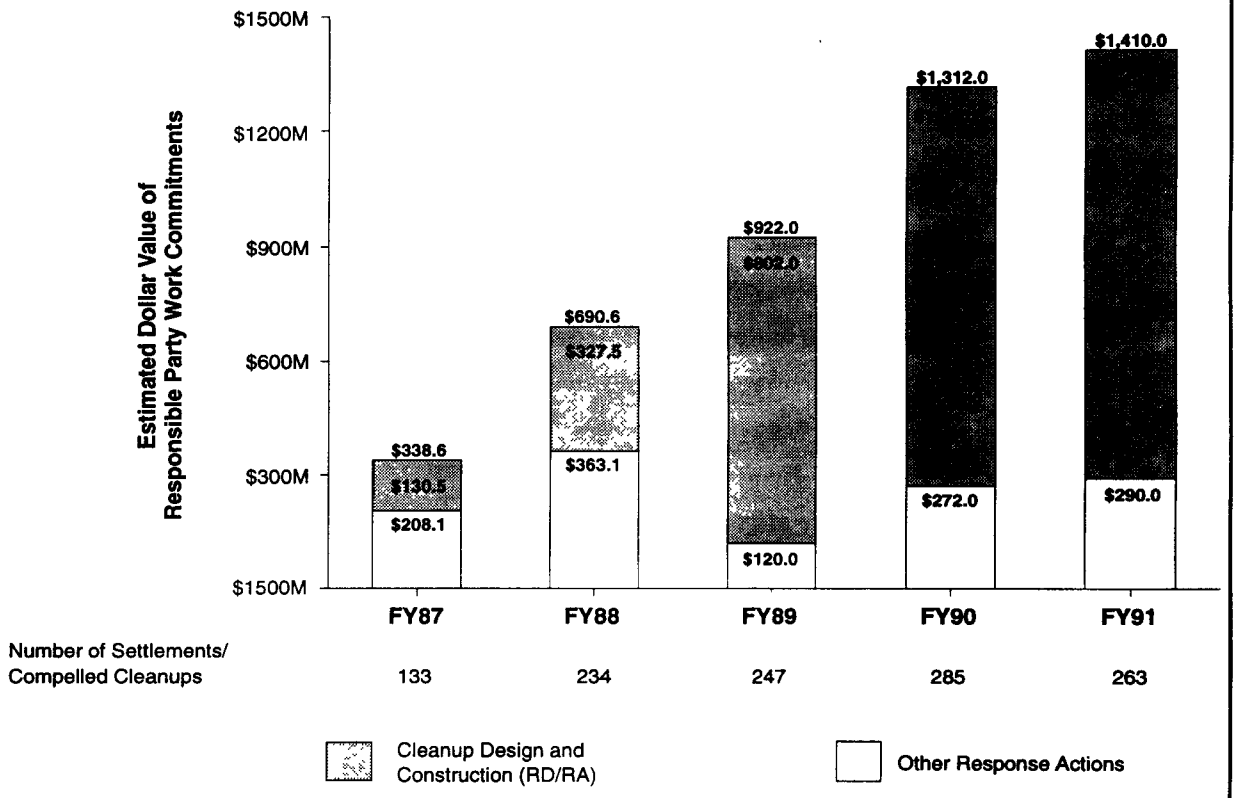
1.2.1 Options for Accelerating Cleanup: 30-Day Study Task Force Recommendations

The 30-Day Study Task Force outlined a five-point strategy:

- Setting aggressive clean-up targets;
- Streamlining the Superfund process;
- Elevating to upper management site-specific issues that cause delays;
- Accelerating the pace of private party cleanups; and,
- Refocusing the debate on Superfund progress.

The following subsections contain a brief summary of each of the five task force recommendations.

Exhibit 1.1-5
Value of Potentially Responsible Party Settlements for Fiscal Year 1987 through Fiscal Year 1991[1]



[1] Historical numbers have been updated. See explanation on page xiii in the Executive Summary of this report.

Source. CERCLIS

Setting Aggressive Clean-up Targets

The first recommendation of the 30-Day Study Task Force was to aggressively pursue completion of construction at sites. Construction is complete at a site when the lead agency has completely constructed the means for implementing the remedies selected for every operable unit at the site. It does not necessarily mean that all cleanup has been accomplished. For example, at a site with ground-water contamination, where the selected remedy is "pump and treat," construction is complete when the lead agency finishes constructing the pump and treat system. Cleanup at the site, however, is accomplished when the quality of the ground water attains or exceeds all required performance criteria and action levels.

At the time of the 30-Day Study, the Agency had completed construction at 61 sites. In response to the

Exhibit 1.1-6
Ongoing Projects at National Priorities List Sites by Lead for Fiscal Year 1987 through Fiscal Year 1991

	RI/FSs					RDs					RAs				
	87	88	89	90	91	87	88	89	90	91	87	88	89	90	91
Fund-financed—state-lead	89	70	65	54	42	32	30	30	29	22	24	25	39	37	29
Fund-financed—federal-lead[1]	215	218	224	203	181	59	85	105	117	121	30	60	97	104	103
Fund-financed—EPA performs work at site[2]	-	1	4	16	19	-	-	1	1	3	-	-	-	-	2
PRP-financed and PRP-lead	195	205	242	260	253	28	39	97	155	186	24	37	69	94	133
Mixed Funding—monies from Fund and PRPs	-	-	-	-	-	-	-	3	4	5	-	-	4	3	6
PRP-financed—state order and EPA oversight[3]	-	29	60	75	65	-	-	7	15	15	-	3	5	13	14
State Enforcement	32	10	1	-	-	2	2	1	-	-	-	1	-	-	-
Federal Facility	25	27	73	212	329	1	2	9	18	22	1	6	7	8	20
Other	4	3	-	16	-	-	-	-	1	-	-	-	-	-	-
Total	560[4]	563	669	836	889	122	158	253	340	374	79	132	221	259	307

1 Includes remedial program lead projects and enforcement program lead projects.
2 Projects at which EPA employees, rather than contractors, perform site clean-up work.
3 Projects where site clean-up work is financed and performed by the PRPs under state order, with EPA oversight.
4 The report to Congress on *Progress Toward Implementing Superfund: Fiscal Year 1987* reported that 563 RI/FSs were ongoing at the end of the fiscal year. After further data analysis, this number has been changed to 560.

Sources: FY87 and FY88 data from CERCLIS; remaining data from *Progress Toward Implementing Superfund:* FY87 (Appendix D); FY88 (Appendix A); FY89 (Appendices A and B); FY90 (Appendices A and B); and FY91 (Appendices A and B).

Exhibit 1.1-7
Summary of Remedies Selected in Fiscal Year 1991 Records of Decision

Source Control Remediation	**Total Number of Occurences**
Treatment Technology [1]	
Thermal Destruction/Incineration	*24*
Immobilization	*35*
In situ Vacuum/Vapor Extraction	*34*
Soil Washing	*2*
Thermal Desorption	*10*
Bioremediation [2]	*8*
To Be Determined/Unspecified Treatment	*19*
In situ Vitrification	*1*
Dechlorination	*3*
Soil Flushing	*7*
Volatilization/Aeration	*2*
Solvent Extraction	*1*
TOTAL	**146**
Other Treatment	
Decontamination	*21*
Recovery/Recycling	*11*
Surface Water Treatment	*12*
NAPLs Treatment	*11*
TOTAL	**55**
Containment Only	
On-site	*27*
Off-site	*8*
TOTAL	**35**
Other Actions (e.g., Institutional Controls, Relocation)	*2*

Contaminated Groundwater Remediation	**Total Number of Occurences**
Active Restoration	
Physical/Chemical	*223*
Biological	*7*
To Be Determined/Unspecified Treatment	*25*
Publicly Owned Treatment Works	*15*
TOTAL	**270**
Alternate Water Supply	*17*
Natural Attenuation	*7*
Leachate Treatment	*17*
Containment [3]	*1*
Other Actions (Institutional Controls)	*2*
No Further Action	*9*

Note: Based on 196 FY91 RODs, including 21 federal facility RODs and 13 ROD ammendments. Includes 137 final and 44 interim action RODs, nine no action RODs, and six RODs with both a final and interim component; more than one remedy may be associated with a ROD.

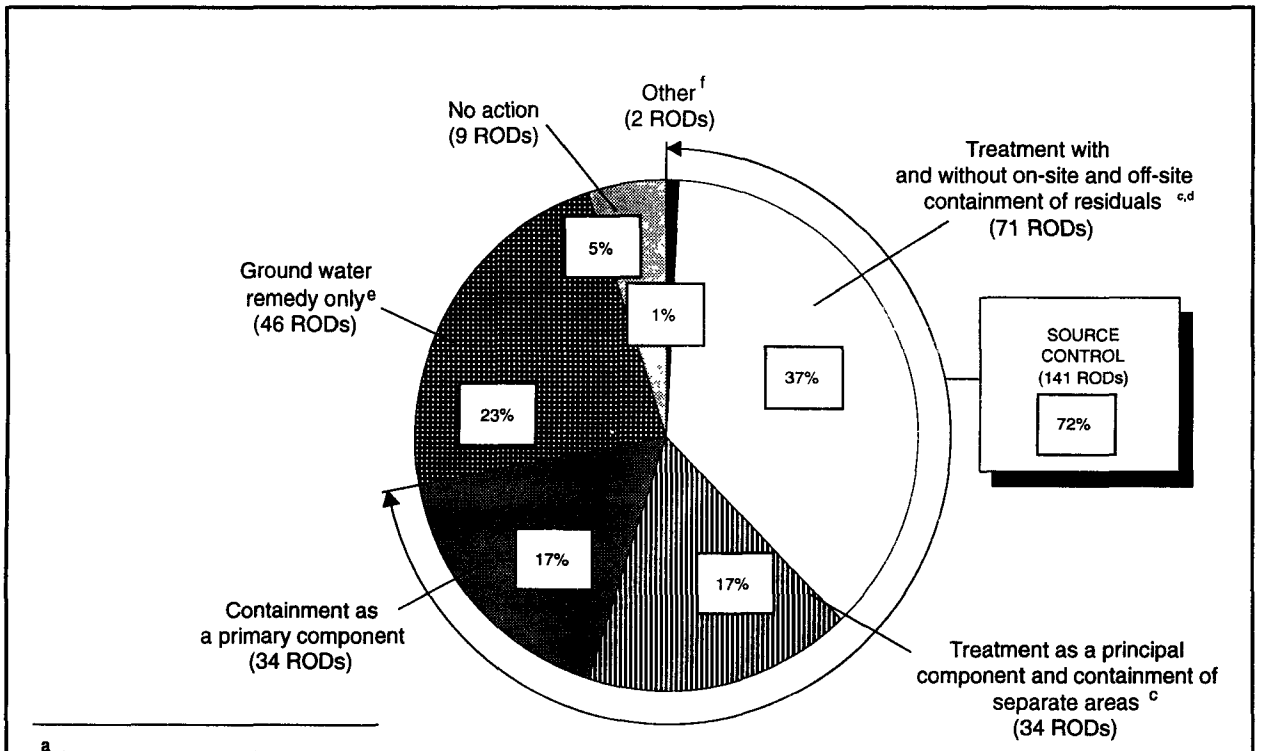
[1] Includes primary and contingent treatment technologies. Data reflects occurrences of technologies as selected in the 141 RODs that addressed source control; more than one technology may be associated with a ROD

[2] Includes *in situ* and *ex situ* processes.

[3] Includes management of migration

Source: EPA Hazardous Site Control Division.

Exhibit 1.1-8
Percentage Distribution of Remedies Selected in Fiscal Year 1991 Records of Decision[a,b]



[a] Many sites require more than one type of action to mitigate threats identified.
[b] Based on 196 FY 1991 RODs, including 21 federal facility RODs and 13 ROD amendments.
[c] Includes treatment trains for source.
[d] Many treatments yield a residual that may require further management.
[e] Includes containment, institutional controls, restoration, and alternate water supply remedies.
[f] Includes institutional controls, monitoring, or relocation remedies.

Source EPA Hazardous Site Control Division.

task force recommendations, the Agency will implement actions necessary to reach the following specific targets: 130 construction completions by the end of 1992; 200 completions by the end of 1993; and at least 650 completions by the year 2000. These goals will be accomplished by setting targets for each region and assigning more personnel to direct site work. Progress will be monitored through a tracking system and periodic meetings with the regions.

Streamlining the Superfund Process

To accelerate sites through the remedial process to construction completion, the 30-Day Study Task Force recommended standardizing remedy selection and shortening the RD phase of the Superfund process. Each recommendation is explained below.

Standardizing Remedy Selection: The 30-Day Study Task Force proposed investigation of the following approaches for standardizing the Superfund remedy-selection process to accelerate the planning phase.

- *Presumptive Remedy Selection:* By analyzing past program experience, the Agency will associate sites with the types of remedies that have been historically selected for such sites. This information will be used to develop a presumptive remedy for a specific type of site. Using this approach, the presumptive remedy could be identified early in the planning process to allow ample opportunities for public comment, and EPA considerations regarding site-specific technical information that might challenge the identified presumptive remedy.
- *Technology-Based Standards:* By developing and using technology-based standards, the Agency would be taking advantage of the body of historical knowledge that the program has collected on various clean-up technologies. Under this approach, historical program experience would be analyzed to identify site characteristics that indicate that certain technologies may be appropriate for use at a site. Specified technological applications could then be identified early in the planning process for sites exhibiting similar characteristics.
- *Standardized Soil Clean-up Levels:* The current process of establishing different soil clean-up levels for each Superfund site is complex and time-consuming. It is necessary however, because states and the federal government have established few soil cleanup standards for specific pollutants. Under the approach recommended in the 30-Day Study, the Agency will evaluate the feasibility of developing methods and standards for determining soil clean-up levels based on land use, pollutant, and soil type. By developing such methods and standards, the Agency could begin incorporating them into the remedy selection process, thereby shortening the remedy selection process.

Efforts to standardize the remedy selection process are being conducted by staff-level Agency workgroups. These workgroups are overseen by the Standardization of Remedy Selection Steering Committee. The workgroups will evaluate the feasibility of the three standardization options and set long and short-term priorities. The steering committee will report progress and recommendations of the workgroups to senior Agency management.

Shortening the Remedial Design Phase: The Agency will initiate a pilot study to develop strategies for shortening the RD phase of the clean-up process. One method the Agency will explore to shorten the RD phase is to increase the flexibility of existing Superfund contracts, including the Emergency Response Cleanup Services contracts, the ARCS contracts, and the U.S. Army Corps of Engineer's pre-placed construction contracts.

Shortening the RD phase will allow construction of the remedy to begin earlier in the process. Currently, the RD phase follows the signing of the ROD and precedes the RA or construction. Under the new plan, construction activities would begin immediately after the ROD is signed. The 30-Day Study Task Force suggested that this approach may be appropriate for sites with high degrees of uncertainty, in which time spent in design would not substantially reduce the level of uncertainty. For example, RDs may not be necessary or helpful at large-scale excavations where contamination boundaries are not defined, or at abandoned industrial facilities that must be dismantled and decontaminated.

To implement this approach, a workgroup consisting of representatives from EPA Headquarters, regions, and the U.S. Army Corps of Engineers will develop criteria and projects for the pilot study, evaluate the results of the study, and make final recommendations.

Elevating Site-Specific Issues That Cause Delays

The 30-Day Study Task Force found that issues arising among EPA, DOJ, the states, and other parties can be a significant source of delay in finalizing RODs, settlements, and RDs, and in starting and completing RAs. The task force recommended alleviating the delays by developing an enhanced communication strategy among the parties. Emphasis

would be placed on early elevation of site-specific issues to EPA, state, and DOJ upper management. The strategy will include discussions in EPA meetings with state representatives, monthly EPA/DOJ meetings, and regular contact between EPA and DOJ on case-specific issues.

Accelerating Private Party Cleanups

In examining ways to streamline clean-up activities, the 30-Day Study Task Force recognized two significant sources of delay in private party cleanups: (1) mid-stream takeovers by private parties, and (2) long lapses in time between the date that private parties enter into a clean-up agreement and the date that the CD for the agreement is entered in court and site work actually begins. The 30-Day Study Task Force recommended several initiatives to reduce these delays. These initiatives are detailed below.

Limiting "Mid-Stream" Takeovers by Private Parties: The lead responsibility for cleaning up a site can change from EPA to private parties, or vice versa. Lead changes from EPA to private parties may result in significant delays when they occur during a discrete phase of cleanup, or "mid-stream." Causes for the delay include the need to negotiate an enforceable order, changes in contractors and funding mechanisms, and demobilization/re-mobilization in the field.

The 30-Day Study Task Force recommended issuing a national policy precluding changes in site lead at "mid-stream." PRPs would be allowed to assume the lead only at the start of new clean-up phases (i.e., start of an RI/FS, or RD/RA).

Beginning Remedial Design Before Entry of Consent Decree: There can be significant delays from the time a private party signs the CD for settlement to the time the CD is entered into court. PRPs often are unwilling to start design or construction at a site because the settlement is not yet a binding, enforceable document. Reasons for delays in entering CDs in court may include other parties taking legal action to block the entry of the CD or the Agency receiving substantial comments on the CD that require EPA and DOJ to spend a substantial amount of time and resources responding to them.

The 30-Day Study Task Force recommended that the Agency adopt a national policy of encouraging PRPs to start RDs before entry of the CD. Earlier PRP design work would provide significant time savings while CDs were negotiated.

Refocusing the Debate on Superfund Progress

The 30-Day Study Task Force identified a need to improve public awareness of Superfund accomplishments, and clarify EPA's responsibilities at NPL sites. In order to accomplish these goals, the task force recommended that the Agency: (1) define and better develop information on the success of Superfund, especially as it relates to protection of public health and the environment; and (2) segregate federal facilities on the NPL more effectively.

Expanding Superfund's Measures of Success: The 30-Day Study Task Force recommended developing a communications strategy that would identify and publicize alternative measures of success, rather than merely identifying the number of sites deleted from the NPL. Suggested activities include developing state-specific Superfund information packages, analyzing cross-cutting risk and public health impacts of the entire program, and routinely announcing removal and remedial starts and completions.

More Effectively Segregating Federal Facilities on the NPL: Although the common public perception is that EPA is responsible for cleaning up all the sites on the NPL, other federal agencies are responsible for implementing Superfund policies at federal facility sites. In the future, EPA expects the number of federal facilities on the NPL to increase at a faster rate than the non-federal facility portion. Accordingly, the task force recommended that EPA clearly distinguish federal facility sites on the NPL from other sites, and that the corresponding roles of EPA and other agencies be more clearly distinguished. To implement this recommendation, the 30-Day Study Task Force proposed evaluating options for making such distinctions, developing a strategy, and

distinguishing federal facilities more clearly in the next NPL update.

1.2.2 Risk Assessment and Management in Superfund: 30-Day Study Task Force Recommendations

The 30-Day Study Task Force examined two aspects of "risk" in Superfund decision-making:

- Risk assessment, which is the scientific process for evaluating the nature and magnitude of threats to human health and the environment as a result of exposure to contaminants at a site both before and after remediation; and
- Risk management, which involves the technical decisions and policies used for deciding which actions to take to mitigate the risks, and for determining appropriate clean-up levels that remedies must achieve.

The 30-Day Study Task Force examined exposure assumptions used in Superfund risk assessment. Although the task force found, with minor exceptions, that the exposure assumptions were consistent with other EPA programs, it also identified issues about exposure assumptions that warrant further study.

The Task Force recommended an interagency effort to seek internal and external review of Superfund risk assessment guidance and policies by representatives of the Office of Research and Development (ORD), the Risk Assessment Council, the Science Advisory Board, industry, and environmental groups. The task force also recommended review of regional interpretation and application of risk assessment policies, and identification of areas in which modification may be warranted. The final recommendation of the task force was the development of a public outreach plan to increase public understanding of Superfund risk assessment policies and procedures.

In evaluating risk management issues, the 30-Day Study Task Force recognized the potential for regional variation in implementing the policies used to guide the interpretation and application of risk assessments at Superfund sites. To promote consistency in risk management decision-making, the 30-Day Study mandated the establishment of the National Superfund Risk Management Workgroup. The goal of the workgroup is to increase national consistency in risk management decisions made in the Superfund remedy-selection process.

The Risk Management Workgroup will identify, prioritize, analyze, and develop strategies for developing policy and guidance on significant risk management issues. Issues being addressed include:

- Land-use assumptions for site remediation;
- Ground-water remediation timeframes; and
- Coordination of ARARs and risk-based concentrations in setting remediation levels.

1.2.3 ARCS Task Force Initiatives

In FY91, the EPA Administrator ordered the formation of a task force to examine and make recommendations to improve ARCS.

Alternative Remedial Contracting Strategy

EPA's implementation of ARCS represents the second generation of contracts designed to support implementation of the Superfund remedial program. After Superfund was reauthorized by SARA in 1986, EPA determined that its ability to contract for and manage clean-up services needed improvement. In an effort to expand the number of contractors available to perform cleanup, improve the technical capabilities of these contractors, and shift management to the field, the Agency developed a strategy pursuing long-term contract support. ARCS involves 23 firms holding 45 contracts potentially worth $6.6 billion over ten years. The contractors perform RI/FSs, RDs, RAs, and other support; they have the capacity to work 15 million hours with a subcontractor pool of $4.2 billion.

The ARCS Task Force

The ARCS Task Force, composed of senior EPA Headquarters and regional managers and

analysts, was formed in response to published allegations concerning mismanagement of the ARCS contracts. The ARCS Task Force evaluated ARCS program activities and addressed the following three questions:

- Are allegations of waste by ARCS contractors fair and accurate? For example, are contractors charging EPA for inappropriate and unnecessary administrative expenses, or for opening and operating field offices before clean-up work is assigned?
- Are problems being caused by ineffective contractor oversight, and has EPA taken the necessary steps to ensure that all problems are corrected?
- Is ARCS still an appropriate approach to Superfund contracting in light of the fact that responsible parties are cleaning up more sites than was anticipated? If not, should EPA change the number, size, or length of ARCS contracts?

In response to these questions, the task force produced the following findings and recommendations:

- *Program Management:* The ARCS Task Force found that program management costs were as high as 70 percent at the start of the ARCS program, but, as the contracts have matured, management costs have dropped to 30 percent. The task force recommended that for the duration of the ARCS contracts, the Agency should set a national goal for program management costs of 20 percent or less of total contract expenditures. The FY92 appropriations language established a goal of 15 percent of total contract expenditures for program management costs. The Agency is committed to achieving this 15 percent goal.
- *ARCS Capacity and Utilization:* The ARCS Task Force found that actual use of ARCS contracts has been less than expected, due to the Agency's success in compelling PRPs to pay for cleanup of over 60 percent of remedial activities at NPL sites and in the decision to have the Army Corps of Engineers manage large clean-up efforts. The Agency has issued guidance that will allow for broader use of ARCS contractors and plans to reduce ARCS construction capacity by approximately $2 billion. EPA is also working to balance the use of ARCS contracts with the continuing role of the Army Corps of Engineers in the remedial program.
- *ARCS Contract Controls:* The ARCS Task Force discovered weaknesses in the administration of contract controls. The ARCS Task Force recommended that the Agency take corrective actions, specifically in the area of work assignment management, invoice review, technical performance management, and independent government cost estimates. Furthermore, the task force recommended that the Agency increase its controls on government-owned equipment, and strengthen the regions' abilities to administer ARCS.
- *ARCS Financial Audits and Reviews:* The ARCS Task Force found that no financial audits had been conducted by the OIG on ARCS contracts. The EPA Administrator has requested that the OIG allocate funding for audits of the ARCS contractors.
- *Award Fee Process:* The ARCS Task Force concluded that award fees should be used to affect contractor performance. The task force emphasized that unsatisfactory performance must not be rewarded, and good past performance, including lower program management costs, should be rewarded with more work in FY92.
- *EPA Management Processes and Organizations:* The ARCS Task Force found that, because the scope and complexity of EPA's mission have increased dramatically over the past few years, the Agency must review and update the manner in which it coordinates activities with other agencies, states, regions, and contractors. The task force recommended that EPA establish a Superfund Acquisition Manager to oversee Superfund acquisition decisions and activities. Finally, the task force suggested that the Agency employ total quality management concepts

throughout ARCS, and establish a coordinated approach to the interaction between EPA Headquarters and regions.

Acting upon the findings of the ARCS Task Force report, EPA established a steering committee to develop an implementation plan for the ARCS Task Force recommendations, to distribute responsibility for implementing the recommendations, and to develop activity milestones. The steering committee, which was composed of representatives of the Office of Solid Waste and Emergency Response (OSWER), the Office of Administration and Resources Management (OARM), and the regions, completed the implementation plan at the end of FY91. The plan includes detailed work plans for each of the 32 recommendations made by the ARCS Task Force.

1.2.4 Other Initiatives

The Agency also undertook several initiatives during the fiscal year to address technical problems that have been identified in dealing with site contamination. These initiatives will result in new policies on ground water and on the treatability of contaminated soil and debris.

Ground Water

In July 1991, the Agency-wide Ground Water Task Force issued a report entitled, *Protecting the Nation's Ground Water: EPA's Strategy for the 1990s.* The report stresses EPA's commitment to preventing adverse effects to human health and the environment and to protecting the environmental integrity of the nation's ground-water resources. EPA's strategy for meeting this commitment is based on the following three principles:

- Ground water should be protected, through pollution prevention means such as source and siting controls, wellhead protection, and aquifer recharge protection, to ensure that standards for drinking water and hydrologically connected surface waters are attained.
- Ground-water remediation activities must be prioritized to limit the risk of adverse effects to human health first, and then to restore sources of drinking and hydrologically connected surface water.
- States should continue to maintain primary responsibility for coordinating and implementing ground-water protection programs that are linked to federal and local activities.

EPA began promoting the development and implementation of comprehensive state ground-water protection programs designed to provide protection and a framework for coordinating activities under federal, state, and local statutes and ordinances. To facilitate state programs, EPA is providing national guidance toward achieving comprehensive programs, and awarding increasing shares of follow-on grants to states demonstrating effective programs.

The Data Management Subcommittee of the Groundwater Task Force issued its report, *Ground-Water Data Collection, Accessibility, and Utilization*, on October 25, 1990. The report details methods for effectively managing ground-water data. The subcommittee presented a number of options for improving ground-water data management, ranging from improved information capture to enhancement of automation and data retrieval systems.

ORD is focusing its attention on serving remediation programs requiring increasingly sophisticated technology in response to the growing awareness of the seriousness of ground-water contamination. One example of the Agency's commitment is its current research on the behaviors of one group of contaminants in particular: dense, non-aqueous phase liquids, or DNAPLS. This group of contaminants, which includes such toxins as tetrachloroethylene, trichloroethylene, and polyaromatic hydrocarbons, is not only difficult to detect, but difficult to remove once they are discovered.

OSWER undertook several initiatives in FY91 to improve its ability to address DNAPL contamination.

- In a survey conducted by ORD and the Office of Emergency and Remedial Response (OERR), analysts are assessing the pervasiveness of DNAPL contamination at Superfund sites,

evaluating ground-water containment systems, and developing guidance on DNAPL site characterization through the Subsurface Clean-up and Mobilization Process, or SCAMP.

- OSWER sponsored two workshops during FY91 involving representatives from EPA, the U.S. Geological Survey, engineering firms, other industries, and university researchers. At these workshops, professionals with experience in DNAPL contamination presented papers and participated in discussions concerning the options for characterization and remediation of DNAPL sites.
- The Agency conducted a study of 24 sites where ground-water remediation is underway. The results of the study demonstrated that ground-water extraction systems are able to remove some mass of some types of contaminants; however, the amount of removal actually achieved was uncertain. The study showed that hydraulic containment of contamination plumes may be achieved through use of ground-water extraction systems. In addition, the study also suggested that initial, rapid decreases in contaminant concentrations at the start-up of an extraction system tend to level off or decrease over time. This may be a result of the type of monitoring data collected as much as a reflection of an actual phenomenon of ground-water extraction systems. The study recommended that monitoring systems be installed at all contaminated ground-water sites; that the potential presence of DNAPLs be determined at all sites exhibiting ground-water contamination; and that ground-water remediation be treated as an ongoing process, requiring persistent evaluation of system design, remediation time frames, and data collection needs.

Contaminated Soil and Debris

EPA has undertaken an initiative to determine the treatability of contaminated soil and debris and to develop the best demonstrated available technology (BDAT) for treating contaminated soil and debris. The BDAT will form the basis for the land disposal restrictions applicable to contaminated soil and debris.

The Resource Conservation and Recovery Act (RCRA) sets specific standards for disposal levels of contaminants. In 1986, the Agency determined that existing treatment methods for soils and debris could not achieve the standards required by RCRA for land disposal. Subsequently, a review of the literature indicated a lack of data to demonstrate how great the deviation from RCRA standards would be.

In 1989, as an interim measure, EPA published a treatability variance procedure to allow for the treatment and placement of treated soils. In the meantime, to establish a BDAT standard, EPA began a comprehensive data-gathering process from unpublished literature, and implemented research studies on state-of-the-art methods of treatment.

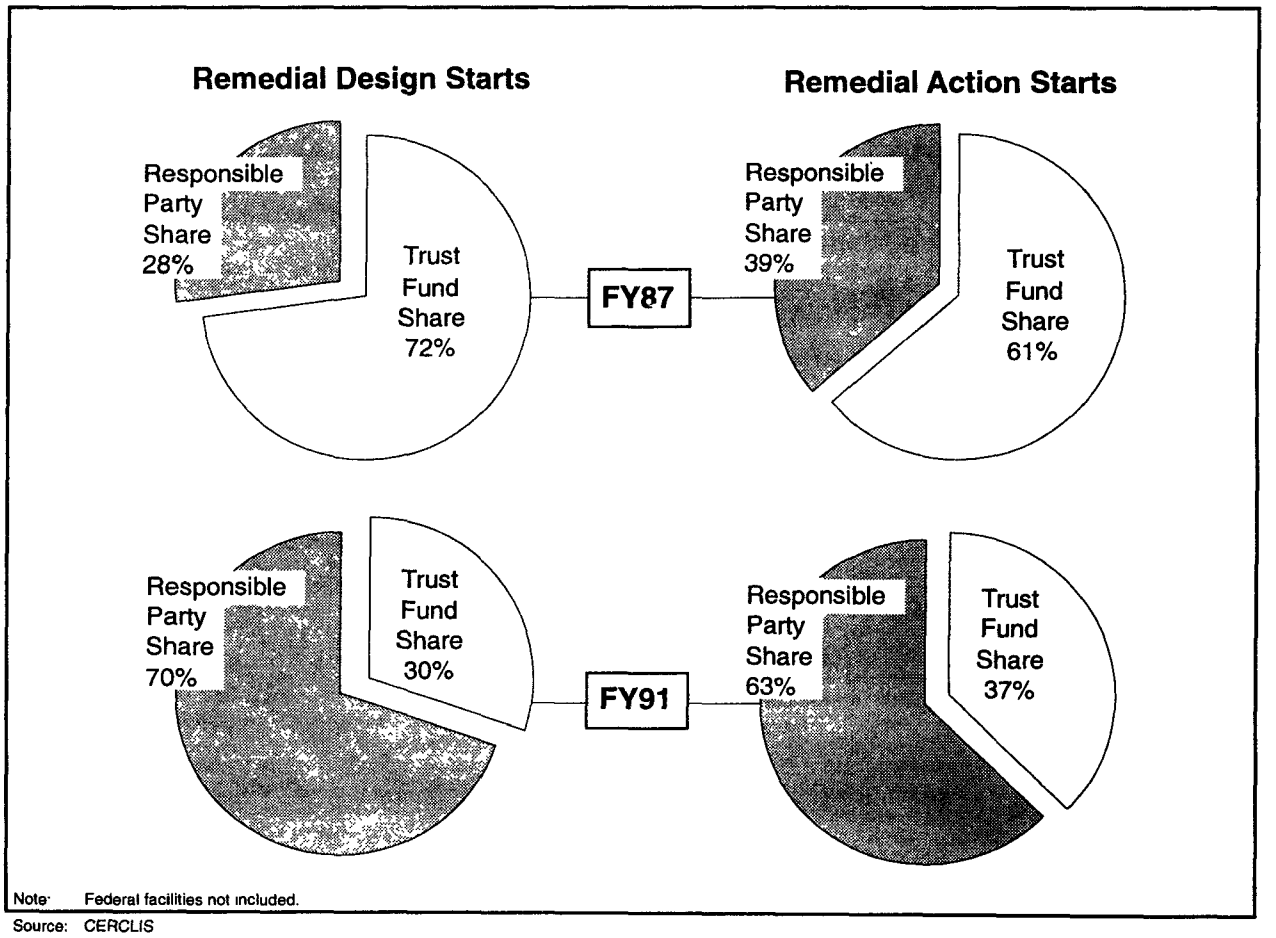
These efforts have had a significant impact on the Agency's progress in determining BDATS for remediating contaminated soil. First, EPA has identified over 120 unpublished studies that deal with contaminated soil. EPA research, conducted jointly by OERR, the Office of Solid Waste, and ORD, is expected to generate further studies to fill gaps in existing treatability studies on contaminated soil.

Second, EPA created a technology transfer database, the Superfund soil data management system (SSDMS), that will enable EPA, state, local, and private parties to access soil treatment records for various technologies. The Agency believes SSDMS has a significant impact on remedy selection at Superfund sites by allowing a quick, direct review of similar sites and technologies. This will eliminate long and costly preliminary work by a responsible party or EPA contractor, thereby decreasing the time required to make treatment and disposal decisions.

1.3 Enforcement Achievements

The enforcement program exceeded FY91 program targets for all major enforcement measures, including RD/RA negotiation starts, RD/RA negotiation completions, UAOs issued for RD/RA

Exhibit 1.3-1
Increase in Remedial Design and Remedial Action Starts Being Performed by Potentially Responsible Parties since Enactment of SARA



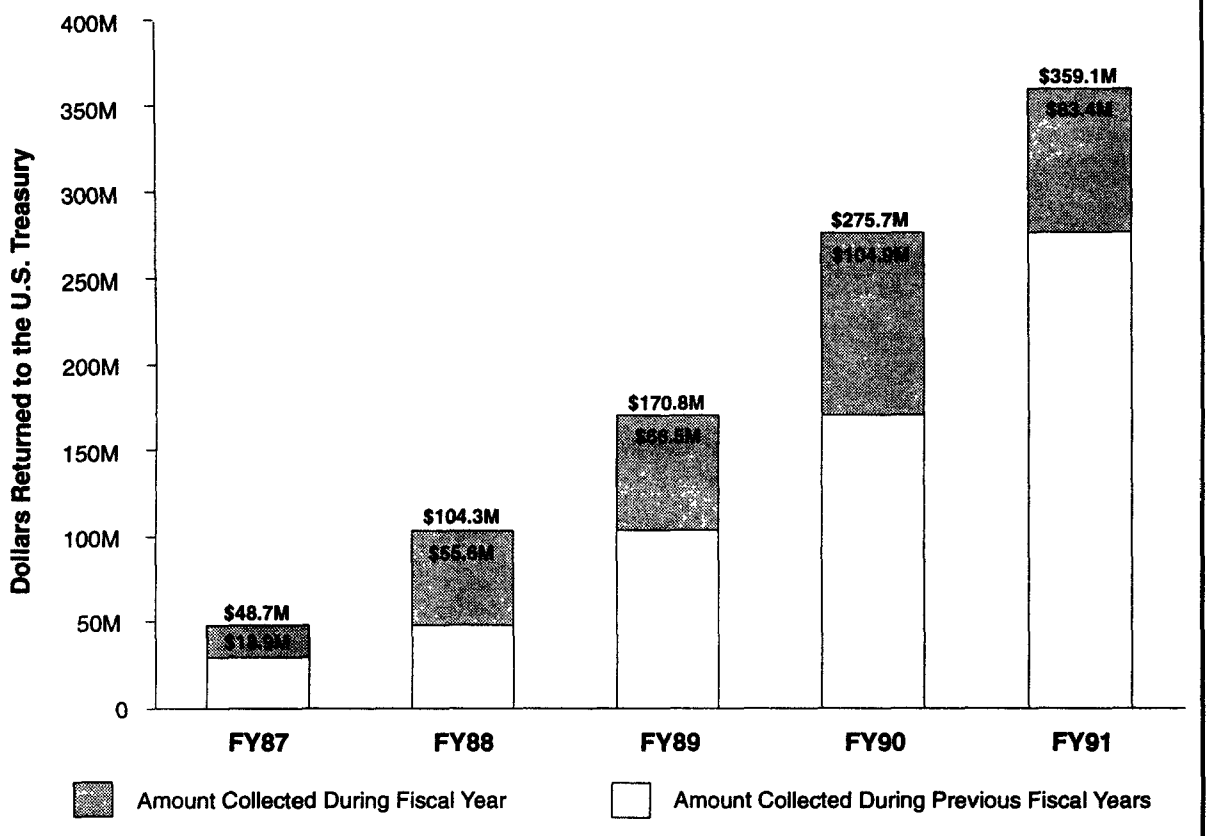
Note: Federal facilities not included.
Source: CERCLIS

work, RD/RA settlements, and pre-remedial cost recovery referrals. Exhibit 1.3-1 shows the increase in the percentage of new RDs and RAs for which PRPs are responsible since the passage of SARA. Exhibit 1.3-2 illustrates cost recovery collections and demonstrates that over $350 million has been returned to the Trust Fund, including over $320 million collected since the passage of SARA.

The Superfund enforcement program initiated 148 RD/RA negotiation starts in FY91, compared to 98 in FY90. The RD/RA negotiation completion rate for FY91 was also higher than in FY90; in FY90 there were 115 RD/RA negotiation completions, and in FY91 there were 132.

In FY91, the Agency issued a record number of 137 UAOs, and entered into 132 AOCs and 119 CDs. Of these, the Agency reached 101 RD/RA settlements (71 CDs and 30 UAOs for RD/RA in compliance, including one AOC for RD work) with an estimated response value of $1.12 billion. This FY91 total exceeds the FY90 total of 97 RD/RA settlements (60 CDs, and 37 UAOs for RD/RA in compliance) with response work estimated at approximately $1 billion. In comparison to FY90, more UAOs were issued this fiscal year for RD/RA work, regions issued 48 UAOs for RD/RA work in FY91, compared to 44 UAOs issued for RD/RA work in FY90.

Exhibit 1.3-2
Post-SARA Cost Recovery Collections[1,2]



1 In pre-SARA years, $29.8 million was collected through cost recovery.

2 Historical numbers have been updated. See explanation on page xiii in the Executive Summary of this report.

Source. September 1991 U.S. Treasury Report.

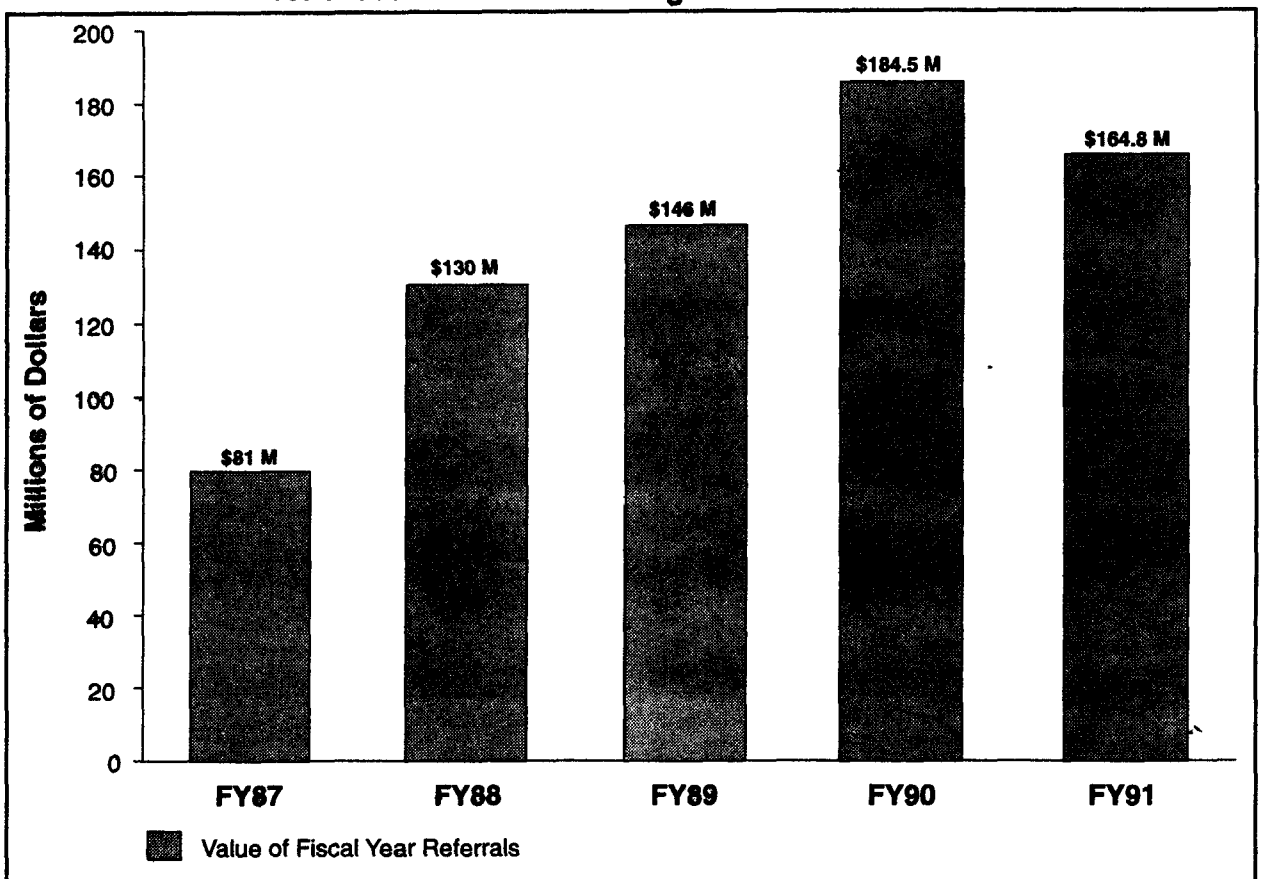
The regions referred 73 Section 107 cost recovery cases (each valued at $200,000 or more) to DOJ and EPA Headquarters. Section 107 pre-remedial action cost recovery referrals accounted for 70 of these cases; remedial action cost recovery referrals accounted for three of these referrals. The regions also referred six cost recovery actions (each valued at less than $200,000) compared to three in FY90. The value of cost recovery referrals for each year since SARA is illustrated in Exhibit 1.3-3. The Agency is seeking $164.8 million in FY91 referrals.

Also, the regions reached 40 administrative cost recovery settlements worth an estimated $20.4 million; in all, the cost recovery program collected $83.4 million from a variety of sources, such as settlements or bankruptcies.

1.3.1 PRP Activity

Successful Superfund enforcement is reflected in the increasing percentage of remedial projects that are PRP-conducted and/or financed. These numbers directly reflect the Agency's commitment to "enforcement first," making polluters pay for hazardous waste cleanup. In FY91, PRP-financed

Exhibit 1.3-3
Value of Costs Sought through Cost Recovery Referrals for Fiscal Year 1987 through Fiscal Year 1991[1,2]



1 Dollar figures represent the value of costs sought in cost recovery cases. Future costs, which may be substantial, are not included.
2 Historical numbers have been updated. See explanation on page xiii in the Executive Summary of this report.

Source: CERCLIS.

activities accounted for 70 percent of the 74 total RI/FS starts, 70 percent of the 161 total RD starts, and 63 percent of the 104 total RA starts started by EPA or PRPs.

1.3.2 Use of Enforcement Measures

During the fiscal year, regions continued to use enforcement tools and techniques to obtain judicial and administrative settlements, including the model CD for RD/RA settlements, mixed funding settlements, *de minimis* settlements, administrative orders (UAOs and AOCs), stipulated/statutory penalties, and referrals to DOJ of Section 107 cases, Section 104(e) cases, penalty cases, treble damage cases, and non-settlor/non-complier cases. States are also heavily involved in the enforcement process.

Accelerated enforcement is creating the need for greater interagency coordination, and greater intra-Agency cooperation. EPA offices involved in the heightened intra-Agency coordination include the Office of Waste Programs Enforcement, ORD, OARM, Office of Enforcement, Office of General Counsel, Regional Waste Management Divisions, Offices of Regional Counsel, and OERR.

Superfund enforcement goals are to:

- Accelerate the use of CERCLA and SARA authorities to expedite PRP settlements and site cleanups;
- Continue to set aggressive PRP-lead clean-up targets;
- Identify and elevate to upper management problems among EPA, DOJ, and states that cause site-specific clean-up delays;
- Communicate Superfund enforcement program successes and accomplishments; and,
- Maximize cost recovery to the Trust Fund by working toward the "management by objective" goal of recovering $300 million in costs in FY93.

In FY91, EPA continued the emphasis on the use of *de minimis* settlements under CERCLA Section 122(g). Under this statutory provision, the Agency settles with parties who contributed waste at a site that is minimal in terms of volume or toxicity. There were 13 *de minimis* settlements in the past fiscal year. In June 1991, EPA organized and co-hosted a national conference among PRPs, public interest groups, Congressional staff, and other interested parties to discuss ways to increase and facilitate the number of *de minimis* settlements. From this conference the Agency developed a number of initiatives designed to encourage *de minimis* settlements and thus reduce transaction costs. (These specific actions are outlined in Section 1.3.4 of this report.)

1.3.3 Success in Reaching and Enforcing Agreements with PRPs

The Agency entered into a number of major agreements with PRPs and established several major enforcement precedents during FY91. Examples of significant CDs, UAOs issued, *de minimis* settlements and other important enforcement actions are described below.

Consent Decrees for RD/RA

Coakley Landfill, New Hampshire (Region 1): A CD was signed by the City of Portsmouth, New Hampshire and 30 other parties on September 30, 1991, and referred to DOJ for filing with the U.S. District Court for the District of New Hampshire. Under the terms of the agreement, the parties will pay for and perform 100 percent of the cleanup of contaminated soil and ground water at the 27-acre landfill. The total estimated value of the settlement is $21.2 million. The parties to the settlement have also agreed to pay approximately $500,000 towards past Agency costs.

Laurel Park Site, Connecticut (Region 1): On March 28, 1991, EPA Region 1 referred to DOJ a CD for a $21.7 million RD/RA settlement whereby 19 PRPs will perform cleanup at the site and reimburse EPA and the State of Connecticut for past and future response costs. In addition, to expedite cleanup, EPA negotiated an agreement for the PRPs to begin administrative RD activities prior to the CD being lodged with the court. Concurrent with the settlement referral, a Section 107 cost recovery action was filed against four non-settling PRPs.

New Bedford Harbor, Massachusetts (Region 1): EPA and DOJ have reached an agreement with the AVX Corporation to pay for a portion of cleanup at the New Bedford Harbor Site. On September 10, 1991, the CD was referred to DOJ and was subsequently filed by DOJ with the U.S. District Court for the District of Massachusetts on September 25, 1991. The agreement specifies that AVX will make a cash-out payment of $50 million to EPA and the State of Massachusetts.

Lone Pine Landfill, New Jersey (Region 2): On March 29, 1991, EPA referred to DOJ an agreement with 128 parties to clean up contaminated ground water and soils at the Lone Pine Landfill in Freehold, New Jersey. The CD was subsequently filed with the U.S. District Court for the Central District of New

Jersey on July 3, 1991. Through the agreement, the parties will perform the cleanup, valued at approximately $10.3 million, which includes annual monitoring fees. In addition, the parties will reimburse EPA $560,000 for past costs. The parties will clean up ground-water contamination to meet drinking water standards and to curtail the migration of contaminants toward the nearby Manasquan River.

Marathon Battery Company Site, New York (Region 2): A successful agreement was reached by EPA, the Marathon Battery Company and the United States Army on September 27, 1991 (date of referral to DOJ). This agreement was subsequently filed with the U.S. District Court in New York on September 30, 1991. Through the agreement, the parties will pay for 70 percent of the cleanup of an 11-acre portion of the site which is currently underway. The parties agreed to a cash-out settlement, valued at $10.3 million.

Myers Property, New Jersey (Region 2): In FY91, EPA successfully reached an agreement with Atochem North America, Inc., for the cleanup of the Myers Property site in Hunterdon County, New Jersey. On September 17, 1991, the CD was referred to DOJ and subsequently filed with the U.S. District Court for the District of New Jersey on December 13, 1991. The party will perform and pay for 100 percent of the cleanup, valued at $46 million, and will reimburse EPA $2.7 million for past clean-up costs incurred at the site. This represents approximately 84 percent of EPA's total past costs at the Myers site. Soil and ground water at the 7-acre site are contaminated with benzene, dioxin, pesticides, and heavy metals.

62nd Street Dump, Florida (Region 4): EPA reached an agreement with six parties to perform and pay for the cleanup of the 5-acre 62nd Street Dump site in Tampa, Florida. On August 22, 1991, the CD was referred to DOJ and subsequently filed with the U.S. District Court in Tampa on January 22, 1992. Under the terms of the CD, the parties agreed to perform and pay for 100 percent of the cleanup of ground water and soil contamination, valued at $18.3 million. The primary contaminants at the site include heavy metals such as cadmium, chromium, and lead.

Metamora Landfill, Michigan (Region 5): EPA reached a large settlement with 35 parties to clean up contaminated soils and ground water at the 160-acre Metamora Landfill site in Lapeer County, Michigan. On May 20, 1991, the CD was referred to DOJ and subsequently filed with the U.S. District Court for the Eastern District of Michigan on July 18, 1991. Through the agreement, the parties will perform and pay for 100 percent of the remaining cleanup at an estimated present worth value of $50 million. The landfill accepted municipal and industrial wastes between 1955 and 1980, during which time as many as 35,000 chemical drums may have been buried. The primary contaminants of concern are volatile organic compounds (VOCs), including benzene, 1,2-dichloroethane, and trichloroethylene (TCE); and heavy metals including barium, arsenic, lead and chromium.

Moss-American Kerr-McGee Oil Site, Wisconsin (Region 5): EPA reached an agreement with the Kerr McGee Chemical Corporation to clean up the 88-acre site in Milwaukee, Wisconsin. The CD was referred to DOJ on August 13, 1991 and subsequently filed with the U.S. District Court for the Eastern District of Wisconsin on December 30, 1991. Through the terms of the agreement, the party will perform and pay for 100 percent of the cleanup, valued at $26 million. Soils, ground water and surface waters and sediments of the Little Menomonee River, which runs through the former wood-preserving facility, are contaminated with polynuclear aromatic hydrocarbons and VOCs.

U.S. DOI Sangamo Crab Orchard, Illinois (Region 5): EPA and DOJ have reached an agreement with Schlumberger Industries and the Department of the Interior (DOI) to clean up a portion of the Sangamo/ Crab Orchard National Wildlife Refuge. The CD was referred to DOJ on May 14, 1991, and DOJ subsequently filed the CD on September 30, 1991, in the U.S. District Court for the Southern District of Illinois. EPA has divided the site into five operable

units with their own individual cleanup plans. This agreement addresses the clean-up of soils and sediments contaminated with polychlorinated biphenols (PCBs) at operable unit two. Schlumberger will perform and pay for 100 percent of the cleanup of PCB-contaminated soils at the site and will recover approximately 35 percent of the costs from DOI. The projected cost of this work is $25 million. Schlumberger must also pay EPA for future oversight costs related to the cleanup of PCB-contaminated sites.

Arkwood Site, Arkansas (Region 6): EPA reached a successful agreement with Mass Merchandisers, Inc., to clean up the 15-acre Arkwood site, a former wood-treating facility in Boone County, Arkansas. The CD was referred to DOJ on May 30, 1991, and was subsequently filed with the U.S. District Court for the District of Arkansas on December 17, 1991. The estimated value of the total cleanup is $12 million, which includes $10.3 million for the response costs. The primary contaminants affecting soil, sludge, debris, ground water, and surface water include pentachlorophenol (PCP) and creosote. The party will take various measures to clean up and mitigate contamination at the site.

Indian Bend Wash Area, Arizona (Region 9): EPA successfully reached an agreement with four parties, including the municipality of Scottsdale, Arizona to clean up contaminated ground water at a portion of the site, which covers 8 square miles. The CD was referred to DOJ on July 3, 1991, and subsequently filed with the U.S. District Court in Arizona on November 25, 1991. Through the terms of the CD, the parties will perform and pay for 100 percent of the cleanup, valued at approximately $17 million.

Koppers (Oroville Plant), California (Region 9): EPA reached a successful agreement with Beazer East, Inc., to perform and pay for the entire cleanup of the 200-acre Koppers Superfund site in Oroville, California. On March 1, 1991, EPA referred the CD to DOJ. The CD was subsequently filed with the U.S. District Court for the Eastern District of California on June 12, 1991. Through the terms of the CD, Beazer East will pay for work valued at approximately $60 million, which includes annual monitoring fees. In addition, the defendant will reimburse EPA $750,000 for past costs incurred at the site. Ground water and soils at the former wood treatment facility are contaminated with PCP, a wood preservative, dioxin, and heavy metals. The party began the clean-up design phase, and some on-site construction has begun at the site.

Operating Industries, Incorporated, California (Region 9): In FY91, EPA signed two partial CDs with settling parties. Through these CDs, the settling parties will perform and pay for various phases of cleanup at the 190-acre landfill, located 10 miles east of Los Angeles. On September 27, 1991, EPA and 178 responsible parties signed a partial CD for $122 million, and referred the CD to DOJ. The CD was subsequently filed with the U.S. District Court for the Central District of California on December 3, 1991. In addition, the parties to a second partial CD will reimburse EPA up to $18 million for past costs incurred at the site. In combination, these settlements represent the largest private party settlement ever reached with EPA at a single Superfund site. The site operated as a municipal and industrial waste disposal facility from the 1950s until 1984. Over the life of the landfill, industrial, residential, commercial, liquid, and hazardous wastes were mixed together. The primary contaminants present include methane and VOCs, such as benzene, vinyl chloride, tetrachloroethylene (PCE), TCE, and toluene.

Phoenix-Goodyear Airport Area, Arizona (Region 9): EPA reached a successful agreement with Goodyear Tire & Rubber Company and Loral Defense Systems to clean up contaminated soils and deep ground water at a portion of the Phoenix-Goodyear Airport Area site in Goodyear, Arizona. EPA referred the CD to DOJ on February 7, 1991, and the agreement was filed on May 7, 1991, with the U.S. District Court for the District of Arizona. Through the terms of the agreement, the PRPs will perform and pay for 100 percent of the cleanup at the southern portion of the 35 square-mile site, valued at approximately $23.5 million. In addition, the PRPs will reimburse EPA $1.5 million for past costs incurred at the site, and pay all future monitoring costs. Soil and ground-

water contamination resulted from past industrial activities at the site. The primary contaminant is TCE, a volatile organic compound.

San Fernando Valley (Burbank Well Field Unit), California (Region 9): EPA successfully reached an agreement with three PRPs, including Lockheed and the municipality of Burbank, California, to address ground-water contamination at the Burbank Well Field Unit site in the San Fernando Valley of California. The CD was signed by the parties on March 28, 1991, and filed with the U.S. District Court for the Central District of California on August 22, 1991. Under the terms of the CD, the parties will conduct an interim remedial action, involving the design, construction and maintenance (for 20 years) of a ground-water extraction and treatment system at one portion of the site. The present value of the cleanup is $65 million. In addition, responsible parties will reimburse EPA approximately $2.5 million for past costs incurred at the site, and pay EPA for future costs.

Commencement Bay/Nearshore Tide Flats (Asarco Smelter Site) (CD10), Washington (Region 10): EPA and DOJ successfully reached an agreement with Asarco, Incorporated to clean up the Asarco Smelter site in Tacoma, Washington. The site is part of the Commencement Bay Nearshore Tide Flats Superfund site. The CD (CD10) was referred to DOJ on September 16, 1991. Under the terms of the agreement, Asarco will perform and pay for 100 percent of the remedy, amounting to approximately $12 million. Asarco also agreed to pay $333,000 in past clean-up costs. The remedy, designed to address arsenic and other hazardous substances contaminating the smelter site, involves three phases: demolition of the smelter stack and other site buildings; off-site disposal of the demolition debris; and collection and on-site treatment of surface water.

Commencement Bay/Nearshore Tide Flats (Tacoma Tar Pits) (CD19), Washington (Region 10): EPA and DOJ have successfully reached two agreements with two parties, Washington Natural Gas (WNG) and Burlington Northern/Union Pacific Railroads (UPR). The agreements were referred to DOJ on September 27, 1991, and filed in the U.S. District Court for the Western District of Washington on October 4, 1991. Under the terms of one of the agreements, WNG will clean the contaminated soil and ground water at the site. The other agreement requires UPR to provide access to property owned by the railroads, and implement future controls and monitoring on those properties to protect the cleanup. These settlements represent a portion of the total clean-up costs, estimated at $20 million. There are four other agreements with 18 other parties. The total amount of the cleanup will be paid for through these six agreements.

Commencement Bay South Tacoma Channel (Tacoma Landfill) (CD3), Washington (Region 10): EPA and the Washington Department of Ecology reached an agreement with the City of Tacoma to perform and pay for the cleanup of the Tacoma Landfill. The remedy at the site, which is part of the Commencement Bay South Tacoma Channel Superfund site, involves capping and closure of the landfill and installation of a ground-water treatment system. Initially, EPA and the Washington Department of Ecology had reached an agreement with the City of Tacoma, the only PRP, in the fall of 1989. The judge, however, declined to approve the original CD. EPA and the Department of Ecology renegotiated a revised agreement with the city. The revised CD, valued at $30 million, was referred to DOJ on March 22, 1991, and lodged with the U.S. District Court for the Western District of Washington on March 25, 1991. The CD was entered by the court on May 17, 1991.

Unilateral Administrative Orders for RD/RA

Cinnaminson Landfill, New Jersey (Region 2): On June 28, 1991, EPA Region 2 issued a UAO for RD/RA to Sanitary Landfill, Inc., a subsidiary of Waste Management, Inc. The first operable unit of work that the company will perform under the order, including ground-water extraction and treatment, is valued at $20 million. In addition, the respondent has reimbursed EPA approximately $3.2 million in past costs.

King of Prussia, New Jersey (Region 2): EPA issued a UAO to five responsible parties on April 15, 1991,

after the parties declined to sign a CD. The UAO requires the PRPs to perform the remedy selected in the September 1990 ROD. The remedy, estimated at $17 million, involves excavating and treating soil, sediment, and ground water contaminated with VOCs, including benzene, and metals including chromium and lead. The UAO also required the PRPs to perform additional analysis and sampling to determine whether the 10-acre abandoned waste disposal and recycling facility can be linked to contaminants in the surface water and sediment of the nearby Great Egg Harbor River. The five PRPs are in compliance with the order.

Solvent Savers, New York (Region 2): EPA issued a UAO on May 29, 1991, requiring five responsible parties to pay for the cleanup of the site, an estimated $29 million. Under the order, the parties will pay for: the excavation of soil that is contaminated by a variety of pollutants, treatability studies, treatment by one of several extraction methods, and the pumping and treating of ground water.

Osborne Landfill, Pennsylvania (Region 3): A UAO was issued to Cooper Industries and General Electric on March 29, 1991, for the first phase of cleanup of this former coal mine that also served as a receptacle for hazardous waste. The estimated cost to carry out the cleanup is $19.4 million. Remedial plans are complicated by the now-abandoned mining system that is currently in place, and include building a containment wall around the site, capping wastes, and the pumping and treating of ground water.

Allied Chemical and Ironton Coke, Ohio (Region 5): A UAO was issued to Allied Signal mandating the company to perform $50 million worth of clean-up activities at this former chemical manufacturing and disposal site. The order represents 100 percent of the cost of the second phase of cleanup; Allied Signal also paid for and performed the first phase of work. Clean-up activities pursuant to the latest order, finalized on July 1, 1991, will include *in situ* vitrification and prepared pad bioremediation, ground-water extraction and treatment, and on-site incineration.

Waste Disposal Engineering, Inc., Minnesota (Region 5): On August 30, 1991, EPA issued a UAO to 25 PRPs to clean up ground water and surface water at the 50-acre Waste Disposal Engineering site in South Andover, Minnesota. The present worth value of the settlement is $15 million. The parties are currently in compliance with the UAO. Solvents, heavy metals, and pesticides contaminated surface and ground water at the site. The primary contaminants of concern include heavy metals (arsenic, chromium, and lead), VOCs (PCE, TCE, and toluene), and other organic compounds.

Cleve Reber, Louisiana (Region 6): EPA issued a UAO on February 6, 1991, requiring the PRPs to pay for and implement the RD/RA. The PRPs are in compliance with the order and will undertake the $40 million remedy which involves excavation and on-site incineration of buried drums and sludges, drainage and backfilling of on-site ponds, capping the portion of the site that was used for disposal of hazardous waste, and ground-water monitoring.

J.H. Baxter Site, California (Region 9): On August 16, 1991, EPA Region 9 issued a UAO to six parties, four of whom complied, to clean up contaminated soil, sediment, and ground water at the 33-acre J.H. Baxter facility in Weed, California. The four cooperating parties include: J.H. Baxter (the owner operator), Roseburg Forest Products, Beazer East, Inc., and the International Paper Company. The parties are paying for and performing 100 percent of the cleanup, which has a present value of approximately $40 million. The primary contaminants of concern include polynuclear aromatic hydrocarbons, dioxin, and arsenic.

Fairchild (Intel and Raytheon) Semiconductor Sites, California (Region 9): On November 29, 1990, EPA Region 9 issued a UAO to nine parties to perform soil cleanup at their respective properties and to monitor on-site ground water at the Mountain View, California site. Through the terms of the UAO, these nine parties will perform and pay for soil cleanup at their respective properties, and will conduct routine monitoring of a ground-water clean-up system, which will be designed and constructed by a separate group of parties, pursuant to a FY92 CD. The estimated value of the cleanup under the UAO is approximately $35 million. The site encompasses four Superfund sites (Fairchild, Intel, Raytheon, and Moffett Naval

Air Station), and is located south of the San Francisco Bay. These sites served as facilities for various uses, including semiconductor manufacturing. Ground water and soils are contaminated with over 70 chemicals, including VOCs (PCE, TCE, trichloroethane, vinyl chloride, toluene, and xylene), and organics (phenols). These chemicals have formed a plume of contaminated ground water, which is migrating toward the San Francisco Bay.

Teledyne Wah Chang Albany, Oregon (Region 10): On February 14, 1991, EPA Region 10 issued a UAO to the Teledyne Wah Chang Corporation to clean up contaminated wastewater sludges at the Millersburg, Oregon site. The cleanup is presently valued at $10.6 million, and the party is paying for and performing 100 percent of the work. Wah Chang Corporation began operating a U.S. Bureau of Mines zirconium metal sponge pilot plant under contract with the U.S. Atomic Energy Commission in 1956. As a result of this practice, on-site sludge ponds are contaminated with heavy metals, organic compounds, and trace levels of radionuclides. Clean-up work is well underway at the site and, by the end of FY92, remedial actions should be completed.

De Minimis Settlements

Landfill and Resource Recovery, Rhode Island (Region 1): A *de minimis* settlement was negotiated with 50 PRPs on March 29, 1991. The settlement for $2.9 million was reached through an AOC and covers 100 percent of past costs and partial future oversight costs. The past costs address the work performed by EPA for the RI/FS at the site. The remedy at the site involves upgrading the existing landfill enclosure to protect ground water and wetlands, implementing wetlands recovery operations, and collecting and treating landfill gas to reduce risks to public health from inhalation.

Union Chemical, Maine (Region 1): On June 12, 1991, EPA Region 1 referred to DOJ an AOC for *de minimis* settlement. DOJ approved the AOC by which 270 *de minimis* parties agreed to pay $3 million toward the cost of cleanup at the site. The remedy at the site included soil and ground-water treatment, demolition of on-site facilities, and off-site soil monitoring and analyses.

Wayne Waste Oil, Indiana (Region 5): On August 13, 1991, EPA reached a *de minimis* settlement with 158 parties. There are a total of 186 parties who have settled with EPA. The overall settlement requires the parties to perform and pay for 100 percent of the clean-up costs, amounting to $10 million; reimburse EPA for any future costs to monitor the cleanup; and pay DOI for natural resources damage claims.

Coal Creek, Washington (Region 10): In FY91, EPA successfully reached an agreement with 27 *de minimis* parties who collectively contributed less than 2 percent of the waste to the site. Each *de minimis* party will pay a fixed amount of money into a clean-up trust account established by the major parties. There are a total of 86 PRPs, including four federal agencies, which have entered into an agreement with EPA to implement and pay for the selected site remedy which involves on-site incineration, on-site containment, and monitoring. The total amount of the settlement, including the *de minimis* portion, is $10.2 million. The agreement was filed in the U.S. District Court for the Western District of Washington on June 4, 1991.

1.3.4 Enforcement Initiatives

In response to the recommendations of the 30-Day Study, the enforcement program is implementing actions to accelerate completion of site cleanups.

Limiting Mid-Stream Takeovers During Remediation: Increased PRP lead in remedial activities benefits the overall clean-up program, but the remedial process can be delayed as much as six to nine months when PRPs assume the lead from EPA. In order to eliminate or decrease the delay, EPA issued a directive in November 1992 limiting project lead transfers to private parties during discrete phases of the remedial process (such as during the RI/FS, RD, or RA). The directive recommends regions to inform PRPs during negotiations that requests for mid-stream takeovers will be considered only in unusual circumstances, thus encouraging PRPs to agree more readily to conduct remedial work from the start. The directive also allows for lead changes between discrete phases of remediation if they do not cause significant delay.

This policy does not apply to EPA takeovers of PRP work, and it does not alter the Agency's "enforcement first" agenda nor discourage PRPs from conducting remedial work.

Beginning Remedial Design Before Entry of Consent Decree: The Agency is revising guidelines to expedite cleanup and encourage the initiation of RD work before the entry of a CD in court. For example, in the $21.7 million settlement for the Laurel Park Superfund site, the PRPs agreed to begin RD activities prior to the lodging of the CD with the court.

Equitable Cost Allocation Initiatives

Equitable allocation of response costs at Superfund sites was a main focus of the enforcement program in FY91. The significant initiatives are described below.

De Minimis Initiative: The Agency is taking a variety of steps to encourage more *de minimis* settlements, and thus reduce transaction costs:

- Guidelines are being developed to promote settlements with *de minimis* parties early in the remedial process. The guidance will address the use of preliminary waste information and remedy cost estimates. The guidelines will also address the use of premiums and re-openers to reduce the risks associated with early settlement.
- Resources to the regions will be reallocated or increased to encourage more *de minimis* settlements; a training program will be established to develop regional experts; and a Headquarters team will be created to provide resources to facilitate settlements.
- The Agency is developing a database for *de minimis* settlements. The information will be used to compare specific provisions from the settlements and to develop consistent language for future settlements.
- The Agency is developing a *de micromis* settlement policy, which will provide settlement options for parties whose proportional liability share is extremely small. The aim of the *de micromis* policy is to decrease transaction costs.
- The Agency is working with the National Enforcement Investigation Center to develop a center of expertise on methods to increase the use of Agency-conducted non-binding allocations of responsibility.

Residential Homeowner Policy: In July 1991, EPA issued the *Policy Toward Owners of Residential Property at Superfund Sites*. The policy formalizes EPA's practice of not taking enforcement actions that require owners of residential property to undertake response actions or pay response costs, unless the owner's activity directly contributed to a release, or potential release, of hazardous substances. The policy is not applicable when an owner of residential property fails to cooperate with a federal or state response action or if the resident is using the property in a manner not consistent with residential use.

Municipal Liability: In July 1991, EPA announced a number of activities concerning municipal liability. The goal of these activities is to address concerns that have arisen from the increase in third-party law suits that have been filed against municipalities solely on the basis of generation or transportation of municipal solid waste. These activities include:

- Developing national guidelines for allocating costs for municipal solid waste; and
- Developing a model settlement document for municipalities involved in the generation or transportation of municipal solid waste to Superfund sites.

The model settlement document will enable municipalities to defend against third-party lawsuits by entering into early settlements with EPA that resolve their potential liability and provide statutory contribution protection.

Other FY91 Enforcement Initiatives

Superfund Lead Initiative: In FY91, EPA initiated an overall enforcement effort to target lead, a highly

toxic metal, and reduce lead exposure from Superfund sites. As part of the initiative, EPA and DOJ filed six complaints and lodged two CDs. Together, the six complaints request reimbursement of approximately $10 million spent on clean-up actions at six sites where lead was a contaminant of concern. These clean-up actions substantially reduced the environmental threat of lead in ground water, surface and subsurface soils, and aided in eliminating the threat of airborne lead contamination.

Final Guidance on the Administrative Record: In December 1990, EPA released the final guidance on the policy and procedures governing the compilation of administrative records supporting the selection of remedial actions.

1.4 Removal Activities

Throughout the 10-year history of Superfund, the removal program has been extremely successful in preventing or minimizing risk to human health and the environment. To date, EPA and PRPs have started 2,664 removal actions at both NPL and non-NPL sites. Removal actions are taken in response to a release or a threat of a release of a hazardous substance, pollutant, or contaminant that presents a near-term threat to human health or the environment. Under oversight of an On-Scene Coordinator (OSC), a removal action is generally short-term in nature, addresses the most immediate threats, and complies with ARARs to the extent practicable, given the exigencies of the situation. Chemical spills or fires, and illegal disposal of toxic materials (midnight dumping) are examples of situations that might warrant a removal action.

The sites where EPA conducts removal actions may or may not be on or proposed for the NPL. Specific activities undertaken during a response may include treatment, excavation, pumping, incineration, barrier installation, provision of an alternate water supply, temporary relocation of residents, or some combination of these activities. As part of the removal actions taken over the course of Superfund, the program has supplied more than 450,000 people with alternative water supplies, and relocated approximately 30,000 people to protect them from harm.

1.4.1 Status Report on Removal Actions

The Agency and PRPs began a total of 341 removal actions during FY91 and completed 265 removal actions. Exhibit 1.4-1 compares the number of removal action starts and completions during FY91 to those of previous fiscal years.

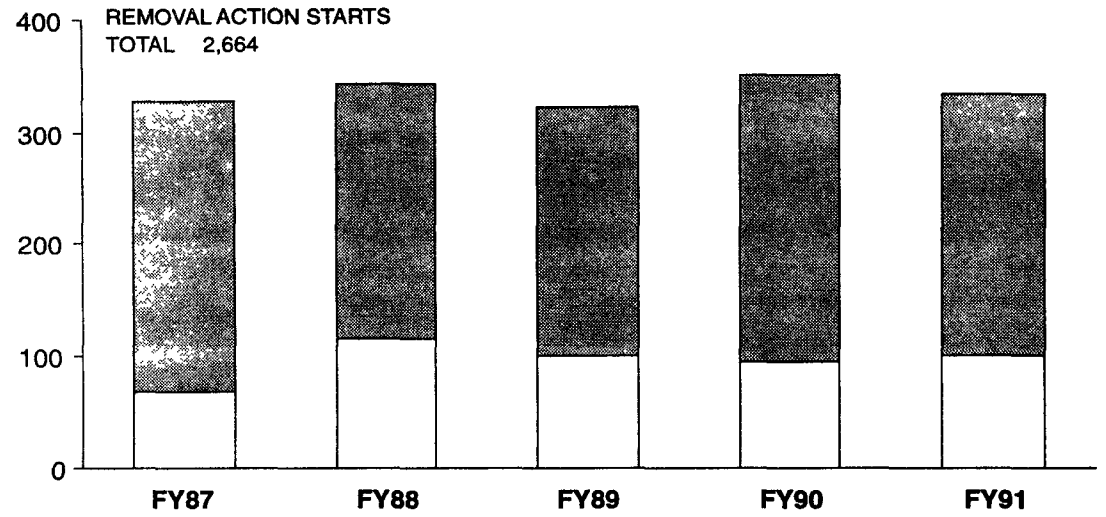
The involvement of PRPs in funding removal efforts grew during the fiscal year. Of the 341 removal actions begun in FY91, 103 were financed by PRPs compared with 95 in FY90. Of these 103 removal action starts conducted by PRPs in FY91, 29 were at NPL sites and 74 were at non-NPL sites. PRP funds were used to complete 55 of the total 265 removal action completions in FY91. EPA financed removal action starts at 238 sites, while completing 210 removals.

Those removal actions that have begun but have not yet reached the completion stage are considered "on-going." On-going removals are actions that have been in progress less than 12 months, and actions that have been granted exemptions from the one-year removal action duration limit. Also, in cases where a removal action has taken place but the contaminants have yet to be transported to a disposal facility, the action is considered on-going.

1.4.2 The Removal Action Process

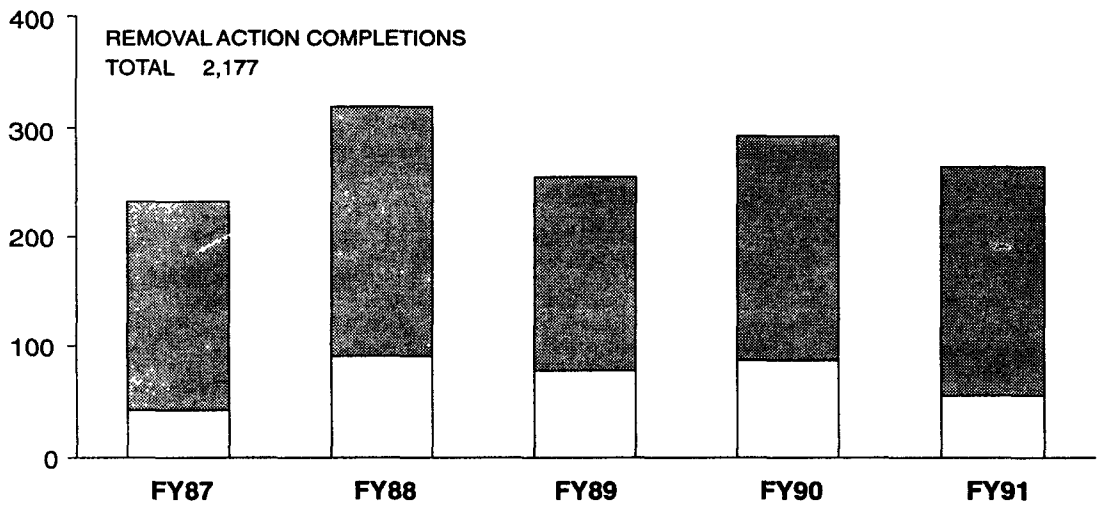
To ensure that the most serious risks to public health and the environment are addressed, the removal program identifies three types of removal actions with respect to response time. Removal actions are classified as "emergencies" if action at the site

Exhibit 1.4-1
Removal Action Starts and Completions by Fiscal Year[1,2]



	FY87	FY88	FY89	FY90	FY91
FY Fund	260	228	223	256	238
FY PRP	67	116	101	95	103
TOTAL	327	344	324	351	341

Fund-financed (2,010) PRP-financed (654)



	FY87	FY88	FY89	FY90	FY91
FY Fund	191	229	177	207	210
FY PRP	41	91	78	87	55
TOTAL	232	320	255	294	265

Fund-financed (1,712) PRP-financed (465)

[1] From 1980 through 1986, the total number of removal action starts was 977 (805 Fund-financed and 172 PRP-financed) and the total number of removal action completions was 811 (698 Fund-financed and 113 PRP-financed).

[2] Historical numbers have been updated. See explanation on page xiii in the Executive Summary of this report.

Source. CERCLIS.

within hours is necessary. "Time-critical" removal actions are based on a site evaluation by the lead agency where it is determined that the action must begin within six months. A planning period of more than six months is available before clean-up activities must begin in the case of "non-time-critical" removal actions. The lead agency will undertake an engineering evaluation/cost analysis for non-time-critical removals. During FY91, 58 Fund-financed removal actions were determined to be emergency actions. Fund-financed time-critical and non-time-critical removals numbered 180.

When there is notification of a release that may require a removal action, the Agency undertakes a removal site evaluation to determine the source and nature of the release, the threat to public health, and whether the party is undertaking a proper response. The Agency reviews the results of the removal site evaluation and a number of other factors to determine the appropriate extent of a removal. At any point in this process, EPA may refer the action to the site assessment program or determine that no action is necessary. When it is determined that a removal action is required, an appropriate response is taken to minimize or eliminate the threat.

The Agency must prepare an action memorandum that states the authority for undertaking the removal action, and describes both the action(s) to be taken and the rationale for the selected action(s). EPA also must establish an administrative record that consists of the documents forming the basis for the selected removal action.

Community Participation in Removal Actions

The removal process provides ample opportunities for public participation. An official spokesperson must be appointed to keep the public abreast of the progress of a given removal action. All emergency, time-critical, and non-time-critical actions require the administrative record to be made available for public comment. If the removal action is expected to continue beyond 120 days, the lead agency must involve local officials and other parties in the process.

The On-Scene Coordinator

The OSC is designated to organize and direct removal actions. The OSC is responsible for preparing a final report describing the situation at the site as the removal developed, the response actions that took place at the site, and any problems that occurred during the response.

Removal Action Statutory Limits

Removal actions are intended to be short-term, relatively inexpensive responses to releases or threats of releases that pose a danger to human health and the environment. Consequently, Congress included limitations in CERCLA on the cost and duration of removal actions of $2 million and one year, respectively. Congress established exemptions, however, under specific circumstances to these cost and duration limits. For example, removal actions may exceed the limits if: (1) continued response is required immediately to prevent, limit, or mitigate an emergency; if there is an immediate risk to public health, welfare, or the environment; and if such action cannot otherwise be provided on a timely basis; or (2) continued response action is otherwise appropriate and consistent with the remedial action to be taken. During FY91, EPA granted 15 requests for exemption/ceiling increases for removal actions that exceeded the $2 million limitation. Additionally, EPA granted four exemptions for removals to continue longer than one year.

1.4.3 Addressing Immediate Threats

Since the creation of Superfund in 1980, EPA has taken appropriate actions to reduce immediate threats to human health and the environment at hazardous waste sites. Superfund's emergency response program reached a significant milestone in

FY91: the 2,000th Fund-financed removal action start. EPA reached the 1,000 mark in 1987; this new milestone comes only four years later. In addition, since 1980, PRPs have initiated 654 removal actions. Two-thirds of these actions have occurred in the last five years.

The 2,000th Fund-financed removal action start took place at the Industrial Fuel and Asphalt site, an inactive refinery and asphalt facility located in Hammond, Indiana. The threats posed by the site included oil migrating into a wetlands area, leaking transformers containing polychlorinated biphenyls (PCBs), drums filled with various chemicals, and a pile of asbestos. As part of the removal action, EPA staged and sampled 300 drums, neutralized 40 drums containing acids and caustics, removed leaking transformers, excavated 500 cubic yards of PCB-contaminated soil, and removed 250 cubic feet of asbestos.

1.4.4 Superfund Removal Procedures Manual

The *Superfund Removal Procedures Manual* covers all removal action procedural and administrative requirements for the program. The manual is used by OSCs, other removal personnel, the remedial program staff, and enforcement personnel, as well as by other federal and state agencies. In FY90, EPA began restructuring the manual into a series of ten stand-alone volumes, each addressing separate topics of importance to Superfund removal actions. In FY91, EPA completed the second volume of the series, *Guidance on the Consideration of ARARs During Removal Actions.* Several others volumes of the manual are nearing completion.

1.4.5 Emergency Response Team

Under the removal program, EPA manages the Emergency Response Team (ERT) as required by the National Oil and Hazardous Substances Pollution Contingency Plan. The ERT consists of EPA experts in emergency response, hazard assessment, health and safety, air monitoring, alternative and innovative technology, site investigation, ecological damage assessment, clean-up contractor management, and oil and chemical spill control. Over the ten years of its existence, the team has been available to OSCs and RPMs 24 hours a day, 365 days a year to support removal and remedial actions at sites. During FY91, the ERT responded on-scene to 104 removal actions, 61 remedial actions, six oil spills, and six international actions.

In addition to its response support actions, ERT provides introductory and intermediate level training courses in health and safety and other technical aspects of response. During FY91, a total of 213 training courses were offered nationwide.

Chapter 2
Response Initiatives

The Agency continued its progress in assessing potentially threatening sites. EPA also began implementing the revised hazard ranking system (HRS); undertaking new initiatives in the contract laboratory program (CLP); and developing specialized programs addressing major environmental concerns such as lead and radionuclide contamination. The Agency also issued guidance documents and rulemakings.

2.1 Site Assessment

The site assessment phase of the Superfund process begins when EPA is notified of a potentially threatening site or incident. The Agency records basic information about the site in the inventory of potential sites maintained in the CERCLA Information System (CERCLIS) and will track further actions and decisions regarding the site in CERCLIS. For sites where there is an immediate threat, EPA will proceed directly to conducting a removal action to address the threat. For other sites, a two-stage assessment will be conducted, consisting of a preliminary assessment (PA) to determine whether a potential threat exists and a site inspection (SI) to determine the relative threat posed and evaluate the site for possible listing on the National Priorities List (NPL). At any time during this two-stage assessment process, EPA may determine that there is an immediate threat at the site and conduct a removal action, or that Superfund activities have been accomplished. Superfund activities have been accomplished when further action is not required at the site or the site is deferred for action under other authority.

Notification of the appropriate government authorities and assessment of the situation are among the crucial elements in the timely response to a potentially threatening site or incident. EPA is notified of potential hazardous waste sites in a variety of ways, including information provided by states and handlers of hazardous materials, and reports from concerned citizens. For example, an individual may report concerns about a particular site, or local law enforcement officials may submit a formal report to EPA. Facility managers may also notify EPA of a release, as required by CERCLA Section 103. Section 103 specifies that a person in charge of a vessel or facility, such as a facility manager, must immediately report any release of a hazardous substance that is equal to or greater than the reportable quantity (RQ) for that substance to the National Response Center (NRC). The NRC operates a 24-hour hotline to allow for immediate notification. CERCLA imposes penalties for failure to comply with this requirement.

EPA will assess the potential threat posed by sites through a PA. The PA may include either an on-site or off-site reconnaissance, with EPA or the state reviewing existing site-specific data for early determination of the need for further action. The information may include past state permitting activities, local population statistics, and the site's potential effect upon the environment. This information review enables the Agency to determine whether further study of a site is necessary, a removal assessment or action is needed, or all necessary

Acronyms Referenced in Chapter 2

AOB	Analytical Operations Branch
CERCLIS	CERCLA Information System
CARD	CLP Analytical Results Database
CADRE	Computer Aided Data Review and Evaluation
CLP	Contract Laboratory Program
HRS	Hazard Ranking System
NPL	National Priorities List
NRC	National Response Center
OERR	Office of Emergency and Remedial Response
OIG	Office of the Inspector General
ORD	Office of Research and Development
ORP	Office of Radiation Programs
OSWER	Office of Solid Waste and Emergency Response
PA	Preliminary Assessment
PE	Performance Evaluation
QTM	Quick Turnaround Method
RQ	Reportable Quantity
SAB	Site Assessment Branch
SAS	Special Analytical Services
SI	Site Inspection
TIB	Toxics Integration Branch
UBK	Uptake Biokinetic Model

Superfund evaluation of the site has been accomplished.

If the PA indicates that an actual or potential contamination problem exists, EPA will perform a more extensive study, the site investigation (SI). The purpose of the SI is to determine whether a site is appropriate for listing on the NPL, which is EPA's list of sites having highest remediation priority. The SI usually includes collection and analysis of environmental and waste samples to determine: (1) the substances present at the site; (2) their concentrations; (3) whether they are being released or there is a potential for their release; and (4) whether the hazardous substances identified are attributable to the site. These data and other available information are used to calculate a score using the HRS, which measures the relative hazard a site poses to human health and the environment and determines whether placement on the NPL is warranted.

At the end of FY91, the inventory of sites in CERCLIS was approximately 34,000 sites. EPA has completed site assessment program activities at the majority of these sites. Due to an ongoing investigation by EPA's Office of Inspector General (OIG), however, specific numerical totals for site assessment accomplishments are not included in this report. These accomplishments will be reported in the FY92 report.

2.2 Revised Hazard Ranking System Implementation

During FY91, EPA began using the revised HRS. The HRS is the scoring system used to assess the relative threat associated with the release or potential release of hazardous substances from a waste site. EPA uses this score as the primary criterion in determining whether a site should be placed on the NPL.

EPA revised the HRS in FY90 to make it more comprehensive and accurate, and to ensure that the regions uniformly interpret and score sites proposed to the NPL. The revisions to the HRS more accurately portray the degree of relative risk to both human health and the environment. The key changes address, to the extent possible:

- Population at risk;
- Potential for drinking water contamination;
- Potential direct human contact;
- Potential ecosystem destruction;
- Damage that may affect the food chain; and
- Actual or potential contamination of air.

To prepare EPA staff to work with the revised system, EPA conducted five HRS/Site Assessment Orientation Sessions in which more than 500 people were trained. These sessions consisted of an overview of the site assessment program and the revised HRS. In addition, 241 people were trained at five HRS Package Preparation Sessions. These sessions provided an in-depth review of the new HRS and hands-on training in scoring sites. To supply the regions with a readily available training course for new personnel, the Agency has begun developing a video on the site assessment program and the revised HRS.

2.3 National Priorities List Update

The NPL is the list of sites to which EPA gives highest priority for remediation. Ranking of the potential hazard of sites, through revised HRS scoring, identifies candidate sites. If a site scores 28.50 or higher on a scale of 100, the Agency proposes the site for listing on the NPL, solicits public comments, and, based on public comments, announces final listing of the site on the NPL. When all clean-up goals are attained, and no further response action is appropriate, EPA will delete a site from the NPL. The Agency's former policy, prior to December 1991, required a five-year review prior to deletion if hazardous substances remained on site above health-based levels.

As a result of site proposals to the NPL, final listings, and deletions during the fiscal year, there were 22 proposed and 1,185 final NPL sites at the end of FY91. During FY91, EPA proposed 23 sites for the NPL and listed one of these sites. Six sites that had been previously proposed were also listed, for a total of seven final listings. Also in FY91, nine sites were deleted from the NPL. The resulting total of proposed and final sites on the NPL is 1,207. Exhibit 2.3-1 illustrates the historical number of final sites on the NPL since SARA was promulgated in 1986.

To improve communication of progress in cleaning up NPL sites, the 30-Day Study Task Force recommended tracking construction completions as a target of performance in cleaning up NPL sites. The construction completion category includes sites where all phases of the site cleanup plan have been performed and EPA has determined that no additional construction actions are required. Sites in this category may be currently undergoing long-term pumping and treating of ground water, operation and maintenance, or monitoring to ensure that the completed clean-up actions continue to protect human health and the environment. Only after all clean-up goals are attained, however, may a site be deleted from the NPL. At the end of FY91, construction had been completed at 61 sites; 38 of these have been deleted from the NPL.

2.4 Relationship between CERCLIS and NPL Data

CERCLIS is used to track sites that may be listed on the NPL and to catalog administrative information, such as the PA or SI completion date. Of the approximately 34,000 sites in CERCLIS at the end of FY91, 1,207 were either proposed to the NPL or on the final NPL. Although the sites on the NPL are a relatively small subset of the inventory in CERCLIS, they generally comprise the most complex and environmentally compelling cases. Only at NPL sites can EPA use the Superfund Trust Fund for a long-term cleanup, although Fund money can be used to undertake removal actions whether or not a site is on the NPL.

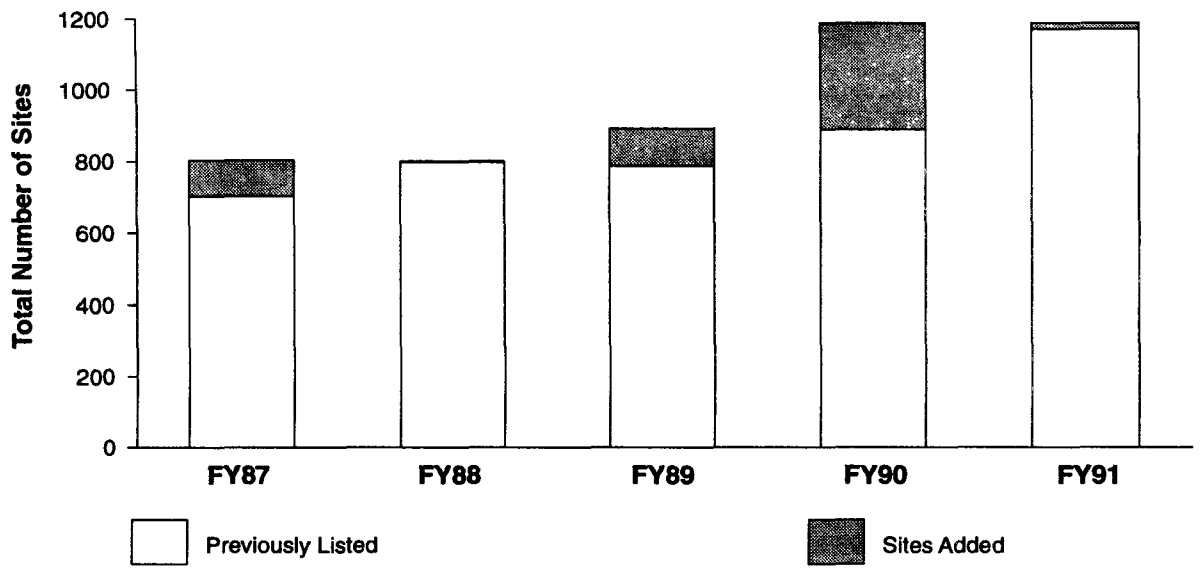
2.5 Contract Laboratory Program Initiatives

In order to accurately assess hazards present at a site, extensive sampling is necessary. During the remedial phase of Superfund, in particular the SI, samples must be extracted from sites and analyzed. The CLP is the Agency's major vehicle for obtaining laboratory chemical analyses of samples from Superfund sites. These samples are delivered from sites to laboratories participating in the CLP. Sample results are later forwarded to the appropriate regions. During FY91, EPA undertook a series of improvements in the CLP that enable the Agency to expand the diversity of routine and special analytical services to meet regional needs more adequately.

Expanded Automated Data Processing

To provide technically sound and legally defensible data, EPA enhanced a number of previously

Exhibit 2.3-1
Final National Priorities List Sites for Fiscal Year 1987 through Fiscal Year 1991



	FY87	FY88	FY89	FY90	FY91
Sites Added	99	0	101	300	7
TOTAL[1]	802	798	888	1,187	1,185

[1] This graph illustrates *final* NPL sites only and reflects the fact that EPA deleted 13 sites from the NPL from FY80 to FY86, four sites in FY88, 11 sites in FY89, one site in FY90, and nine sites in FY91. The total of *final* and proposed NPL sites as of September 30, 1991, was 1207.

Note: The total number of sites listed on the NPL from 1983 to 1986 was 703.

Sources: *Federal Register* notices through September 30, 1991.

developed data programs in FY91. These programs establish organizational procedures that create a degree of uniformity among the data exchanged between the EPA regions and Headquarters. The CLP Analytical Results Database (CARD) was developed to provide an automated means of accessing CLP data. During the fiscal year, the Office of Emergency and Remedial Response (OERR) Analytical Operations Branch (AOB) undertook measures to improve CLP data validity in CARD, reducing the CLP data entry error rate to 38 percent.

To expedite review of CLP organic routine analytical services data processes, technicians developed the Computer Aided Data Review and Evaluation (CADRE) program. The use of CADRE software ensures that CLP data is of known and documented quality. With CADRE, the Agency is able to reduce a data reviewer's workload by as much as 70 percent.

Superfund analytical services performed by laboratories procured through means other than the CLP are tracked by the non-CLP Superfund Analytical Services Tracking System. This system provides the regions with a consistent means of tracking critical information regarding the magnitude, type, and quality of non-CLP analytical services used in support of Superfund. In FY91, a kickoff meeting was held to facilitate regional implementation efforts and nine regions implemented the system. The regions provide periodic updates to EPA Headquarters, where information is compiled

into a national database. Until the system was developed, such information was not contained in a centralized location.

Special Analytical Services Basic Ordering Agreement

In FY91, a contract vehicle to support additional administrative and organizational requirements for analytical testing laboratories was implemented by the Hazardous Site Evaluation Division. Analytical testing laboratories provide special analytical services (SAS) to the regions. The contract between a laboratory and EPA requires a standardized reporting format for the submission of all original data. Standardized formats are critical for documenting data that may be used as evidence in enforcement activities.

Quick Turnaround Analytical Service

The FY91 implementation of the quick turnaround method (QTM) analytical service significantly improved data validation methods used in the CLP. QTM is a pilot program designed to provide a rapid turnaround of data from the analysis of samples. Producing data of known and documented quality, the service is used for screening, monitoring, and other site assessment activities. Using QTM enables a laboratory to provide EPA clients with validated sample results within forty-eight hours of the sample's receipt at the laboratory. Previous methods required six to eight weeks. During the fiscal year, the Agency issued national guidance along with a schedule for implementing QTM pilot programs in interested regions, and two regions held QTM orientation.

Low Detection Levels in Drinking Waters

In FY91, EPA began formalizing protocols to provide the regions with analyses of drinking water samples. The protocols, which are based on EPA's previously developed 500-series methods, establish a consistent reporting format. EPA is currently testing the performance of these methods using actual field samples.

Transportation Contract Awards

In FY91, EPA awarded sample transportation contracts to provide for establishing, maintaining, and monitoring shipping accounts for the transportation of sample coolers, sample data, and other items. To expedite the flow of materials and information, certain standards have been set for transport; for example, laboratories are required to return coolers to the originating sampling office within 14 days of sample receipt. In addition, monthly summary reports are prepared to ensure that the contracts are running effectively.

Task Force Initiatives

An Agency-wide task force conducted a Federal Managers Financial Integrity Act review of the CLP in FY91. The purpose of the review was to assess the management controls of the CLP to determine if significant weaknesses existed and if user needs were being met. The task force found the program to be vulnerable to waste, loss, unauthorized use, or misappropria-tion. Specific recommendations issued by the task force included completing an Office of Solid Waste and Emergency Response (OSWER) internal control review, eliminating duplicate and unnecessary paperwork, and establishing a national reporting system. Improvements to the program were begun in FY91 in response to the study.

OERR Initiatives

On September 18, 1991, the OIG issued an audit report reviewing the adequacy of selected EPA Headquarters and regional operational CLP controls. OIG found that EPA needs to take a number of actions to improve its overall management of the CLP. First, auditors discovered that EPA had failed to obtain and safeguard all original documentation generated when samples from Superfund sites were analyzed by contract laboratories. Second, the Agency

did not have a policy or minimum standards to ensure oversight of data review contractors or to instruct regions in the use of performance evaluation (PE) samples. Finally, weak controls of the SAS program resulted in Agency payments to contractors for laboratory results although the data were not used or did not comply with all terms of the contract.

In response to the findings and recommendations contained in the OIG's report, OERR has worked to eliminate identified problems. The Agency will develop a plan to recover missing documentation files by the end of FY93. The Agency also is drafting guidance on the use of PE samples, and developing a priority workplan for implementing guidance for overseeing contractor's validation of data. Steps are being taken to improve SAS operations and contract laboratory adherence to SAS procedures.

2.6 The Lead Program

Lead is one of the most frequently found toxic substances at Superfund sites. Lead is also a major contaminant and health threat to children in urban areas that are not associated with Superfund sites. EPA has undertaken two initiatives in an effort to better address the effects of lead contamination: the Uptake Biokinetic (UBK) Model and the Three City Lead Study.

The Uptake Biokinetic Model

Currently, EPA recommends an interim soil clean-up level for lead of 500 to 1,000 parts per million (ppm) for Superfund sites characterized as residential. To aid regional risk managers in establishing permanent lead clean-up levels for soil, EPA's Toxics Integration Branch (TIB) continues to develop risk assessment procedures and tools such as the UBK Model. This model estimates the lead level in blood in persons exposed to the contaminant through air, soil, dust, drinking water, diet, and paint. The UBK Model uses site-specific data or, if no such data are available, default values based on national averages.

EPA is developing a site-specific guidance manual and a sampling strategies and protocols manual to assist risk assessors and managers in deciding when to use site-specific data in the model and in identifying the most appropriate method for collecting data. EPA is validating the UBK model by studying data from Superfund sites contaminated with lead from mining and smelting activities. Other validation studies will be conducted using urban and battery recycling sites.

In FY92, the EPA Science Advisory Board will review the appropriateness of using the model to assess total lead exposure at Superfund sites. A soil lead clean-up level for Superfund sites with lead contamination also will be developed. EPA plans to complete the final *Soil Lead Directive*, a guidance manual on the UBK Model, and the *Lead Sampling Manual* in FY92.

Three City Lead Study

EPA has initiated a project in Baltimore, Boston, and Cincinnati to determine whether a reduction of lead in residential soil and/or dust (interior house dust and exterior soil dust) will result in a decrease of blood-lead levels in children exposed to the contaminant. The Maryland Department of the Environment, the City of Boston, and the University of Cincinnati are conducting the project, with technical assistance from EPA, the Centers for Disease Control, the Department of Agriculture, and several academic institutions.

The study areas within each city were not randomly selected. Each area was chosen on the basis of several factors, including the age of housing, the reported incidence of lead poisoning, the expected turnover rate in residents, and the potential for neighborhood involvement in the project. Biological and environmental sampling results reflect this "targeting." Because the study areas were targeted for high-lead levels, the baseline data are not representative of the three cities.

In 1991, all three cities completed baseline sampling of blood, hand dust, soil, interior house dust, paint, and water. Cincinnati also sampled exterior street dust. Soil removal activities were completed in all three cities, as well as post-removal sampling of lead contamination. Boston has completed analyses of its samples, and Baltimore and Cincinnati are nearing sample analysis completion.

An interim project report, entitled the *Three City Study*, released July 26, 1991, contains descriptions of project designs, protocols for sampling and analyses, removal methods, problems encountered, and baseline data. Because final data are not yet available, the interim report does not include findings.

2.7 The Radiation Program

During the fiscal year, EPA undertook several initiatives in an effort to address the many complex and unique issues associated with radionuclide site assessment, risk assessment, and remedial technology development.

Superfund Program Guidance

The Analytical Operations Branch (AOB) of OERR began working with ORP during the fiscal year to develop procedures, protocols, and other documentation required for incorporating radioanalytical services into the CLP in order to ensure that the samples collected and analyzed during the SI result in data of known and legally defensible quality. As a first step in this project, AOB and ORP have reviewed past records from EPA regions requesting radionuclide sample analyses and have begun compiling a list of laboratories offering radioanalytical services. In the past, most radionuclide evaluations were performed under non-CLP programs.

The Site Assessment Branch (SAB) of OERR initiated several joint projects with the Office of Radiation Programs (ORP) of the Office of Air and Radiation to develop supplemental policy and technical guidance in support of the Superfund site assessment program. ORP began revising the Agency's radiation field standard operation procedures, which provide guidance for characterizing mixed waste sites during all phases of the Superfund process.

Risk Assessment

TIB and ORP participated in several joint projects to develop supplemental radionuclide guidance to support the risk assessment program in FY91. In support of the Superfund *Human Health Evaluation Manual*, ORP prepared supplemental guidance on radionuclide issues relevant to the health manual. ORP also assisted TIB in addressing the principles and concepts of radionuclide protection, standardized exposure scenarios, and evaluation of clean-up technologies for contaminated sites.

During FY91, ORP began developing the *Radiation Exposure and Risk Assessment Manual*. The exposure manual will provide, in a single reference document, ORP's current rationale and procedures for conducting radionuclide fate and transport modeling, receptor exposure assessment, and risk characterization. Part I of the exposure manual will cover exposure assessments and Part II will describe risk assessment methods.

Starting in FY91, ORP began revision of the radiation *Site Inspection Manual* to incorporate additional field standard operating procedures and guidance for characterizing mixed waste sites. The manual will provide guidance on how to characterize radionuclide sites during all phases of the Superfund process, including SIs, remedial investigations, remedial actions, and closure sampling and analyses. It will also provide guidance for determining when removal actions may be warranted, as well as basic monitoring procedures to ensure worker protection and public health. Examples of hypothetical radionuclide sites will be provided to illustrate key elements of site characterization.

Technology Development

During FY91, OSWER, ORP, and the Office of Research and Development (ORD) initiated or continued work on several projects concerning the development, testing, and evaluation of remediation technologies for radiation sites.

Based on the results achieved in laboratory- and bench-scale tests, ORP designed, assembled, and conducted preliminary tests of the Volume Reduction/ Chemical Extraction soil washing system at EPA's National Air and Radiation Environmental Laboratory in Montgomery, Alabama. The current system, designed to remove radium from soil, is intended to have a throughput capacity of 2 to 5 tons per hour. Plans are being made to refine the system and possibly expand its current application to the remediation of soils contaminated with other radionuclides besides radium.

Also during FY91, ORP began preparing a soil characterization protocol designed to investigate the suitability of various radionuclide-contaminated soils for physical or chemical separation processes. The protocol will combine radiochemical and petrographic analysis of soil fractions, focusing on the contaminant waste and its particle size distribution.

Regional Assistance

Regional requests for technical assistance from EPA Headquarters to support remedial activities at Superfund sites contaminated with radionuclides nationwide became more frequent during FY91 as compared to previous years. ORP provided technical assistance to Region 4 during the review of remedial investigation/feasibility study documents from the Department of Energy for the Oak Ridge Reservation, the Savannah River Plant, and the Paducah Gaseous Diffusion Plant. Reviewers of these documents considered compliance with applicable, or relevant and appropriate requirements; sampling and analysis of radioactive contamination and mixed waste; proposing dose and risk assessments for the public and workers; and site characterization. In addition, at the request of Region 4, ORP performed an independent baseline risk assessment for the Superfund Maxey Flats low-level radioactive waste disposal site in Kentucky.

ORP assisted Region 6 and the State of New Mexico with information on an evaluation of the proposed radionuclide and mixed waste incinerators located at the Los Alamos National Laboratory. For Region 7, ORP provided technical support on issues concerning the remediation of the Rocky Flats Superfund site in Colorado. In particular, ORP recommended an appropriate gastrointestinal absorption value for plutonium for use in the baseline radionuclide risk assessment and in the development of remediation goals.

ORP continued to assist Region 9 with the assessment of possible releases of radiation at the Norton Air Force Base in California. ORP also provided guidance and acted in an oversight role for radionuclide sampling and analysis activities at the Santa Susana Field Laboratory. ORP provided assistance to Region 10 on a variety of remedial activities associated with the Hanford Superfund sites in Washington.

2.8 Guidance Documents and Rulemakings

OERR, ORP, and ORD published a number of significant Superfund proposed rulemakings and guidance documents.

- *Reportable Quantity Adjustments for Petroleum Refinery Treatment:* This rule proposes to adjust the RQs for waste stream sludges from petroleum refinery separation processes. The Agency is reviewing public comments concerning the proposed rule.
- *Hazardous Waste Management Systems; Reportable Quantity Adjustment, Coke By-Products Waste Listings:* This proposed rule would designate certain hazardous wastes as CERCLA hazardous substances and adjust their

RQs. Also, EPA is proposing a series of exclusions to the definition of solid waste in order to facilitate the recycling of coke by-product wastes.

- *Addition of 22 Sites to the NPL:* This rule proposes 22 sites, located in 15 states, to the NPL. These are the first sites proposed under the revised HRS, which became effective during FY91.
- *Guidance for Performing Preliminary Assessments Under CERCLA:* This guidance contains instructions on conducting a PA and reporting the results. Topics addressed within the document include PA evaluation and scoring, as well as instructions for using standard PA scoresheets. The guidance will assist PA investigators in conducting high-quality, nationally consistent assessments.
- *PA-Score Software User's Manual and Tutorial:* The PA score software package was designed to computerize the scoring system for the PA, provide a user-friendly menu screen system, and provide a useful tool for PA scenario scoring. The user's manual introduces the software package and provides an initial step-by-step lesson and printing instructions.
- *Management of Investigation-Derived Wastes During Site Inspections:* General regulatory background and options for management of investigation-derived wastes are presented in this guidance. Investigation-derived wastes are generated during Superfund SIs, and include soil, water, and equipment. The document will assist EPA Headquarters staff, state environmental agencies, potentially responsible parties, and others involved in Superfund site assessment work by proposing methods for waste management.
- *Sampler's Guide to the Contract Laboratory Program:* This guidance is designed to clarify sampling procedures necessary to submit samples for CLP analysis, serving as a reference document to promote consistent procedures across the regions and to ensure proper adherence to CLP requirements.
- *Users's Guide to the Contract Laboratory Program:* This document acquaints regions and states with the range of CLP services and applications, including a description of analytical services provided and the use of these services, an index of auxiliary support services, and a list detailing program quality assurance.
- *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors:* This document is a supplement to the *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual (Part A)* for reducing unwarranted variability in the exposure assumptions used by regional Superfund staff to characterize human population exposures in baseline risk assessments.
- *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual (Part B):* This document provides a guide for developing risk-based preliminary remediation goals at Superfund sites.
- *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual (Part C):* This guidance is intended for use in evaluating long-term (residual) risks and short-term (during clean-up activities) risks at Superfund sites.

Chapter 3
Estimate of Resources Required to Implement Superfund

Section 301(h)(1)(G) of CERCLA requires EPA to estimate the resources needed by the federal government to complete Superfund implementation. The Agency interprets this requirement as the cost of completing cleanup at sites currently on the National Priorities List (NPL). Much of this work will occur after FY93. This chapter includes annual information through FY93. An estimate of the long-term costs of cleaning up sites on the existing NPL is included in Section 3.2, together with an overview of the estimating method used. The estimate is divided between resources needed by EPA and those needed by other federal departments and agencies.

The resource estimate in this chapter is based primarily on the responsibilities and duties assigned to EPA and other federal departments and agencies by Executive Order 12580. Computing such an estimate entailed making assumptions about the size and scope of the Superfund program; the nature and number of response actions; participation by states and private parties; and the increasing use of treatment technologies. For active NPL sites (those that have reached or passed the remedial investigation/ feasibility study (RI/FS) planning stage), these assumptions relate to management of the workload already in the remedial pipeline and the costs of those actions. For NPL sites that have not yet entered the RI/FS planning stage, the estimating method uses many assumptions about which activities will be necessary to clean up and delete sites from the NPL.

In developing the resource estimate, EPA has considered several sources of information:

- EPA Superfund budgets and budget estimates for FY88 through FY93, including budget requests from other federal departments and agencies;
- Data submitted to EPA by other federal departments and agencies under an approved General Services Administration (GSA) Interagency Report Control Number, issued on February 5, 1988, as required under the provisions of 41 CFR Part 201-45.6;
- The Federal Agency Hazardous Waste Compliance Docket developed under Section 120(c) of CERCLA and each federal department's and agency's annual report to Congress on federal facility cleanup as required under Section 120(e)(5) of CERCLA; and
- Various EPA information systems, primarily the CERCLA Information System (CERCLIS) and the Integrated Financial Management System.

Specifically, EPA has estimated resource needs for FY92, FY93 (the President's Budget), and beyond. The Agency also is working to identify data requirements, improve data quality, develop cost estimating methods, and collect additional information. This long-term effort has been

	Acronyms Referenced in Chapter 3
ATSDR	Agency for Toxic Substances and Disease Registry
CERCLIS	CERCLA Information System
DERP	Defense Environmental Restoration Program
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
DOJ	Departement of Justice
DOT	Department of Transportation
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GSA	General Services Administration
HMTUSA	Hazardous Materials Transportation Uniform Safety Act
IAG	Interagency Agreement
MARAD	Maritime Administration
NASA	National Aeronautics and Space Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NIEHS	National Institute of Environmental Health Sciences
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
OLM	Outyear Liability Model
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyls
PRP	Potentially Responsible Party
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RRT	Regional Response Team
RSPA	Research and Special Programs Administration
TVA	Tennessee Valley Authority
USCG	United States Coast Guard
USDA	Department of Agriculture
VA	Veterans Administration

coordinated with the development of the FY93 budget. In conjunction with the revised National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and its policies affecting program direction and scope, EPA is moving closer to a more complete cost estimate of implementing CERCLA. The initial results of this effort are presented in Section 3.2 of this chapter.

EPA's ability to project the federal resource requirement for CERCLA implementation improves each year as more experience is gained. The Agency is working to identify data requirements, improve data quality, develop cost estimating methods, and collect additional information for better projections next year. Improved coordination with other federal departments and agencies and additional data on the implementation of the federal facilities requirement of Section 120 also will increase the accuracy of future resource estimates.

3.1 Source and Application of Superfund Resources

Since the enactment of CERCLA in 1980, Congress has provided Superfund with $10.7 billion in budget authority (FY81 through FY92 enacted). This includes $1.8 billion for FY81 through FY86, and $8.9 billion for the post-SARA period, FY87 through FY92. The FY93 President's budget allocates total resources of $1.75 billion targeted for the following activities:

- *Site Cleanup:* Site cleanup uses approximately 62 percent of Superfund resources, including engineering studies and design work, and funding/oversight of short- and long-term construction actions.
- *Support:* Support uses 25 percent of Superfund resources. The support category is largely response support for site/program analysis, other federal agencies, and EPA Headquarters and regional intramural (salary and expenses) resources. Administrative management of the program, as well as research and development, also are components of the support category.
- *Enforcement:* Enforcement uses 13 percent of Superfund resources. Enforcement activities, including potentially responsible party (PRP) negotiations, PRP settlements, and cost recovery efforts, are captured in this category.

Exhibit 3.1-1 presents a snapshot of total Superfund resources for FY92 and FY93 and their uses.

3.1.1 Sources

Site cleanup is the single largest category of Superfund expenditures and is expected to remain so

in the future. To project EPA funding needs for these activities, several key estimations were made, including:

- The projected number and average cost of studies, remedial designs, and remedial actions (RAs) undertaken;
- The extent and cost of removal activity; and
- The proportion of direct clean-up actions taken by PRPs.

3.1.2 PRP Contributions to the Clean-Up Effort

The most significant way PRPs contribute to the hazardous substance clean-up effort is by undertaking and financing remedial activities (whether voluntarily or under order). When PRPs finance site clean-up efforts, potential EPA Superfund obligations for those sites are dramatically reduced; the principal remaining cost is PRP oversight. EPA continues to develop and implement policies designed to encourage PRP cleanups.

In addition to remedial and removal actions actually undertaken by PRPs, a portion of the costs of certain Fund-financed response actions will be recovered from PRPs through enforcement activities. Typically, there are significant delays between expenditures from the Trust Fund and recovery of costs.

3.2 Estimated Resources to Complete Current NPL Sites

Estimating the cost of cleaning up existing NPL sites depends on a number of factors, many of which will change as the program continues to mature. The most important of these factors are:

- Changes in Superfund program policies and procedures because of the revised NCP, particularly the clean-up standards as required under Section 121 of CERCLA;
- Changes in the remedial program because of revisions to the hazard ranking system, as required under Section 105 of CERCLA;
- The long period required to identify, develop, select, and construct a remedy, and the need for scheduling flexibility to maximize the impact of enforcement activities;
- The level of state Superfund program activity;
- The level of PRP participation in the program; and
- The nature of and demand for removal actions.

The estimate is based on EPA's Outyear Liability Model (OLM), which estimates the long-term resource needs of Superfund. The OLM provides meaningful long-range forecasts with the flexibility to refine them. The Model can be adjusted for a large

Exhibit 3.1-1
EPA Superfund Operating Plan and Budget Estimates
(Dollars in Millions)

Program Area	FY92 Operating Plan	FY93 Budget Request
Site Cleanup	892.5	1,079.1
Site Enforcement	216.5	225.1
Site Support (total)	491.2	445.9
EPA	*374.9*	*381.3*
Other Federal Agencies	*116.3*	*64.6*
TOTAL SUPERFUND	1,600.2	1,750.1

Source: EPA Superfund Budget Documentation.

number of program-related variables. These variables can be individually adjusted to reflect real or anticipated changes in the program.

The OLM uses three distinct methods, each based on the status of a site in the remediation process:

- Active NPL sites;
- NPL sites where the remedial process has not yet begun; and
- Non-site related activities.

To estimate the resources EPA will need to complete the cleanup of existing NPL sites, the Agency has concentrated on the remedial and removal programs. These programs are the major components of the Superfund program and account for the majority of Fund expenditures by the Agency. Section 3.2.2 describes these and other key OLM features.

3.2.1 Estimated Cost to Complete Current NPL Sites

The OLM estimate of the cost to complete cleanup of the current NPL is $16.5 billion for FY94 and beyond (Exhibit 3.2-1). Major assumptions shaping this estimate include:

- The OLM estimates only the cost of the existing NPL (1,207 proposed and listed and 38 deleted sites as of September 30, 1991);
- Removal activities at sites on the NPL remain at current levels;
- RA cost factors (choice of technology, site size, and technology cost) continue to follow the patterns identified in FY87 through FY91;
- Program support and other non-site related elements are straightlined with FY93 levels;
- Approximately 35 percent of all new RI/FS starts will be fund-lead (i.e., the Trust Fund will pay at least 90 percent of the cost); and
- For non-federal facilities, PRPs will take the lead on 70 percent of RAs. Oversight is significantly less expensive than cleanup; therefore, Fund costs drop dramatically when PRPs assume financial responsibility for more cleanups.
- The OLM does not generate a resource estimate for the federal facility program. Resource and programmatic assumptions have not been included in the OLM for federal facilities.

Assumptions about the future reflect both planning assumptions taken from the Superfund Program Management Manual and historical performance averages, both of which are revised periodically. The increase in the OLM estimate from $27.2 billion in FY90 to $28.9 billion in FY91 is a result of growth in the RA cost estimate. EPA's analysis of FY91 records of decision (RODs) revealed that larger projects are being addressed; accordingly, the RA cost estimate increased from $12.2 million to $13.2 million.

EPA will continue to monitor developments that affect program costs. Changes will be incorporated

Exhibit 3.2-1
Estimate of Total Liability to Complete Cleanup at Sites on the National Priorities List (Dollars in Millions)

Program Area	Total Allocations	Cumulative Allocations
FY91 and Prior	9,144.9	9,144.9
FY92 Operating Plan	1,600.2	10,745.1
FY93 Budget Request	1,750.1	12,495.2
FY94 and Beyond	16,450.0	28,945.2
TOTAL	28,945.2	28,945.2

Source EPA Superfund Budget Documentation and Outyear Liability Model

into the Model as they occur, improving depiction of future programmatic direction and refining previous analysis. OLM estimates will vary over time and subsequent editions of this report will most likely contain different estimates.

3.2.2 Program Element Assumptions Represented in the Model

To provide a better estimate of the cost of the program and the flexibility needed to estimate the costs of future initiatives, the Model includes many variables representing specific program elements.

Currently Active Sites

Remedial efforts are underway at most of the sites on the existing NPL. Remedial plans are being developed for the remaining sites on the NPL, leaving only 87 sites on the existing NPL that were inactive at the end of FY91.

Data on the active NPL sites are stored in CERCLIS and incorporated into the OLM to present the most accurate picture of planned activities. The OLM estimates ancillary activities for sites at which some level of planning or remediation activity is underway. Because most of the existing NPL sites are active, they constitute a large portion of the total liability estimate for the existing NPL.

In addition to planned remedial activities, enforcement activities have a significant impact on the costs of addressing Superfund sites. All enforcement activities are estimated by the Model according to past program experience and several standard sequences of activities, each representing a different enforcement approach. Enforcement-related variables within the Model include costs, workyears, and the shift in remedial costs when Superfund assumes responsibility from, or passes responsibility to, a PRP. As with remedial activities, most enforcement costs and workyears are estimated.

Sites Yet To Begin the Remedial Process

The OLM uses the same general approach for all sites yet to begin the remedial process. Cleaning up an NPL site involves a number of different activities, occurring over time and in predictable arrangements. For sites yet to begin the remedial process, the OLM must first approximate the activities that will be involved once the site begins remediation. Approximations are made by applying several "generic" activity sequences to the number of sites being estimated. When the activities have been set, cost and workyear pricing factors are applied to estimate the necessary resources. A consistent approach is used for all site-related activities, both remedial and enforcement. In the approach, tradeoffs such as avoiding clean-up costs but incurring PRP oversight costs are handled automatically as assumptions are adjusted.

The OLM includes a library of different activity sequences. Each sequence represents a "typical" site and involves different activities, durations, and schedules. In addition to the key activity starts discussed above, the OLM includes a number of other factors to control the mix of these activity sequences.

Non-Site Related Costs

Although non-site related activities comprise a portion of the budget, individually they are fairly small and stable. For these reasons, resource needs for these activities are estimated by applying annual growth factors to the levels included in the current request year budget.

Aside from the number of sites requiring cleanup and the cost of individual cleanups, the assumption of managerial and/or financial responsibility for a site (what is referred to as the site "lead") has the largest potential impact on the cost of the Superfund program. There are many factors involved in establishing who is responsible for a site, including:

- Level of emphasis on the enforcement program;
- Willingness of states to assume financial responsibility; and
- Cost-sharing arrangements between Superfund and the states and Superfund and the PRPs.

The Model accommodates each of these factors with one or more variables, allowing the estimation of Superfund liabilities across a wide range of site

lead and cost sharing scenarios. Related site variables include:

- Proportion of sites addressed by each lead category (Fund, PRP, state, state enforcement, and federal facility);
- Number of sites that are owned and/or operated by state or local governments; and
- Number of sites that follow each of several enforcement paths.

Choices among these variables generally affect both cost and duration of the program. Increases in PRP-lead will ultimately result in lower Fund costs, but related litigation will substantially extend the amount of time required to reach deletion.

Factors Related to RA Costs

The method of estimating RA costs is based on analysis of RODs signed between FY87 and FY91. A statistical analysis of RA cost estimates contained in these RODs identified seven distinct cost patterns based on the choice of remedial technology. For each technology type there is a unique average cost and expected treatment volume. These factors, together with the expected usage of each technology, are the factors that control the RA cost module of the OLM.

Adjustments within the RA cost module make it possible to estimate the fiscal impact of:

- Policies affecting the selection of technological approach (e.g., using more treatment and less containment);
- Changes in the contaminants found on site (e.g., if remaining sites have higher levels of heavy metals than prior sites, incineration would be less effective);
- Changes in technology costs; and
- Changes in site size.

3.3 Estimates of Resources Necessary for Other Executive Branch Departments and Agencies to Complete Superfund Implementation

The second element in fulfilling the requirements of Section 301(h)(1)(G) of CERCLA for the report is an estimation of the resources needed by other federal departments and agencies. The Superfund-related resource needs of the other executive branch departments and agencies for Superfund are met through two sources; the Superfund Trust Fund and the individual federal department or agency budgets.

The Superfund Trust Fund

- *Interagency Budget:* EPA provides Trust Fund monies to other federal departments and agencies that support EPA's Superfund efforts. This is accomplished through an interagency budget under Executive Order 12580.
- *Site-Specific Agreements:* EPA also provides funds to other federal departments and agencies from the Trust Fund through site-specific agreements.

Individual Federal Department or Agency Budgets

- *CERCLA-Specific Funds:* Funds are budgeted by individual departments and agencies specifically for Superfund activities and support, as part of the President's annual budget submission.
- *General Funds:* These funds are used for CERCLA activities and support by the individual departments and agencies, but are obtained through existing or special appropriations.

Exhibit 3.3-1 (located at the end of this chapter) summarizes reported expenditures of other federal departments and agencies. The following information was provided by the respective departments and agencies to supplement resource needs.

Department of Agriculture

Congress appropriated $2 million in FY88, $5 million in FY89, $20 million in FY90, $25 million in FY91, $26 million in FY92, and $16 million in FY93 for hazardous waste management activities of the Department of Agriculture (USDA). Because hazardous waste management activities are performed under both CERCLA and the Resource Conservation and Recovery Act (RCRA), currently, USDA split the monies between the two programs 75/25 (CERCLA/RCRA). USDA intends to dedicate its Superfund effort to planning and RA efforts at abandoned mines for the U.S. Forest Service and to various activities by the Agricultural Research Service, U.S. Forest Service, Animal and Plant Health Inspection Service, Farmers Home Administration, Soil Conservation Service, Food Safety and Inspection Service, and the Commodity Credit Corporation.

Department of Commerce

The National Oceanic and Atmospheric Administration (NOAA) carries out many of the responsibilities of the Department of Commerce under CERCLA. NOAA's CERCLA program goals are to: (1) work with EPA and other agencies to identify, evaluate, and mitigate the adverse effects of hazardous substances on, and risks to, natural resources in coastal areas, and (2) strengthen and accelerate technologies used in planning for and responding to hazardous substance releases.

NOAA's CERCLA program goals are addressed through a regional network of Scientific Support Coordinators, who work with On-Scene Coordinators to mitigate the effects of releases into coastal areas, and Coastal Resource Coordinators, who work with EPA to mitigate the effects of releases from hazardous waste sites.

NOAA acts on behalf of the Secretary of Commerce as a federal trustee for natural resources in coastal and marine areas affected by hazardous substance releases. NOAA, through Coastal Resource Coordinators, works with EPA to evaluate natural resource concerns at coastal hazardous waste sites and to ensure coordination among state and federal natural resource trustees. When threats to natural resources cannot be addressed through CERCLA remedial actions, NOAA may seek to repair natural resource damages through its Damage Assessment and Restoration Program. This program is funded separately from CERCLA.

The Department of Commerce also undertakes site-specific clean-up actions at facilities under its control.

Department of Defense

The Department of Defense (DOD) has the authority and responsibility under CERCLA to clean up contamination associated with past activities. Beginning in 1984, DOD increased its emphasis on hazardous waste cleanup by establishing the Defense Environmental Restoration Program (DERP). Under this program, DOD identifies, investigates, and cleans up contamination and other environmental damage for which DOD is responsible. One element of DERP, the installation restoration program, follows the procedures of the NCP in cleaning up contamination from past activities. By the end of FY91, DOD identified more than 17,000 sites on more than 1,800 installations with the potential for contamination. DOD is committed to cleaning up currently identified contaminated sites and plans to spend approximately $1.56 billion during FY92 to continue this effort.

Department of Energy

The Department of Energy (DOE) is involved in conducting remedial activities at 17 DOE facilities listed on the NPL. Prior to FY91, DOE executed seven CERCLA section 120 interagency agreements (IAGs) with EPA and states that addressed environmental issues at eight of DOE's NPL sites. These eight sites include: the Lawrence Livermore National Laboratory-Main Site; the Hanford Site; the Monticello Mill Site and Vicinity Properties, the Ross Complex (Bonneville Power Administration), the Fernald Environmental Management Project (formerly known as Feed Materials Production Center), the St. Louis Site (including the St. Louis Airport Site, Latty Avenue Properties and Vicinity Properties), and the Mound Plant. During the calendar year for 1991, DOE executed four CERCLA section 120 agreements with EPA and the states. These agreements were reached for the Rocky Flats Plant, the Maywood Site, the Wayne Site, and Idaho National Engineering Laboratory. Additionally, changes to two existing CERCLA section 120 IAGs were undertaken in 1991. These activities included an amended Federal Facility Consent Agreement for the Fernald Environmental Management Project and a "major change" for the tri-party agreement for the Hanford Site.

Department of Health and Human Services

Agency for Toxic Substances and Disease Registry: The Agency for Toxic Substances and Disease Registry (ATSDR) is a part of the Public Health Service within the U.S. Department of Health and Human Services. ATSDR's mission is to prevent or mitigate adverse human health effects and diminished quality of life resulting from exposure to hazardous substances. ATSDR is charged under CERCLA with various responsibilities, including: emergency response; public health assessments, toxicological profiles, health studies, surveillance and registries; and health education.

ATSDR's emergency response staff are responsible for providing health related technical support to federal, state, and local responders during emergencies caused by the release of hazardous substances. ATSDR Emergency Response Coordinators have immediate access to a wide variety of professional expertise including chemists, toxicologists, environmental scientists, and medical professionals.

During FY91, ATSDR participated in 10 simulated hazardous substances emergencies, many of which involved an average of 60 participants and 400 observers from federal, state, and local agencies and organizations. ATSDR also supported, through cooperative agreements, emergency response activities in five state health departments. As a result of ATSDR activities in this area, the capability of participating states to respond to an emergency involving hazardous substances has been significantly improved. In addition, ATSDR provided approximately 900 health consultations to EPA regional and state/local officials.

Public health assessments are required, under CERCLA, to be developed within one year from the date a site is proposed for the NPL. EPA and other agencies use the assessments to determine the extent of danger to public health from a release or threatened release of a hazardous substance. They also serve as an information resource for federal, state, and local environmental and health officials and the public. During 1991, ATSDR prepared a total of 162 public health assessments.

Additionally, in 1991, ATSDR determined that the identification of adverse human health conditions related to populations living near Superfund sites would provide direction for program activities in support of the ATSDR public health assessments. The ATSDR priority health conditions are birth defects, reproductive disorders, cancer (selected sites), kidney dysfunction, liver dysfunction, lung and respiratory diseases, and neurotoxic disorders.

During 1991, ATSDR published the top 275 substances of concern at hazardous waste sites. ATSDR also reranked all of the substances on the NPL hazardous substance list; added 25 new hazardous substances to the list; developed and distributed 19 toxicological profiles on 26 substances; and identified 202 priority data needs for 38 of the most hazardous substances.

ATSDR, in conjunction with states, has conducted, or is conducting, approximately 100

human health studies. These studies evaluate persons living at or near hazardous waste sites across the United States. Work was in progress on 49 sites in FY91. Of five ATSDR studies completed, three studies concentrated on exposure to lead and other heavy metals, and other important public health issues.

ATSDR offers funding and assistance to state health departments to be used for the development of educational materials and activities in environmental medicine for health care professionals. In FY91, ATSDR trained approximately 4,000 health professionals through these cooperative agreements. ATSDR also developed 15 case studies in environmental medicine in FY91 and distributed copies of them to 45,000 health professionals.

National Institute of Environmental Health Sciences: The accomplishments achieved by the National Institute of Environmental Health Sciences (NIEHS) in FY91 are as follows:

- *Worker Training Program:* NIEHS received $20 million from FY91 appropriations to support grants aimed towards occupational safety for workers that perform dangerous jobs and manage hazardous substance emergencies. Between 1987 and 1991, the first four years of the worker training program, NIEHS supported 16 primary grantees representing a consortium of over 60 different organizations and local government units. This includes 11 primary grantees comprised of 44 cooperating institutions funded by NIEHS in 1991. The program has trained 200,000 workers across the country in 7,000 classroom and hands-on training courses, which have accounted for almost four million contact hours of actual training.

- *Superfund Basic Research Program:* The Superfund basic research program of NIEHS supports a range of research addressing broad public health concerns, in particular, the release of hazardous substances and hazardous wastes into the environment originating from uncontrolled waste disposal sites.

NIEHS conducts research in the development of advanced techniques for the detection and evaluation of the effects of hazardous substances on human health. The research of the multidisciplinary program is designed to provide a broader and more detailed body of scientific information to be used by state, local, and federal agencies as well as private organizations and industry in making decisions related to the management of hazardous materials.

In 1991, there were 11 research programs encompassing 98 individual research projects, which address a variety of legislative areas. The following are examples of ongoing research projects supported by the NIEHS:

-- University of California at Berkeley: Steam injection, which is a means of accelerating liquid waste removal while minimizing the volume of waste fluids, provides a rapid way of removing volatile solvents from soil. Researchers are now exploring the prospects of using the injection technique together with bioremediation as an effective way of cleaning up hazardous waste sites. Aspects of the project have been adopted by the Superfund Innovative Technology Evaluation program at EPA.

-- State University of New York at Albany: Research is being conducted that focuses on human monitoring of dietary exposure to polychlorinated biphenyls (PCBs) from hazardous waste. Researchers defined a study population of 10,000 Mohawk Indians living along a stretch of the St. Lawrence River that has significant levels of PCBs in water, sediment, and biota from upstream industries. Studies have shown that most of the women have been exposed to high levels of PCBs from eating fish. This finding is the first time that a point source of PCB exposure has been linked to a biological marker of dose in humans.

-- University of Washington: Physio-logical pharmocokinetic models are being used to describe absorption, distribution, and fate of low level exposures to humans from chemicals associated with Superfund sites. The blood-to-air partition coefficient, which reflects the solubility of contaminants in blood, is one of the more important factors that influence the rate of

absorption. Experiments have shown that this coefficient is dependent on contaminant concentration in the air at low levels of exposure common at Superfund sites. The study of the relationship between hazardous substances in the environment and their effects on human health is in its infancy. The Superfund basic research program represents a uniquely integrated series of studies designed to produce important, immediate, and practical results in the toxic waste field.

Department of the Interior

Each of the nine bureaus and four territorial elements of the Department of the Interior (DOI) provides support to the Superfund program, mostly assisting the National Response Team and Regional Response Teams (RRTs). DOI's role in the program focuses on three general areas:

- Response management, including RRT assistance activities, incident-specific activities, and NPL site remedial response activities;
- Emergency response preparedness, including RRT participation, regional RRT workgroups, and RRT support; and
- Trust resources/damage assessment, including coordination of natural resource trustee concerns, natural resource damage assessment briefings, and settlements of trustee resources.

Department of Justice

The Department of Justice (DOJ) is responsible for all judicial litigation brought under CERCLA. To that end, DOJ is responsible for conducting civil judicial litigation under CERCLA, representing EPA in bankruptcy proceedings, prosecuting criminal violations, conducting defensive and appellate litigation, and participating as *amicus curiae* on behalf of EPA as required to support effective implementation of the statute. In addition, the DOJ provides support on the negotiation of consent decrees under Sections 106, 107, and 122 of CERCLA, processes consent decrees in accordance with approved interagency procedures, prepares and disseminates reports on litigative activities, and keeps EPA informed on other CERCLA actions consistent with the national program.

The enforcement efforts of DOJ play a crucial role in the overall Superfund program. Successful judicial enforcement actions to recover clean-up costs revitalize the Superfund Trust Fund, and enforcement actions to compel responsible parties to perform cleanups are an integral part of EPA's enforcement strategy.

Civil litigation efforts in support of the Superfund program have been extraordinarily successful. Since 1980, DOJ, together with the enforcement arms of EPA, have achieved over 1,500 settlements with responsible parties valued at over $5 billion. Over $3 billion of that figure was recovered in the last three years. In FY91 alone, DOJ filed 154 judicial complaints (the highest in history), recovered $83.4 million through cost recovery actions, and forced defendants to undertake various clean-up activities valued at $820 million. The number of active CERCLA cases being litigated has risen from 159 cases with 523 defendants in FY87 to 480 cases with 3,098 defendants in FY91.

Superfund money provides DOJ with the necessary attorneys, expert witnesses, and litigation support vital to the enforcement component of the CERCLA process.

Department of Labor

Funds appropriated under general interagency agreements allow the Occupational Safety and Health Administration (OSHA) to provide EPA with technical assistance in the area of worker safety. SARA Section 126 requires OSHA to issue standards for employees engaged in hazardous waste operations. Programs operated by OSHA or states with OSHA-approved plans protect workers at Superfund sites, implement worker safety programs at Superfund sites, and support the National and Regional Response Teams.

OSHA performs laboratory analyses of samples collected at Superfund site inspections and maintains and calibrates technical equipment used for these inspections. OSHA's analytical laboratory also maintains a computerized system for tracking

hazardous waste inspection activity. As a member of the National Response Team and the associated Regional Response Teams, OSHA assists the teams in meeting their annual workplans and performs technical assistance site visits.

Department of Transportation

The Department of Transportation (DOT) uses funding from its budget to support CERCLA-related activities as carried out by the Federal Aviation Administration (FAA), the U.S. Coast Guard (USCG), the Maritime Administration (MARAD), and the Research and Special Programs Administration (RSPA). The primary funding areas in support of CERCLA requirements include pollution abatement related to the operation of DOT facilities; response actions for any release or threatened release of hazardous substances within the coastal zone, Great Lakes waters, ports, and harbors; emergency response training; and technical support.

Federal Aviation Administration: CERCLA activities of the FAA involve pollution abatement. Activities focus on hazardous waste cleanup at regional facilities and other clean-up efforts.

United States Coast Guard: The USCG supports the Superfund program by providing On-Scene Coordinators who respond to any release or threatened release of hazardous substances in the coastal zone. USCG also undertakes pollution abatement activities related to the operation of its own facilities.

Maritime Administration: MARAD's activities in support of CERCLA involve testing and cleanup for hydrocarbons in storage tank facilities at Kings Point and other locations.

Research and Special Programs Administration: RSPA activities in support of CERCLA and Superfund requirements include hazardous waste rulemaking and technical support, emergency response training, hazardous materials/hazardous substances incident reporting, and emergency preparedness curriculum development. In addition, RSPA is responsible for implementing a grant program for the states established by the Hazardous Materials Transportation Uniform Safety Act (HMTUSA) of 1990. The HMTUSA program will support SARA-required emergency planning and training for accidents and incidents involving hazardous materials.

Federal Emergency Management Agency

The enactment of SARA in 1986 caused many of the voluntary preparedness and planning activities of the Federal Emergency Management Agency (FEMA) to become ineligible for funding under the Superfund budget after September 30, 1987. To continue the ongoing Superfund assistance to state and local governments and to support efforts to implement Title III of SARA, FEMA consolidated funding requests under two separate authorizations of appropriation.

Funding for Superfund activities was requested under the Superfund interagency budget. The remainder of FEMA's hazardous materials activities, including Title III, was incorporated into FEMA's own operating budget (under its technological hazards budget). No additional funds have been requested under Section 301(h)(1)(G) to carry out Superfund activities after FY87.

General Services Administration

Resources for environmental studies and corrective projects are included in the GSA budget and can be used for CERCLA studies/corrective projects, if necessary.

National Aeronautics and Space Administration

The National Aeronautics and Space Administration's (NASA's) environmental compliance and restoration program was initiated in FY88 to ensure compliance with mandatory statutory environmental requirements. NASA's program provides the means to conduct environmental compliance, site cleanups, and restoration measures at NASA field installations, government-owned industrial plants, and other locations where NASA is required to contribute to clean-up costs. CERCLA-related activities are being addressed as part of the program. Currently, NASA does not own any sites listed on the NPL. However, NASA performs studies,

assessments, and RAs addressed under CERCLA clean-up authorities. As ongoing studies and assessments continue, additional cleanups and RAs are expected to be initiated.

Department of Veterans Affairs

Prior to FY89, funding had not been budgeted for Superfund cleanups. In FY91 and subsequent years, the Veterans Administration (VA) will be budgeting $2 million to meet projected costs. At the present time, the VA is a PRP at a small number of sites throughout the U.S. (Baldwin, Florida, and Holden, Missouri).

Tennessee Valley Authority

The Tennessee Valley Authority (TVA) does not own any NPL sites; consequently, funds are not needed for Superfund cleanup. TVA has been notified, however, that it has been designated as a PRP in two Superfund sites; issues at these two sites have not been fully resolved. At this time, TVA cannot determine in which fiscal year these issues will be resolved nor how much cleanup will cost.

Exhibit 3.3-1
CERCLA Resource Needs and Interagency Funding for Other Federal Departments and Agencies (Dollars in Millions)

Federal Departments and Agencies	FY88 Actual (Dollars)		FY89 Actual (Dollars)		FY90 Actual (Dollars)		FY91 Actual (Dollars)	
	Trust Fund	Agency Budget	Trust Fund	Agency Budget	Trust Fund	Agency Budget	Trust Fund	Agency Budget
Defense	--	402.8	--	502.5	--	601.3	--	1,062.5
Energy	--	87.0	--	112.8	--	431.6	--	1,000.0
Health and Human Resources								
ATSDR	43.0	--	44.5	--	45.2	--	48.5	--
NIEHS	28.9	--	21.9	--	36.3	--	41.9	--
Justice	16.4	--	25.1	--	25.8	--	25.8	--
Transportation	3.0	7.8	4.9	5.8	4.8	11.4	4.8	--
NASA	--	1.7	--	1.4	--	5.5	--	7.3
Interior	1.1	9.6	1.1	24.7	1.2	--	1.2	--
Agriculture	--	1.5	--	3.5	--	10.0	--	--
Commerce (NOAA)	2.4	1.7	2.3	1.0	2.1	3.6	2.2	--
Veterans Affairs	--	--	--	5.0	--	12.0	--	--
FEMA	2.0	--	1.7	1.0	1.7	1.4	1.8	--
FEMA Relocation	--	--	--	--	5.9	--	--	--
Tennessee Valley Authority	--	--	--	--	--	--	--	--
Labor (OSHA)	0.4	--	.04	--	1.0	--	0.7	--
General Services Administration	--	0.3	--	--	--	--	--	--
TOTAL	97.2	512.4	101.54	657.7	124.0	1,076.8	126.9	2,069.8

Source: EPA Office of Program Management.

Exhibit 3.3-1 (continued)
CERCLA Resource Needs and Interagency Funding for Other Federal Departments and Agencies
(Dollars in Millions)

Federal Departments and Agencies	FY92 Operating Plan (Dollars)		FY93 Budget Request (Dollars)		FY88-FY93 Total (Dollars)	
	Trust Fund	Agency Budget	Trust Fund	Agency Budget	Trust Fund	Agency Budget
Defense	--	1,562.4	--	1,513.2	--	5,644.7
Energy	--	1,393.3	--	1,796.1	--	4,820.8
Health and Human Services						
ATSDR	54.5	--	42.0	--	277.7	--
NIEHS	51.1	--	11.9	--	192.0	--
Justice	32.3	--	32.3	--	157.7	--
Transportation	4.8	28.0	4.8	14.9	27.1	67.9
NASA	--	11.0	--	14.6	--	41.5
Interior	1.2	--	1.2	--	7.0	34.3
Agriculture	--	19.8	--	12.0	--	46.8
Commerce (NOAA)	2.2	5.6	2.2	--	13.4	11.9
Veterans Affairs	--	2.0	--	--	--	19.0
FEMA	1.8	1.8	1.8	--	10.8	4.2
FEMA Relocation	--	--	--	--	5.9	--
Tennessee Valley Authority	--	4.3	--	--	--	4.3
Labor (OSHA)	0.7	--	0.7	--	3.5	--
General Services Administration	--	--	--	--	--	0.3
Total	148.6	3,028.2	96.9	3,350.8	695.1	10,695.7

Source: EPA Office of Program Management.

Chapter 4
Federal Facilities Program

The increased role federal agencies and departments have taken in cleaning up hazardous waste sites at federal facilities contributed to Superfund progress in FY91. Departments and agencies of the federal government manage a vast array of industrial activities at 27,000 installations.

Federal facility clean-up activities present unique management problems from the standpoint of compliance with federal environmental statutes. Although federal facilities are only a small percentage of the regulated community, most federal installations are larger and more complex than their private industrial counterparts. During FY91, a total of 15 federal agencies reported a combined budget of approximately $2.9 billion to be devoted to environmental programs in air, water, drinking water, pesticides, Superfund, and other areas. This amount is almost double the FY90 total of $1.5 billion.

4.1 Federal Facility Responsibilities under CERCLA

Federal facilities must comply with CERCLA requirements to the same extent as private facilities. Federal agencies and departments responsible for facilities, therefore, must conduct preliminary assessments (PAs) and site inspections (SIs), in addition to performing clean-up actions. To ensure federal facility compliance with CERCLA requirements, EPA not only provides advice and assistance, but also takes enforcement action when appropriate.

States may also have jurisdiction at federal facilities. Under state statutes, states may exercise a range of authority and enforcement tools under CERCLA in addressing federal facility violations. Violations may also be addressed by Indian tribes who may act as either a lead or support agency during each phase of a Superfund response.

4.1.1 Facility Responsibilities

Federal departments or agencies have the responsibility for identifying and addressing hazardous waste sites at facilities they own or operate. They are required under CERCLA to comply with all provisions of federal environmental statutes and regulations, as well as all applicable state and local requirements. Federal facilities track their compliance status to generate the information to meet such requirements.

EPA is committed to enforcing compliance with CERCLA.

4.1.2 EPA's Oversight Role

EPA works through its Office of Federal Facilities Enforcement (OFFE) in the Office of Enforcement to assist federal agencies with cleanup. EPA responsibilities include assisting and ultimately concurring in remedy selection, providing technical

Acronyms Referenced in Chapter 4	
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
IAG	Interagency Agreement
NACEP	National Advisory Council for Environmental Policy and Technology
NPL	National Priorities List
OFFE	Office of Federal Facilities Enforcement
OSWER	Office of Solid Waste and Emergency Response
PA	Preliminary Assessment
RA	Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SI	Site Inspection
TIO	Technology Innovation Office

advice and assistance, reviewing federal agency pollution and abatement plans, and resolving disputes regarding noncompliance. To meet these responsibilities, the Agency relies on personnel from EPA Headquarters, the regional offices, and the states. To track the status of federal facilities, EPA uses a number of information systems. The Facility Index System, for example, provides an inventory of federal facilities subject to environmental regulations.

4.1.3 The Role of States and Indian Tribes

Although in a more limited capacity than that of the Agency, both states and Indian tribes have been given authority to assist in federal facility cleanup. States are encouraged to negotiate settlements where possible by encouraging violators to enter into cooperative agreements. EPA retains parallel legal authority and responsibility to enforce federal law, but the Agency intervenes only when a state fails to take timely and appropriate action, when a state requests that EPA take the lead, or when other limiting circumstances warrant EPA response.

EPA is committed to ensuring meaningful involvement of tribes in compliance enforcement. Involved Indian tribes must be federally recognized, have a tribal governing body that is currently performing governmental functions to promote health, safety, and welfare of the affected population, and have jurisdiction over a site either listed in the CERCLA Information System or proposed or listed on the National Priorities List (NPL).

4.2 Federal Facilities Program Implementation

OFFE, in conjunction with various other Headquarter offices, regional offices, and states, ensures federal department and agency compliance with CERCLA and RCRA requirements. In order to track the compliance status of federal facilities, OFFE maintains the Federal Agency Hazardous Waste Compliance Docket. The fiscal year has shown an increase in the number of federal facility sites listed on the Federal Agency Hazardous Waste Compliance Docket and the NPL. Also, several interagency agreements were negotiated in an effort to facilitate cleanup.

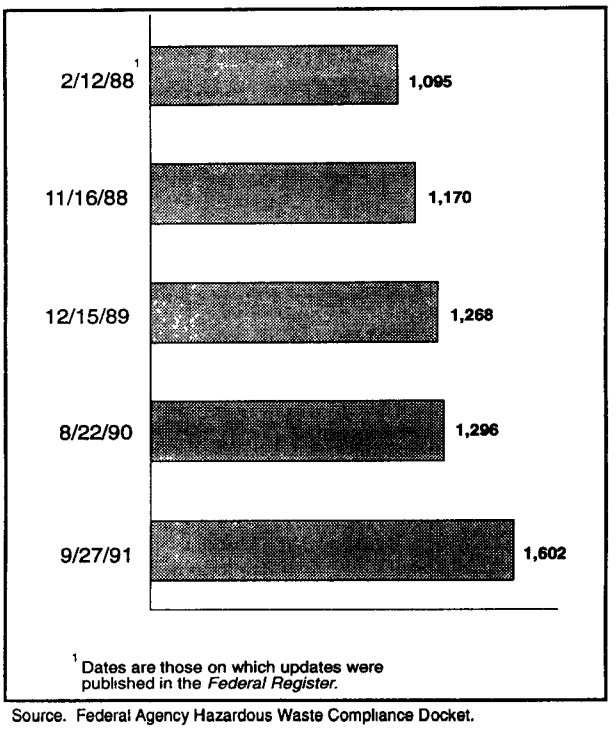
4.2.1 Federal Agency Hazardous Waste Compliance Docket

Federal facilities that have areas contaminated with hazardous substances are identified on the Federal Agency Hazardous Waste Compliance Docket, which was established under CERCLA Section 120(c). The docket documents the federal facilities Superfund program. Information submitted to EPA on identified facilities is compiled and maintained in the docket, where this information is made available to the public.

On February 12, 1988, the initial federal agency docket was published in the *Federal Register*. At that time, 1,095 federal facilities were listed. Exhibit 4.2-1 shows the increase in the number of sites on the docket since its first publication. During FY91, 334 sites were added and 28 were removed. (Facilities are removed from the docket for such reasons as incorrect reporting of hazardous waste activity or transfer from federal ownership.) The most recent

FY91 update of the docket, listing 1,602 federal facilities, was published in the *Federal Register* on September 27, 1991. Of these sites, the Department of Defense (DOD) owns and/or operates 764 (48 percent) and the Department of the Interior (DOI) owns and/or operates 374 (23 percent). The remainder are distributed among 17 other federal departments, agencies, and instrumentalities. A breakdown of the facilities on the docket is illustrated in Exhibit 4.2-2.

Exhibit 4.2-1
Number of Federal Facilities on the Hazardous Waste Compliance Docket



Source. Federal Agency Hazardous Waste Compliance Docket.

4.2.2 Progress towards Cleaning Up Federal Facilities on the NPL

At the end of FY90, 116 federal facilities were listed on the NPL. During FY91, three facilities were proposed for listing on the NPL, although none were made final. Federal departments and agencies made substantial progress during FY91 towards cleaning up federal facility sites listed on the NPL. Activity at federal facility sites included starting 115 remedial investigation/feasibility studies (RI/FSs) and signing 21 records of decision (RODs). The federal government began 23 remedial designs and 15 remedial actions (RAs) at federal facility sites. In FY91, 22 removal actions were begun and 18 removal actions were completed at NPL and non-NPL federal facility sites.

4.2.3 Federal Facility Agreements under CERCLA Section 120

To accomplish required hazardous waste cleanups, EPA negotiated 24 interagency agreements (IAGs) under CERCLA in FY91. Through FY91, a total of 85 IAGs, covering 94 NPL sites, have been signed with other federal agencies. EPA has also signed 70 federal facility compliance agreements, issued two unilateral administrative orders, and issued 16 administrative consent orders with other federal agencies under statutes other than CERCLA. Agreements between EPA and the responsible federal department or agency document some or all of the phases of remedial activity to be undertaken at a federal facility from the RI/FS through the implementation of the RA. As a matter of policy, EPA includes states as signatories to these agreements.

IAGs formalize the procedure and timing for submittal and review of documents and include a schedule for all remedial activities, in accordance with the requirements of CERCLA 120(e). They also establish a mechanism to resolve any disputes between the signatories. Furthermore, EPA can assess stipulated penalties under these agreements.

IAGs must comply with the public participation requirements of CERCLA Section 117 and are enforceable by the states and citizens through citizen suits. Additionally, CERCLA authorizes courts to impose penalties against federal agencies and departments in suits brought by states or citizens for failure to comply with IAGs.

Exhibit 4.2-2
Distribution of Federal Facilities on the Hazardous Waste Compliance Docket

Department of Defense	764	(48%)
Department of the Interior	374	(23%)
Department of Energy	90	(6%)
Department of Agriculture	77	(5%)
Department of Transportation	62	(4%)
Tennessee Valley Authority	35	(2%)
Department of Veterans Affairs	32	(2%)
Department of Justice	32	(2%)
United States Postal Service	30	(2%)
Civil Corp of Engineers	24	(1%)
General Services Administration	19	(1%)
Environmental Protection Agency	18	(1%)
Department of Commerce	15	(1%)
National Aeronautics and Space Administration	15	(1%)
Department of the Treasury	6	(0.4%)
Department of Health and Human Services	5	(0.3%)
Central Intelligence Agency	2	(0.1%)
Department of Labor	1	(0.06%)
Small Business Administration	1	(0.06%)
TOTAL	1,602	

Note Percentages total less than 100% due to rounding

Source Federal Agency Hazardous Waste Compliance Docket

4.2.4 Report to Congress on EPA Responsibility under CERCLA Section 120(e)(5)

CERCLA Section 120(e)(5) requires each federal department and agency to furnish an annual report to Congress on progress toward implementing CERCLA at its facilities. The report must include information on progress toward entering into IAGs, cost estimates for the work proposed in each IAG, public comments on IAGs, a description of any instances in which no agreement could be reached, progress of RI/FSs and RAs initiated at federal facilities on the NPL, and progress in remedial activities at sites not listed on the NPL.

Of the 1,602 sites on the Federal Agency Hazardous Waste Compliance Docket, 18 are EPA-owned. None of these EPA-owned sites are listed on the NPL. Remedial progress at these facilities is described in an EPA annual report, as required by CERCLA Section 120(e)(5). The report is provided in Appendix E of this document.

4.3 Federal Facilities Program Initiatives

EPA recognizes that the efficient approach to preventing pollution problems at federal installations is through educational outreach before problems occur. The Agency has continued to seek fundamental change in the behavior and understanding of federal personnel regarding responsibilities in the environmental arena. To promote this change, EPA has coordinated a number of important interagency educational and outreach efforts. During FY91, EPA continued to host the successful EPA/Federal Agency Roundtable, where representatives of approximately 50 federal agencies meet monthly to exchange information. The Roundtable provides a forum for an exchange of technological information and allows EPA's environmental media experts to discuss existing or proposed approaches and regulations affecting compliance by other federal agencies.

EPA also continued a high-level dialogue with the Department of Energy (DOE) and DOD to improve protection of the environment at installations under their control. This was accomplished through the efforts of a steering committee consisting of the Deputy Assistant Secretary of Defense for Environment at DOD, the Director of the Office of Environmental Restoration and Waste Management at DOE, and the Deputy Assistant Administrator for Federal Facilities Enforcement at EPA. Under the direction of the steering committee, seven

workgroups consisting of experts from each of the three agencies dealt with identified issues.

4.3.1 Segregating Federal Facilities on the NPL

The July 1991 30-Day Study included a recommendation to segregate federal facilities from other sites on the NPL. This recommendation was put into effect in Update 12 of the NPL, published in February 1992. The update contains language that distinguishes more clearly the roles of EPA and other federal departments and agencies.

Segregation of federal facilities will assist the public in understanding that EPA is not the lead agency for all sites on the NPL. Also, distinguishing federal facilities from sites in the general Superfund section of the NPL will allow a more objective assessment of progress at sites on the non-federal portion of the NPL. Regardless of the segregation, EPA's responsibility for overseeing federal facility compliance with CERCLA will remain unchanged.

4.3.2 Other Initiatives

In order to facilitate federal facility cleanup, OFFE initiated numerous actions in FY91. Accomplishments include establishing a leadership council, coordinating technology development, accelerating facility cleanup, successfully using enforcement measures, and forming a military base closure workgroup.

Leadership Council

To lead nationwide federal agency efforts in cleaning up federal facilities, EPA established a Federal Facilities Cleanup Leadership Council consisting of members representing EPA Headquarters, regional program offices, and offices of regional counsel. The council met for the first time during FY91, focusing on policy matters related to cleanup at federal facilities. The council will serve as a forum for developing national policy and guidance; addressing technical, enforcement, and strategic planning issues; and developing a team approach toward making the federal facility clean-up program a model of success.

Also in FY91, OFFE began a pivotal national dialogue on federal facility environmental management. The participants in this effort met several times during FY91 and will continue to address key issues during FY92. This multi-party group includes representatives from DOD, DOE, EPA, state and tribal governments, and environmental and public interest groups. The group has focused on developing a consensus concerning priority setting for the cleanup of federal facilities.

Technology Development

OFFE and the Technology Innovation Office (TIO) of the Office of Solid Waste and Emergency Response (OSWER) began coordinating a number of projects to increase the use of innovative technologies at federal facilities. Federal facilities offer unique opportunities for both the development and application of innovative approaches to hazardous waste remediation.

In April of 1991, the National Advisory Council for Environmental Policy and Technology (NACEPT) recommended that EPA foster technology innovation for environmental purposes. Consistent with NACEPT's recommendation, the Assistant Administrator for OSWER issued a policy directive entitled *Furthering Innovative Treatment Technology Use* on June 10, 1991. EPA believes this policy will encourage responsible parties to explore more effective and less costly technologies to solve the considerable environmental challenge presented. Additionally, the policy acknowledges the Agency's responsibility to lead the effort by promoting the use of innovative technologies under Superfund programs. The policy directive consisted of seven potential initiatives directed at increasing field applications for site remediation.

The Agency is exploring the use of federal facilities both for site-specific technology

demonstrations and as test locations for evaluation of more widely applicable technologies. OFFE and TIO are in the process of developing policies, guidance, and procedures to enhance the use of innovative technologies to remediate federal facilities. Both DOD and DOE have expressed significant interest in developing innovative technologies for use at their facilities and in collaborating with EPA on these efforts. OFFE and TIO anticipate establishing a workgroup consisting of EPA Headquarters and regional representatives to develop appropriate methods for using federal facilities in this way. This workgroup would work in coordination with the Federal Facilities Cleanup Leadership Council.

Accelerated Cleanup

Through several management and operational reviews, the federal facilities program has identified opportunities to expedite cleanups and is working to explore these opportunities in ongoing programs. One such effort is the guide, *The Road to ROD*, prepared jointly by EPA Region 3 and DOD in FY91. This practical guide was prepared for implementation at the Regional Project Manager level.

Another effort is the joint management review by EPA, DOD, and South Carolina Department of Health and Environmental Control of the response programs at the Myrtle Beach Air Force Base. The study was initiated in FY91 and will continue to operate until the site moves into the RA phase. EPA Headquarters and regions have also initiated formation of several workgroups to review conditions that are unique at federal facilities and to develop recommendations that can be translated into national program direction.

Enforcement

EPA encourages compliance at federal facilities through a vigorous enforcement and outreach program. Nationwide, over 820 inspections were conducted at federal facilities during FY91. The cornerstone of the enforcement program, involving the 116 federal facilities listed on the NPL, is the negotiation of an enforceable IAG under CERCLA at each facility. Each IAG includes specific schedules for cleanup of hazardous waste at the sites located on the installation.

EPA took several precedent-setting actions in federal facility enforcement during FY91. One of the most significant of these resulted from a stipulated penalty dispute at DOE's Fernald facility. This was the first time a stipulated penalty dispute under a CERCLA IAG was elevated to the EPA Administrator for resolution. The May 1991 dispute settlement provided that DOE pay $100,000 in fines and spend $150,000 on additional environmental projects at Fernald. This settlement received national attention from the federal regulatory community.

On September 13, 1991, EPA signed an IAG under CERCLA Section 120 with DOI, the U.S. Army, and the State of Illinois Environmental Protection Agency. The agreement provides for remedial action at the Crab Orchard National Wildlife Refuge and is the first between DOI and EPA pursuant to CERCLA Section 120. Furthermore, it is one of the first CERCLA Section 120 agreements to include more than one other federal agency as a potentially responsible party. It is also the first CERCLA Section 120 agreement to provide for private party participation in remedial activities pursuant to Sections 120(e)(6) and 122 of CERCLA.

To address enforcement policy matters in FY91, EPA established the Federal Facilities Enforcement Steering Committee, composed of senior Agency personnel from Headquarters and regional offices. The purpose of the steering committee is to function as a "Board of Directors" for federal facility enforcement policy issues.

Military Base Closure

OFFE worked extensively in FY91 on environmental issues associated with the closure of domestic military installations. OFFE represented EPA on the Defense Environmental Response Task Force, an interagency group charged with reporting to Congress on two categories of issues relating to response actions at bases that are being closed or realigned under the Base Closure and Realignment Act of 1988. The task force considered possible ways of improving interagency coordination within

existing laws, regulations, and administrative policies. It also addressed methods for consolidating and streamlining the practices, policies, and administrative procedures of relevant federal and state agencies. The Defense Environmental Response Task Force submitted a report to Congress on November 12, 1991.

A second significant OFFE initiative was the formation of the Base Closure Workgroup. The workgroup is currently developing approaches to a number of issues, including identification of property parcels to be transferred on closing bases and scheduling of RI/FS activities to meet Congressionally-mandated deadlines. The workgroup reflects EPA's commitment to working with the states and DOD to redevelop closing bases in an environmentally sound and timely manner.

Chapter 5
Other Statutory Requirements for the Report

In addition to reporting on program progress, CERCLA requires EPA to submit annual reports to Congress on several other activities: (1) research on and development of treatment technologies; (2) minority firm participation in Superfund contracting; and (3) five-year reviews of sites where contamination remains after remedial action (RA) is completed. Progress in these areas is described in detail in this chapter.

5.1 Use and Development of Treatment Technologies

Ensuring that a broad range of proven, cost-effective treatment technologies is available for use at Superfund sites involves two distinct efforts: expanding the pool of proven, innovative treatment technologies, and eliminating institutional barriers to the commercialization and availability of proven, technically sound technologies.

To promote the application of clean-up technologies, EPA emphasizes the role of the Technology Innovation Office (TIO) in encouraging innovation. TIO uses booklets, journals, databases, and conferences to alert project managers, engineers, academics, contractors, and other interested parties to the availability of new technologies.

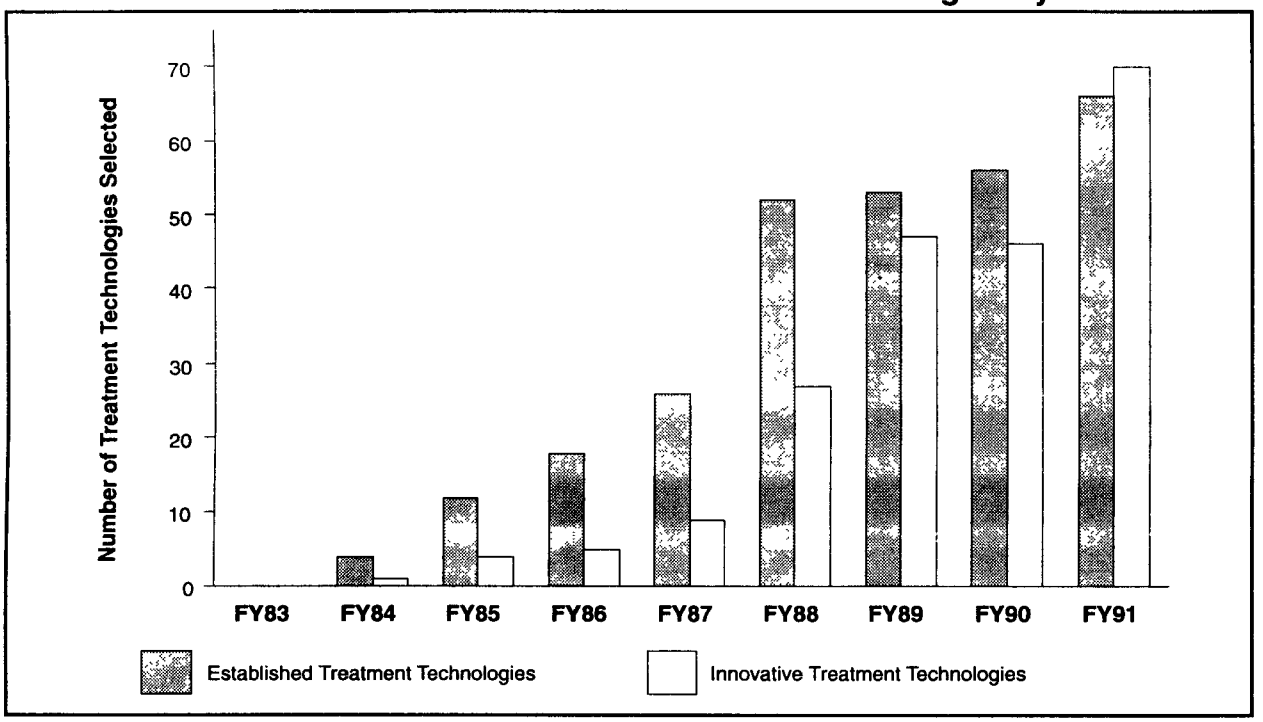
The Office of Research and Development (ORD) contributes to the development of treatment technologies by awarding grants and contracts issued through its Office of Exploratory Research (OER). ORD also invites, as part of the Superfund Innovative Technology Evaluation (SITE) program, technology developers to demonstrate their new, innovative technologies on wastes from current National Priorities List (NPL) sites. In addition, ORD initiates information transfer activities, including seminars, bulletins, and computer systems, and supplies technical assistance to the federal, state, and public sectors in evaluating potentially applicable treatments.

The selection and use at Superfund sites of innovative treatment technologies increased dramatically between 1987 and 1989. In FY90, the number dropped slightly, but increased again in FY91. Exhibit 5.1-1 compares the selection and use of established and innovative technologies, by fiscal year, since EPA began collecting this data in 1983.

Use of Treatment Technologies

Formed in March 1990, TIO has been tasked with promoting the application of innovative treatment technologies to site cleanup. EPA understands that not all innovative technologies will be successful but believes that the benefits of

Exhibit 5.1-1
Use of Established and Innovative Treatment Technologies by Fiscal Year



Source: EPA Technology Innovation Office.

developing new technologies will outweigh any resulting costs. Accordingly, on June 10, 1991, the Agency reinforced TIO's mission in a directive, *Furthering Use of Innovative Treatment Technologies in OSWER Programs.*

In the directive, the Agency stated that "[EPA] must invest the necessary resources and take the risks now to develop the technologies necessary to fulfill the long-term needs of our hazardous waste clean-up programs." The directive encourages selection of innovative treatment technologies by On-Scene Coordinators (OSCs) and Remedial Project Managers (RPMs). TIO accomplishes its technology-promoting mission through a wide-ranging communication program, including publications and databases, forums and conferences, and technical assistance.

Publications and Databases

- A SITE newsletter, written for OSCs and RPMs, is published five times per year. The newsletter focuses on applying innovative technologies in the field and on providing methods for exchanging information among field personnel.
- A journal, *Tech Trends*, describes the successes and problems associated with field applications of innovative technology.
- *Innovative Treatment Technologies: Semi-Annual Status Report* is a booklet produced by TIO that lists every site where innovative technology is used and provides technical background information. The report also enables technology vendors to evaluate the market for innovative technologies in Superfund for the next several years.
- The Vendor Information System on Innovative Treatment Technologies (VISITT) is a new database containing on-line information on the cost and performance of innovative technologies. This database provides an innovative technology information clearinghouse for manufacturers,

Acronyms Referenced in Chapter 5

ATP	Aerobic Thermal Processor
ATTIC	Alternative Treatment Technology Information Clearinghouse
CA	Cooperative Agreement
DOD	Department of Defense
DOE	Department of Energy
IAG	Interagency Agreement
ICMA	International City Management Association
MBE	Minority Business Enterprise
NAMC	National Association of Minority Contractors
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OER	Office of Exploratory Research
ORD	Office of Research and Development
OSC	On-Scene Coordinator
OSDBU	Office of Small and Disadvantaged Business Utilization
OSWER	Office of Solid Waste and Emergency Response
OWPE	Office of Waste Programs Enforcement
PCP	Pentachlorophenol
PCB	Polychlorinated biphenyl
RA	Remedial Action
RFP	Request for Proposal
RPM	Remedial Project Manager
RREL	Risk Reduction Engineering Laboratory
SBIR	Small Business Innovative Research
SITE	Superfund Innovative Technology Evaluation
TCLP	Toxicity Characteristic Leachate Procedure
TIO	Technology Innovation Office
TSB	Technical Support Branch
VISITT	Vendor Information System on Innovative Treatment Technologies
WBE	Women's Business Enterprise

engineering firms, and state and federal project managers.

Forums and Conferences

- TIO and the Risk Reduction Engineering Laboratory (RREL) of ORD hold annual international forums on innovative hazardous waste treatment technologies. The third forum was held in June 1991, in Dallas, Texas. Approximately 750 representatives of various government agencies, industries, and academia attended the 37 presentations. Of these presentations, half were given by vendors in the SITE program, and the remainder by international vendors.
- The Federal Remediation Technologies Roundtable is a forum for the exchange of information among federal departments and agencies using innovative remediation technologies.

Technical Assistance

- The Superfund Technical Assistance Response Team provides specialized assistance to EPA regional and state site managers by directing them to recent research information, providing assistance on characterizing waste, and designing treatability studies.
- Two forums, one for engineers and one for personnel working with ground-water issues, provide a link between laboratories conducting Superfund analyses and EPA regions. The forums were created to answer technical questions from laboratories, OSCs, and RPMs.
- EPA laboratories receive immediate technical support from contractors through a TIO-sponsored contract.

Development of Treatment Technologies

During FY91, OER awarded 10 grants for Superfund-related research and development. OER's Small Business Innovation Research (SBIR) Program solicited proposals for research and development and awarded nine contracts. Additionally, seven new technology demonstrations were completed through the SITE program. The SITE program also accepted 13 technologies into the emerging technologies program and 23 technologies into the demonstration program.

5.1.1 The Superfund Innovative Technology Evaluation Program

CERCLA requires that, when selecting a remedy for a site, EPA give preference to treatment remedies that reduce the toxicity, mobility, and volume of waste at the site. In 1986, to help meet this requirement, the Office of Solid Waste and Emergency Response (OSWER) and ORD created the SITE program. The goal of the program is the

development, demonstration, and subsequent application of new and innovative treatment technologies in the cleanup of Superfund sites across the country.

Now in its sixth year, the SITE program is an integral component of the Agency's research into alternative clean-up technologies. SITE emphasizes the development of a variety of technologies that differ in the treatment techniques they employ. Technologies employing biological treatment, physical and chemical treatment, and thermal treatment all have been shown to be effective remedies in certain situations. These technologies have therefore been accepted into the SITE program.

Operating primarily through cooperative agreements (CAs) between the Agency and technology developers, the program allows for the bench- and pilot-scale testing and the subsequent refinement and larger-scale demonstration of innovative remediation technologies. The SITE program collects and evaluates performance data on various technologies and assesses potential technology applications. RREL is responsible for planning and managing EPA's research, development, and demonstration programs, including the SITE program. Vendors of completed SITE demonstration projects confirm the success of RREL and the SITE program, citing an increase in use of their technologies.

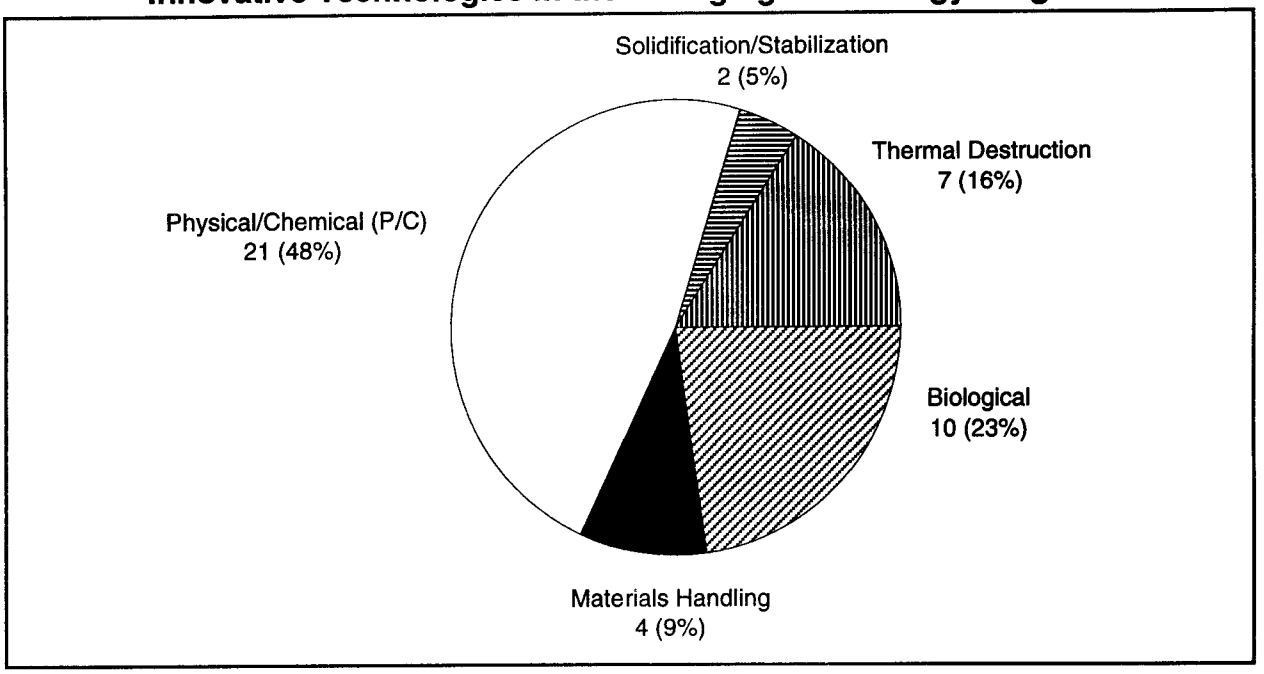
The SITE program is divided into four operational areas: emerging technologies, demonstrations, monitoring/measurement, and technology transfer. The emerging technologies program provides a framework to encourage the bench- and pilot-scale testing and evaluation of technologies that have already been proven at the conceptual stage. Technologies are solicited in annual requests for proposals (RFPs), and accepted technology developers enter into either a one- or two-year CA with EPA. The intent of this program is that, following bench- or pilot-testing, technologies will advance to the more rigorous testing of the demonstration program; three technologies from ORD's first emerging technologies program solicitation (November 1987) currently are in the demonstration program. In response to the FY90 solicitation, 13 new technologies were accepted into the emerging technologies program in FY91, bringing the total number of technologies in the program to 44. Exhibit 5.1-2 provides a percentage breakdown by treatment technique of the technologies currently being tested in the emerging technologies program.

In the demonstration program, engineering performance, reliability, and cost data about specific innovative technologies are generated during a technology demonstration. The demonstration allows prospective users to evaluate the technology's applicability for use on specific wastes from specific Superfund sites. Technologies are selected for the SITE demonstration program through annual RFPs. ORD issued an RFP for the demonstration program in January 1991, and subsequently accepted 23 technologies into the SITE program for future demonstration. The program currently has 63 participating developers working on 76 technology projects. Exhibit 5.1-3 provides a percentage breakdown by treatment technique of the technologies currently in the demonstration program.

Seven developers completed project demonstrations in FY91, bringing to 34 the total number of technology and monitoring demonstrations that have been conducted over the past five years under the SITE demonstration program. The demonstrations completed in FY91 are summarized below.

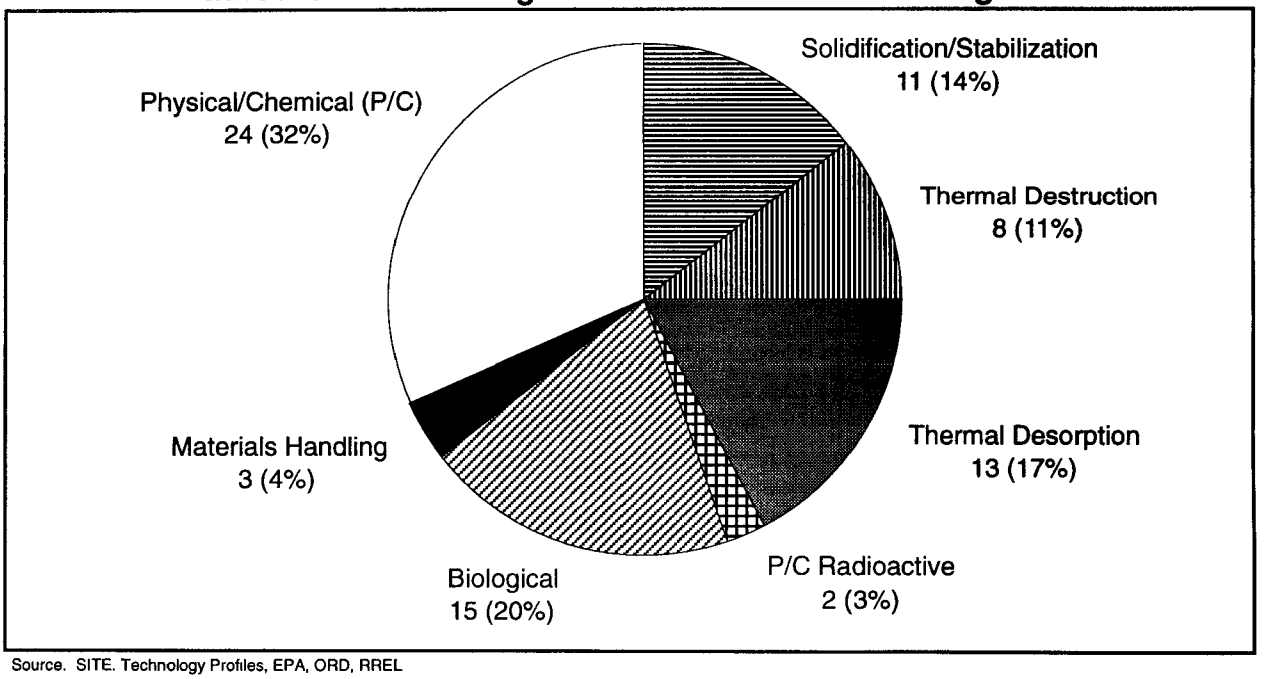
- *Dehydro-Tech Corporation* has continued to develop the Carver-Greenfield process for extraction of oily waste. The process separates hazardous materials from their constituent solid, oil, and water parts. The demonstration was completed in August of 1991. Petroleum wastes from the PAB Oil and Chemical Service, Inc., Superfund site in Abbeville, Louisiana, were sent to EPA's research facility in Edison, New Jersey, for the SITE demonstration. Preliminary results indicate a successful separation of oily drilling muds into their constituent parts.
- *ECOVA Corporations's* slurry-phase bioremediation (bioslurry) reactor is designed to biodegrade creosote-contaminated material by employing aerobic bacteria that use the

Exhibit 5.1-2
Innovative Technologies in the Emerging Technology Program



Source: SITE: Technology Profiles, EPA, ORD, RREL

Exhibit 5.1-3
Innovative Technologies in the Demonstration Program



Source. SITE. Technology Profiles, EPA, ORD, RREL

contaminants as their carbon source. The SITE demonstration of the reactor was conducted in September 1991 on waste obtained from the Burlington Northern Superfund site in Brainerd, Minnesota. Initial treatability results indicated an overall contaminant reduction of 93.4 percent.

- *Horsehead Resources Development Company, Inc.*, produces a flame reactor, a patented, hydrocarbon-fueled flash smelting system that treats metal-containing residues and wastes. The reactor processes wastes with a hot reducing gas produced by the combustion of solid or gaseous hydrocarbon fuels in oxygen-enriched air. Currently the prototype flame reactor technology system operates with a capacity of 1.5 to 3.0 tons per hour in a stationary mode at the developer's facility in Monaca, Pennsylvania. The SITE demonstration test ran from March 18 to 22, 1991, on secondary lead soda slag from the National Smelting and Refining Company Superfund site in Atlanta, Georgia. The test was conducted at the Monaca facility under a research development and demonstration permit subject to the Resource Conservation and Recovery Act. All effluent slag passed the toxicity characteristic leachate procedure (TCLP) limits criteria.

- *Retech, Inc.*, developed plasma arc vitrification, a process that occurs in a plasma centrifugal furnace using a thermal treatment process in which heat from a transferred arc plasma creates a molten bath that detoxifies the feed material. Organic contaminants vaporize and react at temperatures of 2,000°F to 2,500°F to form innocuous products. Solids melt and are vitrified in the molten bath at 2,800°F to 3,000°F. Metals are retained in this phase. When cooled, this phase is a non-leachable, glassy residue that meets the TCLP limits criteria. The SITE demonstration was conducted in July 1991, at a Department of Energy (DOE) research facility. The furnace processed approximately 4,000 pounds of waste. All feed and effluent streams were sampled to assess the performance of this technology.

- *Silicate Technology Corporation's (STC's)* technology for treating hazardous waste uses silicate compounds to solidify and stabilize organic and inorganic constituents in contaminated soils, sludges, and ground water. STC's organic chemical fixation/solidification technology involves bonding organic contaminants into the layers of an aluminosilicate compound. STC's inorganic chemical fixation/ solidification technology involves forming insoluble chemical compounds that reduce the overall reagent addition compared to generic cementitious processes.

  Under the SITE demonstration program, the technology was demonstrated in November 1990 at the Selma Pressure Treating (SPT) wood preserving Superfund site in Selma, California. The SPT site was contaminated with organics, mainly pentachlorophenol (PCP) and inorganics, mainly arsenic, chromium, and copper. Results indicate that STC's technology can treat PCP. Extract and leachate concentrations of PCP were reduced by approximately 97 percent. The technology immobilized the arsenic, chromium, and copper.

- *SoilTech, Inc.*, produces an aerobic thermal processor (ATP) that thermally desorbs hydrocarbons. The ATP heats and mixes contaminated soils, sludges, and liquids in a special rotary kiln that uses indirect heat for processing. The unit desorbs, collects, and recondenses hydrocarbons from solids. The unit also can be used in conjunction with a dehalogenation process to destroy halogenated hydrocarbons through a thermal and chemical process.

  In May of 1991, the first SITE demonstration of this technology used a full-scale unit on soils

contaminated with polychlorinated biphenyls (PCBs) at the Wide Beach Development Superfund site in Brant, New York. The SoilTech ATP unit removed more than 99 percent of the PCBs in the contaminated soil at the Wide Beach Development site, resulting in PCB levels below the desired clean-up concentration of two parts per million. A second demonstration, scheduled for January 1992, will use a full-scale unit at the Outboard Marine Corporation Superfund site in Waukegan, Illinois.

- *WASTECH, Inc.,* produces a solidification and stabilization technology that applies proprietary bonding agents to soils, sludge, and liquid waste contaminated with organics and inorganics. The waste and reagent mixture is then mixed with cementitious materials, forming a stabilizing matrix. The specific reagents used are selected based on the particular waste being treated. The resultant material is a nonleaching, high-strength monolith.

  A field demonstration at Robins Air Force Base in Macon, Georgia, was completed in August 1991. The WASTECH technology was used to treat high-level organic and inorganic waste from an industrial sludge pit. The technology is now being commercially applied to treat hazardous waste contaminated with various organics and inorganics.

5.1.2 Superfund Research Grants

Various sources of funding are available for Superfund-related research. OER administers two significant funding programs: the Research Grants Program and the SBIR Program.

The Research Grants Program provides funding for research in environmental projects related to health, engineering, physics, chemistry (with separate categories for air and water), biology, and Superfund. Researchers submit applications in response to an annual solicitation. Examples of environmental engineering grants include:

- The study of soil flushing as a method of remediating heavy metals from contaminated soils at Superfund sites and of the method's applicability as a viable, cost-effective method (State University of New York at Buffalo);
- The use of phytoremediation to reclaim soils contaminated with low to moderate amounts of chromium and lead (Rutgers University); and
- The development of a cost-effective process for removing toxic heavy metal ions from very dilute aqueous waste streams using porous-magnetic chitosan beads (a natural, renewable, and abundant biopolymer) (Oregon State University).

OER research grants generally last two to three years at an average annual funding level of $108,000 per grant.

SBIR funds high-risk research that EPA anticipates will result in public benefit. The program operates in two phases: Phase I projects are funded up to $50,000 for six months to determine whether the proposed research concept appears technically feasible; Phase II projects involve a more substantive research effort and a higher cost commitment for the most promising projects to emerge from Phase I. During FY91, SBIR received 367 Phase I proposals and awarded a total of 31 grants. Additionally, SBIR received 30 Phase II proposals and awarded a total 14 grants.

Of the total grants awarded in FY91, 10 were for research related to Superfund; OER classifies Superfund-related research grants according to solid and hazardous waste disposal, mitigation of environmental pollution problems at Superfund sites, and air pollution control. OER awarded two Phase II grants for research related to Superfund in the area of solid and hazardous waste disposal.

5.1.3 Technical Assistance, Expert Advice, and Information Transfer

Many of the treatment technologies for Superfund sites are new and complex, and information concerning the performance capability, cost, and availability of these technologies is limited. This lack of available information stems in part from the fact that many of these technologies have not been tested on a pilot-scale with actual waste. Testing, dissemination of test results, and the sharing of technology-related information will increase the visibility of innovative treatment technologies and provide RPMs and OSCs with a screening tool in the remedy selection process.

Management demands on RPMs allow them little time to study the available information on treatment technologies. Consequently, they may not have the information to determine whether a new, innovative technology is appropriate for use at a specific site. To provide greater technical assistance to the regions for the evaluation of treatment technologies, ORD initiated two specific organizational changes:

- ORD's RREL formed the Technical Support Branch (TSB) to coordinate technical support activities. TSB works closely with designated technology teams in providing site-specific technical guidance. Such guidance was offered at Superfund sites in FY91.
- Under TSB, RREL established the Superfund Technical Assistance Response Team to provide technical support to RPMs throughout the remedial process for sites with particularly complex problems.

Throughout FY91, ORD was involved in numerous information transfer activities. The Alternative Treatment Technology Information Clearinghouse (ATTIC) integrates hazardous waste data in a centralized, searchable source that may be accessed by federal, state, and other public sector officials. Among other services, ATTIC provides database searches, expert contact lists, and underground storage tank case-histories.

ORD continued its treatability assistance program to perform and oversee treatability studies on new technologies, and to perform treatability study support activities. Results of the treatability assistance program and other transfer activities include the following:

- Publishing the *Guide to Conducting Treatability Studies Under CERCLA*, and initiating five technology-specific treatability study guides;
- Publishing the *Inventory of Treatability Study Vendors*;
- Publishing technical guidance documents on the cleanup of lead battery and wood preserver sites;
- Presenting seminars on the issues of explosive wastes and lead-contaminated soils;
- Publishing a number of bulletins for engineers on site remediation technologies;
- Developing a computer-assisted site evaluation system to display and evaluate site contamination data; and
- Providing the regions with a course on treatment technology screening.

The Agency's Office of Waste Programs Enforcement (OWPE) also administered an outreach effort to provide information to local government managers at sites where counties or municipalities may be involved in or affected by cleanup of hazardous waste. OWPE awarded two grants in September 1991 to the International City Management Association (ICMA) and to the Vermont Law School.

- The ICMA grant involves the dissemination of information regarding the Superfund process to local government officials. The grant specifically involves producing an information kit, supporting a peer exchange program, and establishing a document center for distribution of instructive materials.
- The Vermont Law School grant complements the ICMA grant by providing legal support for the development of the information kit.

5.1.4 Research, Development, Demonstration, and Evaluation of New Technologies

ORD has continued efforts to respond to recommendations in the 90-Day Study. Specific activities include:

- Participating in jointly funded activities with DOE and Department of Defense (DOD) to enhance the emerging technologies program;
- Working closely with EPA Regions 2 and 5 in evaluating thermal desorption technologies at the Wide Beach Superfund site and the Anderson Development Company Superfund site;
- Working closely with Region 5 on a bilateral agreement with the Federal Republic of Germany for a technology demonstration exchange; and
- Initiating several projects and conducting two technology demonstrations at DOE and DOD sites.

5.2 Minority Firm Participation in Superfund Contracting

Section 105(f) of CERCLA requires EPA to consider the availability of minority contractors when awarding contracts for Superfund work. "Contracts," as defined by EPA, include both direct procurements awarded by the Agency, and procurements resulting from Superfund financial assistance awards to states under CAs.

EPA's Office of Small and Disadvantaged Business Utilization (OSDBU) is responsible for ensuring that the Agency complies with Section 105(f). EPA satisfies Section 105(f) through direct procurements via contracts and subcontracts, including the Small Business Administration's Section 8(a) procurements to minority contractors. Additionally, other federal agencies, states, or Indian tribes may award contracts and subcontracts to minority firms with funds transferred to the agencies, states, or Indian tribes from Superfund through interagency agreements (IAGs) or CAs.

During FY91, EPA and other federal agencies awarded contracts worth $31,862,422 to minority contractors to perform Superfund construction, field support, and professional services. This represents 3.96 percent of the total dollars obligated to finance Superfund work during the fiscal year. Exhibit 5.2-1 illustrates that EPA awarded most of the contract dollars ($29,700,000) to minority contractors through direct procurements. Contracts and subcontracts worth an additional $1,216,266 were awarded under EPA/state CAs. Other federal agencies awarded $946,156 worth of contracts and subcontracts to minority firms with funds transferred from the Superfund program through IAGs. The

Exhibit 5.2-1
Minority Contract Utilization during Fiscal Year 1991

Type of Activity	Total Dollars Obligated	Minority Contractor Participation*	Percentage of Total Dollars
Direct Procurement	$475,284,136	$29,700,000	6.25
Cooperative Agreements	$86,783,621	$1,216,266	1.40
Interagency Agreements	$243,507,157	$946,156	0.39
TOTAL	$805,574,914	$31,862,422	3.96

*This does not include Women's Business Enterprise participation data.

Source. EPA Office of Small and Disadvantaged Business Utilization.

($31,862,422) total does not include a $300,000 grant that EPA awarded to the National Association of Minority Contractors (NAMC), a non-profit organization, for Superfund training.

Exhibit 5.2-2 illustrates the amount of money that EPA awarded to minority contractors through each type of direct procurement. Small Business Administration 8(a) contracts accounted for the largest share of the total value of contracts that EPA directly procured. Subcontracts awarded to minority firms by EPA prime contractors accounted for the next largest share.

Exhibit 5.2-2
Amount of Money Awarded to Minority Firms through Direct Procurement

Type of Contracts	Total Dollars (in millions)
Small Business Administration 8(a) Contracts	$16.90
Minority Prime Contracts	$1.60
Minority Subcontracts	$11.20
TOTAL	$29.70

Source: EPA Office of Small and Disadvantaged Business Utilization.

5.2.1 EPA Efforts to Identify Qualified Minority Firms

OSDBU conducted a number of activities during the fiscal year to identify qualified minority firms and inform them of opportunities available in the Superfund program.

- In cooperation with NAMC, OSDBU conducted training sessions designed to assist minority contractors in becoming eligible to compete for Superfund contracts. A total of 151 participants, representing 101 firms, took part in the training sessions. The Agency added the represented firms to its previous listing of qualified minority firms.
- EPA hosted the Superfund Marketing Trade Fair in May 1991 to provide minority firms the opportunity to meet individually with Superfund prime contractors and responsible state officials; 44 participants from FY90 training sessions attended the fair.
- OSDBU, in cooperation with New Jersey, Colorado, Texas, and Illinois, hosted minority business enterprise (MBE) and women's business enterprise (WBE) workshops that were designed to familiarize minority and women business owners with the opportunities available in Superfund and other EPA programs; a total of 1,000 people attended the workshops.
- EPA hosted its mid-year MBE/WBE workshop in November 1990 and its annual MBE/WBE workshop in April 1991. During both workshops, EPA emphasized the need for improving minority contractor utilization in the Superfund program. This includes the new minimum 8 percent goal as required by the administrative provisions of P.L. 101-507.

5.2.2 Efforts to Encourage Other Federal Agencies and Departments to Use Minority Contractors

OSDBU, in cooperation with the Office of Emergency and Remedial Response and the Grants Administration Division, included special conditions in each IAG between EPA and any agency or department receiving Superfund monies. These conditions ensure that agencies or departments receiving Superfund money are aware of the CERCLA Section 105(f) requirement to ensure the availability of minority contractors when awarding

contracts for Superfund work. Another condition requires that departments or agencies undertaking Superfund work submit an annual report to EPA on minority contractor utilization.

The U.S. Army Corps of Engineers developed a policy statement for the Corps to ensure the maximum practicable opportunity for the utilization of minority firms in the Superfund program under IAGs with the Corps.

5.3 Report on Facilities Subject to Review under CERCLA Section 121(c)

Certain selected remedies permit hazardous substances, pollutants, or contaminants to remain on site if they do not threaten human health or the environment. CERCLA Section 121(c) requires that EPA review sites where the Agency selected such a remedy no less often than every five years after initiation of the RA to ensure that the remedy fully protects human health and the environment. CERCLA Section 121(c) also requires that a report be submitted to Congress that lists the facilities for which periodic reviews are required, the results of all of the reviews, and any action taken as a result of the reviews. FY91 was the first year in which a site became eligible for the five-year review.

5.3.1 Five-Year Review

On May 23, 1991, the Agency issued a directive entitled *Structure and Components of Five-Year Reviews*. The guidance defines the scope of five-year reviews and identifies two types of reviews: statutory reviews (required by CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)) and policy reviews (those that EPA will implement as a matter of policy). In August 1991, EPA issued a fact sheet on five-year review guidance to reinforce the earlier policy.

On June 21, 1991, EPA Region 7 approved the first Five-Year Review Report. The report covered a policy review of the remedy at the Johns' Sludge Pond site in Wichita, Kansas. On the basis of the review, EPA determined that the RA "continues to protect public health, welfare, and the environment" at the site. Subsequently, Region 7 published in the *Federal Register* a notice of intent to delete the Johns' Sludge Pond site from the NPL.

5.3.2 Deletions from the NPL

The FY89 90-Day Study recommended that EPA adopt a policy under which no site will be deleted from the NPL until the Agency has conducted at least one five-year review to verify that the implemented remedy remains protective of human health and the environment. In March 1990, EPA published this policy in the preamble to the NCP. In late 1991, the Agency re-examined the deletion policy due to public confusion over EPA's decision to retain on the NPL sites that were otherwise eligible for deletion.

On December 4, 1991, EPA published in the *Federal Register* a notice of change in policy regarding five-year review and deletion from the NPL. Effective as of the date of the notice, EPA will no longer wait to delete a site from the NPL until after it conducts one five-year review. The notice clarifies that:

- Five-year review and the deletion process are not linked by statute.
- The NCP specifies that deleted sites are eligible for further Fund-financed RAs should future conditions warrant.
- EPA remains committed to conducting five-year reviews of eligible sites and may publish a "monitoring list" of sites at which it potentially will conduct reviews.

Chapter 6
Program Implementation and Support Activities

In addition to its more direct clean-up activities, EPA undertook activities in FY91 to support progress in the program, including efforts to improve community relations and enhance public access to Superfund information, strengthen EPA's partnership with states and Indian tribes, and improve program efficiency. Through the implementation of community relations directives and the issuance of 26 technical assistance grants (TAGs) in eight regions, EPA assisted citizens in preparing to take part in the clean-up process. Also, EPA facilitated involvement by Indian tribes and states in the Superfund clean-up process through implementation of Subpart F of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the administrative requirements of 40 *CFR* Part 35, Subpart O. In addition, the Agency continued its efforts to improve program efficiency by initiating activities to revise its long-term contracting strategy and improve the remedy selection process.

6.1 Community Relations and Public Information

Effective and timely community relations and the distribution of information to the public are significant components of the Superfund program's success. The 30-Day Study Task Force recognized this and recommended that the Agency more aggressively report its accomplishments to the public. Toward this end, the Task Force suggested that EPA identify alternative measures of reporting its success and develop a communication strategy for announcing every remedial action (RA) start and completion. These recommendations affirmed the Superfund program's belief in the importance of community participation in the clean-up process and spurred the program to improve its already active community relations program during FY91.

6.1.1 Community Relations

Superfund's community relations program is based on a commitment to inform citizens who are affected by Superfund sites about those sites and involve them in the Superfund clean-up process. All public involvement efforts are guided by the program's three goals:

- To give the public an opportunity to comment on and provide input to technical decisions;
- To inform the public of planned or ongoing actions; and
- To focus and resolve conflict.

EPA has learned important lessons concerning public involvement from efforts to achieve these goals.

- There are no formulas for approaching a community. Each community is unique and requires a specific communication strategy designed toward its particular need.

Acronyms Referenced in Chapter 6	
CA	Cooperative Agreement
CPCA	Core Program Cooperative Agreement
IFR	Interim Final Rule
LAN	Local Area Network
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NTIS	National Technical Information System
OERR	Office of Emergency and Remedial Response
PRP	Potentially Responsible Party
RI/FS	Remedial Investigation/Feasibility Study
RA	Remedial Action
ROD	Record of Decision
RD	Remedial Design
SACA	Support Agency Cooperative Agreement
SSC	Superfund State Contract
TAG	Technical Assistance Grant

- Generally, the best way to reach concerned citizens is through informal activities.
- Experience shows that even the most carefully planned community involvement effort does not guarantee positive results.
- The best guideline for involving the public in site decisions is early, often, and always. EPA must begin outreach activities early in the process, meet with citizens on a regular basis, and always listen to citizens' concerns. Such a proactive outreach program has proven to facilitate, rather than impede, site cleanup. This is especially important as EPA moves to streamline and accelerate cleanups in the wake of the 30-Day Study.

In FY91, EPA concentrated on implementing the recommendations of the 30-Day Study and the FY89 90-Day Study. Toward this end, EPA issued a number of guidance directives early in the fiscal year covering issues such as developing innovative techniques for increasing public involvement, minimizing problems caused by staff turnover, incorporating citizen concerns into site decisionmaking, and discussing site findings and decisions with the public as they occur.

The policy, embodied in these directives, of enhanced community involvement in the Superfund process is gradually fostering an increase in public confidence, based on mutual trust and respect at the community level. For example, EPA voluntarily missed the record of decision (ROD) deadline for the Union Chemical Co., Inc., Superfund site to allow the residents of Hope, Maine, additional time to comment on EPA's proposed site remedy. The Agency nearly tripled the 30-day public comment period to meet citizen needs.

Likewise, EPA Headquarters community relations staff has recommended the greater use of informal "open houses" to facilitate communication between EPA and local citizens. In one example, an open house addressed and, to a great extent, resolved intense community opposition to an incinerator at a site in Fort Lauderdale, Florida.

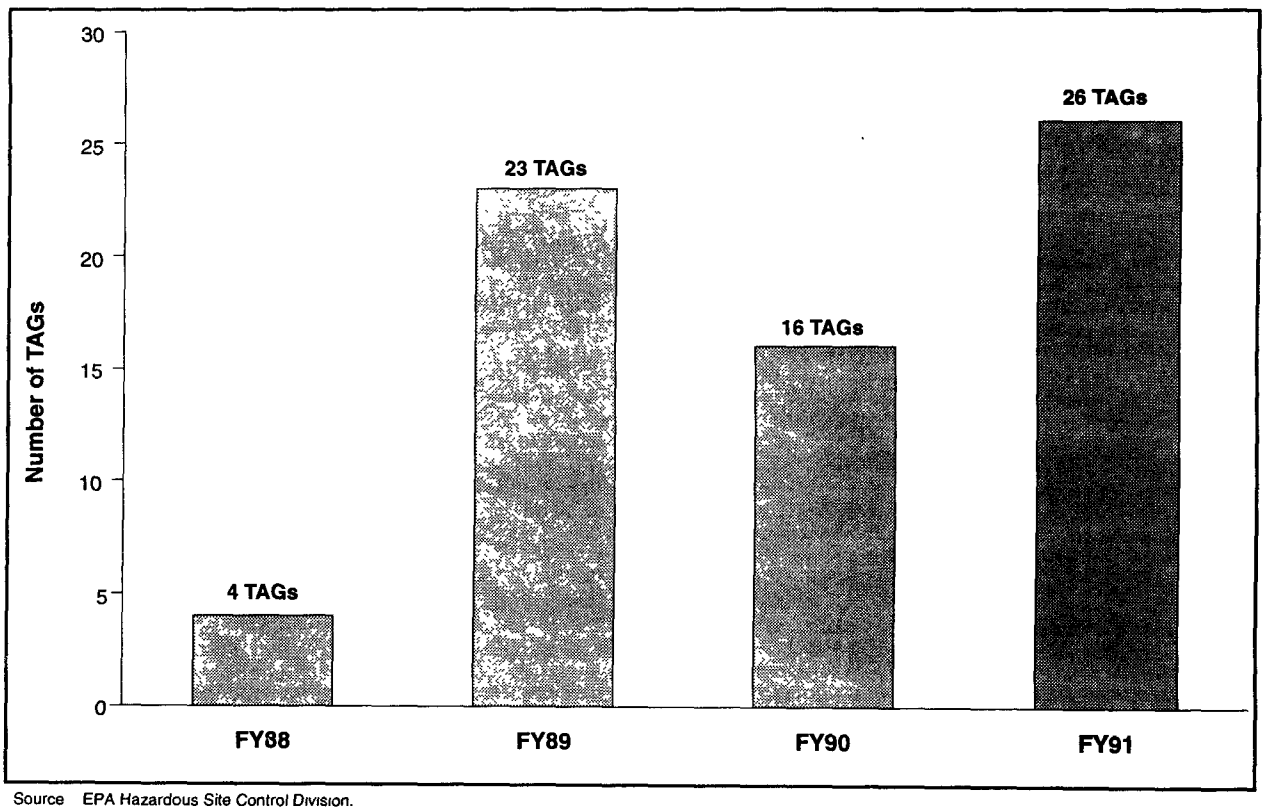
In addition to issuing directives geared toward implementing the recommendations of the 30-Day Study and the 90-Day study, EPA developed new community relations policy guidance with respect to remedial designs (RDs), RAs, removals, TAGs, enforcement, and risk communication. The Agency plans to publish each type of guidance as a separate chapter of the upcoming edition of *Community Relations in Superfund: A Handbook.*

6.1.2 Technical Assistance Grants under CERCLA Section 117(e)

CERCLA Section 117(e), as amended by SARA, authorizes EPA to award TAGs. TAGs are available to local groups affected by sites proposed for or listed on the National Priorities List and by sites where preliminary site work has begun. Using TAGs, local groups employ technical advisors to increase their understanding of conditions at hazardous waste sites and the Superfund clean-up process. The TAG program helps citizens become more knowledgeable about the technical and scientific aspects of a Superfund site and thus better prepared to participate effectively in the clean-up process.

In FY91, EPA awarded 26 TAGs to community groups in eight regions. This brings the total number

Exhibit 6.1-1
Number of Technical Assistance Grants Awarded during Fiscal Year 1988 through Fiscal Year 1991



Source EPA Hazardous Site Control Division.

of TAGs nationwide to 69, including 16 TAGs awarded in FY90, 23 TAGs awarded in FY89, and 4 TAGs awarded in FY88. Exhibit 6.1-1 illustrates the number of TAGs awarded from FY88 through FY91.

To ensure that all eligible groups have equal access to technical assistance and an equal opportunity to compete for the single TAG available for a Superfund site, EPA has established a formal process for evaluating applications. The maximum TAG available is $50,000 per site. Under the current program, the community contributes 20 percent of the total cost of the TAG project. EPA waives the community contribution requirement if the applicant demonstrates financial need. Potentially responsible parties (PRPs) and certain other groups and organizations (for example, groups promoting a single interest to the exclusion of other interests) are not eligible to receive TAGs.

Day-to-day TAG program operations are conducted under EPA's interim final rule (IFR) for the TAG program and an amended IFR. The final rule developed during FY91 incorporates suggested changes for improvement. These suggestions came, in part, from public comment received on the amended IFR. Additional changes were derived from the program experience EPA has gained in the two years since the promulgation of the amendment in 1989. In brief, improvements in the TAG final rule include:

- Allowing additional activities to be funded under the TAG award;
- Simplifying the procedures for procuring TAGs; and
- At complex sites, increasing the amount of funds available and allowing grants to be renewed.

6.1.3 A Coordinated Approach to Public Information

FY91 marked the fourth year of EPA's five-year program to standardize and manage the extensive Superfund document collection and incorporate it into public information and outreach activities. Major accomplishments during the fiscal year include:

- Refining Superfund document production to ensure consistency in content and appearance;
- Issuing a comprehensive *Compendium of Superfund Publications* that describes the entire collection, both current and historical;
- Incorporating the entire Superfund publication collection into the National Technical Information System (NTIS); and
- Creating a "Superfund Order Desk" at NTIS to expedite order processing and develop several types of customized subscription services to meet public user needs.

The National Technical Information Service

Under the Department of Commerce, NTIS serves as a permanent archive and general source of federal publications, including Superfund documents. Over the past five years, however, the Superfund program itself has provided interested parties with over two million documents free of charge. Unfortunately, due to resource constraints, this approach is no longer possible.

EPA nevertheless remains committed to ensuring that its documents will continue to be available to the public. Consequently, the Agency and NTIS have embarked on an ambitious joint project that will bring the entire Superfund collection within quick and easy access to all users external to the Agency. NTIS has established a Superfund Order Desk where users may order single copies or customized subscriptions for documents most pertinent to users' needs.

Pre-publication documents will continue to be available at the desk prior to completion of formal printing and distribution. A joint outreach and marketing effort during FY92 will bring information about this unique activity to all regular users. The program is committed to high quality and quick access, and will be monitored throughout FY92 and FY93 by an interagency Quality Action Team under the Agency's total quality management program.

The Superfund Docket

The Superfund Docket provides public access to the materials that support proposed and final rules, and receives and compiles public comments during the rulemaking process. The public is allowed access to docket materials following approval by the Office of General Counsel and announcement in the *Federal Register*. The docket also maintains viewing copies of RODs and a limited stock of *Federal Register* copies containing Superfund regulatory information.

Other Information Sources

The RCRA/Superfund Hotline provides information to the public and EPA personnel concerning hazardous waste regulations and policies. The hotline is a comprehensive source of general information about ongoing issues in the Superfund program. EPA also maintains the Hazardous Waste Superfund Collection in EPA Headquarters and regional libraries. The collection contains documents ranging from RODs to commercially produced books on hazardous waste and Superfund.

6.2 EPA Partnership with States and Indian Tribes

EPA continues to promote and maintain its partnership with states and Indian tribes in the Superfund clean-up process. Subpart F of the NCP and the administrative requirements in 40 *CFR* Part 35, Subpart O provide mechanisms for ensuring meaningful state and Indian tribe involvement in implementing Superfund response activities. Subpart O describes EPA's authority to transfer funds and responsibilities to states and Indian tribes so that

they may undertake response actions in accordance with the NCP. It also describes the assurances required from states and Indian tribes under CERCLA Section 104.

FY91 activities included a conference where states exchanged information on state Superfund programs, and EPA conducted seminars that provided information on proper administration of response agreements. EPA also developed computer systems to facilitate communication between state, Indian tribe, and federal officials and to allow users access to relevant information on NCP requirements.

Under authority of Subpart O, states took the lead on several clean-up projects during FY91. States supervised the initiation of eight remedial investigation/feasibility studies (RI/FSs), nine RDs, and seven RAs. This includes all state-lead activities, including those financed by states, the Trust Fund, or PRPs.

6.2.1 Response Agreements and the Core Program

Response agreements provide states, Indian tribes, and political subdivisions with the opportunity to participate in response activities at sites under their jurisdiction. The core program assists states in developing their overall response capabilities.

Response Agreements

Certain prerequisites are common to all response agreements. States and Indian tribes must demonstrate the ability to track costs in accordance with EPA financial and administrative standards. For remedial (long-term) action to occur, states must provide the Agency with certain other assurances. These include demonstrating the capability to perform operation and maintenance, providing a cost-sharing match, demonstrating 20-year waste capacity, and providing for off-site disposal.

Superfund State Contracts (SSCs): SSCs are required when EPA assumes the lead for remedial activities. These contracts between EPA and a state specify the process for collection of cost-share payments from states and/or political subdivisions as required by CERCLA Section 104. The cost share is generally 10 percent of the cost of the RA and is not applied to planning activities such as the RI/FS and RD. SSCs also are required when a political subdivision assumes the lead for remedial activities. The parties to this type of SSC include EPA, the state, and the political subdivision. The SSC must be in place before EPA can transfer cooperative agreement (CA) funds to the political subdivision. SSCs also serve as the documents by which states provide EPA with required assurances.

Lead Agency Cooperative Agreements: Lead agency CAs facilitate the implementation of the NCP by allowing states, Indian tribes, and political subdivisions (with appropriate hazardous waste management capability and sufficient resources) to assume lead agency responsibility for many response activities. As the lead agency, EPA provides the state, Indian tribe, or political subdivision with Superfund Trust Fund monies to directly plan and manage studies, RDs, and clean-up activities at specified sites within their jurisdictions. For an RA, a state-lead CA documents the state cost share (cash or in-kind services) and Section 104 assurances.

Support Agency Cooperative Agreements (SACAs): SACAs facilitate the implementation of the NCP by allowing states, Indian tribes, and political subdivisions that do not have the capabilities required to assume lead agency responsibility to actively participate in response activities at sites under their jurisdiction. As a support agency, the state, Indian tribe, or political subdivision may assist the lead agency through the sharing of information and expertise, while benefitting from the experience of participating in a Superfund response action.

Enforcement Cooperative Agreements: Enforcement CA funds may be used by a state to undertake PRP searches, issue notice letters for negotiation activities, undertake administrative and judicial enforcement actions, and oversee PRPs at EPA or state enforcement response actions.

To be eligible for enforcement CA funding under Subpart O, states must submit the following to EPA:

- A letter from the state Attorney General certifying that the state has the capabilities to pursue enforcement actions;

- A copy of the statute that authorizes the state to undertake enforcement actions; and
- Any further documentation required by EPA to establish the capability to undertake the enforcement response.

Indian tribes must satisfy similar requirements.

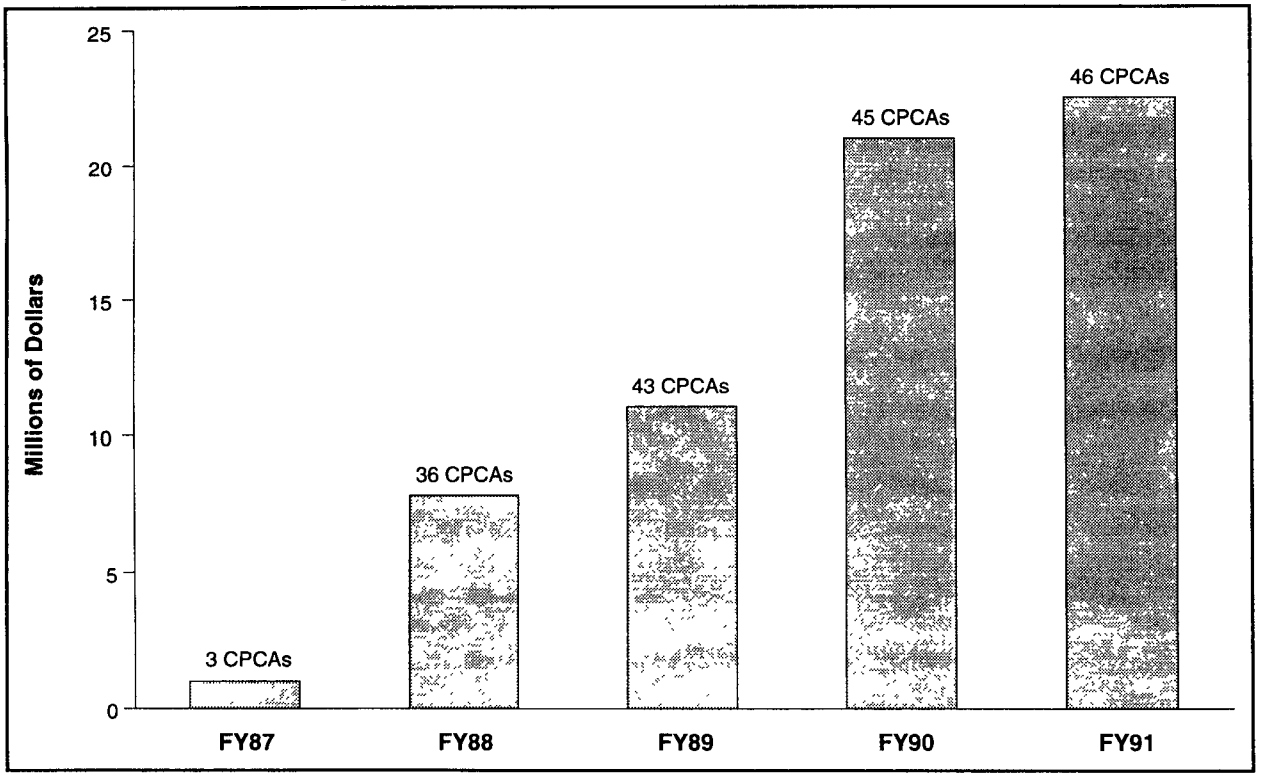
The Core Program

The legislative history of SARA Section 104(d) indicates the intent of Congress to increase the scope of CERCLA funding to include certain basic, or core, activities of states and Indian tribes not attributable to a specific site, yet important to the overall improvement of response capabilities. During the initial years of the federal Superfund program, before the formal establishment of a core program, CA funds were tied to specific activities at specific sites.

The core program was formally initiated as a pilot program in FY87 with awards in three EPA regions. Such annually awarded initial core program cooperative agreements (CPCAs) have a single budget and scope of work designed to enhance state program activities. During FY91, EPA awarded a total of 46 CPCAs. The distribution and value of these agreements over past fiscal years is displayed in Exhibit 6.2-1.

Subpart O modified the restrictions on CPCAs by removing the funding cap, allowing a budget period of up to three years, and emphasizing the development of state program capabilities. EPA typically budgets and distributes $10 to $12 million in CPCAs annually among the ten regional offices. Regions have the discretion to provide additional funding from certain other funding categories if monies are available. Ten states negotiated core programs with multi-year budget periods in FY91.

Exhibit 6.2-1
Number and Value of Core Program Cooperative Agreements Awarded during Fiscal Year 1987 through Fiscal Year 1991



Source EPA Hazardous Site Control Division, State and Local Coordination Branch.

The core program offers states the opportunity to develop comprehensive, self-sufficient state Superfund programs. Approval of the budget request and scope of work is dependent on the developmental needs of a state's program, the demonstrated progress of a state in meeting previous core objectives, and the availability of funds. States are required to provide a 10-percent cost share for core program awards. EPA intends the core program to help lay the groundwork for the implementation of an integrated EPA-state/tribe approach for meeting Superfund goals. The program is approaching its sixth year of implementation and EPA is reviewing its effectiveness to identify potential improvements in the program.

6.2.2 Partnership with Indian Tribes

In FY91, the Superfund program was involved in actively addressing hazardous waste problems on Native American lands and in assisting tribes in assuming regulatory and program management responsibilities. The Superfund program continued to promote involvement by interested Indian tribes through site-specific CAs, CPCAs, and Superfund memoranda of agreement.

Highlights of FY91 tribal involvement include the following activities:

- EPA Region 6 and a consortium of federally recognized Indian tribal governments (the nineteen sovereign pueblos of New Mexico) signed a Superfund memorandum of agreement.
- The Pueblo Consortium of New Mexico received a $350,000 CPCA to support program planning, EPA-state/tribe interagency coordination, development of the tribe's 20-year waste capacity assurance plan, and CERCLA-related clerical and administrative support.
- The Navajo nation received a $250,000 CPCA to support Navajo Superfund activities. The Navajo nation also received more than $400,000 for site assessment activities.
- The St. Regis Mohawks were awarded a $125,000 CPCA for FY90 and FY91 to support Superfund activities at the General Motors Superfund site in Massena, New York.
- The Cherokee nation of Oklahoma was awarded a $200,000 CPCA for FY90 and FY91 and a $150,000 multi-site CA to conduct pre-remedial site work.

As an ongoing activity, representatives from the Agency's Superfund program participate in the EPA/Indian Tribe Workgroup. This workgroup works with the EPA National Indian Program Coordinator to address environmental issues affecting Native Americans.

6.2.3 Other EPA Partnership Developments

During FY91, the Agency was involved in a number of additional partnership activities, some of which directly respond to recommendations of the 30-Day Study and the 90-Day Study for improving the Superfund process.

State Superfund Programs

The Agency co-sponsored the State Superfund Programs Conference during FY90 with the Association of State and Territorial Solid Waste Management Officials. One goal of the conference was to initiate an exchange of information among states about state Superfund programs. The conference included panel discussions on state program issues, demonstrations of training tools for state programs, and workgroup sessions on topics relating to state Superfund programs. Session topics included: establishing and enhancing state programs: statutes and regulatory authorities; state program resources; clean-up technologies; state management issues; and state clean-up policies. During FY91, EPA produced a post-conference document entitled *State Superfund Programs: The Managers Challenge for the 1990s*, which compiles the findings arising

from the conference. The Agency is planning another co-sponsored conference for mid-FY92.

Response Agreement Training

The Agency continued to offer a Response Agreements Seminar to provide EPA and state staff with the skills and information needed to administer CAs and SSCs. The three-day seminar provides information on CAs and SSCs, their purposes and applications. The seminar identifies steps necessary to complete a response agreement, explains state assurances, assists state project officers in calculating a state's cost share, and describes techniques for managing response agreements. The Agency conducted two seminars during FY91 and plans to conduct two additional seminars during FY92.

Information Systems Development

The Office of Emergency and Remedial Response (OERR) completed the development of several distinct information systems during FY91. The EPA/state mailing system, a comprehensive directory of state and federal officials, was produced as a stand-alone software package adaptable for local area network (LAN) use. Accompanied by a hard copy booklet, this system lists key technical, administrative, and legal personnel in the Superfund program and can produce summary reports and labels for all system entries.

Through additional EPA automated systems, users can locate, retrieve, and copy information about the NCP and 40 *CFR* Part 35 Subpart O. These systems are available on diskette in industry-standard WordPerfect format and can also be used in a LAN environment.

6.3 Actions Undertaken to Improve Program Efficiency

In FY91, EPA initiated a number of activities to improve the efficiency of Superfund. These activities included revising the long-term contracting strategy and initiating an effort to improve the remedy selection process.

6.3.1 Long-Term Contracting Strategy

In response to recommendations in the 90-Day Study, EPA developed the Superfund long-term contracting strategy to analyze long-term contracting needs and identify methods for meeting future workforce demands, using both technical contractors and in-house expertise. During FY91, EPA developed the following approach to monitor the implementation of the long-term contracting strategy.

- Formed an advisory committee to provide oversight and direction and to inform upper management of important issues that arise during the strategy's implementation;
- Designated leads to develop and manage a national plan for each new contract component; and
- Appointed regional liaisons to represent the program and administrative organizations in each region and to develop plans for tailoring each region's implementation of the long-term contracting strategy to its needs.
- EPA developed national plans for each new contract component and formed workgroups to begin the procurement process. By the end of

FY91, each region had begun developing plans to meet its individual needs. Implementation of the strategy will continue over a five-year period.

6.3.2 Remedy Selection Process

In an effort to improve the remedy selection process, OERR and the Office of Waste Programs Enforcement initiated an effort to test and implement findings in the study published in October 1990, *Improving Remedy Selection: An Explicit and Interactive Process for the Superfund Program.* The study identified and evaluated problems based on comments from approximately 100 individuals representing all sectors of the Superfund community.

The study provided EPA with specific recommendations for:

- Establishing protective clean-up levels;
- Clarifying Superfund statutory criteria for cleanups; and
- Improving consistency and interaction in remedy selection.

EPA has taken the initiative in implementing these recommendations, the recommendations of the 30-Day Study to accelerate, streamline, and standardize the clean-up process, and the related recommendations of the 90-Day Study. As a result, the Superfund program is cleaning up the nation's worst hazardous waste sites more efficiently than ever.

Appendix A
Status of Remedial Investigations, Feasibility Studies, and Remedial Actions at Sites on the National Priorities List in Progress on September 30, 1991

Appendix A satisfies the combined statutory requirements of CERCLA Sections 301(h)(1)(B) and (F). Accordingly, this appendix reports the status and estimated completion date of all remedial investigation/feasibility study (RI/FS) and remedial action (RA) Title I projects in progress at the end of FY91. This appendix also provides notice of RI/FSs and RAs that EPA presently believes will not meet its previously published schedule for completion, and includes new estimated dates of completion, as required by Section 301(h)(1)(C). These dates were previously published in Appendix A of *Progress Toward Implementing Superfund: Fiscal Year 1990.* In addition to meeting these statutory requirements, this appendix lists new remedial projects that were begun in FY91 and were in process at the end of FY91. Listed activities may include remedial projects at several operable units on a single site, as well as first and subsequent activities at a single operable unit.

Information in the appendix is organized under the following headings:

- **RG** — EPA region in which the site is located.
- **ST** — State in which the site is located.
- **Site Name** — Name of the site, as listed on the National Priorities List (NPL).
- **Location** — Location of the site, as listed on the NPL.
- **Operable Unit** — Operable unit at which the corresponding remedial activity is occurring; a single site may include more than one operable unit.
- **Activity** — Type of project in progress on September 30, 1991.
- **Lead** — The entity leading the activity, as follows:

  EP: Fund-financed with EPA employees performing the project, not contractors;

  F: Fund-financed and federal-lead by the Superfund remedial program;

  FE: EPA enforcement program-lead;

  FF: Federal facility-lead;

  MR: Mixed funding; monies from both the Fund and potentially responsible parties (PRPs);

PRP: PRP-financed and conducted;

PS: PRP-financed work performed by the PRP under a state order (may include federal financing or federal oversight under an enforcement document);

S: State-lead and Fund-financed; and

SE: State enforcement-lead (may include federal financing).

Remaining terms used in the CERCLA Information System (CERCLIS) database, **O** (other), **SN** (state-lead and -financed, no Fund money), and **SR** (state-ordered PRP response activities), are excluded from this status report because they do not include federal financing.

For some activities, the indicated lead is followed by an asterisk (*), which indicates that funding for the activity was taken over by the indicated lead during FY91.

- **Funding Start** — The date on which funds were allocated for the activity.
- **Previous Completion Schedule** — For projects ongoing at the end of FY90 that continued into FY91, the quarter and fiscal year of the planned completion date for the activity, as of 9/30/90. This column is blank for projects that were begun in FY91.
- **Present Completion Schedule** — The quarter and fiscal year of the planned completion of the activity, as of 9/30/91. This information was compiled from CERCLIS on 10/18/91.
- **Status** — Status of the project with respect to previous (FY90) and present (FY91) published completion schedules, as follows:

On-schedule projects are designated by a zero (0).

Projects that are **behind schedule** are designated by a numeral indicating the number of quarters that the project is behind schedule and a minus sign (e.g., -4).

Projects that are **ahead of schedule** are designated by a numeral indicating the number of quarters that the project is ahead of schedule (e.g., 4).

Projects for which **EPA has not estimated a completion date** are designated by an asterisk (*).

Projects that were begun in FY91 are described as **new** in the status column.

Projects described as **DNE** (date newly entered) have funding starts in previous fiscal years and no date in the Previous Completion Schedule. These sites, for numerous reasons, were not entered into CERCLIS during the fiscal year of the funding start, or a change in the status of the site or activity now requires that the activity be published in the FY91 Report. For example, several activities with the status of DNE were state enforcement-lead or state-lead and financed before FY91, and therefore did not fall under the requirements of CERCLA Section 301(h)(1)(B). DuringFY91, a lead change resulted in Fund money being used in the clean-up activities; therefore, they are now included in this appendix.

- An initial completion schedule is required to be put into CERCLIS when an activity is entered. Plans at this point are based on little site knowledge. As work continues, schedules are adjusted to reflect actual site conditions.

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STATUS OF REMEDIAL INVESTIGATIONS, FEASIBILITY STUDIES, AND REMEDIAL ACTIONS IN PROGRESS ON SEPTEMBER 30, 1991

RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
1	CT	Barkhamsted-New Hartford Landfill	Barkhamsted	01	RI/FS	PRP	09/30/91			4	93	new
1	CT	Kellogg-Deering Well Field	Norwalk	03	RI/FS	EP*	05/16/90	1	92	3	93	-6
1	CT	Linemaster Switch Corp.	Woodstock	01	RI/FS	PRP	07/10/89	4	91	3	93	-7
1	CT	Old Southington Landfill	Southington	01	RI/FS	PRP	09/29/87	1	92	2	93	-5
1	CT	Revere Textile Prints Corp.	Sterling	01	RI/FS	F	09/18/89	4	91	3	92	-3
1	CT	Solvents Recovery Service of New England	Southington	01	RA	PRP	01/07/86	2	93	4	94	-6
				02	RA	PRP	10/29/86	2	93	4	94	-6
				03	RI/FS	F	08/12/88	4	92	4	93	-4
1	CT	Yaworski Waste Lagoon	Canterbury	01	RA	PRP	05/03/90	4	91	2	92	-2
				01	RA	PRP	04/08/91	4	91	3	92	-2
1	MA	Atlas Tack Corp.	Fairhaven	01	RI/FS	F	09/18/89	4	92	1	93	-1
1	MA	Baird & McGuire	Holbrook	01	RA	F	09/05/89	3	91	2	92	-3
				02	RA	F	06/26/90	3	97	3	97	0
				03	RA	F	09/30/91			2	93	new
1	MA	Charles-George Reclamation Trust Landfill	Tyngsborough	03	RA	F	09/28/90	4	91	4	93	-8
1	MA	Fort Devens	Fort Devens	01	RI/FS	FF	05/13/91			3	93	new
				02	RI/FS	FF	05/13/91			4	93	new
1	MA	Fort Devens - Sudbury Training Annex	Fort Devens	01	RI/FS	FF	05/13/91			1	94	new
				02	RI/FS	FF	05/13/91			1	94	new
				03	RI/FS	FF	05/13/91			1	94	new
1	MA	Industri-Plex (Mark Philips Trust)	Woburn	02	RI/FS	F	05/30/90	1	92	1	93	-4
				02	RI	PRP	12/08/89	1	92	1	93	-4

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
1	MA	Iron Horse Park	Billerica	01	RA	PRP	07/15/91			4	95	new
				03	RI/FS	F	01/31/90	1	92	3	93	-6
1	MA	New Bedford Site	New Bedford	01	FS	F	02/15/85	3	91	2	92	-3
				02	RA	F	09/10/91			1	93	new
1	MA	Nyanza Chemical Waste Dump	Ashland	01	RA	F	12/31/87	1	92	4	92	-3
				03	RI/FS	F	05/21/87	4	91	4	92	-4
1	MA	Otis Air National Guard Base/Camp Edwards	Falmouth	01	RI/FS	FF	07/17/91			2	94	new
				02	RI/FS	FF	07/17/91			4	92	new
				03	RI/FS	FF	07/17/91			3	92	new
				04	RI/FS	FF	07/17/91			1	93	new
				05	RI/FS	FF	07/17/91			2	93	new
				06	RI/FS	FF	07/17/91			2	93	new
				07	RI/FS	FF	07/17/91			1	94	new
				08	RI/FS	FF	07/17/91			3	94	new
1	MA	PSC Resources	Palmer	01	RI/FS	S	09/30/87	3	91	2	92	-3
1	MA	Plymouth Harbor/Cannon Engineering Corp./Cordage)	Plymouth	02	RI/FS	F	09/04/87	1	91	1	92	-4
1	MA	Salem Acres	Salem	01	RI/FS	PRP	06/15/87	3	91	1	92	-2
1	MA	Shpack Landfill	Norton/Attleboro	01	RI/FS	PRP	09/24/90	1	93	3	93	-2
1	MA	Wells G&H	Woburn	02	RI/FS	PRP	09/28/90	1	93	4	93	-3
				03	RI/FS	F	09/28/90	3	92	2	93	-3
1	ME	Brunswick Naval Air Station	Brunswick	01	RI/FS	FF	02/22/88	1	92	2	92	-1
				02	RI/FS	FF	02/22/88	1	92	2	92	-1
				03	RI/FS	FF	06/22/90	3	92	1	93	-2
				04	RI/FS	FF	02/22/88	1	92	3	92	-2
1	ME	Loring Air Force Base	Limestone	01	RI/FS	FF	01/30/91			4	93	new
				02	RI/FS	FF	01/30/91			4	94	new
				03	RI/FS	FF	05/09/91			1	94	new
				04	RI/FS	FF	05/09/91			4	93	new
				05	RI/FS	FF	05/09/91			3	94	new
				07	RI/FS	FF	01/30/91			3	95	new

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
				08	RI/FS	FF	01/30/91			1	96	new
				09	RI/FS	FF	01/30/91			3	96	new
				10	RI/FS	FF	01/30/91			1	98	new
1	ME	Pinette's Salvage Yard	Washburn	01	RA	F	07/10/90	3	92	3	92	0
1	ME	Winthrop Landfill	Winthrop	01	RA	PRP	11/19/86	3	92	3	92	0
1	NH	Coakley Landfill	North Hampton	02	RI/FS	F	09/27/90	3	92	2	93	-3
1	NH	Fletcher's Paint Works	Milford	01	RI/FS	F	07/29/90	3	92	4	93	-5
1	NH	Holton Circle Ground Water Contamination	Londonderry	01	RI/FS	F	09/05/89	2	92	1	93	-3
1	NH	Keefe Environmental Services	Epping	02	RA	PRP	07/09/90	4	91	2	93	-6
1	NH	Pease Air Force Base	Portsmouth/Newington	01	RI/FS	FF	12/21/90			2	93	new
				02	RI/FS	FF	12/21/90			2	92	new
				03	RI/FS	FF	04/17/91			1	94	new
				04	RI/FS	FF	04/17/91			2	94	new
				07	RI/FS	FF	05/21/91			1	95	new
1	NH	Somersworth Sanitary Landfill	Somersworth	01	RI/FS	PRP	04/28/89	3	91	4	92	-5
1	NH	Tibbets Road	Barrington	01	RI/FS	F	08/31/89	2	92	4	92	-2
1	RI	Central Landfill	Johnston	01	RI/FS	PRP	04/03/87	1	92	4	93	-7
1	RI	Davis (GSR) Landfill	Glocester	01	RI/FS	F	09/27/90	3	93	3	93	0
1	RI	Davis Liquid Waste	Smithfield	01	RA	F	04/27/88	4	91	2	93	-6
1	RI	Peterson/Puritan, Inc.	Lincoln/Cumberland	01	RI/FS	PRP	05/29/87	2	92	3	93	-5
1	RI	Picillo Farm	Coventry	02	RI/FS	F	11/09/87	3	92	4	93	-5

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
1	RI	Rose Hill Regional Landfill	South Kingstown	01	RI/FS	F	09/30/90	1	93	3	93	-2
1	RI	Western Sand & Gravel	Burrillville	01	RA	F	09/25/87	1	91	4	91	-3
1	VT	Bennington Municipal Sanitary Landfill	Bennington	01	RI/FS	PRP	06/28/91			3	93	new
1	VT	Burgess Brothers Landfill	Woodford	01	RI/FS	PRP	08/27/91			1	94	new
1	VT	Darling Hill Dump	Lyndon	01	RI/FS	PRP	09/29/89	3	92	3	92	0
1	VT	Parker Sanitary Landfill	Lyndon	01	RI/FS	PRP	08/10/90	4	92	4	93	-4
1	VT	Pine Street Canal	Burlington	01	RI/FS	F	06/27/88	1	92	3	92	-2
1	VT	Tansitor Electronics, Inc.	Bennington	01	RI/FS	PRP	09/12/90	1	93	2	93	-1
2	NJ	Asbestos Dump	Millington	03	RI/FS	F	01/24/91			3	93	new
2	NJ	Bog Creek Farm	Howell Township	02	RA	F	09/27/91			2	93	new
2	NJ	Bridgeport Rental & Oil Services	Bridgeport	01	RA	F	04/19/88	1	93	1	93	0
				02	RI/FS	F	09/29/88	3	93	3	93	0
2	NJ	Brook Industrial Park	Bound Brook	01	RI/FS	F	04/12/89	4	92	1	93	-1
2	NJ	Burnt Fly Bog	Marlboro Township	01	RA	S	12/07/83	1	92	1	93	-4
				03	RI/FS	S	09/30/88	3	92	3	93	-4
2	NJ	Caldwell Trucking Co.	Fairfield	01	RA	F	05/31/90	4	90	4	91	-4
2	NJ	Chemical Insecticide Corp.	Edison Township	01	RA	F	09/28/90	3	91	1	93	-6
				02	RI/FS	F	03/29/85	3	91	2	92	-3
2	NJ	Chemical Leaman Tank Lines, Inc. (once listed as Chemical Leaman Tank Liners, Inc.)	Bridgeport	02	RI/FS	F	07/15/85	1	92	1	92	0
				03	RI/FS	F	03/15/90	4	92	1	93	-1

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
2	NJ	Chemsol, Inc.	Piscataway	01	RI/FS	F	09/28/90	3	93	1	94	-2
2	NJ	Ciba-Geigy Corp. (once listed as Toms River Chemical)	Toms River	02	RI/FS	F	07/05/89	1	92	4	92	-3
				02	RI/FS	F	06/30/90			4	92	DNE
2	NJ	Combe Fill North Landfill	Mount Olive Township	01	RA	S	09/30/88	1	92	1	93	-4
2	NJ	Combe Fill South Landfill	Chester Township	01	RA	S	09/28/90	4	92	1	95	-9
2	NJ	Cosden Chemical Coatings Corp.	Beverly	01	RI/FS	F	04/14/88	2	92	3	92	-1
2	NJ	Curcio Scrap Metal, Inc.	Saddle Brook Township	02	RI/FS	PRP	04/29/88	1	92	2	93	-5
2	NJ	Delilah Road	Egg Harbor Township	01	RI/FS	S	03/30/84	4	91	4	91	0
2	NJ	Denzer & Schafer X-Ray Co.	Bayville	01	RI/FS	S	06/26/87	4	92	1	93	-1
2	NJ	Ellis Property	Evesham Township	01	RI/FS	S	09/26/84	1	92	4	92	-3
2	NJ	Federal Aviation Administration Technical Center	Atlantic County	03	RI/FS	FF	06/01/87	4	90	3	92	-7
				04	RI/FS	FF	06/01/87	4	90	3	92	-7
				07	RI/FS	FF	06/01/87			1	93	DNE
				08	RI/FS	FF	06/01/87			1	93	DNE
				09	RI/FS	FF	06/01/87			2	93	DNE
				10	RI/FS	FF	06/01/87			4	93	DNE
2	NJ	Florence Land Recontouring Landfill	Florence Township	01	RA	S	09/29/89	4	92	1	94	-5
2	NJ	Fort Dix (Landfill Site)	Pemberton Township	02	RI/FS	FF	06/19/91			1	93	new
2	NJ	Fried Industries	East Brunswick Township	01	RI/FS	FE	06/28/85	1	92	2	93	-5

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
2	NJ	GEMS Landfill	Gloucester Township	01	RA	PS	06/05/89	3	93	3	93	0
2	NJ	Glen Ridge Radium Site	Glen Ridge	01	RA	F	09/15/89	4	98	4	98	0
				02	RI/FS	F	03/30/90	1	93	1	93	0
2	NJ	Global Sanitary Landfill	Old Bridge Township	01	RI/FS	S	09/18/90			4	91	DNE
2	NJ	Helen Kramer Landfill	Mantua Township	01	RA	F	09/23/88	4	93	4	93	0
2	NJ	Hercules, Inc. (Gibbstown Plant)	Gibbstown	01	RI/FS	PS	07/02/86	3	91	2	93	-7
				02	RI/FS	PS	07/02/86	1	93	3	93	-2
2	NJ	Higgins Disposal	Kingston	01	RI/FS	F	05/17/90	4	93	2	93	2
2	NJ	Higgins Farm	Franklin Township	01	RI/FS	F	07/17/89	1	92	4	92	-3
				02	RA	F	09/29/90	1	91	1	93	-8
2	NJ	Hopkins Farm	Plumstead Township	01	RI/FS	PS	02/03/87	2	91	4	92	-6
2	NJ	Imperial Oil Co., Inc./Champion Chemicals	Morganville	01	RA	F	07/23/91			3	92	new
				02	FS	S	09/28/84			4	93	DNE
2	NJ	Industrial-Latex Corp.	Wallington Borough	01	RI/FS	F	09/20/88	1	92	3	92	-2
2	NJ	Jackson Township Landfill	Jackson Township	01	RI/FS	PS	08/21/88	2	93	1	93	1
2	NJ	Kauffman & Minteer, Inc.	Jobstown	01	RI/FS	F	04/11/89	1	93	4	93	-3
2	NJ	Kin-Buc Landfill	Edison Township	02	RI/FS	PRP	02/14/89	2	92	4	92	-2
2	NJ	Lipari Landfill	Pitman	02	RA	F	09/30/88	1	92	4	99	-31
2	NJ	Lodi Municipal Well	Lodi	01	RI/FS	F	06/19/87	1	92	3	92	-2

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
2	NJ	Lone Pine Landfill	Freehold Township	01	RA	PRP	10/13/89	1	93	2	94	-5
2	NJ	Maywood Chemical Co.	Maywood/Rochelle Park	01	RI/FS	PRP	09/21/87	3	92	1	93	-2
				02	RI/FS	FF	07/21/90	4	92	4	94	-8
2	NJ	Metaltec/Aerosystems	Franklin Borough	01	RA	F	03/29/91	4	91	1	93	-5
2	NJ	Monroe Township Landfill	Monroe Township	02	RI/FS	PS	12/01/86	1	93	1	93	0
2	NJ	Montclair/West Orange Radium Site	Montclair/West Orange	01	RA	F	09/15/89	4	98	4	98	0
				02	RI/FS	F	03/30/90	1	93	1	93	0
2	NJ	NL Industries	Pedricktown	01	RI/FS	PRP	04/25/86	1	92	2	93	-5
2	NJ	Naval Air Engineering Center	Lakehurst	01	RA	FF	04/15/91			2	94	new
				03	RI/FS	FF	09/25/89	2	92	4	91	2
				04	RI/FS	FF	09/25/89	4	92	4	91	4
				04	RA	FF	09/30/91			3	95	new
				05	RI/FS	FF	09/25/89	2	92	3	92	-1
				06	RI/FS	FF	09/25/89	2	92	2	92	0
2	NJ	Naval Weapons Station Earle (Site A)	Colts Neck	01	RI/FS	FF	09/27/90	2	93	2	93	0
				02	RI/FS	FF	09/27/90			2	94	DNE
2	NJ	Picatinny Arsenal	Rockaway Township	01	RA	FF	12/15/90			4	91	new
2	NJ	Pohatcong Valley Ground Water Contamination	Warren County	01	RI/FS	F	09/30/88	2	92	2	93	-4
2	NJ	Radiation Technology Inc.	Rockaway Township	01	RI/FS	PS	07/24/86	3	93	1	93	2
2	NJ	Renora, Inc.	Edison Township	01	RA	PRP	09/06/88	1	91	4	91	-3
				02	RI/FS	PRP	08/25/90			2	93	DNE
2	NJ	Scientific Chemical Processing	Carlstadt	01	RA	PRP	08/16/91			4	92	new
				02	RI/FS	PRP	12/19/88	1	92	1	93	-4

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
2	NJ	Shieldalloy Corp.	Newfield Borough	02	RI/FS	PS	10/05/88	1	92	1	93	-4
2	NJ	Swope Oil & Chemical Co.	Pennsauken	01	RA	PRP	09/07/88	2	92	2	96	-16
2	NJ	Syncon Resins	South Kearny	01	RA	S	05/23/89	2	92	1	93	-3
2	NJ	U.S. Radium Corp.	Orange	01	RI/FS	F	09/28/84	1	93	1	93	0
2	NJ	Universal Oil Products (Chemical Division)	East Rutherford	01	RI/FS	PS	05/28/86	2	92	4	92	-2
2	NJ	Ventron/Velsicol	Wood Ridge Borough	01	RI/FS	PS	09/26/84	1	93	1	93	0
2	NJ	WR Grace & Co. Inc./Wayne Interim Storage Site	Wayne Township	01	RI/FS	FF	07/21/90	4	93	4	94	-4
2	NJ	Waldick Aerospace Devices, Inc.	Wall Township	01	RA	F	09/30/91			2	93	new
2	NJ	White Chemical Corp	Newark	01	RA	F	09/27/91			1	93	new
2	NJ	Wilson Farm	Plumstead Township	01	RI/FS	PS	02/03/87	2	91	4	92	-6
2	NJ	Witco Chemical Corp. (Oakland Plant)	Oakland	01	RI/FS	PRP	08/25/89	2	92	4	92	-2
2	NY	Action Anodizing, Plating, & Polishing Corp.	Copiague	01	RI/FS	F	07/17/89	1	92	3	92	-2
2	NY	American Thermostat Co.	South Cairo	01	RA	F	06/28/91			2	93	new
				02	RA	F	09/27/91			4	92	new
2	NY	Anchor Chemicals	Hicksville	01	RI/FS	PRP	06/02/89	1	92	2	93	-5
2	NY	Batavia Landfill	Batavia	01	RI/FS	PRP	08/09/84	3	92	4	92	-1

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
2	NY	BioClinical Laboratories, Inc.	Bohemia	01	RI/FS	F	03/31/88	4	91	2	92	-2
2	NY	Brewster Well Field	Putnam County	01	RA	F	09/23/87	1	91	4	91	-3
				02	RA	F	09/26/89	1	92	3	92	-2
2	NY	Carrol & Dubies Sewage Disposal	Port Jervis	01	RI/FS	PRP	02/08/90	3	92	3	93	-4
2	NY	Clothier Disposal	Town of Granby	01	RA	PRP	06/25/91			4	91	new
2	NY	Cortese Landfill	Vil. of Narrowsburg	01	RI/FS	PRP	09/28/90	2	92	1	93	-3
2	NY	Endicott Village Well Field	Village of Endicott	01	RA	PRP	09/21/88	1	91	2	92	-5
				02	RI/FS	PRP	09/19/88	1	92	4	92	-3
2	NY	FMC Corp. (Dublin Road Landfill)	Town of Shelby	01	RI/FS	PS	02/09/88	3	92	1	93	-2
2	NY	Facet Enterprises, Inc.	Elmira	01	RI/FS	PRP	05/22/86	4	91	3	92	-3
2	NY	Forest Glen Mobile Home Subdivision	Niagara Falls	01	RA	F	03/23/90	3	91	4	91	-1
2	NY	General Motors (Central Foundry Division)	Massena	02	FS	PRP	12/17/90			1	92	new
2	NY	Genzale Plating Co.	Franklin Square	02	RI/FS	F	09/25/91			2	93	new
2	NY	Goldisc Recordings, Inc.	Holbrook	01	RI/FS	PRP*	06/27/91	1	92	2	93	-5
2	NY	Griffiss Air Force Base	Rome	01	RI/FS	FF	03/29/90	4	92	2	93	-2
				02	RI/FS	FF	03/29/90	2	93	2	93	0
				03	RI/FS	FF	03/29/90	4	93	4	93	0
				04	RI/FS	FF	03/29/90	2	94	2	94	0
				05	RI/FS	FF	03/29/90	4	94	4	94	0
				06	RI/FS	FF	03/29/90	2	95	2	95	0
				07	RI/FS	FF	03/29/90	4	95	4	95	0
				08	RI/FS	FF	03/29/90	2	96	2	96	0

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
2	NY	Hooker (Hyde Park)	Niagara Falls	01	RA	PRP	08/15/87	1	93	1	93	0
2	NY	Hooker Chemical (South Area)	Niagara Falls	01	RA	PRP	11/02/90			1	97	new
				01	RA	PRP	11/02/90			4	95	new
2	NY	Hooker Chemical/Ruco Polymer Corp.	Hicksville	01	RI/FS	PRP	09/21/88	1	92	4	92	-3
2	NY	Hudson River PCBs	Hudson River	01	RA	PRP	10/13/89	1	91	4	92	-7
				01	RA	PRP	09/28/90	4	92	4	92	0
				01	RA	S	09/28/84			1	92	DNE
				02	RI/FS	F	07/25/90	1	92	3	93	-6
2	NY	Islip Municipal Sanitary Landfill	Islip	01	RI/FS	PS	11/15/87			2	92	DNE
2	NY	Johnstown City Landfill	Town of Johnstown	01	RI/FS	PS	10/03/88	1	93	1	93	0
2	NY	Jones Chemicals, Inc.	Caledonia	01	RI/FS	PRP	03/29/91			4	93	new
2	NY	Jones Sanitation	Hyde Park	01	RI/FS	PRP	03/26/91			4	93	new
2	NY	Katonah Municipal Well	Town of Bedford	01	RA	PRP	03/14/90	4	92	4	92	0
2	NY	Kenmark Textile Corp.	Farmingdale	01	RI/FS	PRP	07/31/91			4	93	new
2	NY	Kentucky Avenue Well Field	Horseheads	01	RA	S	09/30/88	4	90	4	90	0
				01	RA	F	09/28/90	1	92	1	93	-4
				03	RI/FS	PRP	08/08/91			2	93	new
2	NY	Liberty Industrial Finishing	Farmingdale	01	RI/FS	F	09/28/90	2	93	2	93	0
2	NY	Love Canal	Niagara Falls	07	RA	S	02/09/87	3	92	4	92	-1
				08	RA	S	06/26/87	2	91	4	91	-2
				09	RA	F	06/28/91			4	92	new
2	NY	Ludlow Sand & Gravel	Clayville	02	RI/FS	PS	11/12/89	1	93	1	93	0

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
2	NY	Malta Rocket Fuel Area	Malta	01	RI/FS	PRP	11/10/89	1	93	3	93	-2
2	NY	Marathon Battery Corp.	Cold Springs	01	RA	F	06/28/91			4	94	new
				02	RA	F	06/28/91			4	94	new
				03	RA	PRP	08/30/89	4	91	4	91	0
				03	RA	F	09/27/91			4	94	new
				03	RA	F	06/28/91			4	92	new
2	NY	Mattiace Petrochemical Co., Inc.	Glen Cove	02	RA	F	03/25/91			1	92	new
2	NY	Niagara County Refuse	Wheatfield	01	RI/FS	PRP	03/30/89	2	92	1	93	-3
2	NY	Niagra Mohawk Power Corp. (Saratoga Springs Plant)	Saratoga Springs	01	RI/FS	PRP	09/27/89			2	93	DNE
2	NY	North Sea Municipal Landfill	North Sea	02	RI/FS	PRP	07/27/89	2	92	3	92	-1
2	NY	Old Bethpage Landfill	Oyster Bay	01	RA	PS	06/01/90	2	91	2	92	-4
				01	RA	PS	11/19/90			1	93	new
2	NY	Olean Well Field	Olean	01	RA	PRP	01/27/88	1	91	2	92	-5
				02	RI/FS	FE	09/23/87	1	92	4	93	-7
				02	RI/FS	PRP	06/25/91			4	93	new
2	NY	Pasley Solvents & Chemicals, Inc.	Hempstead	01	RI/FS	PRP	08/19/88	2	91	1	92	-3
2	NY	Plattsburg Air Force Base	Plattsburgh	01	RI/FS	FF	04/23/91			2	92	new
2	NY	Pollution Abatement Services	Oswego	03	RI/FS	PRP	09/28/90	4	92	1	93	-1
2	NY	Preferred Plating Corp.	Farmingdale	02	RI/FS	F	04/09/90	1	92	3	92	-2
				02	RI/FS	PRP	09/27/90	1	92	3	92	-2
2	NY	Radium Chemical Co., Inc.	New York City	01	RA	F	06/29/90	3	92	4	92	-1

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
2	NY	Ramapo Landfill	Ramapo	01	RI/FS	PS	04/11/88	1	92	1	92	0
2	NY	Richardson Hill Road Landfill/Pond	Sidney Center	01	RI/FS	PRP	07/22/87	1	92	1	93	-4
2	NY	Robintech, Inc./National Pipe Co.	Town of Vestal	01	RI/FS	PRP	10/08/87	4	91	1	92	-1
2	NY	Rosen Brothers Scrap Yard/Dump	Cortland	01	RI/FS	PRP	01/04/90	2	92	1	93	-3
2	NY	Rowe Industries Ground Water Contamination	Noyack/Sag Harbor	01	RI/FS	PRP	09/30/88	4	91	4	92	-4
2	NY	SMS Instruments, Inc.	Deer Park	01	RA	F	05/17/91			1	93	new
				02	RI/FS	F	04/26/90	2	92	1	93	-3
2	NY	Sealand Restoration, Inc.	Lisbon	02	RI/FS	F	06/29/90			4	93	DNE
2	NY	Seneca Army Depot	Romulus	01	RI/FS	FF	03/19/90	4	92	4	93	-4
				02	RI/FS	FF	04/29/91			2	94	new
2	NY	Sidney Landfill	Sidney	01	RI/FS	F	09/19/89	1	93	1	93	0
2	NY	Sinclair Refinery	Wellsville	01	RA	PRP	02/21/90	2	91	4	91	-2
				01	RA	PRP	09/26/90	1	93	1	92	4
2	NY	Syosset Landfill	Oyster Bay	02	RI/FS	PRP	11/15/90			1	93	new
2	NY	Tri-Cities Barrel Co., Inc.	Port Crane	01	RI/FS	F	03/30/90	1	93	4	93	-3
2	NY	Tronic Plating Co., Inc.	Farmingdale	01	RI/FS	PRP	06/07/88	1	93	1	93	0
2	NY	Vestal Water Supply Well 1-1 (once listed with Well 4-2 as one site)	Vestal	01	RA	F	09/30/87	4	90	3	92	-7
2	NY	Volney Municipal Landfill	Town of Volney	02	RI/FS	PRP	09/28/90	1	93	1	93	0

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
2	NY	Wide Beach Development	Brant	02	RA	F	06/13/91			1	93	new
2	PR	Barceloneta Landfill	Florida Afuera	01	RI/FS	PRP	09/28/90	1	93	1	93	0
2	PR	GE Wiring Devices	Juana Diaz	01	RA	PRP	05/30/91			1	93	new
2	PR	Juncos Landfill	Juncos	02	RI/FS	PRP	11/30/90			1	93	new
2	PR	RCA Del Caribe	Barceloneta	01	RI/FS	PRP	03/31/88	3	92	4	93	-5
2	PR	Upjohn Facility	Barceloneta	01	RA	PRP	04/19/89	4	92	1	94	-5
2	PR	Vega Alta Public Supply Wells	Vega Alta	02	RI/FS	PRP*	10/23/90	1	91	1	93	-8
3	DE	Army Creek Landfill (once listed as Delaware Sand & Gravel-Llangollen Army Creek Landfills)	New Castle County	01	RA	MR*	09/28/90	1	93	1	93	0
				02	RA	MR	07/23/91			1	95	new
3	DE	Chem-Solv, Inc.	Cheswold	01	RI/FS	PS	09/27/88	1	92	2	92	-1
3	DE	Delaware City PVC Plant (Stauffer Chemical Co.)	Delaware City	01	RA	PRP	03/31/88	2	91	3	92	-5
				02	RA	PRP	09/29/89	4	90	2	92	-6
3	DE	Dover Air Force Base	Dover	02	RI/FS	FF	06/29/90	3	91	1	92	-2
				03	RI/FS	FF	06/29/90	1	92	4	92	-3
3	DE	Dover Gas Light Co.	Dover	01	RI/FS	PRP	07/06/90	3	92	2	93	-3
3	DE	E.I. Du Pont de Nemours & Co. (Newport Pigment Plant Landfill)	Newport	01	RI/FS	PRP	08/12/88	1	92	4	92	-3
3	DE	Kent County Landfill (Houston)	Houston	01	RI/FS	PRP	09/27/91			3	93	new
3	DE	Koppers Co., Inc. (Newport Plant)	Newport	01	RI/FS	PRP	09/26/91			4	93	new

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
3	DE	Standard Chlorine of Delaware, Inc.	Delaware City	01	RI/FS	PS	11/30/87	2	93	2	93	0
3	DE	Sussex County Landfill No. 5	Laurel	01	RI/FS	PRP	03/29/91			2	93	new
3	DE	Tyler Refrigeration Pit	Smyrna	01	RI/FS	PRP	03/28/91			2	93	new
3	DE	Wildcat Landfill	Dover	01	RA	PRP	10/16/89	3	92	1	93	-2
				02	RA	PRP	06/18/91			2	93	new
3	MD	Aberdeen Proving Ground (Edgewood Area)	Edgewood	01	RI/FS	FF	03/27/90	4	90	3	92	-7
				02	RI/FS	FF	03/27/90	4	92	1	96	-13
				03	RI/FS	FF	03/27/90	2	93	1	93	1
				04	RI/FS	FF	03/27/90	4	90	1	93	-9
				05	RI/FS	FF	03/27/90	4	90	4	91	-4
				06	RI/FS	FF	03/27/90	1	94	3	93	2
				07	RI/FS	FF	03/27/90	1	93	1	94	-4
				08	RI/FS	FF	03/27/90	4	92	4	92	0
				09	RI/FS	FF	03/27/90	2	92	3	93	-5
				10	RI/FS	FF	03/27/90	2	92	3	93	-5
				11	RI/FS	FF	12/05/90			1	94	new
3	MD	Aberdeen Proving Grounds (Michaelsville Landfill)	Aberdeen	01	RI/FS	FF	03/27/90	3	93	3	92	4
				02	RI/FS	FF	03/27/90	3	93	1	94	-2
				03	RI/FS	FF	03/27/90	2	92	2	93	-4
				04	RI/FS	FF	03/27/90	4	93	4	91	8
				05	RI/FS	FF	03/27/90	3	92	1	93	-2
				06	RI/FS	FF	08/29/91			4	93	new
3	MD	Anne Arundel County Landfill	Glen Burnie	01	RI/FS	PS	09/01/90	3	92	1	93	-2
3	MD	Bush Valley Landfill	Abingdon	01	RI/FS	FE*	06/15/90	3	92	1	93	-2
3	MD	Kane & Lombard Street Drums	Baltimore	02	RI/FS	S	12/28/88	3	92	1	93	-2
3	MD	Limestone Road	Cumberland	02	RI/FS	PRP	02/28/90	1	93	4	93	-3

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
3	MD	Sand, Gravel & Stone	Elkton	01	RA	PRP	03/19/90	2	91	1	92	-3
3	MD	Woodlawn County Landfill	Woodlawn	01	RI/FS	PRP	12/28/88	3	92	2	93	-3
3	PA	A.I.W. Frank/Mid-County Mustang	Exton	01	RI/FS	F	09/14/90	3	92	4	93	-5
3	PA	AMP, Inc. (Glen Rock Facility)	Glen Rock	01	RI/FS	PRP	03/01/89	4	92	4	94	-8
3	PA	Aladdin Plating, Inc.	Scott Township	01	RA	F	09/29/88	3	91	2	92	-3
				02	RI/FS	F	05/16/90	3	91	2	92	-3
3	PA	Bell Landfill	Terry Township	01	RI/FS	PRP	02/11/91			1	93	new
3	PA	Bendix Flight Systems Division	Bridgewater Township	01	RA	PRP	08/13/91			3	92	new
3	PA	Berkley Products Co. Dump	Denver	01	RI/FS	EP	03/12/90	4	92	1	93	-1
3	PA	Berks Landfill	Spring Township	01	RI/FS	PRP	06/26/91			2	93	new
3	PA	Blosenski Landfill	West Caln Township	01	RA	F	09/11/91	1	91	1	93	-8
3	PA	Boarhead Farms	Bridgeton Township	01	RI/FS	F	12/05/89	4	92	4	93	-4
3	PA	Brown's Battery Breaking	Shoemakersville	01	RI/FS	F	09/29/88			2	92	DNE
3	PA	Bruin Lagoon	Bruin Borough	02	RA	F	06/28/88	4	91	3	92	-3
3	PA	Butler Mine Tunnel	Pittston	01	RI/FS	PRP	03/30/87	1	92	4	92	-3
3	PA	Butz Landfill	Stroudsburg	01	RI/FS	F	12/30/88	1	92	2	92	-1
3	PA	C & D Recycling	Foster Township	01	RI/FS	PRP	08/31/87	1	91	2	92	-5

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
3	PA	Centre County Kepone	State College Boro	01	RI/FS	PRP	11/07/88	1	92	2	93	-5
3	PA	Commodore Semiconductor Group	Lower Providence Twp.	01	RI/FS	PRP	07/29/88	4	91	3	92	-3
3	PA	Croydon TCE	Croydon	02	RA	F	09/25/91			2	93	new
3	PA	Douglassville Disposal	Douglassville	02	RA	F	06/08/89	4	91	3	93	-7
3	PA	Dublin TCE Site	Dublin Borough	02	RI/FS	PRP	08/15/91			1	93	new
3	PA	Elizabethtown Landfill	Elizabethtown	01	RI/FS	PRP	09/28/90	3	92	1	93	-2
3	PA	Havertown PCP	Haverford	01	RA	F	08/03/90	3	91	1	92	-2
				01	RA	F	07/27/90			1	92	DNE
				03	RI/FS	F	08/05/91			2	93	new
3	PA	Henderson Road	Upper Merion Township	01	RA	PRP	03/15/91			4	93	new
				02	RA	PRP	04/29/91			2	94	new
				02	RA	PRP	12/31/90			4	91	new
3	PA	Hunterstown Road	Straban Township	01	RI/FS	PRP	03/10/87	1	92	1	93	-4
3	PA	Jack's Creek/Sitkin Smelting and Refining Inc.	Maitland	01	RI/FS	F	08/28/90	3	93	3	93	0
3	PA	Lackawanna Refuse	Old Forge Borough	01	RA	F	06/02/87	4	91	4	92	-4
3	PA	Letterkenny Army Depot (Property Disposal Office Area)	Franklin County	01	RI/FS	FF	02/03/89	4	90	3	91	-3
				02	RI/FS	FF	02/03/89	3	91	4	93	-9
				03	RI/FS	FF	06/30/90			4	93	DNE
3	PA	Letterkenny Army Depot (Southeast Area)	Chambersburg	01	RI/FS	FF	02/03/89	4	90	3	91	-3
				02	RI/FS	FF	02/03/89	4	91	2	94	-10

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3	PA	Lindane Dump	Harrison Township	01	RI/FS	PS	09/29/87	1	92	2	92	-1
3	PA	MW Manufacturing (once listed as Domino Salvage Yard)	Valley Township	01	RI/FS	F	03/06/87	2	91	3	92	-5
				02	RA	F	01/10/90	2	91	2	92	-4
3	PA	Malvern TCE	Malvern	01	RI/FS	PRP	12/16/88	4	91	1	93	-5
3	PA	McAdoo Associates	McAdoo Borough	01	RA	MR	01/10/91			3	92	new
3	PA	Metal Banks	Philadelphia	01	RI/FS	PRP	05/29/91			3	93	new
3	PA	Mill Creek Dump	Erie	01	RA	F	06/30/89	2	92	4	92	-2
3	PA	Moyers Landfill	Eagleville	01	RA	F	09/29/88	3	92	3	93	-4
3	PA	Naval Air Development Center (8 Waste Areas)	Warminster Township	01	RI/FS	FF	09/20/90	4	91	3	92	-3
3	PA	North Penn-Area 1 (Gentle Cleaners/Granite Knitting Mills, Inc.)	Souderton	01	RI/FS	F	06/30/88	3	92	4	93	-5
3	PA	North Penn-Area 12 (Transicoil, Inc.)	WOrcester	01	RI/FS	PRP	06/26/89	2	92	1	93	-3
3	PA	North Penn-Area 2 (Ametek, Inc. Hunter Spring Division)	Hatfield	01	RI/FS	F	06/30/88	3	92	2	93	-3
3	PA	North Penn-Area 5 (American Electronics Laboratories)	Montgomery Township	01	RI/FS	F	06/30/88	4	92	1	92	3
3	PA	North Penn-Area 6 (J.W. Rex/Allied Paint/Keystone Hydraulics Manufacturing Co., Inc.)	Lansdale	01	RI/FS	F	06/30/88	4	92	1	95	-9
3	PA	North Penn-Area 7 (Spra-Fin, Inc.)	North Wales	01	RI/FS	F	06/30/88	4	92	3	93	-3

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3	PA	Novak Sanitary Landfill	South Whitehall Twp	01	RI/FS	PRP	12/30/88	4	91	1	93	-5
3	PA	Occidental Chemical Corp./Firestone Tire and Rubber Co.	Lower Pottsgrove Twp	01	RI/FS	PRP	12/28/89	2	92	1	93	-3
3	PA	Palmerton Zinc Pile	Palmerton	01	RA	PRP	07/31/88	1	95	4	99	-19
				03	RI/FS	PRP	09/24/85	1	92	2	93	-5
				04	RI/FS	F	08/12/88	1	93	1	93	0
3	PA	Paoli Rail Yard	Paoli	01	RI/FS	PRP	05/27/87	1	92	2	92	-1
3	PA	Publicker Industries Inc.	Philadelphia	02	RI/FS	F	09/21/89	3	91	2	93	-7
3	PA	Recticon/Allied Steel Corp.	East Coventry Twp.	01	RI/FS	PRP	03/29/90	1	92	1	93	-4
3	PA	Revere Chemical Co.	Nockamixon Township	01	RI/FS	PRP	12/16/88	2	91	2	93	-8
3	PA	River Road Landfill (Waste Management, Inc.)	Hermitage	01	RI/FS	PRP	05/05/90	1	92	1	93	-4
3	PA	Route 940 Drum Dump (Pocono Summit)	Pocono Summit	01	RI/FS	EP	04/21/90	1	92	2	92	-1
3	PA	Saegerton Industrial Area	Saegertown	01	RI/FS	PRP	01/31/90	2	92	1	93	-3
3	PA	Salford Quarry	Salford Township	01	RI/FS	PRP	03/22/88	2	92	4	93	-6
3	PA	Shriver's Corner	Straban Township	01	RI/FS	PRP	03/10/87	2	92	1	93	-3
3	PA	Stanley Kessler	King of Prussia	01	RI/FS	PRP*	01/07/91	3	91	3	93	-8
3	PA	Strasburg Landfill	Newlin Township	01	RI/FS	F	02/15/89	2	91	1	92	-3
3	PA	Tobyhanna Army Depot	Tobyhanna	01	RI/FS	FF	09/27/90	3	91	1	93	-6

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STATUS OF REMEDIAL INVESTIGATIONS, FEASIBILITY STUDIES, AND REMEDIAL ACTIONS IN PROGRESS ON SEPTEMBER 30, 1991

RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
3	PA	Tonolli Corp.	Nesquehoning	01	RI/FS	PRP	09/19/89	1	92	2	92	-1
3	PA	Tysons Dump	Upper Merion Township	01	RA	PRP	06/03/88	1	92	1	93	-4
				02	RI/FS	PRP	10/01/88	3	91	1	93	-2
				02	RA	PRP	09/11/89	2	91	1	93	-3
3	PA	Walsh Landfill	Honeybrook Township	02	RI/FS	F	05/01/90	1	92	3	92	-2
3	PA	Westinghouse Elevator Co. Plant	Gettysburg	01	RI/FS	PRP	03/10/87	1	92	4	92	-3
3	PA	Westinghouse Elevator Co. Plant (Sharon Plant)	Sharon	01	RI/FS	PS	09/20/88	1	92	2	92	-1
3	PA	York County Solid Waste and Refuse Authority Landfill	Hopewell Township	01	RI/FS	PS	11/30/87	1	92	2	92	-1
3	VA	Abex Corporation	Portsmouth	01	RI/FS	PS	10/10/89	1	92	2	92	-1
3	VA	Atlantic Wood Industries, Inc.	Portsmouth	01	FS	PRP	07/23/87	2	91	2	92	-4
				01	RI	PRP	07/23/87	2	91	1	93	-7
				02	FS	PRP	07/23/87	2	91	1	93	-7
3	VA	Avtex Fibers, Inc.	Front Royal	02	RA	F	03/04/91			2	92	new
				03	RI/FS	F	09/27/90			1	93	DNE
				03	RA	F	03/04/91			4	92	new
				04	RA	F	07/22/91			4	94	new
3	VA	Buckingham County Landfill	Buckingham	01	RI/FS	PRP	01/31/91			2	93	new
3	VA	Culpeper Wood Preservers, Inc.	Culpeper	01	RI/FS	F	09/28/90	1	92	2	94	-9
3	VA	Defense General Supply Center	Chesterfield County	01	RI/FS	FF	08/15/87	4	90	1	92	-5
				02	RI/FS	FF	09/21/90	4	91	1	92	-1
				03	RI/FS	FF	09/21/90	1	92	4	93	-7

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
3	VA	Dixie Caverns County Landfill	Salem	01	RI	F	08/29/89	1	92	2	92	-4
				02	FS	F	08/29/89	1	92	2	92	-4
3	VA	Greenwood Chemical Co.	Newtown	02	RA	F	09/30/91			2	92	new
				03	RI/FS	F	05/20/91			2	93	new
3	VA	H & H Inc., Burn Pit	Farrington	01	RI/FS	F	06/30/88	1	91	4	92	-7
3	VA	L.A. Clarke & Son	Spotsylvania County	01	RA	PRP	09/08/89	4	90	1	92	-5
				01	RA	PRP	08/07/90	3	92	1	92	2
				02	RI/FS	PRP	09/06/89	1	92	4	92	-3
3	VA	Rentokil, Inc. (Virginia Wood Preserving Division)	Richmond	01	RI/FS	PRP	12/31/87	1	92	3	92	-2
3	VA	Rinehart Tire Fire Dump	Frederick County	01	RA	F	09/29/89	3	91	4	92	-5
				02	RI/FS	F	09/28/88	3	91	2	92	-3
				02	FS	F	09/28/88			1	92	DNE
				02	RI	F	09/28/88			4	92	DNE
				03	FS	F	09/28/88			1	93	DNE
3	VA	Saltville Waste Disposal Ponds	Saltville	01	RA	PRP	05/17/91			3	95	new
				02	RI/FS	PRP	09/15/88	1	92	4	92	-3
				03	RI/FS	PRP	09/15/88	1	93	3	93	-2
3	VA	Suffolk City Landfill	Suffolk	01	RI/FS	PS	06/30/89	2	92	1	93	-3
3	WV	Fike Chemical, Inc.	Nitro	01	RA	F	01/11/89	2	91	3	92	-5
				03	FS	F	04/12/90	4	91	1	92	-1
				03	RI	F	04/12/90	4	91	1	98	-29
				04	FS	F	04/12/90			1	94	DNE
3	WV	Follansbee Site	Follansbee	01	RI/FS	PRP	09/27/90	2	92	1	97	-19
3	WV	Leetown Pesticide	Leetown	01	RA	F	06/03/88	4	91	1	92	-1
3	WV	Ordnance Works Disposal Areas	Morgantown	02	RI/FS	PRP	06/04/90	2	92	1	93	-3

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
4	AL	Alabama Army Ammunition Plant	Childersburg	02	RI/FS	FF	11/19/90			4	91	new
				03	RI/FS	FF	03/15/90	4	90	4	92	-8
4	AL	Anniston Army Depot (Southeast Industrial Area)	Anniston	03	RI/FS	FF	12/12/90			2	93	new
4	AL	Ciba-Geigy Corp. (McIntosh Plant)	McIntosh	01	RA	PRP	09/28/89	3	93	3	93	0
				02	RI/FS	PRP	01/02/87	2	91	4	91	-2
				03	RI/FS	PRP	01/02/87	4	91	3	93	-7
4	AL	Interstate Lead Co. (ILCO)	Leeds	01	RI/FS	F	05/30/86	3	91	4	91	-1
				02	RI/FS	F	09/18/89	3	91	2	93	-7
4	AL	Olin Corp. (McIntosh Plant)	McIntosh	01	RI/FS	PRP	05/08/90	1	93	2	93	-1
4	AL	Redwing Carriers, Inc. (Saraland)	Saraland	01	RI/FS	PRP	07/02/90	1	93	1	93	0
4	AL	Stauffer Chemical Co. (Cold Creek Plant)	Bucks	01	RA	PRP	09/27/89	1	97	2	92	19
				02	RI/FS	PRP	01/05/90	4	94	4	94	0
				03	RI/FS	PRP	12/19/90			3	93	new
4	AL	Stauffer Chemical Co. (LeMoyne Plant)	Axis	01	RA	PRP	09/27/89	1	97	2	92	19
				02	RI/FS	PRP	01/05/90	4	94	4	94	0
				03	RI/FS	PRP	12/19/90			3	93	new
4	AL	T.H. Agriculture & Nutrition Co. (Montgomery Plant)	Montgomery	01	RI/FS	PRP	03/26/91			3	93	new
4	AL	Triana/Tennessee River (once listed as Triana (Redstone) Arsenal)	Limestone/Morgan	01	RA	PRP	11/20/86			1	92	DNE
4	FL	Agrico Chemical Co.	Pensacola	01	RI/FS	PRP	09/29/89	1	92	2	92	-1
4	FL	Airco Plating Co.	Miami	01	RI/FS	PRP	11/14/90			3	93	new
4	FL	American Creosote Works, Inc. (Pensacola Plant) (once listed as American Creosote Works)	Pensacola	02	RI/FS	EP	11/28/89	3	91	2	92	-3

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
4	FL	Anodyne, Inc.	North Miami Beach	01	RI/FS	PRP	03/26/90	4	92	4	92	0
4	FL	B&B Chemical Co., Inc.	Hialeah	01	RI/FS	F	09/13/89	3	92	3	92	0
4	FL	Beulah Landfill	Pensacola	01	RI/FS	PRP	09/16/91			3	93	new
4	FL	Brown Wood Preserving	Live Oak	01	RA	PRP	04/07/89			1	92	DNE
4	FL	Cecil Field Naval Air Station	Jacksonville	02	RI/FS	FF	12/12/89	1	93	3	93	-2
				03	RI/FS	FF	10/22/90			3	93	new
				04	RI/FS	FF	10/22/90			1	94	new
				08	RI/FS	FF	10/22/90			3	93	new
4	FL	Chemform, Inc.	Pompano Beach	01	RI/FS	PRP	10/19/89	3	92	4	92	-1
4	FL	Florida Steel Corp.	Indiantown	01	RI/FS	PS	09/14/87			3	92	DNE
				01	RI/FS	EP*	08/13/90	4	91	3	92	-3
4	FL	Gold Coast Oil Corp.	Miami	01	RA	PRP	02/06/89	1	92	3	92	-2
				01	RA	PRP	01/30/90	1	92	3	92	-2
4	FL	Harris Corp. (Palm Bay Plant) (once listed as Harris Corp./General Development Utilities)	Palm Bay	01	RA	PS	06/28/90	3	92	3	95	-12
				02	RI/FS	PS	02/07/89			1	93	DNE
4	FL	Hollingsworth Solderless Terminal	Fort Lauderdale	01	RA	F	12/10/87	1	92	1	93	-4
4	FL	Homestead Air Force Base	Homestead	02	RI/FS	FF	10/01/90			2	92	new
				03	RI/FS	FF	10/01/90			2	92	new
				04	RI/FS	FF	10/01/90			3	93	new
				05	RI/FS	FF	10/01/90			4	93	new
				06	RI/FS	FF	10/01/90			4	93	new
				07	RI/FS	FF	10/01/90			1	94	new
				08	RI/FS	FF	10/01/90			2	94	new
				09	RI/FS	FF	10/01/90			4	94	new

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
4	FL	Jacksonville Naval Air Station	Jacksonville	02	RI/FS	FF	10/08/90			4	93	new
4	FL	Madison County Sanitary Landfill	Madison	01	RI/FS	PRP	06/11/90	2	92	3	92	-1
4	FL	Miami Drum Services (Part of Biscayne Aquifer)	Miami	01	RA	F	09/30/88	3	92	3	93	-4
4	FL	Northwest 58th Street Landfill (Part of Biscayne Aquifer)	Hialeah	01	RA	PRP	03/22/90	1	93	1	93	0
4	FL	Peak Oil Co./Bay Drum Co.	Tampa	01	RI/FS	PRP	02/10/89	1	92	1	93	-4
4	FL	Pensacola Naval Air Station	Pensacola	02	RI/FS	FF	12/28/89			1	94	DNE
				03	RI/FS	FF	10/15/90			1	94	new
				04	RI/FS	FF	10/15/90			1	94	new
				05	RI/FS	FF	10/15/90			1	94	new
				06	RI/FS	FF	10/15/90			1	94	new
				07	RI/FS	FF	10/15/90			4	95	new
				08	RI/FS	FF	10/15/90			4	95	new
				09	RI/FS	FF	10/15/90			4	95	new
				10	RI/FS	FF	10/15/90			4	95	new
				11	RI/FS	FF	06/24/91			2	94	new
4	FL	Pepper Steel & Alloys, Inc.	Medley	01	RA	PRP	03/26/87	2	91	4	92	-6
4	FL	Petroleum Products Corp.	Pembroke Park	02	RI/FS	F	09/15/89	4	92	2	92	2
4	FL	Pioneer Sand Co.	Warrington	01	RA	PRP	03/23/90	3	92	1	92	2
4	FL	Reeves Southeast Galvanizing Corp.	Tampa	01	RI/FS	PRP	02/10/89	1	92	3	92	-2
4	FL	Sapp Battery Salvage	Cottondale	02	RI/FS	F	09/30/90	1	93	4	93	-3
4	FL	Sherwood Medical Industries	Deland	01	RI/FS	PRP	04/30/87	1	92	4	92	-3

Progress Toward Implementing Superfund: Fiscal Year 1991

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE	PRESENT COMPLETION SCHEDULE	STATUS
4	FL	Standard Auto Bumper Corp.	Hialeah	01	RI/FS	F	11/15/88	1 92	4 92	-3
				01	RI/FS	EP*	03/12/91	2 92	4 92	-2
4	FL	Sydney Mine Sludge Ponds	Brandon	01	RA	PRP	06/01/89	1 92	4 93	-7
4	FL	Tower Chemical Co.	Clermont	02	RA	F	09/27/90	4 94	4 94	0
4	FL	Whitehouse Oil Pits	Whitehouse	01	RI/FS	F	02/15/89		1 92	DNE
4	FL	Wilson Concepts of Florida, Inc.	Pompano Beach	01	RI/FS	EP*	07/23/91	3 92	3 92	0
4	FL	Wingate Road Municipal Incinerator Dump	Fort Lauderdale	01	RI/FS	PRP	09/27/91		2 94	new
4	FL	Woodbury Chemical Co. (Princeton Plant)	Princeton	01	RI/FS	EP	06/05/90	2 92	3 92	-1
4	FL	Yellow Water Road Dump	Baldwin	02	RI/FS	PRP	01/28/91		4 92	new
4	FL	Zellwood Ground Water Contamination	Zellwood	01	RA	F	09/30/91		1 93	new
4	GA	Cedartown Industries, Inc.	Cedartown	01	RI/FS	PRP	03/08/90	4 92	4 92	0
4	GA	Cedartown Municipal Landfill	Cedartown	01	RI/FS	PRP	03/30/90	4 92	1 93	-1
4	GA	Diamond Shamrock Corp. Landfill	Cedartown	01	RI/FS	PRP	09/16/91		2 94	new
4	GA	Firestone Tire & Rubber Co. (Albany Plant)	Albany	01	RI/FS	PRP	07/09/90	2 93	4 92	2
4	GA	Hercules 009 Landfill	Brunswick	01	RI/FS	PRP	07/15/88	4 91	4 92	-4
4	GA	Marine Corps Logistics Base	Albany	02	RI/FS	FF	07/23/91		2 94	new
				03	RI/FS	FF	07/23/91		2 94	new
4	GA	Marzone Inc./Chevron Chemical Co.	Tifton	01	RI/FS	PRP	09/28/90	2 93	2 93	0
				02	RI/FS	PRP	09/28/90		3 92	DNE

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
4	GA	Mathis Brothers Landfill (South Marble Top Road)	Kensington	01	RI/FS	PRP	11/02/88	4	91	3	92	-3
4	GA	Powersville Site	Peach County	01	RA	PRP	01/08/91			2	93	new
				01	RA	PRP	01/08/91			3	92	new
4	GA	Robins Air Force Base (Landfill #4/Sludge Lagoon) (once listed as Robins Air Force Base)	Houston County	03	RI/FS	FF	09/28/90	1	92	3	93	-6
				04	RI/FS	FF	05/06/91			3	92	new
4	GA	T.H. Agriculture & Nutrition Co. (Albany Plant)	Albany	01	RI/FS	PRP	07/06/90	4	94	4	92	8
4	GA	Woolfolk Chemical Works, Inc.	Fort Valley	01	RI/FS	PRP	04/24/90	1	93	1	93	0
4	KY	Caldwell Lace Leather Co., Inc.	Auburn	01	RI/FS	EP	03/29/90	1	92	1	93	-4
4	KY	Distler Brickyard	West Point	01	RA	F	09/28/88	2	91	4	96	-22
4	KY	Distler Farm	Jefferson County	01	RA	F	09/28/88	2	91	4	95	-18
4	KY	Fort Hartford Coal Co. Stone Quarry	Olaton	01	RI/FS	PRP	09/20/89	1	92	4	93	-7
4	KY	General Tire & Rubber Co. (Mayfield Landfill)	Mayfield	01	RI/FS	PRP	12/20/89	4	91	4	92	-4
4	KY	Green River Disposal, Inc.	Maceo	01	RI/FS	PRP	05/22/90	1	93	1	93	0
4	KY	Red Penn Sanition Co. Landfill	Peewee Valley	01	RI/FS	F	08/18/89	1	92	1	93	-4
4	MS	Flowood Site	Flowood	01	RA	PRP	08/09/91			3	93	new
4	MS	Newson Brothers/Old Reichold Chemicals, Inc.	Columbia	01	RA	PRP	09/20/91			2	93	new
				01	RA	PRP	05/15/91			1	92	new

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AND REMEDIAL ACTIONS IN PROGRESS ON SEPTEMBER 30, 1991

RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
4	NC	ABC One Hour Cleaners	Jacksonville	01	RI/FS	F	09/25/89	1	92	3	92	-2
4	NC	Benfield Industries, Inc.	Hazelwood	01	RI/FS	F	06/20/90	4	92	4	92	0
4	NC	Bypass 601 Ground Water Contamination	Concord	02	RI/FS	F	09/21/90	4	92	1	93	-1
4	NC	Camp Lejeune Military Reservation (Marine Corp Base)	Onslow County	02	RI/FS	FF	12/29/89			3	92	DNE
				03	RI/FS	FF	02/15/90			2	93	DNE
				04	RI/FS	FF	06/28/90	4	93	4	93	0
				05	RI/FS	FF	10/04/90			2	94	new
4	NC	Celanese Corp. (Shelby Fiber Operations)	Shelby	01	RA	PRP	10/24/88	4	99	4	99	0
				02	RA	PRP	09/24/90	4	95	4	95	0
4	NC	Chemtronics, Inc.	Swannanoa	01	RA	PRP	06/10/91	4	99	4	99	0
4	NC	FCX, Inc. (Statesville Plant)	Statesville	01	RI/FS	EP	11/29/90			1	93	new
4	NC	FCX, Inc. (Washington Plant)	Washington	01	RI/FS	F	09/05/90	2	92	2	93	-4
4	NC	Geigy Chemical Corp. (Aberdeen Plant)	Aberdeen	01	RI/FS	PRP	12/16/88	1	92	2	92	-1
4	NC	JFD Electronics/Channel Master	Oxford	01	RI/FS	F	09/25/89	1	92	3	92	-2
4	NC	Koppers Co., Inc (Morrisville Plant)	Morrisville	01	RI/FS	PRP	03/14/89	1	92	3	92	-2
4	NC	Martin-Marietta, Sodyeco, Inc.	Charlotte	01	RA	PRP	09/25/89	2	99	2	99	0
4	NC	National Starch & Chemical Corp.	Salisbury	01	RA	PRP	06/27/90	2	99	2	99	0
4	NC	New Hanover County Airport Burn Pit	Wilmington	01	RI/FS	EP	03/16/90	1	92	3	92	-2

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
4	NC	North Carolina State University (Lot 86, Farm Unit #1)	Raleigh	01	RI/FS	FE	04/18/87	1	93	1	93	0
4	NC	Potter's Septic Tank Service Pits	Maco	01	RI/FS	F	09/29/88	3	91	2	92	-3
4	SC	Elmore Waste Disposal	Greer	01	RI/FS	F	09/15/89	4	91	1	93	-5
4	SC	Golden Strip Septic Tank Service	Simpsonville	01	RI/FS	PRP	06/30/88	2	91	4	91	-2
4	SC	Helena Chemical Co. Landfill	Fairfax	01	RI/FS	PRP	03/31/89	3	91	3	92	-4
4	SC	Kalama Specialty Chemicals	Beaufort	01	RI/FS	PRP	01/13/88	3	91	3	92	-4
4	SC	Koppers Co., Inc (Florence Plant)	Florence	01	RI/FS	PRP	02/29/88	3	91	4	92	-5
4	SC	Leonard Chemical Co., Inc.	Rock Hill	01	RI/FS	PRP	12/13/90			2	93	new
4	SC	Palmetto Wood Preserving	Dixiana	01	RA	F	03/25/90	4	90	4	97	-28
				02	RA	F	09/25/89	4	93	4	93	0
4	SC	Para-Chem Southern, Inc.	Simpsonville	01	RI/FS	PRP	09/30/91			4	93	new
4	SC	Rock Hill Chemical Co.	Rock Hill	01	RI/FS	F	09/25/91			4	93	new
4	SC	SCRDI Dixiana	Cayce	01	RA	F	09/29/89	4	94	4	94	0
4	SC	Sangamo Weston, Inc./Twelve-Mile Creek/Lake Hartwell PCB Contamination	Pickens	02	RI/FS	F	08/31/90	2	92	2	93	-4
4	SC	Savannah River Site (USDOE)	Aiken	01	RI/FS	FF	09/25/89	4	90	4	91	-4
				02	RI/FS	FF	11/06/89	1	93	2	92	3
				03	RI/FS	FF	11/06/89	1	93	3	92	2
				04	RI/FS	FF	12/29/89	1	93	4	92	1
				05	RI/FS	FF	02/28/90	4	93	4	92	4
				06	RI/FS	FF	02/28/90	4	93	4	93	0
				07	RI/FS	FF	07/06/90	1	94	1	94	0
				08	RI/FS	FF	08/06/90	2	93	2	93	0

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
				09	RI/FS	FF	08/06/90	2	93	2	93	0
				10	RI/FS	FF	12/06/90			3	93	new
				11	RI/FS	FF	01/09/91			4	93	new
				12	RI/FS	FF	03/06/91			4	93	new
				13	RI/FS	FF	05/08/91			1	94	new
				14	RI/FS	FF	06/07/91			1	94	new
				15	RI/FS	FF	07/01/91			2	94	new
				16	RI/FS	FF	07/01/91			2	94	new
				17	RI/FS	FF	03/06/91			2	94	new
				18	RI/FS	FF	05/08/91			2	94	new
				19	RI/FS	FF	07/01/91			2	94	new
				20	RI/FS	FF	08/05/91			2	94	new
4	SC	Townsend Saw Chain Co.	Pontiac	01	RI/FS	PRP	08/30/91			4	93	new
4	TN	American Creosote Works, Inc. (Jackson Plant)	Jackson	01	RA	F	06/12/89	1	92	1	92	0
				02	RI/FS	F	12/29/89	4	91	1	94	-9
4	TN	Carrier Air Conditioning Co.	Collierville	01	RI/FS	PRP	09/29/89	1	92	2	92	-1
4	TN	Milan Army Ammunition Plant	Milan	02	RI/FS	FF	10/01/89	2	92	1	94	-7
				03	RI/FS	FF	10/01/89	1	93	1	94	-4
				04	RI/FS	FF	10/01/89	1	93	1	94	-4
				05	RI/FS	FF	10/01/89	1	93	1	94	-4
				06	RI/FS	FF	10/01/89	1	93	1	94	-4
				07	RI/FS	FF	10/01/89	1	93	1	94	-4
				08	RI/FS	FF	10/01/89	1	93	1	94	-4
				09	RI/FS	FF	10/01/89	1	93	1	94	-4
				10	RI/FS	FF	10/01/89	1	93	1	94	-4
				11	RI/FS	FF	10/01/89	1	93	1	94	-4
				12	RI/FS	FF	10/01/89	1	93	1	94	-4
				13	RI/FS	FF	07/23/90	1	93	4	92	1
4	TN	Murray-Ohio Dump	Lawrenceburg	01	RI/FS	PRP	03/06/90	2	92	1	94	-7
4	TN	Murray-Ohio Manufacturing Co. (Horseshoe Bend Dump)	Lawrenceburg	01	RI/FS	PRP	03/30/90	2	92	1	94	-7

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
4	TN	Oak Ridge Reservation (USDOE)	Oak Ridge	03	RI/FS	FF	12/29/89	4	91	4	91	0
				04	RI/FS	FF	12/29/89	4	91	4	91	0
				05	RI/FS	FF	03/31/90	2	93	2	93	0
				06	RI/FS	FF	03/31/90	2	93	2	93	0
				07	RI/FS	FF	03/31/90	2	93	2	93	0
				08	RI/FS	FF	06/05/90	3	93	3	93	0
				09	RI/FS	FF	06/05/90	3	93	3	93	0
				10	RI/FS	FF	06/05/90	3	93	3	93	0
				11	RI/FS	FF	06/05/90	4	93	4	93	0
				12	RI/FS	FF	01/03/90	4	93	4	93	0
				13	RI/FS	FF	01/03/90	3	93	3	93	0
				14	RI/FS	FF	06/09/90	1	94	1	94	0
				16	RI/FS	FF	09/14/90	1	94	1	94	0
				17	RI/FS	FF	09/18/90	2	94	2	92	8
				18	RI/FS	FF	09/18/90	2	94	4	92	6
				19	RI/FS	FF	05/22/90	2	93	4	92	2
				21	RI/FS	FF	07/16/90	3	93	3	93	0
4	TN	Oak Ridge Reservatrion (USDOE)	Oak Ridge	15	RI/FS	FF	09/06/90			1	94	DNE
				20	RI/FS	FF	09/07/90			2	93	DNE
				22	RI/FS	FF	12/28/90			2	93	new
				23	RI/FS	FF	12/28/90			3	93	new
				24	RI/FS	FF	01/14/91			3	93	new
4	TN	Wrigley Charcoal Plant	Wrigley	03	RI/FS	F	02/15/89			4	91	DNE
5	IL	Adams County Quincy Landfills 2 & 3	Quincy	01	RI/FS	PS*	09/12/90	2	93	2	93	0
5	IL	Beloit Corp.	Rockton	01	RI/FS	PS	09/27/90	2	93	2	93	0
5	IL	Belvidere Municipal Landfill	Belvidere	01	RA	PRP	03/28/90	2	92	3	92	-1
5	IL	Byron Salvage Yard	Byron	04	RI/FS	EP	12/29/89	3	92	1	93	-2
5	IL	Central Illinois Public Service Co.	Taylorville	01	RI/FS	PS	09/12/90	4	92	2	93	-2

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
5	IL	DuPage County Landfill/Blackwell Forest Preserve)	Warrenville	01	RI/FS	PRP	09/29/89	4	92	1	93	-1
5	IL	H.O.D. Landfill	Antioch	01	RI/FS	PRP	08/20/90	4	92	4	93	-4
5	IL	Ilada Energy Co.	East Cape Girardeau	01	RI/FS	PRP	06/19/89	2	92	1	93	-3
5	IL	Interstate Pollution Control, Inc.	Rockford	01	RI/FS	PS	09/27/90	3	93	3	93	0
5	IL	Johns-Manville Corp.	Waukegan	01	RA	PRP	10/21/88	2	91	1	92	-3
				02	RA	PRP	08/08/90			1	93	DNE
				02	RA	PRP	08/08/90			1	93	DNE
5	IL	Joliet Army Ammunition Plant (Load-Assembly-Packing Area)	Joliet	01	RI/FS	FF	06/09/89	4	93	4	93	0
5	IL	Joliet Army Ammunition Plant (Manufacturing Area)	Joilet	01	RI/FS	FF	06/09/89			1	93	DNE
5	IL	Kerr-McGee (Kress Creek/West Branch of Dupage River)	DuPage County	01	RI/FS	F	11/18/83	2	92	3	93	-5
5	IL	Kerr-McGee (Reed-Keppler Park)	West Chicago	01	RI/FS	FE	11/18/83	2	92	3	93	-5
5	IL	Kerr-McGee (Residential Areas)	West Chicago/DuPage County	01	RI/FS	F	11/18/83	2	92	3	93	-5
5	IL	Kerr-McGee (Sewage Treat Plant)	West Chicago	01	RI/FS	F	11/18/83	2	92	3	93	-5
5	IL	LaSalle Electric Utilities	LaSalle	02	RA	S	04/11/89	2	93	2	93	0
5	IL	Lenz Oil Service, Inc.	Lemont	01	RI/FS	PRP	09/29/89	2	92	3	93	-5

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5	IL	MIG/Dewane Landfill	Belvidere	01	RI/FS	PRP	03/29/91			2	94	new
5	IL	Outboard Marine Corp.	Waukegan	03	RA	PRP	06/27/91			3	93	new
5	IL	Pagel's Pit	Rockford	02	RI/FS	PRP	08/13/91			2	93	new
5	IL	Parsons Casket Hardware Co.	Belvidere	01	RI/FS	S	09/29/88	1	92	1	93	-4
5	IL	Sangamo Electric Dump/Crab Orchard National Wildlife Refuge (USDOI)	Carterville	03	RI/FS	FF	09/13/91			1	95	new
				04	RI/FS	FF	09/13/91			1	95	new
5	IL	Savanna Army Depot Activity	Savanna	01	RI/FS	FF	09/29/89			3	92	DNE
				02	RI/FS	FF	09/29/89			4	93	DNE
5	IL	Southeast Rockford Ground Water Contamination	Rockford	01	RI/FS	S	07/10/89	2	92	2	93	-4
				02	RA	F	07/17/91			1	93	new
5	IL	Tri-County Landfill Co./Waste Management of Illinois, Inc.	South Elgin	01	RI/FS	F	04/22/88	3	92	3	92	0
5	IL	Velsicol Chemical (Illinois)	Marshall	01	RA	PRP	03/29/91			4	94	new
5	IL	Wauconda Sand & Gravel	Wauconda	02	RA	PRP	09/30/91			1	93	new
5	IL	Woodstock Municipal Landfill	Woodstock	01	RI/FS	PRP	09/29/89	1	93	2	93	-1
5	IN	American Chemical Service, Inc.	Griffith	01	RI/FS	PRP	06/29/88	3	92	3	92	0
5	IN	Columbus Old Municipal Landfill #1	Columbus	01	RI/FS	PRP	09/15/87	1	92	2	92	-1
5	IN	Conrail Rail Yard (Elkhart)	Elkhart	02	RI/FS	F	10/01/90			4	93	new

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
5	IN	Continental Steel Corp.	Kokomo	01	RI/FS	S	05/25/90	4	92	3	93	-3
				02	RI/FS	S	08/26/91			4	93	new
5	IN	Douglas Road/Uniroyal, Inc., Landfill	Mishawaka	01	RI/FS	PS	08/24/89	1	93	1	93	0
5	IN	Fort Wayne Reduction Dump	Fort Wayne	01	RA	PRP	09/20/90	4	93	4	93	0
5	IN	Galen Meyer's Dump/Drum Salvage	Osceola	01	RI/FS	S	04/11/89	3	92	2	93	-3
5	IN	Himco Dump	Elkhart	01	RI/FS	F	09/21/89	3	92	1	93	-2
5	IN	Lake Sandy Jo (M&M Landfill) (once listed as Lake Sandy Jo)	Gary	02	RA	F	09/28/87			2	92	DNE
5	IN	Lakeland Disposal Service, Inc.	Claypool	01	RI/FS	PRP	03/30/89	2	93	4	93	-2
5	IN	Marion (Bragg) Dump	Marion	01	RA	MR	08/07/89	3	92	3	93	-4
5	IN	Neal's Landfill (Bloomington)	Bloomington	01	RA	PRP	07/07/88	2	89	2	89	0
5	IN	Ninth Avenue Dump	Gary	01	RA	PRP	12/11/90			1	93	new
				01	RA	PRP	07/16/91			1	93	new
5	IN	Prestolite Battery Division	Vincennes	01	RI/FS	F	12/23/88	3	92	2	93	-3
5	IN	Reilly Tar & Chemical Corp. (Indianapolis Plant)	Indianapolis	01	RI/FS	PRP	03/31/87	1	92	2	92	-1
5	IN	Seymour Recycling Corp.	Seymour	01	RA	PRP	08/17/87	2	94	2	94	0
				02	RA	PRP	09/08/89	3	95	3	95	0
5	IN	Southside Sanitary Landfill	Indianapolis	01	RI/FS	PS	09/29/89	4	92	1	93	-1
5	IN	Tippecanoe Sanitary Landfill, Inc.	Lafayette	01	RI/FS	PRP	03/08/90	4	92	4	93	-4

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5	IN	Tri-State Plating	Columbus	01	RA	F	03/29/91		2 95	new
5	IN	Waste, Inc. Landfill	Michigan City	01	RI/FS	PRP	03/31/87	2 92	3 92	-1
5	IN	Whiteford Sales & Service Inc./NationaLease	South Bend	01	RI/FS	F	09/29/89	3 92	2 93	-3
5	MI	Adam's Plating	Lansing	01	RI/FS	F	09/28/88	1 92	1 94	-8
5	MI	Allied Paper, Inc./Portage Creek/Kalamazoo River	Kalamazoo	01	RI/FS	PS	12/28/90		1 93	new
5	MI	American Anodco, Inc.	Ionia	01	RI/FS	PRP	10/23/87	3 92	3 92	0
5	MI	Auto Ion Chemicals, Inc.	Kalamazoo	02	RI/FS	PRP	06/01/90	1 92	2 92	-1
5	MI	Bendix Corp./Allied Automotive	St. Joseph	01	RI/FS	PRP	02/13/89	1 92	1 93	-4
5	MI	Bofers Nobel, Inc.	Muskegon	02	RI/FS	S	03/31/90		2 93	DNE
5	MI	Burrows Sanitation	Hartford	02	RA	PRP	06/20/91		4 94	new
5	MI	Butterworth #2 Landfill	Grand Rapids	01	RI/FS	PRP	04/22/87	1 92	1 93	-4
5	MI	Cannelton Industries, Inc.	Sault Sainte Marie	01	RI/FS	F	09/27/88	2 92	2 92	0
5	MI	Charlevoix Municipal Well	Charlevoix	01 01	RA RA	F F	05/03/91 05/03/91		2 93 2 93	new new
5	MI	Clare Water Supply	Clare	01 02	RA FS	PRP PRP	03/07/91 09/27/85		2 92 2 92	new DNE
5	MI	Duell & Gardner Landfill	Dalton Township	01	RI/FS	S	04/08/87	1 92	1 92	0
5	MI	Electrovoice	Buchanan	01	RI/FS	PRP	10/08/87	1 92	1 92	0

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
5	MI	Grand Traverse Overall Supply Co.	Greilickville	01	RI/FS	F	04/09/87	1	92	2	92	-1
5	MI	H. Brown Co., Inc.	Grand Rapids	01	RI/FS	F	09/12/88	1	92	2	92	-1
5	MI	Hi-Mill Manufacturing Co.	Highland	01	RI/FS	PRP	09/23/88	2	92	1	93	-3
5	MI	J & L Landfill	Rochester Hills	01	RI/FS	F	04/24/89	1	92	2	92	-1
5	MI	Mason County Landfill	Pere Marquette Township	01	RA	PRP	06/29/90	1	92	2	92	-1
				02	RI/FS	F	09/28/88	2	92	3	95	-13
5	MI	Metal Working Shop	Lake Ann	01	RI/FS	EP*	11/15/90	2	94	1	92	9
5	MI	Metamora Landfill	Metamora	01	RA	S	02/17/88	4	92	1	93	-1
				03	RI/FS	S	09/29/89	1	92	1	92	0
5	MI	North Bronson Industrial Area	Bronson	01	RI/FS	S	06/24/87	2	92	1	93	-3
5	MI	Northernaire Plating	Cadillac	01	RA	S	06/23/87	3	91	1	92	-2
5	MI	Organic Chemicals, Inc.	Grandville	02	RI/FS	F	04/22/88	1	93	1	93	0
5	MI	Ott/Story/Cordova Chemical Co.	Dalton Township	01	RA	F	09/25/91			4	95	new
				03	RI/FS	F	09/14/90			1	93	DNE
5	MI	Packaging Corp. of America	Filer City	01	RI/FS	PRP	05/02/85	2	92	2	93	-4
5	MI	Parsons Chemical Works, Inc.	Grand Ledge	01	RI/FS	S	09/29/89	1	93	3	93	-2
5	MI	Peerless Plating Co.	Muskegon	01	RI/FS	F	07/10/89	3	92	1	93	-2
5	MI	Petoskey Municipal Well Field	Petoskey	01	RI/FS	S*	10/05/90	1	91	1	93	-8

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
5	MI	Rockwell International Corp. (Allegan Plant)	Allegan	01	RI/FS	PRP	06/07/88	1	92	1	94	-8
5	MI	Roto-Finish Co., Inc.	Kalamazoo	01	RI/FS	PRP	12/18/87	2	92	2	93	-4
5	MI	Shiawassee River	Howell	01	RI/FS	S	06/19/87	1	92	1	93	-4
5	MI	South Macomb Disposal Authority (Landfill #9 & 9A)	Macomb Township	01	RI/FS	FE	09/24/87	4	91	4	91	0
5	MI	Spiegelberg Landfill	Green Oak Township	01	RA	PRP	05/30/89	3	90	3	92	-8
5	MI	Tar Lake	Mancelona Township	01	RI/FS	PRP	01/29/86	1	92	1	92	0
5	MI	Torch Lake	Houghton County	01	RI/FS	F	09/28/88	1	92	2	92	-1
5	MI	U.S. Aviex	Howard Township	01	RA	F	09/25/91			4	92	new
5	MI	Verona Well Field	Battle Creek	02	RI/FS	F	05/30/85	2	91	2	92	-4
5	MN	Arrowhead Refinery Co.	Hermantown	01	RA	PRP	08/15/90	3	91	3	92	-4
5	MN	Burlington Northern (Brainerd/ Baxter Plant)	Brainerd/Baxter	01	RA	PRP	03/31/87	1	94	1	94	0
5	MN	Dakhue Sanitary Landfill	Cannon Falls	02	RI/FS	S	03/29/90			4	92	DNE
5	MN	Freeway Sanitary Landfill	Burnsville	01	RI/FS	PS	03/27/86			1	92	DNE
5	MN	Joslyn Manufacturing & Supply Co.	Brooklyn Center	01	RA	PS	12/31/88	2	91	4	91	-2
5	MN	Koch Refining Co./N-Ren Corp.	Pine Bend	01	RI/FS	PS	10/15/85			4	91	DNE
				02	RI/FS	PS	10/15/85			4	91	DNE

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5	MN	Koppers Coke	St.Paul	01	RI/FS	PRP	06/29/87	1	92	3	92	-2
5	MN	Kummer Sanitary Landfill	Bemidji	02	RA	S	03/26/90	1	92	3	93	-6
5	MN	Kurt Manufacturing Co.	Fridley	01	RA	PS	12/15/86	4	99	4	99	0
5	MN	LaGrand Sanitary Landfill	LaGrand Township	01	RI/FS	S	06/30/87	2	92	3	92	-1
5	MN	Lehillier/Mankato Site	Lehillier/Mankato	01	RA	S	03/31/88	4	99	4	99	0
5	MN	Long Prairie Ground Water Contamination	Long Prairie	01	RA	S	04/11/91			1	94	new
5	MN	MacGillis & Gibbs Co./Bell Lumber & Pole Co.	New Brighton	01	RI/FS	S	09/29/87	2	91	3	92	-5
				02	RI/FS	F	09/28/90	4	91	4	91	0
5	MN	Naval Industrial Reserve Ordnance Plant	Fridley	01	RA	FF	06/14/91			4	99	new
				02	RI/FS	FF	03/28/91			1	95	new
5	MN	New Brighton/Arden Hills	New Brighton	07	RI/FS	FF	06/28/88			2	94	DNE
				09	RI/FS	FF	06/21/89	4	90	2	92	-6
5	MN	Nutting Truck & Caster Co.	Faribault	01	RI/FS	PS	04/26/84			1	92	DNE
5	MN	Olmsted County Sanitary Landfill	Oronoco	01	RI/FS	PS	12/20/89	3	92	2	93	-3
5	MN	Perham Arsenic Site	Perham	01	RI/FS	F*	05/01/91	1	93	4	93	-3
5	MN	Pine Bend Sanitary Landfill (once listed as Pine Bend Sanitary Landfill/Crosby American Demolition Landfill)	Dakota County	01	RI/FS	PS	04/15/85			4	91	DNE
				02	RI/FS	PS	04/15/85			1	92	DNE
				03	RI/FS	PS	04/15/85			3	92	DNE
5	MN	Reilly Tar & Chemical Corp. (St. Louis Park Plant)	St. Louis Park	02	RA	PRP	09/30/87	4	99	4	99	0
				03	RI/FS	PRP	09/04/86	3	91	1	92	-2
				04	RA	PRP	04/01/91			1	93	new

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5	MN	Ritari Post & Pole	Sebeka	01	RI/FS	S	06/30/87	1	92	4	92	-3
5	MN	South Andover Site (once listed as Andovers Sites)	Andover	02	RI/FS	F	09/28/90	4	91	1	92	-1
				02	FS	F	06/19/91			1	92	new
5	MN	St. Augusta Sanitary Landfill/Engen Dump (once listed as St. Augusta Sanitary Landfill/St. Cloud Dump)	St. Augusta Township	01	RI/FS	PS	02/15/91			2	93	new
5	MN	St. Louis River Site	St. Louis County	02	RI/FS	PS	09/30/85	4	95	4	95	0
				03	RI/FS	PS*	04/15/91	1	92	4	92	-3
5	MN	Twin Cities Air Force Reserve Base (Small Arms Range Landfill)	Minneapolis	01	RI/FS	FF	11/06/89			1	92	DNE
5	MN	Waite Park Wells	Waite Park	02	RI/FS	PS	09/20/89	4	92	4	92	0
5	MN	Washington County Landfill	Lake Elmo	01	RA	PRP	10/24/84	4	99	4	99	0
				02	RA	PS	06/24/91			4	91	new
5	OH	Alsco Anaconda	Gnadenhutten	01	RA	PRP	09/30/91			4	92	new
				02	RI/FS	PRP	08/15/89	1	92	3	92	-2
5	OH	Big D Campground	Kingsville	01	RA	PRP	06/03/91			3	96	new
5	OH	Bowers Landfill	Circleville	01	RA	F	09/05/91			4	92	new
5	OH	Feed Materials Production Center (USDOE)	Fernald	01	RI/FS	FF	04/09/90	1	92	2	94	-9
				02	RI/FS	FF	04/09/90	4	90	2	94	-14
				03	RI/FS	FF	04/09/90	4	90	2	94	-14
				04	RI/FS	FF	04/09/90	4	90	2	94	-14
				05	RI/FS	FF	04/09/90	4	90	2	94	-14
5	OH	Fields Brook	Ashtabula	02	RI/FS	PRP	03/22/89	1	93	1	93	0
				03	RI/FS	PRP	09/26/89	4	99	4	93	24

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5	OH	Fultz Landfill	Jackson Township	01	RI/FS	F	09/24/84	2	91	4	91	-2
5	OH	Industrial Excess Landfill	Uniontown	01	RA	F	09/14/89	4	90	3	91	-3
				02	RA	PRP	08/17/89	1	91	3	91	-2
5	OH	Laskin/Poplar Oil Co. (once listed as Poplar Oil Co.)	Jefferson Township	02	RA	PRP	06/27/91			4	92	new
5	OH	Mound Plant (USDOE)	Miamisburg	01	RI/FS	FF	08/06/90	3	92	3	95	-12
5	OH	Nease Chemical	Salem	01	RI/FS	PRP	01/27/88	3	92	1	93	-2
5	OH	New Lyme Landfill	New Lyme	01	RA	F	04/11/88	1	91	2	92	-5
5	OH	Ormet Corp.	Hannibal	01	RI/FS	PRP	03/27/87	1	92	4	91	1
5	OH	Powell Road Landfill	Dayton	01	RI/FS	PRP	11/12/87	2	91	2	92	-4
5	OH	Pristine, Inc.	Reading	02	RA	PRP	08/20/91			1	92	new
5	OH	Reilly Tar & Chemical Corp. (Dover Plant)	Dover	01	RI/FS	PRP	03/29/89	1	92	1	93	-4
5	OH	Sanitary Landfill Co. (Industrial Waste Disposal Co., Inc.)	Dayton	01	RI/FS	PRP	12/16/87	1	92	1	93	-4
5	OH	Skinner Landfill	West Chester	01	RI/FS	F	12/20/88	3	91	2	92	-3
5	OH	South Point Plant	South Point	01	RI/FS	PRP	03/31/87	3	91	4	91	-1
5	OH	Van Dale Junkyard	Marietta	01	RI/FS	F*	08/18/90	1	92	3	92	-2
5	OH	Wright-Patterson Air Force Base	Dayton	01	RI/FS	FF	03/21/91			4	93	new
5	OH	Zanesville Well Field	Zanesville	01	RI/FS	PRP	08/03/88	4	90	3	91	-3

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE	PRESENT COMPLETION SCHEDULE	STATUS
5	WI	Better Brite Plating Co. Chrome and Zinc Shops	DePere	01	RI/FS	S	09/28/90	2 93	2 93	0
				02	RA	F	08/05/91		3 97	new
5	WI	City Disposal Corp. Landfill	Dunn	01	RI/FS	PRP	05/22/87	3 92	1 93	-2
5	WI	Delavan Municipal Well #4	Delavan	01	RI/FS	PS	09/28/90	4 92	1 93	-1
5	WI	Hagen Farm	Stoughton	01	RA	PRP	08/14/91		1 94	new
				02	RI/FS	PRP	07/27/87	1 92	2 92	-1
5	WI	Hechimovich Sanitary Landfill	Williamstown	01	RI/FS	PS	09/28/90	2 93	3 93	-1
5	WI	Janesville Ash Beds	Janesville	01	RI/FS	PRP	09/30/86	1 90	1 90	0
5	WI	Kohler Co. Landfill	Kohler	01	RI/FS	PRP	09/30/85	1 92	1 93	-4
5	WI	Lauer I Sanitary Landfill	Menomonee Falls	01	RI/FS	PS	08/01/90	1 93	1 93	0
5	WI	Lemberger Landfill, Inc. (Lemberger Fly Ash Landfill)	Whitelaw	01	RI/FS	F	06/26/87	4 91	4 91	0
5	WI	Lemberger Transport & Recycling	Franklin Township	01	RI/FS	F	06/30/87	4 91	4 91	0
				02	RI/FS	F	04/23/91		3 93	new
5	WI	Muskego Sanitary Landfill	Muskego	01	RI/FS	PRP	08/14/87	1 92	2 92	-1
				02	RI/FS	PRP	08/14/87		3 92	DNE
5	WI	N.W. Mauthe Co., Inc.	Appleton	01	RI/FS	S	09/30/88	3 92	2 93	-3
5	WI	National Presto Industries, Inc.	Eau Claire	02	RA	PRP	04/03/91		1 92	new
5	WI	Oconomowoc Electroplating Co., Inc.	Ashippin	01	RA	F	09/30/91		1 95	new
				02	RI/FS	F	09/20/90		1 93	DNE
5	WI	Schmalz Dump	Harrison	02	RA	F	09/29/88		1 93	DNE

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
5	WI	Sheboygan Harbor & River	Sheboygan	01	RI/FS	PRP	04/11/86	4	92	1	93	-1
5	WI	Spickler Landfill	Spencer	01	RI/FS	PRP	07/07/88	3	92	2	93	-3
6	AR	Gurley Pit	Edmondson	01	RA	F	03/29/89	1	92	4	93	-7
6	AR	Industrial Waste Control	Fort Smith	01	RA	PRP	07/25/89	2	92	3	92	-1
6	AR	Midland Products	Ola/Birta	01	RA	S	06/29/90	2	96	2	96	0
6	AR	Monroe Auto Equipment Co. (Paragould Pit)	Paragould	01	RI/FS	PRP	06/28/91			4	93	new
6	AR	Vertac, Inc.	Jacksonville	03	RI/FS	PRP	07/12/89	2	92	2	93	-4
				05	RI/FS	PRP	07/12/89	3	91	1	93	-6
6	LA	Bayou Bonfouca	Slidell	02	RA	F	06/30/89	2	92	1	92	1
				02	RA	F	02/04/91			4	94	new
6	LA	Bayou Sorrel Site	Bayou Sorrel	01	RA	PRP	07/11/88	2	92	3	92	-1
6	LA	Cleve Reber	Sorrento	01	RA	PRP	04/10/91			1	97	new
6	LA	Combustion, Inc.	Denham Springs	01	RI/FS	PS	10/25/88	2	92	2	93	-4
6	LA	D.L. Mud, Inc.	Abbeville	01	RI/FS	PRP	06/20/90	2	92	1	93	-3
6	LA	Dutchtown Treatment Plant	Ascension Parish	01	RI/FS	PRP	08/07/89	3	92	2	94	-7
6	LA	Gulf Coast Vacuum Services	Abbeville	01	RI/FS	F	06/27/90	2	92	4	92	-2
				02	RI/FS	F	09/27/90			3	92	DNE
6	LA	Louisiana Army Ammunition Plant	Doyline	01	RA	FF	01/31/89	2	92	4	92	-2
				02	RI/FS	FF	01/31/89	2	92	2	93	-4
6	LA	Old Inger Oil Refinery	Darrow	01	RA	S	04/25/86	2	94	2	94	0
				01	RI/FS	S	04/09/90	2	91	1	92	-3

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6	LA	PAB Oil & Chemical Service, Inc.	Abbeville	01	RI/FS	F	06/27/90	4	92	2	93	-2
6	LA	Petro-Processors of Louisiana, Inc.	Scotlandville	01	RA	PRP	06/30/87	4	92	4	97	-20
6	NM	AT & SF (Clovis)	Clovis	01	RA	PRP	08/07/89	4	92	4	95	-12
6	NM	Cal West Metals (USSBA)	Lemitar	01	RI/FS	EP	08/03/90	2	92	2	92	0
6	NM	Cimarron Mining Corp.	Carrizozo	01	RA	EP	08/13/91			4	94	new
				02	RA	EP	08/13/91			2	95	new
6	NM	Cleveland Mill	Silver City	01	RI/FS	S*	03/29/90	2	92	2	93	-4
6	NM	Prewitt Abandoned Refinery	Prewitt	01	RI/FS	PRP	07/03/89	3	91	3	92	-4
6	NM	South Valley	Albuquerque	02	RA	PRP	10/04/90			3	92	new
				03	RA	PRP	12/28/89	2	91	2	94	-12
6	NM	United Nuclear Corp.	Church Rock	01	RA	PRP	09/12/89	3	92	4	97	-21
6	OK	Compass Industries (Avery Drive)	Tulsa	01	RA	PRP	06/30/89	2	92	2	93	-4
6	OK	Double Eagle Refinery Co.	Oklahoma City	01	RI/FS	F	12/29/89	3	92	3	92	0
6	OK	Fourth Street Abandoned Refinery	Oklahoma City	01	RI/FS	F	12/29/89	3	92	3	92	0
6	OK	Mosley Road Sanitary Landfill	Oklahoma City	01	RI/FS	PRP	07/28/89	1	92	2	92	-1
6	OK	Oklahoma Refining Co.	Cyril	01	RI/FS	S	03/31/89	2	92	3	92	-1
				02	RI/FS	F	05/16/91			3	93	new
6	OK	Tinker Air Force Base (Soldier Creek/Building 3001)	Oklahoma City	01	RA	FF	06/10/91			4	93	new
				02	RI/FS	FF	12/09/88	1	93	2	93	-1

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
6	TX	Air Force Plant #4 (General Dynamics)	Fort Worth	01	RI/FS	FF	08/20/90	4	91	1	95	-13
6	TX	Bio-Ecology Systems, Inc.	Grand Prairie	01	RA	S	05/12/86	2	92	2	93	-4
6	TX	Brio Refining, Inc.	Friendswood	01	RA	PRP	06/29/89	4	96	2	97	-2
6	TX	Crystal City Airport	Crystal City	01	RA	S	12/29/88	2	92	2	92	0
6	TX	French, Ltd.	Crosby	01	RA	PRP	06/28/89	2	95	4	96	-6
				02	RA	PRP	06/28/89			3	98	DNE
6	TX	Geneva Industries/Fuhrmann Energy	Houston	02	RA	S	03/31/89			4	94	DNE
6	TX	Highlands Acid Pit	Highlands	01	RA	S	09/24/84	3	92	3	92	0
6	TX	Kopppers Co., Inc. (Texarkana Plant)	Texarkana	02	RA	PRP	05/13/91			3	92	new
6	TX	Lone Star Army Ammunition Plant	Texarkana	01	RI/FS	FF	06/18/90	3	91	3	93	-8
6	TX	Motco, Inc.	La Marque	01	RA	MR	12/30/88	1	94	1	94	0
6	TX	North Calvacade Street	Houston	01	RA	S	09/12/91			3	96	new
6	TX	Odessa Chromium #1	Odessa	02	RA	S	09/27/89	4	95	1	94	7
6	TX	Odessa Chromium #2 (Andrews Highway)	Odessa	02	RA	S	03/30/90	1	96	1	94	8
6	TX	Pesses Chemical Co.	Fort Worth	01	RA	S	06/27/90			4	93	DNE
6	TX	Sikes Disposal Pits	Crosby	01	RA	S	05/04/89	2	97	2	97	0
6	TX	Sol Lynn/Industrial Transformers	Houston	01	RA	PRP	06/12/91			4	92	new
				02	RA	S	09/10/91			3	94	new

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6	TX	Tex-Tin Corp.	Texas City	01	RI/FS	PRP	03/30/90	2	93	4	93	-2
6	TX	Texarkana Wood Preserving Co.	Texarkana	02	RI/FS	S	03/28/91			1	93	new
7	IA	Des Moines TCE (once listed as DICO)	Des Moines	01	RA	PRP	09/30/87	2	91	2	92	-4
				02	RI/FS	PRP	08/08/89	1	92	3	92	-2
				03	RI/FS	F	09/22/88	4	91	3	92	-3
7	IA	Iowa Army Ammunition Plant	Middletown	01	RI/FS	FF	09/20/90	2	93	2	95	-8
7	IA	Red Oak City Landfill	Red Oak	01	RI/FS	PRP	12/04/89	4	92	4	92	0
7	IA	Sheller-Globe Corp. Disposal	Keokuk	01	RI/FS	PRP	10/18/90			1	93	new
7	KS	29th & Mead Ground Water Contamination	Wichita	01	RI/FS	PS	09/27/89	1	92	4	92	-3
				02	RI/FS	PS	06/14/91			1	92	new
7	KS	Arkansas City Dump	Arkansas City	02	RA	F	09/10/91			1	93	new
7	KS	Cherokee County (Tar Creek)	Cherokee County	01	RA	F	07/13/89	2	92	2	93	-4
				03	RI/FS	PRP	05/07/90	3	92	1	93	-2
				04	RI/FS	PRP	05/07/90	3	92	1	93	-2
7	KS	Fort Riley	Junction City	01	RI/FS	FF	08/23/90	1	93	1	95	-8
7	KS	Hydro Flex Inc.	Topeka	01	RI/FS	PS	09/26/89	1	92	3	92	-2
7	KS	Obee Road	Hutchinson	01	RI/FS	PS	03/27/90	4	92	3	93	-3
7	KS	Pester Refinery Co.	El Dorado	01	RI/FS	PS	04/19/90	1	92	4	92	-3
7	KS	Strother Field Industrial Park	Cowley County	01	RI/FS	PS	03/28/90	4	93	4	93	0
7	MO	Bee Cee Manufacturing Co.	Malden	01	RI/FS	S	12/29/88	2	92	1	93	-3

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7	MO	Fulbright Landfill	Springfield	01	RA	PRP	06/15/90	2	91	1	92	-3
7	MO	Kem-Pest Laboratories	Cape Girardeau	01	RA	F	09/25/91			2	93	new
7	MO	Lake City Army Ammunition Plant (Northwest Lagoon)	Independence	01	RI/FS	FF	08/01/87	4	94	4	94	0
				02	RI/FS	FF	06/27/90	4	92	3	93	-3
				03	RI/FS	FF	06/27/90	4	92	3	93	-3
7	MO	Minker/Stout/Romaine Creek (once listed as Area 2: Fills 1 & 2)	Imperial	02	RA	F	06/30/88	1	91	1	92	-4
				04	RA	F	05/10/83	1	91	1	92	-4
7	MO	North-U Drive Well Contamination	Springfield	01	RI/FS	S	09/27/85	1	92	4	92	-3
7	MO	Oronogo-Duenweg Mining Belt	Jasper County	01	RI/FS	F	04/24/90	3	93	2	94	-3
				01	RI/FS	PRP	08/02/91			2	94	new
7	MO	Quality Plating	Sikeston	01	RI/FS	S	12/30/88	4	92	3	93	-3
7	MO	Solid State Circuits, Inc.	Republic	01	RA	PS	09/27/91			4	93	new
7	MO	St. Louis Airport/Hazelwood Interim Storage/Futura Coatings Co.	St. Louis County	01	RI/FS	FF	06/26/90	4	94	4	94	0
7	MO	Syntex Facility	Verona	02	RI/FS	PRP	11/28/89			2	92	DNE
7	MO	Times Beach Site	Times Beach	02	RA	PRP	09/16/91			4	93	new
				02	RA	PRP	09/18/91			3	95	new
				03	RA	F	03/14/83	1	91	1	92	-4
7	MO	Valley Park TCE	Valley Park	01	RI/FS	PS	12/31/87	3	92	4	93	-5
7	MO	Weldon Spring Former Army Ordnance Works	St. Charles County	01	RI/FS	FF	02/16/90	1	93	1	93	0
7	MO	Weldon Spring Quarry/Plant/Pits (USDOE/Army) (once listed as Weldon Spring Quarry (USDOE/Army))	St. Charles County	01	RI/FS	FF	08/22/86	4	92	2	93	-2
				02	RA	FF	06/03/91			3	92	new

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7	NE	10th Street Site	Columbus	01	RI/FS	F	12/08/89	4	92	3	92	1
7	NE	Cleburn Street Well	Grand Island	01	RI/FS	F	09/16/91			3	93	new
7	NE	Cornhusker Army Ammunition Plant	Hall County	01	RI/FS	FF	03/15/90	1	93	4	94	-7
7	NE	Hastings Ground Water Contamination	Hastings	00	RI	F	03/22/85			3	99	DNE
				01	RI/FS	F	10/15/86	3	91	4	91	-1
				02	RI/FS	PRP	09/26/89	3	91	4	91	-1
				06	FS	F	12/29/88	3	93	3	93	0
				08	RI/FS	PRP	09/30/91			2	94	new
				12	RI/FS	F	08/31/90	4	92	1	94	-5
				13	RI/FS	F	01/03/91			2	93	new
				14	RI/FS	PRP	06/15/86	1	93	2	93	-1
				16	RI/FS	PRP	02/11/91			2	93	new
7	NE	Nebraska Ordnance Plant (Former)	Mead	01	RI/FS	PRP	09/26/91	4	92	4	93	-4
7	NE	Sherwood Medical Co.	Norfolk	01	RI/FS	PRP	03/21/91			2	93	new
7	NE	Waverly Groundwater Contamination	Waverly	01	RA	PRP	12/11/90			4	94	new
8	CO	Air Force Plant PJKS	Watertown	01	RI/FS	FF	02/07/89			4	92	DNE
8	CO	Broderick Wood Products	Denver	01	RA	F	09/25/89	1	91	4	92	-7
				02	RI/FS	PRP	01/16/89	1	92	1	92	0
8	CO	California Gulch	Leadville	01	RA	PRP	09/04/90	4	93	4	93	0
				02	RI/FS	PRP*	04/07/87	2	92	1	93	-3
				02	RI/FS	PRP	04/07/87			1	93	DNE
8	CO	Central City - Clear Creek	Idaho Springs	02	RA	F	03/29/89	4	94	4	91	12
8	CO	Denver Radium Site	Denver	02	RA	F	04/02/91			4	92	new
				02	RA	F	03/30/89	4	92	4	92	0
				06	RA	F	03/30/89	4	91	4	92	-4
				08	FS	S*	06/24/88	2	91	4	91	-2
				09	FS	F	09/10/90			1	92	DNE

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8	CO	Eagle Mine	Minturn/Redcliff	01	RA	PS	09/01/88	4	94	4	94	0
				01	FS	FE	09/25/90			3	92	DNE
8	CO	Lowry Landfill	Arapahoe County	01	RI/FS	PRP	12/07/88	1	93	2	93	-1
				02	RI/FS	PRP	10/23/89	2	94	4	93	2
				03	RI/FS	PRP	10/23/89	1	94	4	93	1
				04	RI/FS	PRP	03/25/91			2	93	new
				06	RI/FS	PRP	09/27/89	1	93	2	93	-1
8	CO	Marshall Landfill	Boulder County	01	RA	PRP	09/16/89	1	91	4	91	-3
				01	RA	PRP	09/30/91			2	93	new
8	CO	Rocky Flats Plant (USDOE)	Golden	01	RA	FF	01/15/90	2	92	2	92	0
				01	RI	FF	02/06/90	1	95	1	95	0
				02	RI	FF	04/12/90	4	95	4	95	0
				02	RA	FF	05/13/91			1	92	new
				03	RI	FF	07/10/91			4	99	new
				04	RI	FF	06/08/90	3	95	3	95	0
				05	RI	FF	04/05/91			4	99	new
				06	RI	FF	04/19/91			4	99	new
				07	RI	FF	06/08/90	1	96	1	96	0
				09	RI	FF	06/08/90	3	96	3	96	0
				11	RI	FF	06/08/90			1	97	DNE
8	CO	Rocky Mountain Arsenal	Adams County	02	RI	FF	10/27/87	1	91	4	91	-3
				03	RI/FS	FF	02/15/85	2	93	2	93	0
				04	RI/FS	FF	02/15/85	3	92	3	92	0
				05	RA	FF	09/10/91			4	92	new
				14	RA	FF	07/10/90	1	93	1	93	0
				17	RA	FF	08/05/91			4	92	new
				18	RA	FF	01/02/91			1	93	new
				19	RA	FF	12/11/90			1	92	new
				22	RA	FF	11/30/90			1	93	new
				23	RA	FF	04/15/91			1	93	new
				24	RA	FF	06/05/90	1	92	1	92	0
				25	RA	FF	03/21/91			3	93	new

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8	CO	Sand Creek Industrial	Commerce City	01	RA	F	09/25/90	3 92	3 93	-4
				02	RI/FS	F	04/07/91		1 93	new
				03	RI/FS	PRP	12/29/89	3 92	1 93	-2
				06	RI/FS	PRP	09/27/90	3 92	1 93	-2
8	CO	Smuggler Mountain	Pitkin County	01	RA	F	09/28/90	1 91	4 91	-3
				01	RA	F	03/29/91		4 93	new
8	CO	Woodbury Chemical Co.	Commerce City	01	RA	PRP	06/28/91		4 92	new
				02	RA	PRP	06/28/91		4 92	new
8	MT	Anaconda Co. Smelter	Anaconda	14	RI/FS	PRP	09/28/88	2 93	2 93	0
8	MT	East Helena Site (once listed as East Helena Smelter)	East Helena	02	RI/FS	PRP	06/23/87	3 91	2 93	-7
				03	RI/FS	PRP	06/27/87	3 93	3 93	0
8	MT	Idaho Pole Co.	Bozeman	01	RI/FS	S	09/25/87	3 92	3 92	0
8	MT	Libby Ground Water Contamination	Libby	02	RA	PRP	10/18/89	2 93	2 95	-8
8	MT	Milltown Reservoir Sediments	Milltown	02	FS	PRP	02/02/90	2 94	2 94	0
				02	RI	PRP	02/02/90	2 94	2 94	0
8	MT	Montana Pole and Treating	Butte	01	RI/FS	PS	04/24/90	1 93	2 93	-1
8	MT	Silver Bow Creek/Butte Area (once listed as Silver Bow Creek)	Silver Bow/Deer Lodge	03	RI/FS	PRP	05/04/90	3 94	3 94	0
				05	RI/FS	S	05/27/88	1 93	1 93	0
				07	RI/FS	PRP	08/02/91		2 93	new
				12	FS	PRP	01/15/91		3 92	new
8	ND	Arsenic Trioxide Site	Southeastern ND	01	RA	S	08/11/89	1 93	1 94	-4
8	ND	Minot Landfill	Minot	01	RI/FS	PRP*	09/28/90	2 92	2 93	-4
8	SD	Ellsworth Air Force Base	Rapid City	01	RI/FS	FF	04/13/90		1 93	DNE

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
8	SD	Whitewood Creek	Whitewood	01	RA	PRP	09/13/91			2	93	new
8	SD	Williams Pipe Line Co. Disposal Pit	Sioux Falls	01	RI/FS	PRP	04/25/91			1	93	new
8	UT	Hill Air Force Base	Ogden	01	RI/FS	FF	06/28/91	2	92	2	94	-8
				02	RI/FS	FF	06/28/91	3	91	1	94	-10
				03	RI/FS	FF	07/25/91	2	91	3	92	-5
				05	RI/FS	FF	08/13/91	1	92	3	95	-14
8	UT	Midvale Slag	Midvale	01	RI/FS	F	08/07/89	2	93	3	93	-1
				02	RI/FS	F	09/10/91			2	95	new
8	UT	Monticello Mill Tailings (USDOE)	Monticello	01	RA	FF	08/19/91			3	92	new
				03	RI/FS	FF	05/31/91			1	98	new
8	UT	Monticello Radioactively Contaminated Properties	Monticello	01	RA	PRP	09/06/84	3	94	3	94	0
8	UT	Monticello Radioactively Contaminated Properties	Monticello	01	RI/FS	PRP	03/12/91			4	91	new
				02	RA	PRP	11/09/90			2	96	new
8	UT	Ogden Defense Depot	Ogden	01	RI/FS	FF	09/29/89	2	92	4	92	-2
				03	RI/FS	FF	11/05/90	4	92	1	93	-1
				04	RI/FS	FF	09/29/89	3	92	4	92	-1
8	UT	Portland Cement (Kiln Dust 2 & 3)	Salt Lake City	02	RI/FS	F*	03/26/91	2	92	2	92	0
8	UT	Sharon Steel Corp. (Midvale Tailings) (once listed as Sharon Steel Corp. (Midvale Smelter))	Midvale	01	RI/FS	FE	12/31/84	2	91	4	92	-6
				01	RI/FS	PRP*	12/31/84	2	91	4	92	-6
				02	RA	F	08/21/91			1	92	new
8	UT	Tooele Army Depot (North Area)	Tooele	01	RI/FS	FF	08/16/90			3	94	DNE
				05	RI/FS	FF	09/16/91			1	93	new
8	UT	Utah Power & Light/American Barrel Co.	Salt Lake City	01	RI/FS	PRP	08/10/90	4	92	4	93	-4

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
9	AZ	Apache Powder Co.	St. David	01	RI/FS	PRP	10/05/89	2	93	2	93	0
9	AZ	Hassayampa Landfill	Hassayampa	01	RI/FS	PRP	02/19/88	1	92	4	92	-3
9	AZ	Indian Bend Wash Area	Scottsdate/Tempe/	03	RI/FS	F	03/14/88	4	92	2	93	-2
			Phoenix	07	RI/FS	EP	09/26/90	4	92	2	93	-2
9	AZ	Luke Air Force Base	Glendale	01	RI/FS	FF	09/27/90	4	93	1	95	-5
				02	RI/FS	FF	09/27/90	3	93	1	94	-2
9	AZ	Motorola, Inc. (52nd Street Plant)	Phoenix	01	RA	PS	08/15/90	3	92	3	92	0
				02	RI/FS	PS	06/20/89	1	92	3	92	-2
9	AZ	Tucson International Airport Area	Tucson	01	RA	PRP	09/12/91			1	93	new
				02	RI/FS	PRP	12/11/90			1	94	new
9	AZ	Williams Air Force Base	Chandler	01	RI/FS	FF	09/21/90	4	93	2	94	-2
				02	RI/FS	FF	09/21/90	4	92	1	93	-1
9	AZ	Yuma Marine Corps Air Station	Yuma	01	RI/FS	FF	09/30/91			4	95	new
				02	RI/FS	FF	09/30/91			4	95	new
9	CA	Advanced Micro Devices, Inc.	Sunnyvale	01	RI/FS	PS	04/19/89	2	91	4	91	-2
9	CA	Aerojet General Corp.	Rancho Cordova	01	RI/FS	PRP	09/08/88	4	94	4	96	-8
9	CA	Atlas Asbestos Mine	Fresno County	02	RA	PRP	10/16/89	4	90	4	91	-4
9	CA	Barstow Marine Corps Logistics Base (Nebo Area)	Barstow	01	RI/FS	FF	09/28/90	3	93	4	93	-1
				02	RI/FS	FF	09/28/90	3	93	1	94	-2
9	CA	Beckman Instruments (Porterville Plant)	Porterville	01	RA	PRP	12/19/90			2	93	new
9	CA	Brown & Bryant, Inc. (Arvin Plant)	Arvin	01	RI/FS	EP	05/03/90	1	93	3	93	-2

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
9	CA	Camp Pendleton Marine Corps Base	San Diego County	01	RI/FS	FF	09/28/90	2	94	2	94	0
				02	RI/FS	FF	09/28/90	4	93	3	94	-3
				03	RI/FS	FF	09/28/90	4	93	3	95	-7
9	CA	Castle Air Force Base	Merced	01	RI/FS	FF	07/21/89	4	93	3	95	-7
				03	RI/FS	FF	05/29/91			1	93	new
9	CA	Coalinga Asbestos Mine	Coalinga	02	RA	PRP	10/16/89	4	90	4	91	-4
9	CA	Del Norte Pesticide Storage	Crescent City	01	RA	F	09/26/89	2	92	2	92	0
9	CA	Edwards Air Force Base	Kern County	01	RI/FS	FF	09/26/90	3	92	3	99	-28
				02	RI/FS	FF	09/26/90	1	93	3	96	-14
9	CA	El Toro Marine Corps Air Station	El Toro	01	RI/FS	FF	09/28/90	1	93	4	93	-3
				02	RI/FS	FF	09/28/90	2	93	2	94	-4
				03	RI/FS	FF	09/28/90			3	94	DNE
9	CA	Fort Ord	Marina	01	RI/FS	FF	07/23/90	4	95	2	97	-6
				02	RI/FS	FF	07/23/90	1	92	3	93	-6
				03	RI/FS	FF	07/23/90	4	92	4	93	-4
9	CA	Fresno Municipal Sanitary Landfill	Fresno	01	RI/FS	PRP	09/20/90	4	92	3	93	-3
9	CA	George Air Force Base	Victorville	01	RI/FS	FF	09/21/90	4	95	1	95	3
				02	RI/FS	FF	09/21/90	3	92	1	93	-2
				03	RI/FS	FF	09/21/90	4	92	1	94	-5
				04	RI/FS	FF	08/27/91			3	94	new
9	CA	Hewlett Packard (620-640 Page Mill Rd.)	Palo Alto	01	RI/FS	PS	03/16/89	4	91	2	93	-6
9	CA	Hexcel Corp.	Livermore	01	RI/FS	PS	05/16/90	2	92	2	93	-4
9	CA	Iron Mountain Mine	Redding	01	RA	PRP	03/29/90	1	92	3	92	-2
				02	RI/FS	F	03/28/87	2	93	3	92	3

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
9	CA	Jasco Chemical Corp.	Mountain View	01	RI/FS	PRP	12/21/88	1	92	3	92	-2
9	CA	Lawrence Livermore National Laboratory (USDOE)	Livermore	01	RI/FS	FF	11/02/88	2	92	3	92	-1
9	CA	Liquid Gold Oil Corp.	Richmond	01	RI/FS	PS	09/20/83			1	93	DNE
9	CA	Lorentz Barrel & Drum Co.	San Jose	01	RI/FS	F	02/17/88	1	92	1	93	-4
				02	RA	PRP	07/10/91			4	92	new
9	CA	Lousiana-Pacific Corp.	Oroville	01	RI	EP*	02/08/88	4	90	4	91	-4
9	CA	MGM Brakes	Cloverdale	01	RA	PRP	01/29/91			3	93	new
9	CA	March Air Force Base	Riverside	01	RI/FS	FF	09/27/90	4	95	1	97	-5
				02	RI/FS	FF	09/27/90	3	92	4	94	-9
				03	RI/FS	FF	08/06/91			3	95	new
9	CA	Mather Air Force Base (once listed as Mather Air Force Base (AC & W Disposal Site)	Sacramento	01	RI/FS	FF	06/06/91	3	92	1	94	-6
				02	RI/FS	FF	07/21/89	4	93	4	93	0
				03	RI/FS	FF	07/21/89			3	92	DNE
9	CA	McClellan Air Force Base (Ground Water Contamination)	Sacramento	01	RI/FS	FF	07/21/89	2	96	4	99	-14
				02	RI/FS	FF	07/21/89	2	94	1	95	-3
				03	RI/FS	FF	07/21/89	2	96	1	93	13
				04	RI/FS	FF	07/21/89	2	96	4	97	-6
				05	RI/FS	FF	10/01/90			4	99	new
9	CA	McColl	Fullerton	01	RA	S	06/11/84	4	90	4	91	-4
				02	RI/FS	F	02/03/86	3	91	1	94	-10
				04	RI/FS	F	09/27/90	4	93	4	95	-8
9	CA	Modesto Ground Water Contamination	Modesto	01	RI/FS	F	03/21/91			3	93	new
9	CA	Moffett Naval Air Station	Sunnyvale	01	RI/FS	FF	08/08/89	2	93	3	97	-17
				02	RI/FS	FF	08/08/89	1	94	1	94	0
				03	RI/FS	FF	09/12/91			1	93	new

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
9	CA	Monolithic Memories	Sunnyvale	01	RI/FS	PS	04/19/89	3	91	4	91	-1
9	CA	Montrose Chemical Corp.	Torrance	01	RI/FS	PRP	10/10/86	4	92	1	93	-1
9	CA	National Semiconductor Corp.	Santa Clara	01	RI/FS	PS	04/19/89	3	91	4	91	-1
9	CA	Newmark Ground Water Contamination	San Bernadino	01	RI/FS	F	06/28/90	4	92	1	93	-1
9	CA	Norton Air Force Base	San Bernardino	01	RI/FS	FF	06/29/89	4	95	4	95	0
				02	RI/FS	FF	06/29/89	4	92	4	92	0
9	CA	Operating Industries, Inc., Landfill	Monterey Park	01	RI/FS	F	09/15/89	4	93	4	93	0
				02	RA	PRP	07/18/91			2	94	new
				04	RA	PRP	05/11/89	4	94	4	94	0
9	CA	Pacific Coast Pipe Lines	Fillmore	01	RI/FS	PRP	11/15/89	1	92	2	92	-1
9	CA	Purity Oil Sales, Inc.	Malaga	01	RA	F	07/19/90	2	91	3	92	-5
				02	FS	F	06/23/89	1	91	4	92	-7
9	CA	Riverbank Army Ammunition Plant	Riverbank	01	RI/FS	FF	04/05/90	3	92	3	93	-4
9	CA	Sacramento Army Depot	Sacramento	01	RI/FS	FF	12/16/88	4	96	4	96	0
				02	RA	FF	02/16/90	4	99	4	99	0
				03	RI/FS	FF	12/16/88	4	91	4	91	0
				04	RI/FS	FF	12/16/88	1	92	4	92	-3
				05	RI/FS	FF	11/13/90			1	93	new
9	CA	San Fernando Valley (Area 1)	Los Angeles	01	RI/FS	S	08/16/85	4	93	4	93	0
9	CA	San Fernando Valley (Area 2)	Los Angeles/Glendale	01	RI/FS	S	08/16/85	4	93	4	93	0
				02	RI/FS	S	09/06/89	1	92	1	93	-4
9	CA	San Fernando Valley (Area 3)	Glendale	01	RI/FS	S	08/16/85	4	93	4	93	0

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
9	CA	San Fernando Valley (Area 4)	Los Angeles	01	RI/FS	S	08/16/85	4	93	4	93	0
9	CA	San Gabriel Valley (Area 1)	El Monte	01	RI/FS	F	06/13/84	4	93	4	99	-24
				02	RI/FS	F	04/01/87	3	91	4	92	-5
9	CA	San Gabriel Valley (Area 2)	Baldwin Park Area	01	RI/FS	F	06/13/84	4	93	4	99	-24
				03	RI/FS	F	08/01/87	1	92	4	92	-3
				05	RI/FS	F	04/01/87	3	91	4	92	-5
9	CA	San Gabriel Valley (Area 3)	Alhambra	01	RI/FS	F	06/13/84	4	93	4	99	-24
9	CA	San Gabriel Valley (Area 4)	La Puente	01	RI/FS	F	06/13/84	4	93	4	99	-24
				03	RI/FS	F	04/01/87	3	91	4	92	-5
9	CA	Sharpe Army Depot	Lathrop	01	RI/FS	FF	03/16/89	3	93	3	93	0
				02	RI/FS	FF	03/16/89	4	91	1	93	-5
9	CA	Stringfellow	Glen Avon Heights	01	RI/FS	S	08/07/84	3	92	4	93	-5
9	CA	Sulphur Bank Mercury Mine	Clear Lake	01	RI/FS	EP	09/28/90	4	92	1	94	-5
				01	RI/FS	EP	09/28/90	4	92	1	94	-5
9	CA	T.H. Agriculture & Nutrition Co. (once listed as Thompson-Haywood Chemical Co.)	Fresno	01	RI/FS	PS	02/06/87	1	92	1	93	-4
9	CA	TRW Microwave, Inc. (Building 825)	Sunnyvale	01	RI/FS	PS	04/19/89	2	91	4	91	-2
9	CA	Tracy Defense Depot	Tracy	01	RI/FS	FF	06/27/91			4	94	new
				02	RI/FS	FF	06/27/91			3	93	new
9	CA	Travis Air Force Base	Solano County	01	RI/FS	FF	09/28/90	1	93	2	94	-5
				02	RI/FS	FF	09/28/90	1	93	2	94	-5

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
9	CA	Treasure Island Naval Station - Hunters Point Annex	San Francisco	01	RI/FS	FF	09/28/90	4	93	4	94	-4
				02	RI/FS	FF	09/28/90	4	93	1	94	-1
				03	RI/FS	FF	09/28/90	4	93	2	94	-2
				04	RI/FS	FF	10/01/90			2	94	new
				05	RI/FS	FF	01/22/91			4	94	new
9	CA	United Heckathorn Co.	Richmond	01	RI/FS	F	09/26/91			3	93	new
9	CA	Waste Disposal, Inc.	Santa Fe Springs	01	RI/FS	F	12/22/87	4	90	2	93	-10
9	CA	Watkins-Johnson Co. (Stewart Division)	Scotts Valley	01	RA	PRP	07/16/91			4	93	new
9	CA	Westinghouse Electric Corp. (Sunnyvale Plant)	Sunnyvale	01	RI/FS	PRP	08/24/88	1	92	1	92	0
9	HI	Schofield Barracks	Oahu	01	RI/FS	FF	09/27/91			2	95	new
				02	RI/FS	FF	09/27/91			4	95	new
				03	RI/FS	FF	09/27/91			3	96	new
9	NV	Carson River Mercury Site	Lyon/Churchill County	01	RI/FS	F	09/28/90			4	93	DNE
10	AK	Alaska Battery Enterprises	Fairbanks	01	RI/FS	F	05/04/90	4	92	1	93	-1
10	AK	Eielson Air Force Base	Fairbanks N Star Borough	02	RI/FS	FF	06/17/91			2	93	new
				07	RI/FS	FF	05/21/91			4	95	new
				08	RI/FS	FF	06/17/91			4	92	new
				09	RI/FS	FF	06/17/91			3	93	new
10	AK	Elmendorf Air Force Base	Greater Anchorage Borough	01	RI/FS	FF	09/30/91			4	92	new
10	ID	Arrcom (Drexler Enterprises)	Rathdrum	01	RI/FS	F	05/01/87	4	91	4	92	-4
10	ID	Bunker Hill Mining & Metallurgical	Smelterville	02	RI/FS	PRP	05/13/87	2	93	3	92	3

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
10	ID	Eastern Michaud Flats Contamination	Pocatello	01	RI/FS	PRP	05/30/91			3	94	new
10	ID	Kerr-McGee Chemical Corp. (Soda Springs Plant)	Soda Springs	01	RI/FS	PRP	09/20/90	1	94	4	94	-3
10	ID	Monsanto Chemcial Co. (Soda Springs Plant)	Soda Springs	01	RI/FS	PRP	03/19/91			2	94	new
10	ID	Pacific Hide & Fur Recycling Co.	Pocatello	01	RA	PRP	09/22/89	1	92	4	93	-7
10	OR	Allied Plating, Inc.	Portland	01	RI/FS	F	09/24/87	4	91	4	92	-4
10	OR	Joseph Forests Products	Joseph	01	RI/FS	F	09/21/89	4	92	4	92	0
10	OR	Martin-Marietta Aluminum Co.	The Dalles	01	RA	PRP	05/15/90	3	92	3	92	0
10	OR	Teledyne Wah Chang	Albany	01	RI/FS	PRP	05/05/87	2	92	2	93	-4
				02	RA	PRP	07/12/91			4	92	new
10	OR	Umatilla Army Depot (Lagoons)	Hermiston	01	RI/FS	FF	01/26/90	3	92	1	93	-2
				02	RI/FS	FF	01/26/90			3	92	DNE
				03	RI/FS	FF	01/26/90			1	93	DNE
				04	RI/FS	FF	01/26/90			1	93	DNE
				05	RI/FS	FF	01/26/90			1	93	DNE
				06	RI/FS	FF	01/26/90			1	93	DNE
10	OR	United Chrome Products, Inc.	Corvallis	01	RA	F	09/24/87	1	92	1	92	0
10	WA	American Crossarm & Conduit Co.	Chehalis	01	RI/FS	F	07/12/89	4	92	1	93	-1
10	WA	Bangor Naval Submarine Base	Silverdale	01	RI/FS	FF	02/16/90	2	92	4	92	-2
				02	RI/FS	FF	02/16/90	3	92	1	94	-6
				03	RI/FS	FF	06/29/90	3	93	4	93	-1
				04	RI/FS	FF	07/30/90	3	93	4	93	-1
				05	RI/FS	FF	09/02/90	3	93	1	94	-2

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AND REMEDIAL ACTIONS IN PROGRESS ON SEPTEMBE 30, 1991

RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
10	WA	Bangor Ordnance Disposal	Bremerton	01	RI/FS	FF	01/29/90	4	91	2	92	-2
10	WA	Bonneville Power Administration Ross Complex (USDOE)	Vancouver	01	RI/FS	FF	05/15/90	2	92	1	93	-3
10	WA	Colbert Landfill	Colbert	01	RA	MR	08/28/89	4	93	4	93	0
10	WA	Commencement Bay, Near Shore/Tide Flats	Pierce County	02	RI/FS	PRP	09/10/86	1	92	3	93	-6
				04	RI/FS	F	09/27/89	1	92	4	92	-3
				05	RA	PS	01/16/90	4	94	1	94	3
				05	RA	PS	09/30/89	1	94	4	94	-3
				05	RA	PS	06/30/89	4	95	4	95	0
				05	RA	PS	11/16/90			1	93	new
				06	FS	FE	01/23/91			1	92	new
10	WA	Commencement Bay, South Tacoma Channel	Tacoma	01	RA	F	07/19/90	1	92	4	92	-3
				02	RI/FS	PRP	10/15/90			4	93	new
				03	RA	PRP	07/20/90	1	92	4	92	-3
10	WA	Fairchild Air Force Base (4 Waste Areas)	Spokane County	01	RI/FS	FF	03/27/90	4	92	1	93	-1
				02	RI/FS	FF	03/27/90			4	93	DNE
10	WA	Fort Lewis (Landfill No.5)	Tacoma	01	RI/FS	FF	01/29/90	4	91	4	92	-4
10	WA	Fort Lewis Logistics Center	Tillicum	02	RI/FS	FF	02/08/91			1	94	new
10	WA	Hanford 100-Area (USDOE)	Benton County	01	RI/FS	FF	06/30/89	2	93	2	93	0
				01	RI/FS	FF	05/15/89	3	92	2	94	-7
				02	RI/FS	FF	06/30/89	2	93	2	93	0
				03	RI/FS	FF	10/27/89	3	93	3	93	0
				04	RI/FS	FF	04/09/90	2	94	2	94	0
				05	RI/FS	FF	04/09/90	2	95	2	95	0
				06	RI/FS	FF	06/05/90	2	94	2	94	0
				07	RI/FS	FF	06/05/90	2	95	2	95	0
				08	RI/FS	FF	10/12/90			3	93	new
				09	RI/FS	FF	10/12/90			2	95	new

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APPENDIX A

STATUS OF REMEDIAL INVESTIGATIONS, FEASIBILITY STUDIES, AND REMEDIAL ACTIONS IN PROGRESS ON SEPTEMBER 30, 1991

RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	ACTIVITY	LEAD	FUNDING START	PREVIOUS COMPLETION SCHEDULE		PRESENT COMPLETION SCHEDULE		STATUS
10	WA	Hanford 200-Area (USDOE)	Benton County	01	RI/FS	FF	05/15/89	2	94	2	94	0
10	WA	Hanford 300-Area (USDOE)	Benton County	01	RI/FS	FF	05/15/89	1	93	3	95	-10
				02	RI/FS	FF	09/27/89	3	94	2	96	-7
10	WA	Harbor Island (Lead)	Seattle	01	RI/FS	F	09/07/88	2	92	4	92	-2
				03	RI/FS	PRP	09/14/90	1	93	1	93	0
				07	RI/FS	F	09/07/88			4	93	DNE
				08	RI/FS	F	05/11/90			2	93	DNE
10	WA	Lakewood Site	Lakewood	01	RA	F	09/24/87	1	92	4	92	-3
10	WA	McChord Air Force Base (Wash Rack/ Treatment Area)	Tacoma	01	RI/FS	FF	10/23/89	3	92	4	92	-1
10	WA	Naval Air Station, Whidbey Island (Ault Field)	Whidbey Island	01	RI/FS	FF	10/16/90	4	92	4	92	0
				02	RI/FS	FF	06/30/91			4	93	new
10	WA	Naval Air Station, Whidbey Island (Seaplane Base)	Whidbey Island	01	RI/FS	FF	01/02/91			3	93	new
10	WA	Naval Undersea Warfare Engineering Stn. (4 Waste Area)	Keyport	01	RI/FS	FF	07/17/90	1	92	2	93	-5
10	WA	Queen City Farms	Maple Valley	01	RI/FS	PRP	05/06/88	2	92	1	93	-3
10	WA	Silver Mountain Mine	Loomis	01	RA	F	06/15/91			4	93	new
10	WA	Western Processing Co., Inc.	Kent	02	RA	PRP	07/06/87	4	90	1	92	-5
10	WA	Wycoff Co./Eagle Harbor	Bainbridge Island	01	RI/FS	F	09/03/87	1	92	3	92	-2

Appendix B
Remedial Designs in Progress on September 30, 1991

This appendix lists the remedial designs in progress at the end of FY91 and their estimated completion schedule. Activities at multiple operable units, as well as first and subsequent activities, are listed.

- **RG** — EPA region in which the site is located.
- **ST** — State in which the site is located.
- **Site Name** — Name of the site, as listed on the National Priorities List (NPL).
- **Location** — Location of the site, as listed on the NPL.
- **Operable Unit** — Operable unit at which the corresponding remedial activity is occurring; a single site may include more than one operable unit.
- **Lead** — The entity leading the activity, as follows:

  EP: Fund-financed with EPA employees performing the project, not contractors;

  F: Fund-financed and federal-lead by the Superfund remedial program;

  FE: EPA enforcement program-lead;

  FF: Federal facility-lead;

  MR: Mixed funding; monies from both the Fund and potentially responsible parties (PRPs);

  PRP: PRP-financed and conducted;

  PS: PRP-financed work performed by the PRP under a state order (may include federal financing or federal oversight under an enforcement document);

  S: State-lead and Fund-financed; and

  SE: State enforcement-lead (may include federal financing).

  Remaining terms used in the CERCLA Information System (CERCLIS) database, **O** (other), **SN** (state-lead and -financed, no Fund money), and **SR** (state-ordered PRP response activities), are excluded from this status report because they do not include federal financing.
- **Funding Start** — The date on which funds were allocated for the activity.
- **Present Completion Schedule** — The quarter and fiscal year of the planned completion date for the activity, as of 9/30/91. This information was compiled from CERCLIS on 10/18/91.

APPENDIX B

STATUS OF REMEDIAL DESIGNS IN PROGRESS ON SEPTEMBER 30, 1991

RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
1	CT	Beacon Heights Landfill	Beacon Falls	02	PRP	07/02/87	1	92
1	CT	Kellogg-Deering Well Field	Norwalk	02	PRP	03/14/91	2	93
1	CT	Laurel Park Inc. (once listed as Laurel Park Landfill)	Naugatuck Borough	02	PRP	04/24/91	1	93
1	MA	Baird & McGuire	Holbrook	04	S	09/24/91	1	93
1	MA	Charles-George Reclamation Trust Landfill	Tyngsborough	04	F	09/30/88	1	93
1	MA	Groveland Wells	Groveland	02	PRP	03/18/91	3	92
1	MA	Hocomonco Pond	Westborough	02	PRP	08/07/87	2	93
1	MA	Industri-Plex (once listed as Mark Phillip Trust)	Woburn	01	PRP	09/22/88	3	92
1	MA	New Bedford Site	New Bedford	02	F	06/28/90	1	92
1	MA	Norwood PCBs	Norwood	01	F	09/28/90	1	94
1	MA	Re-Solve, Inc.	Dartmouth	02 03	MR MR	03/30/89 03/30/89	3 4	93 93
1	MA	Rose Disposal Pit	Lanesboro	01	PRP	08/16/89	1	93
1	MA	Sullivan's Ledge	New Bedford	01	PRP	03/15/91	2	94
1	MA	W.R. Grace & Co., Inc. (Acton Plant)	Acton	02	PRP	05/18/90	3	94
1	MA	Wells G&H	Woburn	01	PRP	04/27/90	1	93
1	ME	O'Connor Co.	Augusta	01	PRP	12/14/90	2	93
1	ME	Pinette's Salvage Yard	Washburn	02	F	09/13/89	1	93
1	ME	Saco Tannery Waste Pits	Saco	01	F	09/29/89	4	92
1	ME	Winthrop Landfill	Winthrop	02	PRP	08/18/89	2	92

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APPENDIX B

STATUS OF REMEDIAL DESIGNS IN PROGRESS ON SEPTEMBER 30, 1991

RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
1	NH	Auburn Road Landfill	Londonderry	02	PRP	09/30/90	2	93
				03	PRP	09/30/90	1	93
1	NH	Kearsarge Mettallurgical Corp. (once listed as Kearsage Metallurgi cal Corp.)	Conway	02	F	09/27/91	1	93
1	NH	Ottati & Goss/Kingston Steel Drum (once listed as Ottati & Goss)	Kingston	02	PRP	03/15/89	2	93
				03	F	09/20/90	2	93
				04	F	09/20/90	4	92
1	NH	South Municipal Water Supply Well	Peterborough	01	PRP	09/04/90	1	93
1	NH	Tinkham Garage	Londonderry	01	PRP	09/23/88	2	92
				02	PRP	09/23/88	2	93
1	RI	Davis Liquid Waste	Smithfield	02	F	07/11/88	3	93
1	RI	Landfill & Resource Recovery, Inc. (L&RR)	North Smithfield	01	PRP	11/16/90	2	93
1	RI	Stamina Mills, Inc. (once listed as Forestdale - Stamina Mills, Inc.)	North Smithfield	01	PRP	07/16/91	1	93
1	VT	Old Springfield Landfill	Springfield	01	PRP	09/29/89	2	92
2	NJ	Asbestos Dump	Millington	01	PRP	10/20/89	4	92
2	NJ	Burnt Fly Bog	Marlboro Township	02	S	09/29/89	4	93
2	NJ	Caldwell Trucking Co.	Fairfield	01	F	04/22/87	3	92
				02	F	05/31/91	3	93
2	NJ	Chemical Control	Elizabeth	02	PRP*	10/23/90	3	93
2	NJ	Chemical Insecticide Corp.	Edison Township	01	F	09/30/89	1	92
2	NJ	Ciba-Geigy Corp. (once listed as Toms River Chemical)	Toms River	01	PRP	06/01/89	2	93

APPENDIX B

STATUS OF REMEDIAL DESIGNS IN PROGRESS ON SEPTEMBER 30, 1991

RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
2	NJ	Cinnaminson Township (Block 702) Ground Water Contamination	Cinnaminson Township	01	PRP	07/09/91	1	93
2	NJ	Combe Fill South Landfill	Chester Township	01	S	06/26/87	4	91
				01	S	06/26/87	1	93
2	NJ	D'Imperio Property	Hamilton Township	01	F	04/10/86	3	92
2	NJ	De Renewal Chemical Co.	Kingwood Township	01	F	09/30/89	1	93
2	NJ	Diamond Alkali Co.	Newark	01	PRP	12/14/89	1	93
2	NJ	Ewan Property	Shamong Township	01	PRP	10/13/89	4	92
2	NJ	Federal Aviation Administration Technical Center	Atlantic County	01	FF	10/31/89	1	93
				02	FF	03/31/91	4	92
2	NJ	Fort Dix (Landfill Site)	Pemberton Township	01	FF	06/04/91	4	92
2	NJ	GEMS Landfill	Gloucester Township	01	S	05/22/86	4	91
2	NJ	Glen Ridge Radium Site	Glen Ridge	01	F	05/25/89	1	93
				03	F	09/26/90	1	93
2	NJ	Goose Farm	Plumstead Township	01	PRP	01/09/88	3	92
2	NJ	Imperial Oil Co., Inc./Champion Chemicals	Morganville	01	S	09/30/91	1	93
2	NJ	Kin-Buc Landfill	Edison Township	01	PRP	09/30/88	2	93
2	NJ	King of Prussia	Winslow Township	01	PRP	05/02/91	2	93
2	NJ	Lang Property	Pemberton Township	01	F	03/20/87	1	92
2	NJ	Lipari Landfill	Pitman	03	F	09/29/88	2	92

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STATUS OF REMEDIAL DESIGNS IN PROGRESS ON SEPTEMBER 30, 1991

RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
2	NJ	Mannheim Avenue Dump	Galloway Township	01	PRP	06/14/91	1	93
2	NJ	Metaltec/Aerosystems	Franklin Borough	01	F	01/06/88	1	92
				02	F	03/29/91	3	93
2	NJ	Montclair/West Orange Radium Site	Montclair/West Orange	01	F	05/25/89	1	93
				03	F	09/26/90	1	93
2	NJ	Montgomery Township Housing Development	Montgomery Township	02	S	03/24/89	1	93
2	NJ	Nascolite Corp.	Millville	01	PRP*	01/16/91	2	93
				02	F	09/27/91	1	93
2	NJ	Pepe Field	Boonton	01	S	03/29/90	4	93
2	NJ	Price Landfill	Pleasantville	02	S	06/26/87	4	92
2	NJ	Reich Farms	Pleasant Plains	01	PRP	04/05/90	4	92
2	NJ	Rocky Hill Municipal Well	Rocky Hill Borough	01	S	03/24/89	1	93
2	NJ	Roebling Steel Co.	Florence	02	F	09/25/91	2	93
2	NJ	Sharkey Landfill	Parsippany/Troy Hills	01	S	03/31/87	2	93
2	NJ	Tabernacle Drum Dump	Tabernacle Township	01	PRP	11/29/89	4	92
2	NJ	Vineland Chemical Co., Inc.	Vineland	01	F	09/30/89	2	93
				01	F	10/02/89	1	93
2	NJ	Waldick Aerospace Devices, Inc.	Wall Township	01	F	01/13/88	1	92
				02	F	06/28/91	3	93
2	NJ	Williams Property	Swainton	01	S	09/30/88	4	92
2	NY	American Thermostat Co.	South Cairo	02	F	09/30/90	3	92
2	NY	Byron Barrel & Drum	Byron	01	PRP	09/21/90	1	93

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STATUS OF REMEDIAL DESIGNS IN PROGRESS ON SEPTEMBER 30, 1991

RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
2	NY	Circuitron Corp.	East Farmingdale	01	F	06/24/91	2	93
2	NY	Claremont Polychemical	Old Bethpage	01	F	09/28/90	1	93
2	NY	Colesville Municipal Landfill	Town of Colesville	01	PS	04/01/91	1	93
2	NY	Conklin Dumps	Conklin	01	PS	04/02/91	1	93
2	NY	Fulton Terminals	Fulton	01	PRP	11/28/90	2	93
2	NY	Genzale Plating Co.	Franklin Square	01	F	09/25/91	3	93
2	NY	Haviland Complex	Town of Hyde Park	01	F	04/29/88	4	91
				01	F	09/29/90	3	92
2	NY	Hooker Chemcial/Ruco Polymer Corp.	Hicksville	02	PRP	07/16/91	4	92
2	NY	Hooker Chemical (South Area)	Niagara Falls	01	PRP	12/01/86	1	93
				01	PRP	09/21/90	3	95
				01	PRP	05/31/91	1	94
2	NY	Kentucky Avenue Well Field	Horseheads	01	F	09/28/90	4	91
				02	PRP	08/29/91	1	93
2	NY	Ludlow Sand & Gravel	Clayville	01	PS*	11/12/89	4	93
2	NY	Marathon Battery Corp.	Cold Springs	01	F	06/26/87	1	92
				02	F	09/30/89	1	92
				03	F	09/30/88	1	92
2	NY	Mattiace Petrochemical Co., Inc.	Glen Cove	01	F	09/30/91	2	93
2	NY	North Sea Municipal Landfill	North Sea	01	PRP	09/26/90	4	92
2	NY	Port Washington Landfill	Port Washington	01	PRP	09/28/90	4	93
2	NY	Preferred Plating Corp.	Farmingdale	01	F	03/28/90	1	92
2	NY	SMS Instruments, Inc.	Deer Park	01	F	09/30/89	2	92

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
2	NY	Sarney Farm	Amenia	01	F	09/28/90	2	92
				01	F	03/29/91	1	93
2	NY	Sinclair Refinery	Wellsville	01	PRP	07/18/89	2	92
2	NY	Solvent Savers	Lincklaen	01	PRP	07/02/91	2	93
2	NY	Syosset Landfill	Oyster Bay	01	PRP	04/11/91	4	93
2	NY	Vestal Water Supply Well 1-1 (once listed with Well 4-2 as one site)	Vestal	02	F	03/28/91	1	93
				02	PRP	04/18/91	1	93
2	NY	Volney Municipal Landfill	Town of Volney	01	F	09/28/90	2	93
2	PR	GE Wiring Devices	Juana Diaz	01	FE	09/30/88	4	91
2	PR	Upjohn Facility	Barceloneta	01	PRP	05/09/89	1	93
				01	PRP	05/09/89	3	92
2	PR	Vega Alta Public Supply Wells	Vega Alta	01	PRP	04/27/89	2	92
3	DE	Delaware Sand & Gravel Landfill (once listed as Delaware Sand & Gravel-LLangollen Army Creek Landfills)	New Castle County	01	F	08/26/88	2	93
				02	F	08/26/88	1	92
3	DE	Harvey & Knott Drum, Inc.	Kirkwood	01	PRP	09/14/87	4	92
3	DE	New Castle Spill (once listed as TRIS Spill)	New Castle County	01	PRP	10/17/90	1	93
3	DE	Tybouts Corner Landfill	New Castle County	01	PRP	04/19/89	1	93
3	MD	Limestone Road	Cumberland	01	PRP	04/13/90	1	93
3	MD	Sand, Gravel & Stone	Elkton	01	PRP	01/05/89	4	92
3	MD	Southern Maryland Wood Treating	Hollywood	01	F	09/22/88	4	92

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STATUS OF REMEDIAL DESIGNS IN PROGRESS ON SEPTEMBER 30, 1991

RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE
3	PA	Ambler Asbestos Piles	Ambler	01	PRP	01/21/91	3 92
				02	PRP	09/12/90	1 92
3	PA	Bally Ground Water Contamination	Bally Borough	01	PRP	09/25/91	2 93
3	PA	Bendix Flight Systems Division	Bridgewater Township	02	PRP	04/19/90	1 93
3	PA	Blosenski Landfill	West Caln Township	01	F	02/14/90	3 92
3	PA	Brown's Battery Breaking	Shoemakersville	01	F	12/31/90	2 92
3	PA	Craig Farm Drum	Parker	01	PRP	09/26/90	1 93
3	PA	CryoChem, Inc.	Worman	01	F	02/22/90	2 92
				02	F	12/28/90	4 92
3	PA	Dorney Road Landfill	Upper Macungie Township	01	PRP	09/26/91	2 93
3	PA	Douglassville Disposal	Douglassville	03	F	09/27/89	4 92
3	PA	Drake Chemical	Lock Haven	03	F	01/03/89	1 92
				03	F	01/03/89	3 92
3	PA	East Mount Zion	Springettsbury Township	01	F	01/09/91	1 93
3	PA	Hebelka Auto Salvage Yard	Weisenberg Township	01	F	06/20/89	2 92
				02	F	06/20/89	2 92
3	PA	Heleva Landfill	North Whitehall Township	01	F	09/28/88	2 92
3	PA	Henderson Road	Upper Merion Township	01	PRP	02/27/89	4 92
3	PA	Hranica Landfill	Buffalo Township	01	PRP	08/26/91	1 93
3	PA	Kimberton Site	Kimberton Borough	02	PRP	11/01/90	2 92

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STATUS OF REMEDIAL DESIGNS IN PROGRESS ON SEPTEMBER 30, 1991

RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
3	PA	Letterkenny Army Depot (Southeast Area)	Chambersburg	01	FF	09/25/91	2	92
3	PA	Lord-Shope Landfill	Girard Township	01	PRP	08/19/91	4	92
3	PA	MW Manufacturing (once listed as Domino Salvage Yard)	Valley Township	03	F	09/30/90	1	93
3	PA	Mill Creek Dump	Erie	01	F	03/23/87	4	91
3	PA	Osborne Landfill	Grove City	01	PRP	08/12/91	2	93
3	PA	Palmerton Zinc Pile	Palmerton	02	PRP	11/02/88	1	94
3	PA	Raymark	Hatboro	02	F*	06/10/91	2	92
				03	F	06/10/91	4	92
				04	PRP	01/26/89	2	93
3	PA	Walsh Landfill	Honeybrook Township	01	F*	09/26/90	4	92
				01	F*	01/08/91	1	92
3	VA	Avtex Fibers, Inc.	Front Royal	01	PRP	08/26/89	2	93
3	VA	C&R Battery Co., Inc.	Chesterfield County	01	F	09/27/90	1	92
3	VA	Greenwood Chemical Co.	Newtown	01	F	06/29/90	2	92
3	VA	L.A. Clarke & Son	Spotsylvania County	01	PRP	03/03/90	1	93
3	VA	Saltville Waste Disposal Ponds	Saltville	04	PRP	07/27/88	2	93
3	VA	U.S. Titanium	Piney River	01	PRP	12/04/90	1	93
3	WV	Ordnance Works Disposal Areas	Morgantown	01	PRP	08/06/90	2	93
3	WV	West Virginia Ordnance	Point Pleasant	02	FF	04/15/91	2	92
4	AL	Anniston Army Depot (Southeast Industrial Area)	Anniston	02	FF	09/26/91	4	92

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
4	AL	Interstate Lead Co. (ILCO)	Leeds	01	F	09/30/91	2	93
4	AL	Perdido Ground Water Contamination	Perdido	01	PRP	06/20/89	2	92
4	AL	Stauffer Chemical Co. (Cold Creek Plant)	Bucks	01	PRP	04/25/90	1	93
4	AL	Stauffer Chemical Co. (LeMoyne Plant)	Axis	01	PRP	04/25/90	1	93
4	FL	American Creosote Works, Inc. (Pensacola Plant) (once listed as American Creosote Works)	Pensacola	01	F	09/25/89	1	92
4	FL	Cabot/Koppers	Gainesville	01 01	PRP PRP	09/27/91 04/12/91	1 1	93 93
4	FL	City Industries, Inc.	Orlando	01	F	09/28/90	2	92
4	FL	Coleman-Evans Wood Preserving Co.	Whitehouse	01	F	09/28/90	3	92
4	FL	Dubose Oil Products Co.	Cantonment	01	PRP	07/19/91	1	93
4	FL	Kassauf-Kimerling Battery Disposal (once listed as Timber Lake Battery Disposal)	Tampa	01	PRP	05/23/91	4	92
4	FL	Sapp Battery Salvage	Cottondale	01	F	06/30/90	1	92
4	FL	Schuylkill Metal Corp.	Plant City	01	PRP*	09/28/90	1	92
4	FL	Sherwood Medical Industries	Deland	02	PRP	03/27/91	3	92
4	FL	Sixty-Second Street Dump	Tampa	01	PRP	08/22/91	2	93
4	FL	Sydney Mine Sludge Ponds	Brandon	01	PRP	10/18/90	2	92
4	FL	Whitehouse Oil Pits	Whitehouse	01	F	06/26/85	1	93
4	FL	Yellow Water Road Dump	Baldwin	01	PRP	03/22/91	4	92

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE
4	FL	Zellwood Ground Water Contamination	Zellwood	01 01	F F	09/28/90 09/28/90	4 91 4 92
4	GA	Monsanto Corp. (Augusta Plant)	Augusta	01	PRP	03/28/91	1 93
4	GA	Robins Air Force Base (Landfill #4/Sludge Lagoon) (once listed as Robins Air Force Base)	Houston County	02	FF	08/01/91	4 92
4	KY	Airco	Calvert City	01	PRP	01/05/89	3 93
4	KY	B.F. Goodrich	Calvert City	01	PRP	01/05/89	3 93
4	KY	Howe Valley Landfill	Howe Valley	01	PRP	06/03/91	1 93
4	KY	Smith's Farm	Brooks	01	PRP	05/04/90	1 92
4	MS	Newson Brothers/Old Reichhold Chemicals, Inc.	Columbia	01	PRP	05/12/89	3 92
4	NC	Aberdeen Pesticide Dump	Aberdeen	04	PRP	03/21/90	1 93
4	NC	Jadco-Hughes Facility	Belmont	01	PRP	01/31/91	4 92
4	SC	Carolawn, Inc.	Fort Lawn	01	PRP	07/16/91	1 93
4	SC	Geiger (C & M Oil)	Rantoules	01 02	F F	09/18/89 07/31/90	1 92 4 92
4	SC	Palmetto Wood Preserving	Dixiana	02	F	02/08/89	1 92
4	SC	Wamchem, Inc.	Burton	01	PRP	01/31/89	1 92
4	TN	Lewisburg Dump	Lewisburg	01	PRP	09/05/91	1 93
4	TN	Oak Ridge Reservation (USDOE)	Oak Ridge	02 04	FF FF	06/28/91 09/30/91	3 92 4 92
5	IL	Cross Brothers Pail Recycling (Pembroke)	Pembroke Township	01	PRP	03/13/90	3 93

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
5	IL	NL Industries/Taracorp Lead Smelter	Granite City	01	F	03/08/91	1	93
5	IL	Sangamo Electric Dump/Crab Orchard National Wildlife Refuge (USDOI)	Carterville	01 02	FF PRP	05/02/91 05/14/91	3 3	93 94
5	IN	Envirochem Corp.	Zionsville	01	PRP	09/25/89	4	92
5	IN	MIDCO I	Gary	01	F	09/28/90	3	91
5	IN	MIDCO II	Gary	01 01	F F	09/30/89 06/15/90	3	91
5	IN	Neal's Dump (Spencer)	Spencer	01	PRP	08/22/85	3	93
5	IN	Ninth Avenue Dump	Gary	02	PRP	09/20/89	1	93
5	IN	Northside Sanitary Landfill, Inc.	Zionsville	01	PRP	03/12/90	1	93
5	IN	Wayne Waste Oil	Columbia City	01	PRP	08/13/91	2	94
5	MI	Anderson Development Co.	Adrian	01	PRP	09/10/91	1	93
5	MI	Auto Ion Chemicals, Inc.	Kalamazoo	01	PRP	08/28/90	3	92
5	MI	Bofors Nobel, Inc.	Muskegon	01	F	09/27/90	1	93
5	MI	Cliff/Dow Dump	Marquette	01	PRP	09/27/89	2	93
5	MI	Forest Waste Products	Otisville	02	F	06/27/88	1	93
5	MI	Hedblum Industries	Oscoda	01	PRP	03/22/90	2	92
5	MI	Ionia City Landfill	Ionia	01	PRP	09/13/90	1	93
5	MI	Kysor Industrial Corp.	Cadillac	01	PRP	05/16/90	4	92
5	MI	Liquid Disposal, Inc.	Utica	01	PRP	08/18/89	4	92
5	MI	Metamora Landfill	Metamora	01 02	PRP PRP	04/26/91 04/26/91	3 1	93 93

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STATUS OF REMEDIAL DESIGNS IN PROGRESS ON SEPTEMBER 30, 1991

RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
5	MI	Northernaire Plating	Cadillac	02	PRP	05/16/90	4	92
5	MI	Novaco Industries	Temperance	01	F	03/16/87	4	93
5	MI	Ott/Story/Cordova Chemical Co.	Dalton Township	01 02	F F	06/05/90 02/28/91	4 4	91 92
5	MI	Rose Township Dump	Rose Township	01	PRP	07/18/89	2	92
5	MI	Spiegelberg Landfill	Green Oak Township	02	PRP	08/22/91	1	93
5	MI	Springfield Township Dump	Davisburg	01	F	03/15/91	2	93
5	MI	Verona Well Field	Battle Creek	01	S	09/29/89	1	92
5	MN	Arrowhead Refinery Co.	Hermantown	01 01	PRP PRP	03/26/90 09/06/91	1 1	92 93
5	MN	Dakhue Sanitary Landfill	Cannon Falls	01	S	09/06/91	4	92
5	MN	Kummer Sanitary Landfill	Bemidji	03	S	06/28/91	4	93
5	MN	Oak Grove Sanitary Landfill	Oak Grove Towsnship	02	PRP	05/02/91	4	92
5	MN	South Andover Site (once listed as Andovers Sites)	Andover	01	F	05/23/89	1	92
5	MN	St. Louis River Site	St. Louis County	01	PS	03/26/91	4	92
5	MN	University of Minnesota (Rosemount Research Center)	Rosemount	03	PS	06/29/90	1	92
5	MN	Waste Disposal Engineering	Andover	01	PRP	08/30/91	4	92
5	OH	Allied Chemical & Ironton Coke	Ironton	01 02	PRP PRP	03/09/89 08/13/91	1 4	93 93
5	OH	Arcanum Iron & Metal	Drake County	01	F	03/20/87	2	93

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
5	OH	Big D Campground	Kingsville	02	PRP	05/02/90	4	92
5	OH	Bowers Landfill	Circleville	01	F	10/04/89	1	92
5	OH	Coshocton Landfill	Franklin Township	01	PRP	02/23/90	1	93
5	OH	E.H. Schilling Landfill	Hamilton Township	01	PRP	09/28/90	3	92
5	OH	Fields Brook	Ashtabula	01	PRP	03/22/89	3	93
5	OH	Industrial Excess Landfill	Uniontown	01	F	09/29/89	3	93
5	OH	Laskin/Poplar Oil Co. (once listed as Poplar Oil Co.)	Jefferson Township	01	PRP	07/27/90	2	92
5	OH	Pristine, Inc.	Reading	03	PRP	08/20/91	4	92
5	OH	Summit National	Deerfield Township	01	PRP	06/11/91	4	93
5	OH	United Scrap Lead Co., Inc.	Troy	01	F	04/10/89	2	93
5	WI	Algoma Municipal Landfill	Algoma	01	PRP	08/25/91	1	93
5	WI	Better Brite Plating Co. Chrome and Zinc Shops	DePere	2	F	08/05/91	2	92
5	WI	Eau Claire Municipal Well Field	Eau Claire	01	F	09/29/88	1	94
5	WI	Fadrowski Drum Disposal	Franklin	01	PRP	09/27/91	3	93
5	WI	Janesville Ash Beds	Janesville	01	PRP	07/12/91	1	93
5	WI	Janesville Old Landfill	Janesville	01	PRP	07/12/91	1	93
5	WI	Master Disposal Service Landfill	Brookfield	01	PRP	08/13/91	1	93
5	WI	Mid-State Disposal, Inc. Landfill	Cleveland Township	01 02	PRP PRP	08/11/89 08/11/89	4 1	92 93
5	WI	Moss-American (Kerr-McGee Oil Co.)	Milwaukee	01	PRP	07/15/91	1	93

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
5	WI	Oconomowoc Electroplating Co., Inc.	Ashippin	01	F	09/26/90	3	93
5	WI	Onalaska Municipal Landfill	Onalaska	01	F	02/28/91	3	92
				01	F	09/30/91	4	92
5	WI	Schmalz Dump	Harrison	02	F	01/25/88	4	90
5	WI	Wausau Ground Water Contamination	Wausau	02	PRP	05/10/90	2	92
5	WI	Wheeler Pit	La Prairie Township	01	PRP	05/21/91	3	92
6	AR	Gurley Pit	Edmonson	01	F	06/22/87	1	92
6	NM	South Valley	Albuquerque	05	PRP	09/01/89	3	92
6	OK	Hardage/Criner (once listed as Criner/Hardage Waste Disposal)	Criner	02	PRP	09/09/90	3	93
6	OK	Sand Springs Petrochemical Complex	Sand Springs	01	PRP	10/03/88	2	94
6	OK	Tenth Street Dump/Junkyard	Oklahoma City	01	F	03/21/91	4	92
6	OK	Tinker Air Force Base (Soldier Creek/Building 3001)	Oklahoma City	01	FF	11/30/90	1	93
6	TX	Bailey Waste Disposal	Bridge City	01	MR	03/31/89	2	92
6	TX	Brio Refining Co., Inc.	Friendswood	01	PRP	06/29/89	2	93
6	TX	Dixie Oil Processors, Inc.	Friendswood	01	PRP	06/30/89	4	92
6	TX	Geneva Industries/Fuhrmann Energy	Houston	02	S	04/07/87	2	92
6	TX	MOTCO, Inc.	La Marque	02	MR	06/11/90	4	92
6	TX	North Calvacade Street	Houston	02	S	03/28/91	1	93

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE
6	TX	Sheridan Disposal Service	Hempstead	01 02	PRP PRP	12/29/89 03/29/90	3 93 3 93
6	TX	Sol Lynn/Industrial Transformers	Houston	02	S	03/31/89	1 92
6	TX	South Cavalcade Street	Houston	01	PRP	07/30/90	4 93
6	TX	Texarkana Wood Preserving Co.	Texarkana	01	S	03/06/91	2 93
6	TX	United Creosoting Co.	Conroe	02	S	03/30/90	1 92
7	IA	Fairfield Coal Gasification Plant	Fairfield	01	PRP	04/23/91	4 92
7	IA	Midwest Manufacturing/North Farm	Kellogg	02 03	F F	08/21/91 08/21/91	2 92 2 92
7	IA	Northwestern States Portland Cement Co.	Mason City	01	PRP	05/21/91	1 92
7	KS	Cherokee County (once listed as Tar Creek, Cherokee County)	Cherokee County	05 05	F F	07/30/90 07/30/90	4 92 4 91
7	KS	Doepke Disposal (Holliday)	Johnson County	01	PRP*	10/24/90	2 93
7	MO	Ellisville Site	Ellisville	02	EP*	10/02/90	1 93
7	MO	Kem-Pest Laboratories	Cape Girardeau	02	F	09/10/91	2 92
7	MO	Minker/Stout/Romaine Creek (once listed as Area 2: Fills 1 & 2)	Imperial	01	EP	05/01/91	2 92
7	MO	Shenandoah Stables (once listed as Arena 1: Shenandoah Stables)	Moscow Mills	02	EP	05/01/91	2 92
7	MO	Solid State Circuits, Inc.	Republic	01	PS	05/31/91	4 92
7	MO	Weldon Spring Quarry/Plant/Pits (USDOE/Army) (once listed as Weldon Spring Quarry (USDOE/Army))	St. Charles County	02	FF	08/09/90	4 91

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
7	MO	Wheeling Disposal Service Co. Landfill	Amazonia	01	PRP	09/11/91	2	93
7	NE	Hastings Ground Water Contamination	Hastings	03	PRP	09/27/90	3	93
				04	PRP	09/28/90	3	93
				07	F	04/01/90	1	92
				07	F	04/01/90	2	92
				09	PRP	12/14/88	4	92
7	NE	Lindsay Manufacturing Co.	Lindsay	01	PRP	09/30/91	3	92
8	CO	Broderick Wood Products	Denver	01	F	09/29/88	1	92
8	CO	California Gulch	Leadville	01	PRP	04/25/89	2	92
8	CO	Central City - Clear Creek	Idaho Springs	01	S	06/15/88	2	92
				03	S	09/30/91	4	92
8	CO	Chemical Sales Co.	Denver	03	F	09/20/91	3	92
8	CO	Denver Radium Site	Denver	06	F	04/07/91	3	92
8	CO	Eagle Mine	Minturn/Redcliff	01	PS	05/20/88	4	94
8	CO	Rocky Flats Plant (USDOE)	Golden	02	FF	01/25/91	3	92
8	CO	Rocky Mountain Arsenal	Adams County	16	FF	04/04/90	4	92
				21	FF	06/28/91	1	92
				25	FF	06/20/90	1	92
				26	FF	09/03/91	1	92
8	CO	Sand Creek Industrial	Commerce City	05	F	03/29/91	2	92
8	MT	East Helena Site (once listed as East Helena Smelter	East Helena	01	PRP	09/11/90	2	92
8	SD	Whitewood Creek	Whitewood	01	PRP	03/26/91	4	92
8	UT	Hill Air Force Base	Ogden	02	FF	09/30/91	1	92
8	UT	Monticello Mill Tailings (USDOE)	Monticello	01	FF	05/02/91	3	92

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
				02	FF	09/26/90	2	92
8	UT	Monticello Radioactively Contaminated Properties	Monticello	02	FE	09/29/89	2	94
8	UT	Ogden Defense Depot	Ogden	02	FF	12/21/90	4	92
8	UT	Portland Cement (Kiln Dust 2 & 3)	Salt Lake City	01	PRP	06/28/91	3	94
8	UT	Sharon Steel Corp. (Midvale Tailings) (once listed as Sharon Steel Corp. (Midvale Smelter))	Midvale	02	F	12/31/90	3	92
8	UT	Wasatch Chemical Co. (Lot 6)	Salt Lake City	01	PRP	09/30/91	1	93
8	WY	Baxter/Union Pacific Tie Treating	Laramie	01	PRP	02/15/87	1	93
8	WY	Mystery Bridge Rd/U.S. Highway 20	Evansville	01	PRP	06/27/91	3	92
				01	PRP	06/27/91	4	92
9	AZ	Indian Bend Wash Area	Scottsdale/Tempe/Phoenix	02	PRP	10/03/88	3	92
9	AZ	Nineteenth Avenue Landfill	Phoenix	01	PS	09/28/90	2	93
9	AZ	Phoenix-Goodyear Airport Area	Goodyear	01	PRP	01/04/91	4	92
				02	PRP	01/30/91	1	92
				03	PRP	01/04/91	4	92
				04	PRP	05/07/91	4	92
9	AZ	Tucson International Airport Area	Tucson	01	PRP	01/07/89	1	93
9	CA	Coalinga Asbestos Mine	Coalinga	01	PRP	05/02/88	3	92
9	CA	Fairchild Semiconductor Corp. (Mountain View) (once listed as Fairchild Camera & Instrument Corp. (Mountain View Plant)	Mountain View	01	PRP	01/02/91	2	93
				02	PRP	01/02/91	1	93

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
9	CA	Fairchild Semiconductor Corp. (South San Jose Plant) (once listed as Fairchild Camera & Instrument Corp. (South San Jose	South San Jose	01	PRP	01/02/91	1	93
9	CA	Intel Corp. (Mountain View Plant)	Mountain View	01	PRP	05/14/91	1	93
				01	PRP	05/14/91	2	93
9	CA	J.H. Baxter & Co.	Weed	01	PRP	08/19/91	4	92
9	CA	Koppers Co., Inc. (Oroville Plant)	Oroville	01	PRP	10/01/90	3	92
9	CA	Louisiana-Pacific Corp.	Oroville	01	PRP	09/26/91	4	92
9	CA	Raytheon Corp.	Mountain View	01	PRP	05/14/91	1	93
				01	PRP	05/14/91	2	93
9	CA	Selma Treating Co.	Selma	01	F	09/21/89	2	92
				01	F	09/29/90	2	92
9	CA	South Bay Asbestos Area (once listed as Alviso Dumping Area)	Alviso	02	F	09/14/89	2	92
9	CA	Stringfellow	Glen Avon Heights	05	PRP	09/30/89	1	94
9	CA	Synertek, Inc. (Building 1)	Santa Clara	01	PS	06/28/91	1	92
10	WA	Colbert Landfill	Colbert	01	MR	03/23/89	2	93
10	WA	Commencement Bay, Near Shore/Tide Flats	Pierce County	01	PRP	09/28/90	2	92
				01	PRP	03/29/91	3	92
				03	PRP	02/03/89	3	92
				05	PS	09/30/89	2	96
				05	PS	09/30/89	1	94
				05	PS	08/22/90	1	93
				05	PS	06/28/91	3	93
				05	PS	01/30/91	3	93
				05	PS	06/30/89	4	93

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RG	ST	SITE NAME	LOCATION	OPER-ABLE UNIT	LEAD	FUNDING START	PRESENT COMPLETION SCHEDULE	
10	WA	Commencement Bay, South Tacoma Channel	Tacoma	03	PRP	11/13/89	4	92
10	WA	FMC Corp. (Yakima Pit)	Yakima	01	PRP	08/23/91	2	93
10	WA	Fort Lewis Logistics Center	Tillicum	01	FF	06/30/91	4	92
10	WA	Frontier Hard Chrome, Inc.	Vancouver	01	F	03/23/88	1	93
10	WA	Northside Landfill	Spokane	01	PRP	02/11/91	2	92
10	WA	Silver Mountain Mine	Loomis	01	F	05/01/90	1	92

Appendix C
Record of Decision Abstracts

This appendix provides detailed descriptions of FY91 feasibility studies, as required by CERCLA Section 301(h)(1)(A). These descriptions are based on records of decision (RODs) signed from October 1, 1990, through September 30, 1991. EPA signed 196 RODs in FY91, including 21 federal facilities and 13 ROD amendments.

Each abstract provides background information on the Superfund site, including the date on which EPA signed the ROD, former user of the site, type of operation, contaminants of concern, and previous clean-up actions. Each abstract also includes a description of the remedial alternative selected in the ROD and provides information on the use of alternative or resource recovery treatment technologies and on the performance standards or goals for the site. All sites abstracted in the appendix are listed alphabetically according to the site name and are grouped by EPA region.

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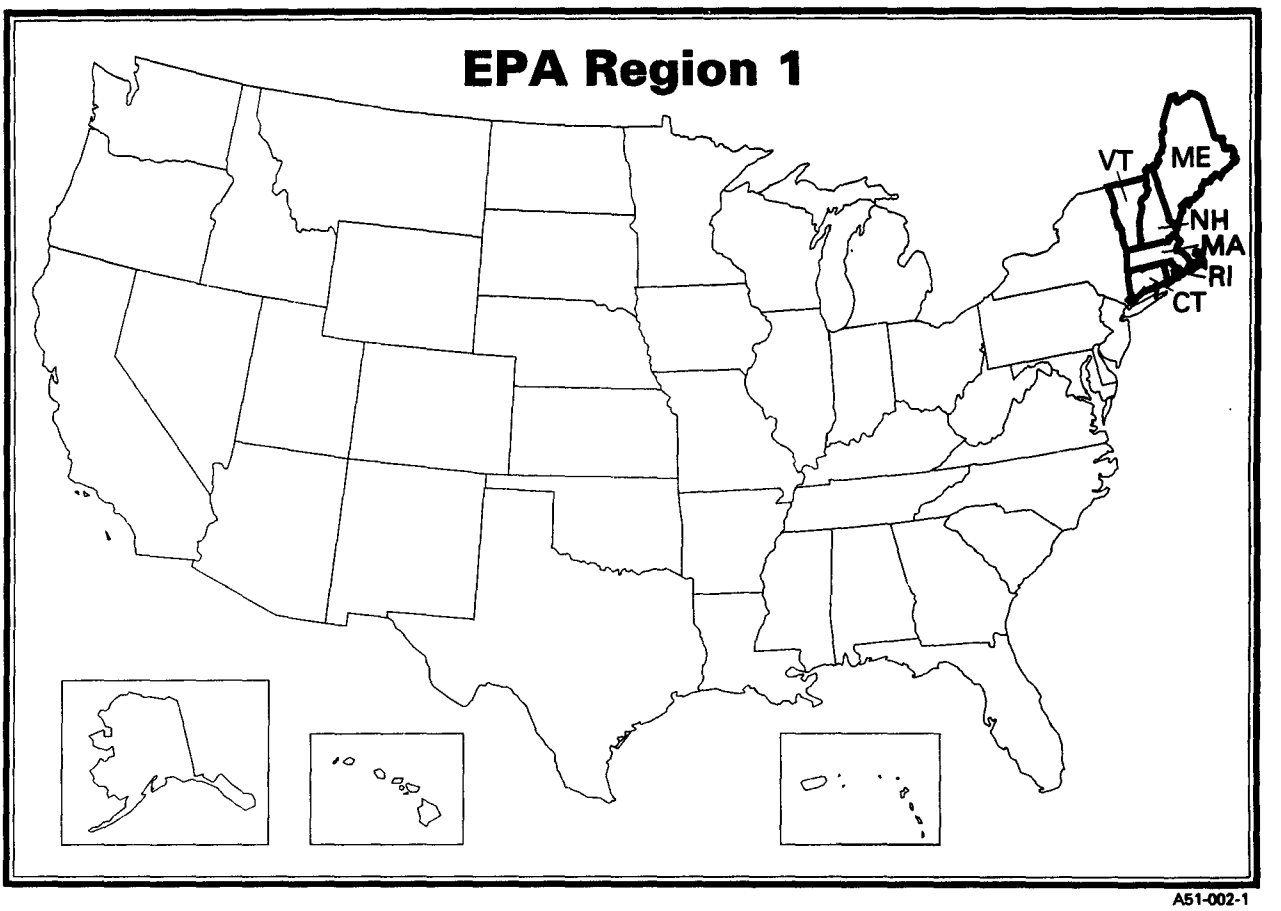
Acronyms Referenced in Record of Decision Abstracts

ACL	Alternate Concentration Limit
ACM	Asbestos-Containing Material
AOC	Administrative Order on Consent
AOP	Advanced Oxidation Process
APEG	Alkaline Polyethylene Glycol
ARAR	Applicable or Relevant and Appropriate Requirements
ATSDR	Agency for Toxic Substances and Disease Registry
BAT	Best Available Technology
BEST	Basic Extraction Sludge Technology
BHC	Benzenehexachloride
BLM	Bureau of Land Management
BND	Benzolated-napthoylated diethylaminoethyl
CAA	Clean Air Act
CWA	Clean Water Act
DANC	Decontaminating Agent Non-Corrosive
DCA	1,1-Dichloroethane
DCE	1,2-Dichloroethylene
DDT	1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane
DNAPL	Dense Non-Aqueous Phase Liquid
DNT	Dinitrotoluene
DOD	Department of Defense
DOI	Department of Interior
EP	Extraction Procedure
ESD	Explanation of Significant Differences
FFS	Focused Feasability Study
GPAL	Ground-Water Protection Achievement Level
HI	Hazard Index
HLSC	Human Life Cycle Safe Concentration
IAG	Interagency Agreement
IRA	Interim Response Action
IRM	Initial Remedial Measure
ISAL	Interim Soil Action Level
IWTP	Industrial Wastewater Treatment Plant
LAA	Lower Alluvial Aquifier
LDR	Land Disposal Restriction
LNAPL	Light Non-Aqueous Phase Liquid
LTTD	Low Temperature Thermal Desorption
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDL	Method Detection Limit
MTCA	Model Toxic Control Act
NAPL	Non-Aqueous Phase Liquid
NCP	National Oil and Hazardous Substances Contingency Plan
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenence
OU	Operable Unit
OSHA	Occupational Safety and Health Act
PACT	Powdered Activated Carbon Treatment
PAH	Polyaromatic hydrocarbons
PAL	Preventive Action Limit
PCB	Polychlorinated biphenol
PCE	Tetrachloroethylene
PCP	Pentachlorophenol
PMCL	Proposed Maximum Contaminant Level
POTW	Publicly Owned Treatment Works
PRP	Potentially Responsible Party
PVC	Polyvinyl chloride
RA	Remedial Action
RD	Remedial Design
RDX	Research Department Explosive
RI/FS	Remedial Investigation/Feasability Study
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SDWA	Safe Drinking Water Act
SI	Site Investigation
SVOC	Semi-Volatile Organic Compound
TCA	1,1,2-Trichloroethane
TCDD	Tetrachloro dibenzo-p-dioxin
TCE	Trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TEM	Transmission Electron Microscopy
THF	Tetrahydrofuran
TNB	Trinitrobenzene
TNT	Trinitrotoluene
TSCA	Toxic Substances Control Act
UAA	Upper Alluvial Aquifier
UAO	Unilateral Administrative Order
UST	Underground Storage Tank
UV	Ultraviolet
VOC	Volatile Organic Compound



REGION 1

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DOVER MUNICIPAL LANDFILL, NH

September 10, 1991

The 55-acre Dover Municipal Landfill site is an inactive landfill in Dover, Strafford County, New Hampshire. Land use in the area is rural-residential and recreational. The site overlies both an upper and a lower aquifer that are separated by impermeable clay. Significant nearby surface water bodies include the Bellamy reservoir, located 2,000 feet south of the site, which supplies drinking water for local municipalities; and the Calderwood well, which supplies drinking water for the City of Dover, and is located approximately 0.5 miles north of the landfill; and the Cocheco River, which runs approximately 500 feet east of the landfill. A portion of the site lies within the 100-year floodplain of the Cocheco River, and four wetland systems are in the vicinity of the site. From 1960 until 1979, the landfill accepted municipal and industrial wastes including drummed materials and liquid waste. Landfill disposal practices included trenching, burning, and fill and cover methods. Between 1980 and 1982, the facility was capped and closed, and a drainage channel was excavated around the landfill to intercept leachate. In 1981, VOC contamination was found in private residential wells screened in the upper aquifer in the vicinity of the landfill. Further analyses identified two contaminant plumes, one migrating to the south and the other moving to the east. This ROD addresses both source control and management of migration of contaminated ground water, as a final remedy. The primary contaminants of concern affecting the soil, sediment, sludge, debris, and ground water are VOCs including benzene, PCE, TCE, toluene, and vinyl chloride; other organics; and metals including arsenic.

Selected Remedial Action

The selected RA for this site includes excavating and consolidating approximately 300 cubic yards of sediment from the drainage channel, and depositing the material into the landfill prior to capping; recontouring and capping the landfill with a multi-media cap including installing a passive venting system for methane gas; ground-water pumping and on-site treatment of the southern plume ground water and leachate using aeration for VOC removal, carbon adsorption to remove other organics, and flocculation, coagulation, and precipitation, followed by discharge of the treated water on-site to surface water or off site to the Dover POTW; disposing of residual sludge off site; constructing a clean ground-water diversion system upgradient of the site; natural attenuation of the eastern plume ground water; constructing a surface water run-on/run-off diversion system; conducting long-term ground-water monitoring; and implementing institutional controls, including deed and ground-water use restrictions. If it is determined that the selected ground-water treatment remedy for the southern plume is not effective, a contingency remedy that utilizes precipitation and air stripping will be implemented. The estimated present worth cost for this RA is $24,155,700, which includes an annual O&M cost of $157,680 for 10 years and an annual cost for ground-water monitoring of $721,600 for 30 years.

Performance Standards or Goals

Sediment in areas where arsenic levels are above 50 mg/kg will be excavated and consolidated under the landfill cap. Ground-water interim clean-up goals are based on the more stringent of federal MCLs or non-zero MCLGs, EPA health advisories, state standards, or reference doses, and include arsenic 50 *u*g/l (RCRA MCL) or background, whichever is higher, benzene 5 *u*g/l (MCL), PCE 5 *u*g/l (MCL), and TCE 5 *u*g/l (MCL). The final

ground-water clean-up levels will be determined as a result of a risk assessment performed on residual ground water after all interim clean-up levels have been met.

Institutional Controls

Deed and ground-water use restrictions will be implemented at the site.

GROVELAND WELLS, MA

September 30, 1991

The 850-acre Groveland Wells site is a municipal well field in Groveland, Massachusetts. Land use in the area is residential, industrial, and commercial. The site is bounded to the north by the Merrimack River; to the west by the Haverhill Municipal Landfill, which is another Superfund site; and to the south and east by mixed land use areas. The site is underlain by a surficial unconsolidated aquifer, which is a source of ground water for the well field, and a deeper bedrock aquifer. Both a current and a former municipal water supply well are located within the site boundaries. Johnson Creek, including its associated wetlands, flows across the site, and portions of the site lie within the 100-year floodplain of the Merrimack River. In 1979, elevated levels of TCE were discovered in the on-site water supply wells, resulting in the closure of the wells, development of alternate water supplies, and investigations by EPA. An IRM by EPA in 1985 provided an alternate water supply by installing a carbon adsorption unit on one of the on-site water supply wells. EPA investigations identified three likely sources of contamination: the A.W. Chesterton Company, currently being remediated under RCRA corrective action and closure activities; the Haverhill Municipal Landfill, which has been addressed as a separate CERCLA action; and the Valley Manufactured Products Company (Valley), a screw machine products manufacturer and finisher. From 1963 to 1974, Valley operations involved the release of up to 3,000 gallons of waste oil and solvents, including TCE, to the soil either from an underground disposal storage tank leak, or from spills or leaks from underground disposal systems. A 1988 ROD provided for removal of source contamination from the Valley property using vacuum extraction, and installation of a ground-water recovery, treatment, and reinjection system to treat VOC-contaminated ground water beneath the property. The state also required Valley to install a ground-water pump and treatment system using air stripping to intercept the plume at Mill Pond, an on-site man-made water body. This ROD addresses management of migration of contamination in the surficial and bedrock aquifers extending from the valley site, as a final remedy. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCE, and toluene; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes pumping and treatment of ground water using an inorganics removal system consisting of equalization/aeration, flocculation, coagulation, sedimentation, and filtration; disposing of the resulting sludge off site; further treating ground water using ultraviolet light and oxidation to remove VOCs; discharging the treated water on site to Johnson Creek; monitoring ground water, surface water, and sediment; and implementing institutional controls including deed and ground-water use restrictions. The estimated present worth cost for this RA is $8,900,000, which includes an annual O&M cost of $333,000 for 30 years.

Performance Standards or Goals

Interim ground-water clean-up levels are based on the more stringent of federal MCLs or non-zero MCLGs, or state MCLs. Chemical-specific ground-water goals include benzene 5 *ug*/l (MCL), PCE 5 *ug*/l (MCL), TCE 5 *ug*/l (MCL), toluene 1 mg/l (MCL), arsenic 50 *ug*/l (MCL), and chromium 50 *ug*/l (MCL). The clean-up level for lead, 15 *ug*/l, is based on EPA Superfund policy. When all

interim levels are met, a risk assessment will be performed on residual ground-water contamination to determine final clean-up levels.

Institutional Controls

Deed and ground-water use restrictions will be implemented at the site.

IRON HORSE PARK, MA
June 27, 1991

The 552-acre Iron Horse Park site is an active industrial complex and railyard with a long history of activities that have resulted in contamination of soil, ground water, and surface water in North Billerica, Massachusetts. The site includes open storage areas, landfills, and lagoons. This ROD addresses the on-site 60-acre landfill, known as the Shaffer Landfill, that was used for disposal of residential and commercial solid waste from 1946 until its closure in 1986. The Shaffer Landfill is surrounded by wetlands and lies within the 100-year floodplain of Middlesex Canal and Content Brook, which border the site to the east and south, respectively. Land use outside the surrounding wetlands areas is predominantly industrial and residential. As a result of State investigations in 1980, EPA identified on-site contamination in ground water, surface water, and soil; and the presence of asbestos. In 1984, EPA, under its removal authority, covered an on-site asbestos-contaminated landfill. After further investigation, EPA divided the site into OUs to facilitate remediation. A 1988 ROD addressed the B&M Lagoon site as OU1, which includes the contaminated waste lagoons located on another portion of this site. This ROD addresses OU2, final remediation of the Shaffer Landfill, including leachate and ground water. A future ROD will address surface water contamination as part of OU3. The primary contaminants of concern affecting the landfill materials, ground water, and air are VOCs including benzene, TCE, toluene, and xylenes; other organics including PAHs; and metals including arsenic and lead.

Selected Remedial Action

The selected RA for this site includes reconstructing the 60-acre existing landfill cap; maintaining the cap, the existing surface drainage system, and the existing landfill gas collection/flare system; constructing, operating, and maintaining a leachate collection system; treating and disposing of leachate off site; monitoring ground water, surface water, and the gas collection/flare system; and implementing institutional controls, including deed and ground-water use restrictions. The estimated present worth cost for this RA is $12,553,524, which includes a present worth O&M cost of $3,541,426 for 30 years.

Performance Standards or Goals

Interim chemical-specific ground-water clean-up goals are based on SDWA MCLs, and include arsenic 50 *u*g/l (MCL), benzene 5 *u*g/l (MCL), and TCE 5 *u*g/l (MCL).

Institutional Controls

Deed and ground-water use restrictions will be imposed on the property to prevent the use of the aquifer as a drinking water source and to ensure site activities will not compromise the integrity of the landfill cap.

MOTTOLO PIG FARM, NH
March 29, 1991

The 50-acre Mottolo Pig Farm site is in Raymond, New Hampshire. Surrounding land is primarily rural residential and undeveloped. The site includes a wooded area, an inactive piggery area comprised of several structures, a building drum disposal area, and wetlands. An on-site brook (brook A) originating in the wetlands discharges into the Exeter River. Prior to 1975, a piggery operation was located on site. From 1975 to 1979, the owner disposed of 1,600 drums and pails containing hazardous wastes in a disposal area north of the piggery building, and subsequently filled in the area. In 1979, the state identified on-site buried drums some of which were crushed and leaking. Consequently in 1980, EPA began excavation and staging of these drums. From 1981 to 1982, EPA removed and characterized drummed waste, then transported the waste off site along with 160 cubic yards of contaminated soil, drum parts, and plastic sheeting. The area was then regraded and seeded. This ROD addresses contaminated on-site soil, debris, and the associated ground-water plume. The primary contaminants of concern affecting the soil, debris, and ground water are VOCs including TCE, toluene, vinyl chloride and xylenes; and metals including arsenic.

Selected Remedial Action

The selected RA for this site includes installing a ground-water interceptor trench upgradient of the former drum disposal area to reduce migration of contaminants and facilitate treatment of contaminated soil; capping the drum disposal and southern boundary areas with temporary waterproof caps to improve treatment efficiency; treating approximately 3,400-4,000 cubic yards of VOC-contaminated soil at these areas using in-situ vacuum extraction and activated carbon to control off-gases, followed by on-site or off-site carbon regeneration and disposal; allowing the contaminated ground-water plume to be restored through natural attenuation; monitoring ground water and surface water; and implementing institutional controls including deed and ground-water use restrictions, and site access restrictions such as fencing. The present worth cost for this RA is $690,000, which includes a present worth O&M cost of $280,000.

Performance Standards Or Goals

Soil clean-up levels were established to protect ground water from soil leachate. Ground-water interim clean-up levels were based on federal SDWA MCLs and MCLGs, or state health advisory levels. The estimated time frame for the restoration of the overburdened ground water affected by the drum disposal area soil and the bedrock ground water affected by the southern boundary soil to acceptable levels by natural attenuation is 6 years and 2 years, respectively.

Institutional Controls

Deed and ground-water use restrictions will be implemented on site.

NYANZA CHEMICAL, MA
September 23, 1991

The 35-acre Nyanza Chemical site is a former dye manufacturing facility in Ashland, Middlesex County, Massachusetts. Land adjacent to the site is used for industrial, residential, commercial, and recreational purposes. Wetlands are located to the north and east; woodlands lie to the south, southeast, and west; and the Sudbury River is 700 feet north of the site. The site overlies an unconsolidated glacial aquifer, which has been affected by site activities. The study area for this ground-water OU is larger than the site and consists of up to 395 acres. From 1917 to 1978, the property was occupied by several companies involved in manufacturing textile dyes, dye intermediates, inorganic collodial solids, and acrylic polymers. Starting in 1917, several types of waste was disposed of in various on-site locations including Megunko Hill, an unsecured landfill/disposal area in the southern portion of the site, and wetlands areas to the east and northwest. Waste included process wastewater, chemical sludge, solid process waste in drums, solvent recovery distillation residue in drums, off-specification products, and unrecyclable process chemicals including phenol, nitrobenzene, and mercuric sulfate. The dye waste stream and wastewater were discharged to an on-site concrete "vault" or settling basin adjacent to the main processing building. The liquid occasionally overflowed through a pipe into the wetlands and to surface water. In the 1960s or 1970s, the vault was removed from service, and subsequently was filled in with sludge and covered over with fill. In 1970, a state investigation linked the site to mercury contamination in the nearby Sudbury River. A 1985 ROD addressed soil and wetland excavation at nine localized areas of contamination; solidification of water-bearing excavated sludge, sediment, and soil; and placement, capping, and consolidation of those materials left in place on Megunko Hill, as OU1. In addition, a diversion trench was constructed on the side of Megunko Hill to divert surface water flow, and lower the ground-water table around Megunko Hill. In 1985, the state constructed fencing along a road embankment, placed one foot of clean fill over an area to prevent direct contact, and culverted surface water through a neighboring property under an IRM. In 1987, under an EPA removal action, 655 tons of soil adjacent to the vault were removed, 309 tons were incinerated, and 356 tons of soil were transported off site to an approved landfill. In 1988, EPA solidified on-site 2,000 tons of sludge from the vault and disposed of the sludge at an off-site RCRA landfill facility. This ROD addresses management of migration as OU2, and constitutes an interim remedy designed to treat the highest ground-water contamination and to collect additional data achieving cleanup objectives. A subsequent ROD will address uncontrolled wastewater discharges to the Sudbury River and its tributaries. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCE, and toluene; other organics; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected interim RA for this site includes constructing extraction wells at the northern border of the site; constructing a ground-water treatment plant that utilizes precipitation and filtration to remove inorganics, and ultraviolet oxidation or biological treatment as well as carbon adsorption to remove organics, pumping and treating ground water, with on-site discharge of treated water to surface water; performing pump tests in the eastern portion of the plume to determine the need for future ground-water remediation; installing additional deep bedrock wells to fully define depth and location of contamination; inspecting the

Megunko Road water line; monitoring ground water and surface water; and implementing institutional controls including deed and ground-water use restrictions, as well as site access restrictions. The estimated present worth cost for this RA is $7,440,000, which includes an estimated O&M cost of $2,180,000 over 5 years.

Performance Standards or Goals

Ground-water clean-up levels will be identified in a subsequent ROD.

Institutional Controls

Deed and ground-water use restrictions will be implemented at the site.

SAVAGE MUNICIPAL WATER SUPPLY, NH

September 27, 1991

The Savage Municipal Water Supply site is located in Milford, New Hampshire. The site and surrounding properties encompass the Savage Municipal Well, four major industrial facilities, and two fish hatcheries. Land use includes residential, agricultural, heavy and light industrial, and commercial areas. The site is located within the 100 year floodplain of the Souhegan River, which is the principal stream flowing through the site. From the 1940s to the 1980s, process and waste waters from the industrial facilities were released untreated to the ground water or to the surface waters flowing through the site. In 1983, the state identified concentrations of several VOCs that were above drinking water standards in water from the Savage Municipal Well and water drawn from the well supplying a nearby trailer park. At the state's request, EPA conducted a removal action in 1983. This included temporarily supplying bottled water to affected residences in the trailer park, and connecting the residences to the existing municipal water supply system. This ROD addresses potential risks to future use of the aquifer caused by ground water contamination at the site, within a 6,000- by 2,500-foot contaminated ground-water plume. This ground-water plume was divided into two zones: the concentrated plume, which contains the highest concentrations of contaminants; and the extended plume, which has the remainder of the contaminated ground water. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCA, and TCE; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes on-site pumping and treatment of the concentrated and extended plume areas using air stripping and ultraviolet oxidation; discharging the treated ground water on site; use of natural attenuation to aid in contaminated ground-water remediation until clean-up levels are met; implementing ground water, surface water, and sediment monitoring programs during remediation; and implementing institutional controls including deed and ground-water use restrictions. The estimated present worth cost for this RA is $15,500,000, which includes an annual O&M cost of $1,400,000 for 30 years.

Performance Standards Or Goals

Interim ground-water clean-up levels for carcinogenic compounds have been set at the more stringent of MCLs, non-zero MCLGs, or an excess cancer risk of 10^{-6}. Clean-up levels for non-carcinogenic compounds have been set at the non-zero MCLG or an HI=1. Ground-water clean-up levels include benzene 5 *ug*/l (MCL), PCE 5 *ug*/l (MCL), TCE 5 *ug*/l (MCL), arsenic 50 *ug*/l (MCL), chromium 100 *ug*/l (MCL), and lead 15 *ug*/l (action). Final protective clean-up levels will be developed after interim levels have been attained or the remedy is otherwise deemed protective.

Institutional Controls

Deed and ground-water use restrictions will be implemented to restrict the use of contaminated ground water.

SILRESIM CHEMICAL, MA

September 19, 1991

The 4.5-acre Silresim Chemical site is a former chemical waste reclamation facility in Lowell, Massachusetts. Land use in the area is predominantly industrial, although residential areas are located to the south, east, and northeast with the closest residences approximately 300 to 500 feet from the site. The nearby residences obtain their drinking water from a municipal water supply. From 1971 to 1977, Silresim Chemical Corporation (SCC) used the site for a chemical waste reclamation facility. The facility's primary operations included recycling and reclaiming various chemicals and consolidating waste for off-site disposal. The facility handled approximately three million gallons of waste per year including halogenated solvents, oily waste, alcohols, metal sludge, and plating and pesticide wastes. From 1977 to 1978, SCC abandoned the facility, leaving approximately one million gallons of hazardous waste on site in bulk tanks and nearly 30,000 decaying drums. State investigations revealed evidence of numerous spills, leakage of drums, discharges to nearby sewers, and run-off to adjacent property. A number of EPA and state investigations revealed contamination of soil and ground water. From 1978 to 1982, the state constructed a fence, removed liquid waste in on-site drums and tanks, and constructed berms and absorbent-filled trenches. From 1983 to 1984, EPA removed all on-site structures, extended the fence, and placed a clay cap over the site. This ROD addresses both on-site and off-site soil and ground-water contamination. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, TCE, toluene, and xylenes; other organics including dioxin, PAHs, PCBs, and phenols; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes constructing additional perimeter fencing; placing a low-permeability temporary cover over areas of contaminated off-site soil; extending and repairing the existing cap as required; conducting *in situ* vacuum/vapor extraction of approximately 137,000 cubic yards of contaminated soil; excavating and stabilizing any soil with residual contamination after treatment with vapor extraction, followed by on-site disposal; backfilling excavated areas with clean fill; installing a RCRA Subtitle C cap over the stabilized soil; pumping and pretreatment of ground water using a phase separation tank to separate NAPLs, followed by chemical addition, flocculation, precipitation, and filtration to remove metals; off-site disposal of NAPLs and residuals from the metals removal process; treating residual ground water using air stripping of heated influent, thermal oxidation, and aqueous phase carbon adsorption, followed by off-site discharge of the treated ground water to the municipal sewer system or on-site discharge to surface water; conducting long-term soil, surface water, and ground-water monitoring; and implementing institutional controls including deed, ground-water, and land use restrictions The estimated present worth cost for this RA is $22,300,000, which includes a present worth O&M cost of $9,263,000.

Performance Standards or Goals

Chemical-specific unsaturated soil clean-up goals are based on leachability modeling and include among others benzene 4 *u*g/kg, dioxin 1 *u*g/kg, PAHs 10,000 *u*g/kg, PCBs 2,300 *u*g/kg, phenol 5,300 *u*g/kg, toluene 2,700 *u*g/kg,

TCE 6 *u*g/kg, and xylenes 22,000 *u*g/kg. Chemical-specific surficial soil clean-up goalsare based on risk assessments, background levels, and EPA policy and include among others arsenic 21,000 *u*g/kg (background), benzene 15,000 *u*g/kg (risk), dioxin 1 *u*g/kg (policy), lead 500,000 *u*g/kg (policy), PAHs (total) 29,000 *u*g/kg (background), PCBs 1,000 *u*g/kg (policy), and TCE 40,000 *u*g/kg (risk). Chemical-specific interim ground-water clean-up goals are based on MCLs, MCLGs, PMCLs, reference doses, and EPA policy and include among others arsenic 50 *u*g/l (MCL), benzene 5 *u*g/l (MCL), chromium 100 *u*g/l (MCLG), dioxin $5x10^{-8}$ *u*g/l (PMCL), lead 15 *u*g/l (policy), PAHs 0.2 *u*g/l (PMCL), PCBs 0.5 *u*g/l (MCL), phenol 21,000 *u*g/1 (reference dose), TCE 5 *u*g/l (MCL), toluene 1,000 *u*g/l (MCLG), and xylenes 10,000 *u*g/l (MCLG). EPA will conduct a risk assessment of residual ground water contamination to determine final ground-water clean-up goals.

Institutional Controls

Deed, ground-water, and land use restrictions will be implemented to prevent potential use of the site.

SULLIVAN'S LEDGE, MA
September 27, 1991

The Sullivan's Ledge site consists of a 12-acre former quarry site/disposal area and 14.5 acres of downgradient wetlands areas in New Bedford, Bristol County, Massachusetts. Land use in the area is predominantly municipal. The downgradient portion of the site, which is the focus of this ROD, includes two wetlands areas: a 13-acre wooded wetland called Middle Marsh bordering an unnamed stream and a 1.5-acre wetland area 400 feet upstream from Middle Marsh called the "adjacent wetlands". In addition, the site includes portions of golf course fairways and associated floodplains and watershed areas. The entire site lies within the 25- and 100-year floodplains of a tributary of the unnamed stream to the south and the Apponagansett Swamp to the north. Prior to 1930, 12 acres of the site were used as a granite quarry. From the 1930s to 1970s, the City of New Bedford acquired the property and used the quarry pits and nearby areas for disposal of hazardous materials including electrical transformers and capacitors, fuel oil, volatile liquids, and other industrial waste. From 1988 to 1990, several EPA investigations identified contamination by PCBs and PAHs in surface and subsurface sediment, soil, and biota; and VOCs and inorganics in ground water. Contamination has resulted in part from contaminated sediment migrating from the disposal area via the unnamed stream and deposition in Middle Marsh during stream flooding. A 1989 ROD for OU1 addressed source control of the disposal area and the unnamed stream. This ROD addresses the Middle Marsh as OU2. The primary contaminants of concern affecting the soil, sediment, and surface water are VOCs including toluene; other organics including PAHs, PCBs, pesticides, and phenols; and metals including lead.

Selected Remedial Action

The selected RA for this site includes excavating and dewatering approximately 5,200 cubic yards of contaminated sediment and soil from portions of Middle Marsh and the adjacent wetlands; solidifying/stabilizing the excavated materials as needed to comply with RCRA LDR rules; treating water extracted from excavated materials using carbon adsorption, followed by on-site discharge to the unnamed stream; on-site disposal of the excavated materials beneath the cap that will be constructed over portions of the disposal area as part of OU1; restoring affected wetlands; conducting long-term environmental monitoring; and implementing institutional controls to prevent future residential use of Middle Marsh and the adjacent wetlands. If the disposal area in OU1 has already been capped when materials from OU2 are excavated and ready for disposal, a contingency remedy will be implemented. This contingency remedy includes treating the excavated soil/sediment using solvent extraction, and treating the extracted oil containing PCBs and other organic chemicals off site using incineration; treating residual water using carbon adsorption; disposing of the treated sediment/soil at Middle Marsh; restoring affected wetlands; conducting long-term environmental monitoring; and implementing institutional controls to prevent future residential use of Middle Marsh and the adjacent wetlands. The estimated present worth cost for this RA is $2,800,000, which includes a present worth O&M cost of $164,000. The estimated present worth cost for the contingent remedy is $7,780,000, which includes a present worth O&M cost of $164,000.

Performance Standards or Goals

Soil, sediment, and surface water clean-up goals are based on an excess lifetime cancer risk of 10^{-4} to 10^{-6} and an HI=1. The sediment/soil clean-up level for aquatic areas in Middle Marsh is the interim mean sediment quality criterion of 20 ug of total PCBs per gram of carbon (*u*g/Gc). This will result in interstitial water concentrations equal to or lower than the PCB ambient water quality criteria of 0.014 *u*g/l. The sediment/soil clean-up level for non-aquatic areas in Middle Marsh and for the adjacent wetland is total PCBs 15 mg/kg. This will protect mammals from chronic adverse effects from wetland/terrestial exposure to contaminated sediment/soil.

Institutional Controls

Land use or deed restrictions will be implemented to ensure that Middle Marsh and the adjacent wetland are limited to recreation and conservation purposes.

UNION CHEMICAL, ME
December 27, 1990

The 12.5-acre Union Chemical (UCC) site is an inactive paint stripping, solvent manufacturing, and recycling facility in Hope, Knox County, Maine. Land use in the area is residential, and a pond is located approximately 300 feet northeast of the site. The site is bounded on the east and southeast by Quiggle Brook, which flows southward for five miles before discharging into Crawford Pond, a drinking water source. A floodplain and a wetland area exist along Quiggle Brook at the eastern edge of the site, and another wetland has been identified to the south. Site operations, which began in 1967, included formulating patented solvents for paint stripping and coating. These products were manufactured and utilized on the premises in several on-site buildings. Later operations also included recycling of used stripping compounds and solvents from other businesses on a small scale until 1982, when a fluid-bed incinerator was acquired. In 1979, state investigations identified the presence of on-site ground-water contamination. Subsequent private studies in 1981 confirmed the presence of contaminated ground water in the area between the facilities and Quiggle Brook. The state issued several violations to the owner between 1979 and 1984, and eventually closed the plant in late 1984. At that time approximately 2,000 to 2,500 55-gallon drums and 30 liquid storage tanks were identified on site. In 1984, the state and EPA removed the 55-gallon drums and all but two of the liquid storage tanks. This ROD addresses remediation of on-site soil, debris, sludge, ground water, and facilities, and provides for further evaluation of contaminated off-site soil. The primary contaminants of concern affecting the soil, debris, and ground water, are VOCs including PCE, TCE, toluene, and xylenes; other organics including dioxin; metals including arsenic and lead; and other inorganics including asbestos.

Selected Remedial Action

The selected RA for this site includes decontaminating all on-site facilities including the still building, production facilities, welding shop, incinerator complex, concrete pads, the church, all associated equipment, tanks, aboveground drums, and buried pipes using high pressure steam cleaning or another decontamination technique; collecting and testing all wastewater resulting from decontamination operations, draining all contaminated water from sumps, and treating on site, if necessary, using UV light/oxidation or equivalent treatment technology; crushing and treating all concrete from the warehouse pad, structures, floor, and sumps by low temperature thermal desorption or an equivalent desorption treatment; backfilling the treated concrete on site, if it meets LDR standards, or removing it off site for disposal at a RCRA facility; removing and containing asbestos from the still building, followed by off-site disposal; treating any other RCRA hazardous waste including dioxin/lead scrubber ash, liquids, and sludge from the on-site equipment, prior to off-site disposal by solidification/stabilization; demolishing the on-site facilities and associated components; sampling the debris and removing it off site to either a RCRA facility or permitted landfill depending on testing results; excavating approximately 10,500 cubic yards of soil from the unsaturated and saturated zones; treating the contaminated soil on site using low temperature soil aeration or equivalent thermal desorption technique; conducting treatability studies prior to full-scale treatment of contaminated soil; treating saturated soil and soil gases between the facilities and Quiggle Brook areas that exceed clean-up levels using vacuum extraction; controlling air emissions of organics using vapor phase carbon adsorption; incinerating or

thermally regenerating the residual carbon off site; treating fumes and other particulate matter collected by the thermal aeration process; treating soil which does not achieve site-specific clean-up levels using another approved technology, or obtaining a RCRA Treatability Variance; redepositing the treated material on site with the other treated soil; filling excavated areas with clean fill; mixing nutrients with soil prior to redepositing, and grading and revegetating the area; constructing additional vacuum enhanced extraction and monitoring wells; pumping and treating ground water on site using UV light/oxidation or an equivalent destruction technology, followed by liquid phase carbon adsorption or an equivalent treatment technology prior to on-site discharge to Quiggle Brook; pretreating ground water, if necessary, to remove inorganics or solids; monitoring air and ground water; sampling off-site soil, and collecting meteorological site information to define whether off-site soil contamination was the result of UCC operations; and implementing institutional controls including deed and ground-water use restrictions, and site access restrictions such as fencing.

The present worth cost for this RA ranges from $9,724,000 to $10,654,000, which includes an O&M cost ranging from $3,828,000 to $4,757,000 for 30 years.

Performance Standards or Goals

Soil clean-up levels are based on an excess lifetime cancer risk level of less than 10^{-6} and an HI < 1. Chemical-specific levels for soil include TCE 100 *u*g/kg individually, and xylenes 100 mg/kg. Ground-water clean-up standards have been set based on federal MCLs, MCLGs, proposed MCLs, or state maximum exposure guidelines including TCE 5 *u*g/l (MCL), total xylenes 10,000 *u*g/l (PMCLG), and toluene 2,000 *u*g/l (PMCL).

Institutional Controls

Institutional controls including deed and ground-water use restrictions will be implemented on site and off site.

WESTERN SAND & GRAVEL, RI

April 16, 1991

The 20-acre Western Sand & Gravel site is a former liquid waste disposal site on the boundary of Burrillville and North Smithfield, Rhode Island. Land use in the area is primarily semi-rural. Tarklin Brook, which lies within a wetland immediately to the west of the disposal area, discharges to a reservoir north of the site. Residential areas to the west and north of the site have private wells and use treated ground water as a source of drinking water. From 1975 to 1979, approximately 12 acres of the site were used for the disposal of liquid waste including hazardous substances and sewage. The waste was dumped into 12 unlined lagoons and pits, and subsequently infiltrated through the porous soil and into the ground water. As a result of a fire in one of the pits in 1977, local officials ordered the owner to remove chemicals from the site. After the owner failed to comply, a cease and desist order was issued in 1979, and waste was no longer accepted. In 1980, at the request of the state, EPA removed approximately 60,000 gallons of VOC-contaminated liquid waste from the lagoons. In 1982, the state began a ground-water recirculation system to control the spread of contaminants in the ground water. RAs for the site have been divided into three OUs, addressed by three RODs. A 1984 ROD provided for installation of water filters in affected residences, and subsequent provision for a permanent alternate water supply (OU1). A 1985 ROD addressed OU2, which provided site closure activities, including capping contaminated soil areas with a RCRA-approved cap, phaseout of the ground-water recirculation system with removal and off-site disposal of the associated equipment, evaluation of alternatives for ground-water treatment, ground-water monitoring, and implementing site access restrictions such as fencing. This ROD addresses contaminated ground water, which discharges into Tarklin Brook and the reservoir, as OU3. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCE, toluene, vinyl chloride, and xylenes; other organics; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes natural attenuation of ground water; implementing a site monitoring program for sediment, ground water, and surface water; and implementing institutional controls to restrict consumption of ground water. A comparison of current and historical data indicates that the magnitude and extent of contamination has decreased significantly and will continue to decrease with time as the integrity of the cap is maintained. Ground water is expected to achieve interim clean-up levels within 24 to 28 years. However, if this cleanup is proceeding at an unacceptable rate, active restoration including pumping and treatment by sedimentation, filtration, air stripping, and carbon adsorption, followed by on-site discharge to Tarklin Brook will be implemented as a contingency remedy. There are three additional scenarios that individually may trigger active restoration. These include determining that Tarklin Brook is endangered, that a threat exists from contamination of the bedrock, or that institutional controls cannot be implemented effectively. The estimated present worth cost for this RA is $1,123,952 ($4,039,227 with active restoration), which includes an annual O&M cost of $1,041,452 ($2,990,151 with active restoration) for 24 to 28 years.

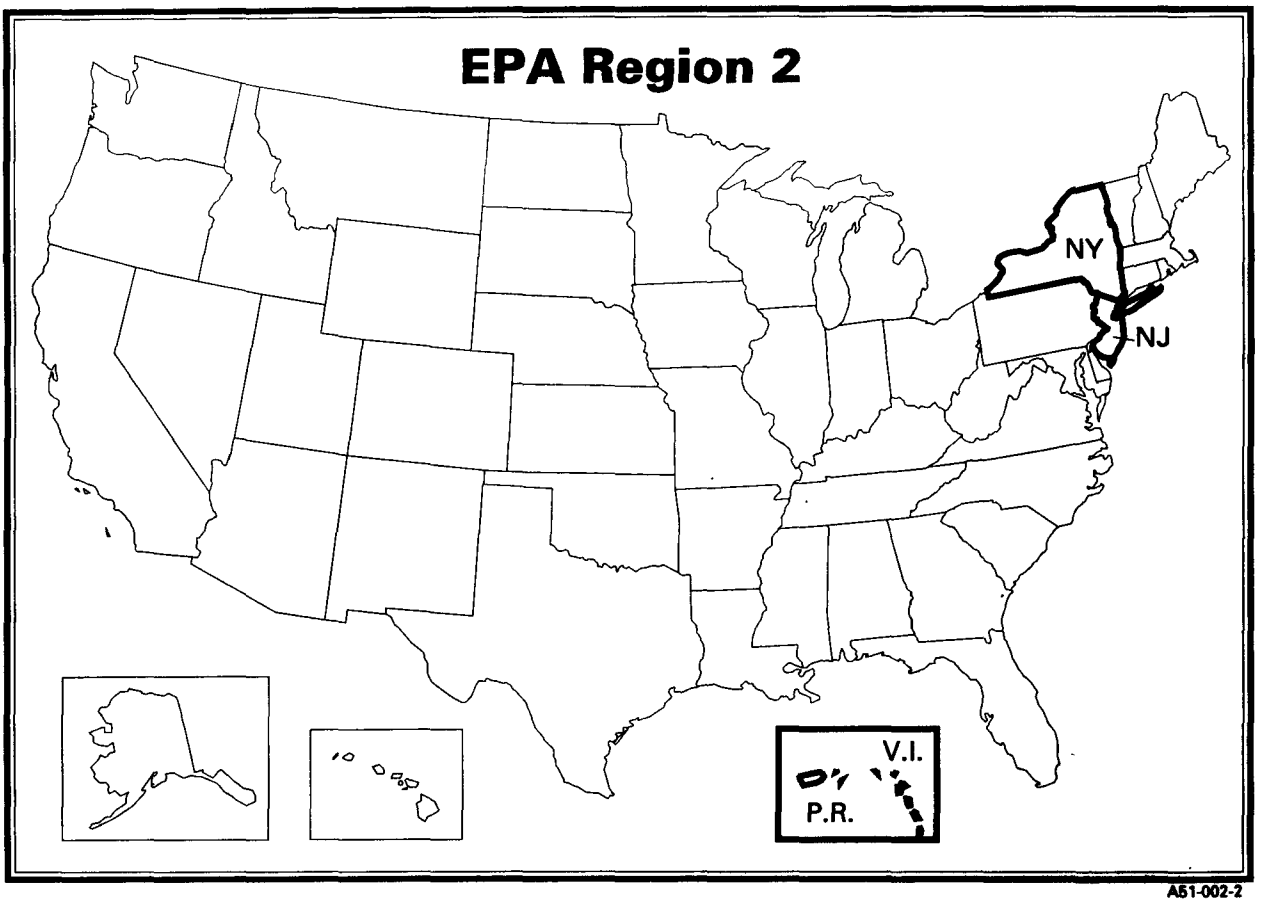
Performance Standards or Goals

Interim ground-water clean-up goals are based on SDWA MCLs and MCLGs, a 10^{-6} excess cancer risk level and a HI=1, or practical quantification limits. Once all

ARAR-based interim levels have been achieved, a risk analysis will be performed to develop a cumulative risk assessment. The cumulative risk of residual levels must attain a 10^{-4} to 10^{-6} risk range for carcinogens and an HI=1 for non-carcinogens before these levels will be considered as the final clean-up levels for any action. Chemical-specific interim goals for ground water include benzene 5 *ug*/l (MCL), PCE 5 *ug*/l (MCL), TCE 5 *ug*/l (MCL), toluene 1 mg/l (MCL), vinyl chloride 2 *ug*/l (MCL), xylenes 10 mg/l (PMCL), and lead 5 *ug*/l (PMCL).

Institutional Controls

Institutional controls including regulatory restrictions, acquisition of affected properties or ground-water rights, and other restrictions on property transactions may be implemented, as needed, to reduce the risk to public health from consumption of ground water.



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A.O. POLYMER, NJ
June 28, 1991

The 4-acre A.O. Polymer site is an active resin manufacturer in Sparta, Sussex County, New Jersey. Land use in the area is semi-rural, and the facility is surrounded by wetlands. The A.O. Polymer site is 1.5 miles from Sparta High School, which has an on-site well, and 500 feet southeast of the Wallkill River, a ground-water discharge area. The ground water in the area is a current or potential source of drinking water. From the early 1960s to 1978, Mohawk Industries operated as a resin production facility and also reclaimed electronic component cleaning fluids. In 1978, the A.O. Polymer Corporation purchased the site, and on-site resin manufacturing operations continued to utilize the same storage vessels and laboratories previously owned by Mohawk Industries. State investigations in 1978 identified VOC-contamination in local drinking water, and in 1979 the affected residences were connected to the public water supply. Further, state investigations in 1978 identified improper waste handling and storage practices including disposal of liquid waste into unlined lagoons; improper storage of over 800 deteriorating drums; and buried, crushed, and open drums containing VOCs and organic compounds. In 1980 and 1981, the state excavated and removed 120 cubic yards of crushed drums and debris, 1,700 cubic yards of associated contaminated soil, and 1,150 surface drums. In 1982, state investigations confirmed that these disposal practices had resulted in the contamination of potable ground water. This ROD addresses soil contamination in the former waste lagoon area and the contaminated ground-water plume, and provides a final remedy for the site. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, TCE, toluene, and xylenes; and other organics including PAHs, PCBs, pesticides, and phenols.

Selected Remedial Action

The selected RA for this site includes treating contaminated soil on site using vapor extraction, with control of off-gas emissions using activated carbon; treating minimal amounts of liquid condensate with an on-site ground-water treatment unit, or disposing of liquid condensate off site along with the spent carbon; on-site pumping and treatment of ground water using activated sludge in conjunction with a powdered activated carbon treatment, followed by filtration and a carbon polishing treatment; reinjecting the treated ground water on site with a contingency for on-site discharge to surface water, if necessary; and disposing of residual sludges off site. An ARAR waiver may be necessary if on-site discharge standards to surface water cannot be met. The estimated present worth cost for this RA is $4,577,000, which includes an annual O&M cost of $218,000 for 30 years.

Performance Standards or Goals

Soil clean-up levels are based on state soil action levels including total VOCs 1 mg/kg and total organics 10 mg/kg. Ground water will be remediated to meet the more restrictive of state or federal MCLs.

Institutional Controls

Not provided.

APPLIED ENVIRONMENTAL SERVICES, NY

June 24, 1991

The 3.2-acre Applied Environmental Services site is a former petroleum, gasoline, and solvent chemical facility in Glenwood Landing, Nassau County, New York. The site is surrounded by industrial, commercial, and residential properties. A tidal wetlands area of Hempstead Harbor is located to the west of the site. From 1939 to 1972, Texaco Oil Company and, subsequently, Phillips Petroleum used the site for bulk storage of petroleum products. From 1974 to 1980, Mattiace Petrochemical Company leased part of the property, and stored and distributed chemical solvents on site. Numerous spills and releases have occurred on site, including a tank truck spill in 1978, which released 3,000 gallons of toluene that soaked into the sandy soil and spilled into the adjacent harbor. From 1980 to 1984, a new tenant, Applied Environmental Services, blended various chemical waste materials on site and operated a hazardous waste storage facility at the site. EPA and state investigations in 1984 identified VOCs, metals, and organics in soil, sediment, ground water, surface water, and air. Consequently, in 1984, the current site owner, Shore Realty, was required to remove 255 of the 410 drums containing hazardous waste that were stored on the property. In 1986 due to the imminent danger posed by the site, the state removed approximately 700,000 gallons of hazardous waste including PCBs from the facility. This ROD addresses contamination of soil, ground water, sediment, surface water, and air as a final remedy. The primary contaminants of concern affecting the soil, sediment, ground water, surface water, and air are VOCs including TCE, toluene, and xylenes; other organics including PCBs and PAHs; metals including arsenic, chromium, and lead; and oils.

Selected Remedial Action

The selected RA for this site includes treating contaminated soil using *in situ* vacuum extraction; on-site pumping and treatment of contaminated ground water using air stripping, followed by reinjecting the treated ground water along with nutrients and a chemical source of oxygen to promote *in situ* aerobic biodegradation of contaminants in ground water and soil; treating air emissions from the vacuum extraction and air stripping processes by catalytic oxidation prior to release to the atmosphere; and monitoring soil, sediment, ground water, surface water, and air. The estimated present worth cost for this RA is $4,507,000, which includes an annual O&M cost of $970,000 for 4 years.

Performance Standards or Goals

Soil clean-up goals are based on risk-based criteria. Ground-water clean-up goals are based on state standards. Chemical-specific goals for ground water include arsenic 25 *ug*/l, chromium 50 *ug*/l, lead 25 *ug*/l, TCE 5 *ug*/l, toluene 5 *ug*/l, and xylenes 15 *ug*/l. For all other media, clean-up goals are based on applicable standards for sediment, surface water, and air.

Institutional Controls

Not provided.

ASBESTOS DUMP, NJ

September 27, 1991

The Asbestos Dump site is composed of four asbestos disposal areas in Meyersville, Passaic Township, New Jersey. This ROD addresses two of the four properties: the 30-acre New Vernon Road site and the 12-acre White Bridge Road site. These properties are bordered by the Great Swamp National Wildlife Refuge and tracts of wooded and wetland areas. Land use in the area is primarily recreational and residential. From 1968 to 1971, asbestos-containing material generated by the National Gypsum Company was disposed of on the New Vernon Road property in a large depression and in other areas of the property. From 1970 to 1975, asbestos material was disposed of on the White Bridge Road property in what is now a horse-riding track and in other property areas. In a 1990 investigation, EPA identified high levels of asbestos contamination in soil at both properties. Based on this investigation, ATSDR issued a public health advisory, and EPA conducted an immediate removal action at both sites, which included air and soil sampling for asbestos, covering areas of visible asbestos contamination with geotextile fabric, removing any asbestos-containing material located on the ground surface for off-site disposal, and restricting site access. A 1988 ROD addressed another site property, the Millington site, as OU1, and provided for constructing slope protection/stabilization measures and surface water diversion channels along and on top of the asbestos mound and installing security fences and a soil cover. This ROD addresses the asbestos-contaminated soil on both the New Vernon Road and White Bridge Road properties, as OU2. A subsequent ROD will address the fourth property, the Dietzman Tract, as OU3. The primary contaminant of concern affecting the soil is asbestos, an inorganic.

Selected Remedial Action

The selected RA for this site includes treating approximately 37,000 cubic yards of asbestos-contaminated soil using *in situ* solidification/stabilization and covering the solidified material with six inches of soil; conducting confirmatory sampling of soil, sediment, ground water, and surface water; implementing an air monitoring program; and implementing institutional controls. The estimated present worth cost for this RA is $5,700,000, which includes an annual O&M cost of $43,400.

Performance Standards or Goals

The chemical-specific clean-up level for soil at both sites is the TEM detection limit of 0.5 percent asbestos.

Institutional Controls

Institutional controls will be implemented to restrict future surface and subsurface activities that could affect the integrity of the treated waste.

C&J DISPOSAL, NY
March 29, 1991

The C&J Disposal site is a former industrial waste disposal area in the Town of Eaton, Madison County, New York. Land use in the area is rural and residential. Surface drainage flows toward a small pond located in a wetland area 100 feet from the disposal area, and ultimately drains into Woodman Pond. Located 3,000 feet to the south of the site, Woodman Pond serves as a backup drinking water source for the nearby village of Hamilton. Currently, 12 area residences use ground water as a source of drinking water. In 1976, C&J Leasing dumped paint sludge, liquid industrial waste, and 75 to 100 drums into an on-site disposal trench. The trench was subsequently covered with fill, burying the waste and drums. In 1989, C&J Leasing conducted an unauthorized site excavation, which left two large holes and three stockpiles of soil and waste material in the trench, as well as scattered crushed drums, cans, and plastic scrap material. It is believed that many buried drums were removed off site during this excavation. EPA believes that on-site contaminants are primarily adsorbed or bound in the 1,250 cubic yards of waste material and soil and are not presently migrating into the ground water. This ROD addresses on-site contaminated soil and debris, and provides a final remedy for the site. The primary contaminants of concern affecting the soil and debris are VOCs including benzene, toluene, TCE, and xylenes; other organics including PAHs and phenols; and metals including lead.

Selected Remedial Action

The selected RA for this site includes dewatering the trench and treating the water before recharge, if necessary; excavating approximately 1,250 cubic yards of contaminated soil and debris from the disposal trench, followed by off-site treatment or disposal; transporting drummed waste generated during the field investigation to an off-site RCRA facility for treatment and/or disposal; backfilling the trench; revegetating the site; and monitoring ground water for one year. If all or a portion of the soil and debris is classified as RCRA hazardous waste and requires incineration to meet LDR regulations, and the waste is managed prior to May 8, 1992, the soil and debris will be disposed of off site without treatment under a national capacity variance. If the waste requires treatment other than incineration under LDR regulations, the necessary treatment will be conducted off site under a treatability variance. That portion of the soil and debris not classified as RCRA hazardous waste will be disposed of in a RCRA Subtitle-D facility. After May 8, 1992, this ROD provides for a contingency remedy, which includes off-site thermal treatment of organic waste, and treatment and disposal of inorganic waste in accordance with LDR requirements. The estimated present worth cost for this RA, assuming off-site disposal without treatment, is $672,400, which includes an annual O&M cost of $86,000.

Performance Standards or Goals

Removal of contaminated soil and debris will ensure that federal and state regulations for ground and surface waters are not exceeded. Clean-up criteria will be based on background levels found in off-site and native soil samples. There were no chemical-specific ARARs provided for soil.

Institutional Controls

Not applicable.

CHEMSOL, NJ
September 20, 1991

The 40-acre Chemsol site is a former solvent recovery and waste reprocessing facility in Piscataway Township, Middlesex County, New Jersey. Land use in the area is predominantly commercial and residential, with an on-site marshy area that may be considered a wetland. The site overlies a bedrock aquifer that is used as a regional drinking water source. In addition, three streams that discharge to nearby Bound Brook are located on site. From the 1950s until 1964, Chemsol, Inc., recovered and reprocessed solvents and materials received from various companies through activities such as mixing, blending, and distillation. The site was closed in 1964 after a series of industrial accidents, explosions, and fires. In 1978, the site was purchased by Tang Realty Corporation. In 1984, as a result of previous accidents, the state required Tang Realty to investigate site contamination and to develop a remedial plan. In 1988, Tang Realty removed 3,700 cubic yards of PCB-contaminated soil and discovered several thousand small (less than 1 gallon) containers of unidentified waste. In October 1991, the drums were removed and disposed off site. Between 1980 and 1990, sampling of residential wells indicated the presence of organic contaminants and PCBs. As a result, the township extended municipal water service to the affected area. This ROD provides an interim remedy to restrict the off-site migration of highly contaminated ground water. Subsequent actions will address ground-water contamination at a depth of greater than 130 feet, off-site ground-water contamination, and air and soil contamination. The primary contaminants of concern affecting the ground water are VOCs including benzene, toluene, and xylenes; other organics including pesticides and phenols; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this interim remedy includes installing a ground-water collection trench, which will extend from the surface of the site down to approximately 10 to 15 feet below the surface; installing three ground-water extraction wells to a depth of 130 feet; constructing an on-site treatment plant and treating contaminated ground water using air stripping, biological filtration, and activated carbon adsorption; treating and disposing sludge generated by the treatment processes off site; discharging the treated ground water on site via an above-ground pipe to the stream flowing along the eastern property boundary; and conducting ground water and surface water monitoring to measure the potential migration of hazardous substances from the site. The estimated present worth cost for this RA is $7,700,000, which includes an annual O&M cost of $915,000 for 5 years.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on the more stringent of state or federal standards and include arsenic 0.50 *ug*/l (state), benzene 1 *ug*/l (state), chromium 50 *ug*/l (state), lead 15 *ug*/l (federal), phenols 4,000 *ug*/l (federal), toluene 1,000 *ug*/l (federal), and xylenes 44 *ug*/l (state).

Institutional Controls

Not applicable.

CIRCUITRON, NY
March 29, 1991

The 1-acre Circuitron site is a former electronic circuit board manufacturing facility in East Farmingdale, Suffolk County, New York. Surrounding land use is industrial. A 23,500-square-foot building and a paved parking area account for 95 percent of the site, and the remaining portion is a small unpaved area behind the building. From 1961 to 1986, circuit board manufacturing operations including metal plating were conducted on site. Several on-site areas were used for discharge of process-generated waste including one authorized and two unauthorized leaching pools located beneath the parking area, two cesspools, and storm drains. At least two unauthorized leaching pools are located beneath the floor of the plating room. In 1984 and 1985, Circuitron agreed to remediate all leaching pools and storm drains, remove all hazardous materials from the site, and conduct ground-water monitoring. However, before abandoning the premises in 1986, Circuitron remediated only one unauthorized leaching pool under the building and installed monitoring wells. In 1989, EPA removed 20 waste drums and contaminated debris from inside the building and three above-ground tanks from the rear of the building, and emptied two USTs. Further EPA site investigations from 1988 to 1990 have characterized contaminants and contaminated media. This ROD addresses contaminated on-site soil and sediment. Ground-water remediation will be addressed in a subsequent ROD. The primary contaminants of concern affecting the soil, sediment, and debris are VOCs including benzene, PCE, TCE, toluene, and xylenes; other organics including PAHs, PCBs, pesticides, and phenols; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes treating highly VOC-contaminated soil in the southwest corner of the site using *in situ* vapor extraction; treating emissions using carbon adsorption and disposing of any spent carbon residuals off site; excavating contaminated soil, sediment, and debris from the leaching pools, cesspools, and storm drains inside and outside of the building; incinerating the excavated material off site, with off-site disposal of any residuals; decontaminating the building by vacuuming, incinerating, and disposing of 53 cubic yards of sediment, accumulated dust, and debris off site; replacing the concrete floor overlying the excavated leaching pits under the building; and repaving the parking area. The estimated present worth cost for this RA is $685,675, which includes an annual O&M cost of $3,850 for 4 years.

Performance Standards or Goals

Performance standards for *in situ* soil vapor extraction are based on leachability modeling, and include 1,1,1-TCA 1 mg/kg and TCE 1.5 mg/kg.

Institutional Controls

Not applicable.

COLESVILLE MUNICIPAL LANDFILL, NY

March 29, 1991

The 35-acre Colesville Municipal Landfill site is a former municipal and industrial landfill in Colesville, Broome County, New York. Land use in the area is rural, and wetlands and woodlands are present in the vicinity of the site. Many of the 1,921 residents living within 3 miles of the site use ground water from shallow and deep aquifers and springs as their drinking water. From 1969 until its closure in 1984, the landfill accepted primarily municipal solid waste, although some drummed industrial waste was accepted from 1973 to 1975. The majority of the 468,000 cubic yards of waste was disposed within three trenches at the site, and the drums were either buried intact, punctured, or crushed. In 1983 and 1984, private investigations identified that upper portions of the ground water beneath the site and in the vicinity of the site were being contaminated by the landfill. The county provided temporary water supplies and carbon filters to affected residences, and conducted well monitoring. This ROD provides a final remedy for the landfill waste and soil, leachate seeps, associated contaminated sediment, and ground water. The primary contaminants of concern affecting the soil, sediment, debris, and ground water are VOCs including benzene, PCE, TCA, TCE; and metals including arsenic.

Selected Remedial Action

The selected RA for this site includes cutting and regrading the sides and surface of the landfill; constructing lined leachate collection trenches; installing a multi-media cap over the existing landfill; installing a gravel gas venting layer in the landfill, with a filter fabric layer placed over the gravel; seeding and mulching the top soil layer of the landfill; pumping and treatment of the contaminated ground water beneath and downgradient of the landfill using air stripping and metals treatment, and discharging the treated water on site to surface water after disinfection by a UV treatment, if required; constructing a water supply system for present and future affected residences, and providing temporary water supplies and carbon filtration units to affected residences until construction is completed; conducting long-term ground-water monitoring; and implementing institutional controls including deed restrictions and site access restrictions such as fencing, as necessary. The estimated present worth cost for this RA is $5,135,000, which includes an annual O&M cost of $250,000 for 4 years.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on the more stringent of state or federal MCLs including benzene 5 *ug*/l (state), PCE 5 *ug*/l (state), TCE 5 *ug*/l (state), toluene 5 *ug*/l (state), and xylenes 5 *ug*/l (state).

Institutional Controls

Deed restrictions will be implemented, if necessary, to prevent the installation of drinking water wells at the site and restrict activities which could affect the integrity of the cap.

CONKLIN DUMPS, NY
March 29, 1991

The 8.5-acre Conklin Dumps site is an inactive municipal landfill in Conklin, New York. Land use in the area is rural. The site consists of two municipal landfills referred to as the upper and the lower landfills. The lower landfill is adjacent to the 100-year floodplain of the Susquehanna River, and is bordered by wetlands. Portions of the landfill were operational between 1964 and 1975, and approximately 80,000 cubic meters of waste material were disposed of on site during this time. In 1985, private investigations identified the presence of leachate seeps from the site and low levels of contaminants in ground water. This first ROD addresses containment of landfill leachate and remediation of contaminated ground water as a final remedy. The primary contaminant of concern affecting the leachate and ground water is chloroethane, a VOC.

Selected Remedial Action

The selected RA for this site includes cutting and regrading the landfill; installing a gravel gas venting layer and multi-media cap over the landfill material; installing a leachate collection system and leachate collection trenches or toe drains at the upper landfill, and discharging leachate off site to a POTW with or without pretreatment; allowing natural degradation to reduce the contamination in ground water; monitoring ground water; and implementing institutional controls including deed, land, and ground-water use restrictions, and site access restrictions such as fencing. If the POTW is not available, the leachate will be treated on site using air stripping, followed by discharging the treated effluent on site to surface water. The estimated present worth cost for this RA is $4,352,078, which includes an annual O&M cost of $86,669 for 30 years.

Performance Standards or Goals

Natural degradation is expected to reduce the concentration of chloroethane to below the state level of 5 *ug*/l within 7 to 9 years. Leachate treatment levels were not specified, but will meet NPDES requirements.

Institutional Controls

Deed restrictions will be implemented as necessary. Restrictions include measures to prevent the installation of drinking water wells and to maintain the integrity of the cap.

CURCIO SCRAP METAL, NJ

June 28, 1991

The 1-acre Curcio Scrap Metal site encompasses two active scrap metal recycling businesses and associated warehouses in Saddle Brook Township, Bergen County, New Jersey. Land use around the site is mixed industrial and residential. Surface water drainage from the site empties into Schroeder's Brook, located a few hundred feet from the property, which drains into a nearby lake. The site is situated above the Brunswick Formation, which is a sole source aquifer. This formation supplies potable water to the public and private wells in the area. Since 1975, Curcio Scrap Metal, Inc. (CSMI) and Cirello Iron and Steel Company (CISC) have recycled scrap metals products on site. In 1982, the state identified cut electrical transformers stored on site, and pools of black oily fluid, which had collected on the ground under and near the transformers. Samples taken from this area and from on-site soil in 1984 revealed contamination by VOCs, organics, and metals. In 1985, the state discovered an oil spill in a nearby pond approximately 200 feet from the property. The state determined that CISC was responsible for the spill of approximately 200 gallons of hydraulic fluid on the property and directed CISC to remove contaminated soil. CISC reportedly removed the bulk of the soil and stored it in another on-site area. EPA issued an AOC to the PRPs on May 27, 1988. Remedial investigation activities were initiated in 1989 by the PRPs under the terms of this order. In 1989, CISC caused a spill of PCB-contaminated oil into on-site soil, and the state required CISC to excavate and drum the resulting contaminated soil. During the RI/FS, PCBs, vinyl chloride, and other contaminants were detected in the on-site ground water. This ROD provides a final remedy for the first OU, the approximately 1,800 cubic yards of contaminated on-site soil. Future RODs will address other ground water and surface water contamination. The primary contaminants of concern affecting the soil are PCBs and metals including lead.

Selected Remedial Action

The selected RA for this site includes excavating, incinerating, and disposing of 1,800 cubic yards of PCB- and metal-contaminated soil above action levels at an off-site RCRA/TSCA incineration facility, along with disposal of any resulting ash. The estimated present worth cost for this RA is $7,500,000. There are no O&M costs associated with this RA.

Performance Standards or Goals

All soil contaminated in excess of soil action levels for metals and greater than PCB 1 mg/kg will be excavated and treated off site. Chemical-specific goals for soil are based on state soil action levels, and include lead 250 mg/kg to 1000 mg/kg.

Institutional Controls

Not provided.

ENDICOTT VILLAGE WELL FIELD, NY
March 29, 1991

The Endicott Village Well Field site consists of a municipal well, the Ranney Well, and its zone of influence, and is located in Endicott, Broome County, New York. Ground water pumped from the well serves as the primary drinking water source for the area. Land use in the area of concern includes a golf course, a sewage treatment plant, an airport, a few industrial tracts, two inactive landfills, and the Endicott Landfill. The Endicott Landfill accepted municipal and industrial waste from the late 1950s until 1975, and has been used to compost sludge from the on-site sewage treatment plant since 1982. In 1981, EPA detected VOC contamination in the Ranney Well, which was confirmed by subsequent state and local investigations from 1984 to 1987. Consequently, in 1983 local authorities installed a diffused aeration air stripping unit on the Ranney Well, and in 1984 installed a purge well to intercept VOCs before impacting the Ranney Well. A 1987 ROD provided for installation of a packed column air stripper to treat water from the Ranney Well. In 1988, EPA identified the materials in the Endicott Landfill as the probable source of ground-water contamination, and determined that the purge well did not adequately prevent the movement of contaminated ground water to the Ranney Well. This ROD addresses management of migration of the contaminant plume as an interim remedy. Final restoration of the aquifer and remediation of source material will be addressed in a subsequent ROD. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, and TCE.

Selected Remedial Action

The selected RA for this site includes upgrading the existing purge well system by installing an additional purge well between the landfill and the Ranney Well; pumping ground water from the purge well and discharging the water on site to the sewage treatment plant, or treating the water prior to discharge, based on the results of purge well testing; and monitoring purge well water. The estimated present worth cost for this RA, assuming that no treatment will be required, is $376,000, which includes an estimated annual O&M cost of $24,000 for 30 years.

Performance Standards or Goals

Not provided.

Institutional Controls

Not provided.

FIBERS PUBLIC SUPPLY WELLS, PR
September 30, 1991

The 540-acre Fibers Public Supply Wells site is in Guayama, Puerto Rico. The site includes an active pharmaceutical plant (AWPI); two former manufacturing facilities, one of which encompasses two former settlement lagoons and a soil disposal area; and five public supply wells. Land use in the area is mixed agricultural and light industrial. The site overlies a class II aquifer. In addition, the Caribbean Sea is located two miles south of the site. From 1966 to 1976, Fibers International Corporation (FIC) manufactured nylon fibers on site. From 1976 to 1980, Chevron Chemical Company (CCCPR) expanded the operations of the FIC plant to include the production of polypropylene fibers. Both FIC and CCCPR operations used organic solvents and degreasing solvents in their on-site processes. Wastewater containing these solvents was directed through the process sewer system to two settling lagoons for preliminary treatment, before being piped to an off-site biological treatment system. FIC lined the lagoons in 1969 to reduce the seepage of treatment wastewater. In 1978, CCCPR installed an on-site system for treating process and sanitary wastewater, and the treated effluent was directed to the settling lagoons before off-site discharge to the sea. CCCPR ceased on-site operations in 1980. State and private site investigations in 1983 revealed the presence of elevated levels of organics and inorganics in soil and ground water. Between 1984 and 1985, AWPI remodeled the facilities, and in 1985 began pharmaceutical manufacturing operations. Also in 1985, AWPI excavated portions of the settling lagoons and enlarged the stormwater retention pond to encompass the lagoon area. AWPI excavated 2,500 cubic yards of the lagoon sludge and asbestos-contaminated liner material, and deposited the material at an on-site soil disposal area. This ROD addresses a final remedy for source contamination in the soil disposal area and ground water. The primary contaminants of concern affecting the soil, debris, and ground water are VOCs including PCE and TCE; other organics; metals including chromium and lead; and other inorganics including asbestos.

Selected Remedial Action

The selected RA for this site includes excavating 9,010 cubic yards of contaminated material from the soil disposal area and transporting the soil off site to a landfill authorized to accept asbestos; conducting soil sampling; controlling dust during remediation to prevent exposure and to protect workers and the local community during the transportation of ACM; restoring and covering the excavated area with six inches of fill and six inches of top soil, followed by revegetating the area; on-site pumping and treatment of the 200-acre contaminated ground water plume from five recovery wells using filtration and air stripping, and discharging the treated water on site to a nearby irrigation canal to recharge the aquifer; and installing monitoring wells near the coastline to monitor potential salt water encroachment. The estimated present worth cost for this RA is $6,686,591, which includes an annual O&M cost of $270,868 for 30 years.

Performance Standards or Goals

Soil goals for asbestos are based on NESHAPs under the CAA, which consider that materials containing asbestos in concentrations exceeding 1 percent be regarded as ACM. Ground-water clean-up goals are based on state and federal MCLs. Goals for soil include asbestos one percent by volume. Chemical-specific ground-water goals include PCE 0.005 mg/l (MCL) and TCE 0.005 mg/l (MCL). EPA

may invoke an ARAR waiver for ground water if the remediation program indicates that reaching MCLs in the aquifer is technically impracticable.

Institutional Controls

Not provided.

FORT DIX LANDFILL, NJ

Federal Facility
September 24, 1991

The 126-acre Fort Dix Landfill site is an inactive landfill located in the southwest section of the U.S. Army Fort Dix Military Reservation, Pemberton Township, Burlington County, New Jersey. The site is surrounded by military housing developments, a hardwood swamp, and a densely vegetated hardwood forest. The site is bordered by Cannon Run Stream, located on the east side of the landfill, and an unnamed stream located northwest of the landfill. From 1950 until its closure in 1984, the site was used and operated by the Fort Dix Military Reservation to dispose of various wastes including household waste from the military base, paints, thinners, demolition debris, ash, and solvents. From 1968 to 1984, McGuire Air Force Base also used the landfill for waste disposal. Landfilling operations consisted of excavating a series of parallel trenches and filling with waste materials. Waste disposal began at the northern portion of the landfill in 1950 and proceeded in a southerly direction to the southern boundary of the landfill. In addition to the landfill, during 1982 the Army used a pit in the southwestern area of the site to dispose of mess hall grease and degreasing agents. A 1982 state investigation revealed ground-water contamination beneath the site that had resulted from landfill leachate. This ROD addresses final source control at the site; however, if additional investigations reveal significant increases in unacceptable risk to human health and the environment, then additional RAs will be proposed. The primary contaminants of concern affecting the soil and debris are VOCs including benzene and toluene; other organics including PAHs; and metals including chromium and lead.

Selected Remedial Action

The selected RA for this site includes capping the 50-acre southern portion of the landfill with a clay or geomembrane cap; developing a soil erosion and sediment control plan; long-term ground water, surface water, and air monitoring; and implementing institutional controls including deed, land, and ground-water use restrictions, and site access restrictions such as fencing. The estimated capital cost for this RA is $12,600,000, with an annual O&M cost of $218,900 for the first 2 years and $199,900 for years 3 to 30.

Performance Standards or Goals

Not applicable.

Institutional Controls

Institutional controls including land use, ground-water use, and deed restrictions will be implemented at the site.

FRONTERA CREEK, PR
September 30, 1991

The Frontera Creek site is composed of 13 industrial facilities and 200 acres of associated lagoons within the municipality of Humaco, Puerto Rico. The site includes Frontera Creek, the industrial properties adjacent to the creek, the Frontera lagoons, and the Ciudad Cristiana housing development located adjacent to the creek. Land surrounding the site consists of mixed residential and industrial areas, and a wildlife refuge. From 1971 to 1981, several industries within the site including Technicon Electronics used mercury in manufacturing processes and discharged wastewater directly into Frontera Creek. The Commonwealth of Puerto Rico Environmental Quality Board (EQB) fined Technicon in 1978 for these processes, resulting in the cessation of its mercury discharges to the creek. During investigations in 1986, EPA identified mercury in surface soil and sediment on Technicon property associated with the storage, use, or discharge of mercury-containing compounds. This ROD addresses contaminated soil and sediment on the Technicon property and provides a final remedy for the site. The primary contaminant of concern affecting the soil and sediment is mercury.

Selected Remedial Action

The selected RA for this site includes excavating 180 cubic yards of soil and 370 cubic yards of sediment contaminated with mercury; dewatering and containing the excavated material, followed by disposing of the material off site at a RCRA Subtitle D or C waste facility; pretreating wastewater generated from dewatering, followed by on-site discharge to Technicon's wastewater treatment plant or off site to a local POTW; performing confirmatory soil sampling in the remediated areas to verify that mercury concentrations in residual and on-site materials do not exceed the clean-up levels; and regrading and revegetating the remediated areas. The estimated present worth cost for this RA ranges from $562,000 to $730,000, based on whether the waste is disposed of as a solid or hazardous waste, respectively. There are no O&M costs associated with this RA.

Performance Standards or Goals

Clean-up levels for the soil and sediment on site were established based on a site-specific risk assessment and an HI=1, and include mercury 35 mg/kg.

Institutional Controls

Not applicable.

GARDEN STATE CLEANERS, NJ

September 26, 1991

The 3,000-square-foot Garden State Cleaners (GSC) site is an active dry cleaning operation in Minotola, Bueno Borough, Atlantic County, New Jersey. Land use in the area is residential and commercial, and local residents obtain drinking water from the Borough municipal water supply system. From 1966 to the present, dry cleaning activities using PCE were conducted at the GSC site, and until 1985, waste was discharged through pipes directly into the ground. An adjacent Superfund site, the 1.2-acre South Jersey Clothing Company (SJCC) facility, has manufactured and dry cleaned military clothing using PCE and TCE since 1940 and also discharged wastewater on site. SJCC also stored solvents and VOC-contaminated wastewater on site in leaking drums and tanks. In 1981, SJCC reportedly removed thirty-three 55-gallon drums of contaminated soil from the facility. In 1984, state investigations showed elevated levels of PCE in ground water adjacent to and downgradient from the GSC and SJCC facilities, and elevated levels of PCE and TCE in on-site soil. SJCC installed a ground-water pump and treatment system under a state order in 1985, and in 1989, began installing a limited soil vapor extraction system near a TCE storage tank that ruptured in a 1979 fire. This project was abandoned with the start of EPA's RI. Because the GSC and SJCC sites are in proximity to one another and have similar contamination, the sites will be remediated concurrently. This ROD addresses remediation of contaminated soil and ground water at both the GSC and SJCC sites, as a final remedy. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, PCE, TCE, and toluene.

Selected Remedial Action

The selected RA for this site includes treating on site approximately 1,600 cubic yards of contaminated soil using *in situ* vapor extraction; treating the contaminated wastewater from the vapor extraction processes on site using an air stripping column; treating air emissions using carbon adsorption units; pumping and on-site treatment of contaminated ground water using air stripping and carbon adsorption; reinjecting the treated ground-water upgradient from the site; regenerating spent activated carbon from both treatment processes off site; conducting long-term ground-water monitoring; and implementing temporary institutional controls. The estimated present worth cost for this RA at the GSC site is $5,451,000, which includes an estimated annual O&M cost of $249,500 for 70 years. The estimated present worth cost for the RA at the GSC and SJCC sites is $11,169,000, which includes an annual O&M cost of $542,000 for 70 years.

Performance Standards or Goals

Federal and state agencies have agreed to jointly establish ISAL clean-up goals of 1,000 *ug*/kg for PCE and TCE, given the predominance of the two compounds at the site. Ground-water remediation goals are based on the more stringent of SDWA federal and state MCLs, and include PCE 1 *ug*/l (state) and TCE 1 *ug*/l (state).

Institutional Controls

Temporary institutional controls will be implemented on site while the need for providing home treatment units for individual residents is evaluated.

GENERAL MOTORS/CENTRAL FOUNDRY DIVISION, NY

December 17, 1990

The 270-acre General Motors/Central Foundry Division site is an active aluminum casting plant in Massena, St. Lawrence County, New York. The site is bordered by the St. Lawrence River to the north, the St. Regis River Mohawk Indian Reservation (which includes Turtle Creek) to the east, the Raquette River to the south, and a manufacturing facility to the west. Surrounding land use is mixed residential and industrial. The site overlies a surficial alluvial aquifer and is adjacent to wetlands, both of which have been contaminated. Additional on-site features of concern include the unlined north and east disposal areas and the industrial landfill, which contain contaminated soil, debris, sludge; four unlined industrial lagoons, which contain contaminated liquids, sludge, and soil; the rivers and creek which contains contaminated sediment; contaminated soil on the St. Regis Mohawk Reservation and on General Motors property; and contaminated associated wetlands. From 1959 to 1980, hydraulic fluids containing PCBs were used in the on-site aluminum casting operations. During the 1960s, PCB oil-laden wastewater was routinely discharged to one of the four industrial lagoons resulting in sludge buildup. Wastewater was discharged to the St. Lawrence River. During the mid-1970s, the migration of water and sludge through a breached berm surrounding the east disposal area resulted in PCB contamination on the St. Regis Reservation and in Turtle Creek. Further contamination stemmed from the placement of PCB-contaminated soil on the bank of the Raquette River, as well as from discharge of surface water run-off from the site to the Raquette River. In 1976, a wastewater treatment system, which included a lagoon for solids settling was installed resulting in which created PCB-laden sludge buildup in the on-site lagoon. PCB-laden sludge from the lagoon was periodically removed to the east and north disposal areas and the industrial landfill. Solid industrial waste was disposed of in the industrial landfill as well. Investigations by General Motors from 1985 to 1989 confirmed and characterized on-site and off-site contamination in soil, sediment, sludge, and ground water. As a result, in 1988 an interim cap was placed over the industrial landfill. This ROD provides a final remedy for all site areas and media except the east disposal area and the industrial landfill, which will be addressed in a subsequent ROD. The primary contaminants of concern affecting the soil, sediment, sludge, debris, ground water, and surface water are PCBs, and to a much lesser degree, VOCs including TCE; and other organics including PAHs, and phenols.

Selected Remedial Action

The selected RA for this site includes dredging and excavating approximately 62,000 cubic yards of contaminated soil and sediment from PCB "hot spots" in the St. Lawrence and Raquette rivers, Turtle Creek, and associated wetlands and riverbanks; excavating approximately 142,000 cubic yards of sludge, soil, and debris from the north disposal area and the four industrial lagoons (two of the four of the lagoons are inactive and will be remediated currently, the two active lagoons will be remediated after they are taken out of service); excavating approximately 49,000 cubic yards of soil from the reservation and General Motors property; dewatering and treating dredged and excavated material using bioremediation, another equivalent treatment, or incineration based on treatability test results; disposing of residuals and material with low-level contamination on site, placing a vegetated cap over the residuals; pumping and on-site treatment of contaminated ground water; discharging the treated water on site to surface water; implementing interim surface run-off controls at the east disposal area; and monitoring sediment, ground water, and

surfacewater. The estimated present worth cost for this RA is $78,000,000, which includes an annual O&M cost of $464,000 for years 0 through 8, $197,000 for years 9 and 10, $464,000 for years 11 through 13, and $197,000 for years 14 through 30.

Performance Standards or Goals

Excavation levels for PCB-contaminated materials are based on TSCA requirements and St. Regis Mohawk PCB clean-up requirements, and include 1 mg/kg (TSCA) for sediment in the St. Lawrence and Raquette Rivers, 1 mg/kg (St. Regis) for soil on the St. Regis Reservation, 0.1 mg/kg (St. Regis) for sediment in Turtle Creek, and 10 mg/kg (TSCA) for on-site soil and sludge on the General Motors facility. PCB-contaminated material will be treated to a level of 10 mg/kg or less. Phenols in on-site solids will be remediated to a level of 50 mg/kg. Ground-water clean-up standards are based on state standards, and include TCE 5 *ug*/l, PCBs 0.1 *ug*/l, and phenols 1 *ug*/l.

Institutional Controls

Not provided.

GENZALE PLATING, NY
March 29, 1991

The Genzale Plating site is an electroplating facility, which occupies a 24,000-square-foot area in Franklin Square, Nassau County, New York. Land use in the area is predominantly residential, with a wetlands area located approximately 3 miles southeast of the site. The site overlies a Class II aquifer, which is tapped by three water supply wells within 1.5 miles of the site. Since 1915, the Genzale Plating Company, Inc. operated an electroplating facility on site. Records indicate that copper, silver, zinc, cadmium, nickel, and chromium compounds, as well as acids and cleaners, were used during plating processes. Wastewater generated from the electroplating operations was discharged to four subsurface leaching pits. Following a 1981 county inspection, the owner was required to discontinue on-site contaminant discharge to the leaching pits. Testing of the wastewater samples from the pits indicated heavy metal concentrations in excess of state discharge standards. In 1982, 36 cubic yards of contaminated material were excavated; but the entire excavation was never completed. In April 1983, a state investigation determined that on-site contaminants presented a potential public health threat because the site is in close proximity to public water supply wells. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE and TCE; other organics including PAHs; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected interim RA for this site includes treating soil using *in situ* vacuum extraction and vapor phase carbon adsorption to control emissions, followed by excavating 1,600 cubic yards of the treated soil and 480 cubic yards of topsoil and material from the leaching pits, followed by off-site treatment and disposal; backfilling the excavated areas with clean soil; pumping and treatment of ground water using precipitation to remove metals, followed by air stripping, with reinjection on-site and off-site disposal of treatment residuals. The estimated present worth cost for this RA is $6,358,700, which includes an annual O&M cost of $223,800.

Performance Standards or Goals

Chemical-specific soil clean-up goals include TCE 1 mg/kg. Ground-water treatment will be designed to reduce the metals concentrations in the treated ground water below the federal and state ground-water standards.

Institutional Controls

Not provided.

GLOBAL LANDFILL, NJ
September 11, 1991

The 57.5-acre Global Landfill is an inactive solid waste disposal facility in Old Bridge Township, Middlesex County, New Jersey. The facility is bordered by wetlands to the northeast, southeast, and southwest, and a former sand borrow pit and wooded area to the northwest. Land use in the area is primarily residential. On-site features include a 51-acre landfill, a 6.5-acre northwest landfill extension, and an inactive 1.7-acre leachate collection pond. Municipal water supply wells are located approximately one mile north of the landfill. From 1968 until its closure in 1984, the Global Landfill site was used for non-hazardous solid waste disposal. As a result of a slope failure in 1984, landfill waste was exposed, the dyke was breached, and the waste spilled into an adjacent wetlands area. Subsequently, the state ordered all on-site disposal operations to cease. From 1988 to 1991, EPA and state site investigations identified 63 buried 55-gallon drums containing hazardous wastes including VOCs, organics, and metals within both the waste mound and northwest extension. This ROD addresses OU1, the landfill waste. A second ROD will address possible off-site ground-water and surface water contamination, and wetland areas, as OU2. The primary contaminants of concern affecting the soil and sediment are VOCs including benzene, PCE, TCE, toluene, and xylenes; other organics; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes capping the landfill with a synthetic and clay cap; constructing a soil stabilization berm; constructing and operating a gas management system, and stormwater and leachate collection systems; pumping leachate and condensate from the gas collection system to a holding tank, and subsequently transporting the waste off site for treatment and disposal (this constitutes an interim remedy for the leachate); disposing of sludge off site at a RCRA facility; implementing a monitoring program to ensure the effectiveness of the remedy; mitigating any affected wetlands; and implementing site access restrictions such as fencing. On-site leachate treatment that would replace the off-site leachate treatment and disposal provided for in this ROD, may be initiated as part of the ground-water remedy in the next ROD, which addresses OU2, as part of the preferred leachate management alternative. This may include treatment using powdered activated carbon, nitrification and denitrification, and UV disinfection, followed by discharging the treated effluent on site to the Cheesequake Creek. The estimated present worth cost of this RA is $30,353,200, which includes an annual O&M cost of $865,100 based on on-site treatment of leachate.

Performance Standards or Goals

A waiver of New Jersey's hazardous waste landfill closure regulations will be required on the basis of technical impracticality due to the large volume of waste to be removed. The remedy will meet the appropriate federal and state guidelines and requirements for subsurface gas and leachate management systems and surface water systems. No chemical-specific standards were provided.

Institutional Controls

Not applicable.

HERTEL LANDFILL, NY
September 27, 1991

The 80-acre Hertel Landfill site consists of a 13-acre former municipal landfill and adjacent land in Plattekill, Ulster County, New York. Land use in the area is predominantly residential, with wetland areas adjacent to the site. The site overlies two natural aquifers. From 1963 to 1975, Hertel Enterprises used the site for the disposal of municipal solid waste. In 1975, the landfill was purchased by Dutchess Sanitation Services, which had been hauling and disposing of refuse from Dutchess County in the Hertel Landfill since 1970. It is estimated that 240,000 cubic yards of waste were disposed on site during landfill operations. In 1976, the site was shut down for a variety of violations, including illegal dumping of industrial waste and violating a town ordinance prohibiting the disposal of non-local waste. As a result of these improper disposal practices, a number of state investigations were conducted, which identified contamination by various organic compounds and metals in the on-site soil and ground water. This ROD addresses soil contaminated by landfill waste, and ground water contaminated by landfill leachate. The primary contaminants of concern affecting the soil, sediment, debris, and ground water are VOCs including benzene, toluene, and xylenes; other organics including phenols; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes regrading and compacting the landfill mound to provide a stable foundation for cap placement; constructing a 13-acre multi-layer cap over the landfill with an associated gas venting system; sampling soil along the western portion of the disposal area to determine the need to extend the cap or to consolidate the soil beneath the cap; monitoring air to ensure that air emissions resulting from the cap construction meet ARARs; ground-water pumping and treatment using an innovative treatment system consisting of precipitation and membrane microfiltration to remove metals and solids, and an ultraviolet light and hydrogen peroxide oxidation system to remove organics; performing a treatability study to demonstrate the effectiveness of the innovative technology; implementing a contingency remedy consisting of precipitation, clarification, and filtration to remove metals and suspended solids, and carbon absorption to remove organic compounds, if the treatability study indicates that the selected innovative ground-water treatment technology is not effective; discharging the treated water on site, and disposing of treatment residuals in accordance with RCRA LDRs; evaluating and mitigating affected wetlands; conducting ground-water monitoring to observe flow patterns above and below the landfill; and implementing institutional controls including deed restrictions, and site access restrictions such as fencing. The estimated present worth cost for this RA is $8,207,000, which includes an annual O&M cost of $267,000 for years 0 through 12, $162,800 for years 13 through 17, and $31,000 for years 18 through 30. The present worth cost for the contingency remedy is $8,774,000, with the same O&M costs.

Performance Standards or Goals

Capping will prevent direct contact exposure to contaminated soil, and will result in risks that are less than EPA's target levels of 10^{-6} for carcinogenic risks and an HI = 1. Ground-water clean-up goals are based on federal and state standards, and include total xylenes 5 *ug*/l (state).

Institutional Controls

Deed restrictions will be implemented to ensure that future use of the site property will maintain the integrity of the cap.

JUNCOS LANDFILL, PR
September 24, 1991

The approximately 20-acre Juncos Landfill site is an inactive municipal waste landfill in the City of Juncos, Puerto Rico. Land use in the area is predominantly residential, with a housing development located along the northern border of the site. Two unnamed tributaries are located outside the eastern and western borders of the site and flow to the Rio Gurabo. Municipal waste, including broken and/or intact mercury thermometers, was disposed of at the site from 1957 to 1977, and in 1981, the site was closed. Several EPA investigations revealed the presence of mercury and VOCs in the soil, off-site leachate, and air. In 1984, under an Administrative Order, EPA required the PRP to place a soil cover over some portions of the landfill where wastes were exposed, and to assess risks posed by potential mercury contamination. This ROD is the first of two OUs and addresses contaminated soil and soil/leachate. A future ROD will provide for remediation of potential ground-water contamination as a result of migrating leachate, as OU2. The primary contaminants of concern affecting the soil and debris are VOCs; other organics including phenol; and metals including arsenic, chromium, lead, and mercury.

Selected Remedial Action

The selected RA for this site includes constructing a single barrier cap over the landfill to reduce surface infiltration, prevent direct contact, limit gas emissions, and control erosion; installing a passive landfill gas venting system, which could be converted to an active system if monitoring shows this is needed; clearing and grubbing existing vegetation on the landfill area, and regrading the landfill; installing, if necessary, a leachate control system composed of a leachate storage system prior to off-site treatment of leachate; providing for erosion control appurtenances including drainage channels, and stilling and sediment basins; conducting long-term monitoring of air, sediment, surface water, and leachate; relocating families living in homes located along the immediate north face of the landfill during the construction phase; and implementing institutional controls including deed restrictions, and site access restrictions including fencing. The estimated present worth cost for this RA is $4,420,000, which includes an annual O&M cost of $176,100.

Performance Standards or Goals

Not applicable.

Institutional Controls

Deed restrictions will be implemented to preclude future development and ensure the integrity of the cap.

LOVE CANAL (93rd STREET), NY

Amendment
May 15, 1991

The Love Canal site is an inactive hazardous waste site located in Niagara Falls, New York. The 19-acre 93rd Street School site, one of several OUs for the Love Canal Superfund site, is the focus of this ROD. This subsite is located less than one mile northwest of the Love Canal disposal area and is within the Love Canal emergency declaration area. Site features include the 93rd Street School and adjacent vacant land, and the site is bordered by Bergholtz Creek to the north and residential properties to the east, west, and south. From 1942 to 1953, Hooker Chemicals and Plastics Corporation (now Occidental Chemical Corporation) disposed of over 21,000 tons of various chemicals including dioxin-tainted trichlorophenols at the Love Canal site. In 1950, after the site was deeded to the City of Niagara Falls Board of Education, the 93rd Street School was built. In 1954, a second school, the 99th Street School, was built adjacent to the mid-portion of the canal. Before construction of the 93rd Street School, a drainage swale had crossed the site. In 1954, the site was graded to its present contours with approximately 3,000 cubic yards of fill materials including fill from the 99th Street School. The fill material is reported to contain fly ash and BHC (a pesticide) waste. During the mid-1970s, contaminated leachate migrated to the surface of the canal, to some residential basements adjacent to the canal, and through sewers to area creeks. Those homes have been demolished, and the sewers and creeks in the Love Canal emergency declaration area have been remediated. In 1980, the 93rd Street School was closed because of public health concerns related to the potentially contaminated fill material. Investigations conducted in 1988 revealed the presence of VOCs, other organics, and metals in the soil. During previous investigations, it was determined that low level contamination present in the ground water compared to the ground-water quality in the area and did not pose an exposure threat to the concerned population. A 1988 ROD addressed source control through excavating and solidifying/stabilizing the excavated material, placing the material into the same unit, and capping with a low permeability soil cover. The RA was not implemented and has been reevaluated in light of the Niagara Falls Board of Education's 1989 plan to restore the 93rd Street School as an educational facility and to address objections to reopening the school if contaminated soil remains on site. This ROD amends the 1988 ROD, and addresses final remediation of on-site contaminated soil through excavation and off-site disposal. The primary contaminants of concern affecting the soil are VOCs including toluene and xylenes; other organics including PAHs and pesticides; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The amended RA for this site includes excavating and disposing of off site 7,000 cubic yards of contaminated soil from hot spot areas; backfilling excavated areas with site soil of lower contamination; and capping and regrading the area with fill material. The estimated present worth cost for this amended RA is $2,250,000, which does not include O&M costs.

Performance Standards or Goals

Soil action levels were not provided. Ground-water clean-up goals were waived due to technical impracticability.

Institutional Controls

Not applicable.

MATTIACE PETROCHEMICALS, NY

June 27, 1991

The 2-acre Mattiace Petrochemicals site is an inactive liquid storage and redistribution facility in Glen Cove, Nassau County, New York. Surrounding land use is primarily industrial. Glen Cove Creek, a potential wetland area, is located south of the site. The site overlies a system of three unconsolidated sedimentary aquifers, of which the surficial Upper Glacial Aquifer has been affected by on-site contamination. From the mid-1960s to 1986, organic solvents were stored, blended, and repackaged on site. On-site features involved with the operation included a metal Quonset hut, a concrete fire shed, a leaching pond, a partially covered concrete loading dock, and 32 underground and 24 above-ground storage tanks. Drums were reconditioned on site, and the resulting water/solvent mixtures were discharged to above-ground tanks or to an on-site leaching pond. A solvent water separator was used to collect overflow from the above-ground tanks for discharge to the leaching pond. There is evidence, however, that overflow from these tanks may have been discharged directly into the soil. In 1988, EPA characterized and disposed of 100,000 gallons of hazardous liquids off site from approximately 24 above-ground and 32 USTs. In 1989, a second EPA investigation identified approximately 25 buried drums and numerous other containers that were leaking contaminated material into the surrounding soil and ground water. A 1990 ROD provided for removal of on-site buried drums containing sludge, as well as the associated highly contaminated soil as OU2. In 1989, EPA characterized on-site contamination, and discovered a layer of "free product" floating on top of contaminated ground water and contaminated sediment in Glen Cove Creek. This ROD addresses remediation of on-site source materials, as well as management of migration of contaminated shallow ground water. The primary contaminants of concern affecting the soil, debris, and ground water are VOCs including PCE, TCE, toluene, and xylenes; other organics including PAHs, pesticides, and phenols; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes excavating and treating off site 208 cubic yards of pesticide-contaminated "hot spot" soil, possibly by incineration, followed by off-site disposal of residuals; backfilling excavated areas with clean soil; treating 17,141 cubic yards of contaminated soil using *in situ* vacuum extraction, followed by activated carbon to control off-gases, as needed; decontaminating and demolishing the Quonset hut, 24 above-ground tanks, 32 underground tanks, and 1,360 cubic yards of concrete and asphalt, followed by off-site disposal; removing 15,000 gallons of "free product" using ground-water extraction wells and a skimmer pump, followed by off-site treatment and disposal; pumping and treatment of ground water using precipitation and clarification as pretreatment to remove metals, and air stripping to remove organics, and reinjecting the treated water on site; treating air effluent from the air stripper using thermal treatment; treating water effluent from the air stripper using carbon adsorption, and regenerating spent carbon off site; performing treatability studies; conducting a soil gas survey to monitor off-gas migration; and monitoring ground water, Glen Cove Creek sediment, and surface water. The estimated present worth cost for this RA is $15,930,592, which includes an annual O&M cost of $692,997 for 30 years.

Performance Standards or Goals

Soil clean-up goals are based on achieving an excess lifetime cancer risk of 10^{-6}. Chemical-specific goals for soil include PCE 0.6 mg/kg, TCE 0.07 mg/kg, and xylenes 259 mg/kg. Ground-water clean-up levels are the more stringent of federal MCLs or state standards, and include PCE 5 *u*g/l (state), TCE 5 *u*g/l (MCL), and xylenes 5 *u*g/l (state).

Institutional Controls

Not provided.

NASCOLITE, NJ
June 28, 1991

The 17.5-acre Nascolite site is an inactive acrylic and plexiglass sheet manufacturing plant in Millville, Cumberland County, New Jersey. The site lies within the New Jersey coastal plain and overlies clay, silt, sand, and gravel layers. The majority of the site is wooded, with a wetland located in the southwestern portion. Land use is both industrial and residential, with homes located 1,500 feet to the east and southeast of the site. Site features include six buildings, which served as the production facility, laboratory, and company offices; and a drainage ditch. From 1953 to 1980, site operations included reclaiming scrap material through depolymerization and distillation processes. Residues from these operations were discharged to the buried on-site tanks, and wastewater was discharged to the on-site drainage ditch. Decay of the structures and asbestos fibers within the buildings pose a threat to site workers. In 1980, although the state ordered the plant to stop discharging wastewater into the on-site drainage ditch, well water monitoring conducted during 1981 identified VOC-contamination in these wells. In 1984, the state identified over one hundred 55-gallon drums and several USTs buried on site. In 1987, the state ordered Nascolite to remove some of the drums, and later during 1987 and 1988, EPA removed the remaining drums off site. Perforations found in one of the excavated tanks indicated the likelihood that VOCs and lead had leaked into and contaminated on-site soil, which was confirmed by subsequent sampling. Also in 1987, EPA assumed the lead for the site, cleaned and cut the waste material storage tanks into scrap metal, and removed 20 cubic yards of soil and 30 cubic yards of asbestos insulation. In addition, the waste in tanks and drums was sampled, bulked into 1,825 gallons of corrosive/ignitable liquid and 134 cubic yards of solidified solvent sludge, and emoved off site. A 1988 ROD addressed on-site ground-water contamination and provided for pumping and treatment of ground water, provision of an alternate water supply to affected residences, and additional site studies. This ROD addresses contaminated on-site soil, sediment, and buildings. The primary contaminant of concern affecting the soil, sediment, and debris is the inorganic contaminant lead; and VOCs including benzene, PCE, TCE, toluene, and xylenes.

Selected Remedial Action

The selected RA for this site includes excavating, treating, and stabilizing 8,000 cubic yards of unsaturated and wetlands soil containing lead above 500 *ug*/kg; backfilling excavation pits using the treated soil; transporting wetland sediment not amenable to stabilization off site; restoring any affected wetlands; conducting asbestos abatement, followed by off-site disposal; demolishing site structures in accordance with asbestos regulations, followed by decontamination, on-site treatment, recycling, or off-site disposal of associated debris; and implementing institutional controls. The estimated present worth cost for this RA is $4,165,000, which includes an annual O&M cost of $31,000.

Performance Standards or Goals

All unsaturated soil contaminated with lead above the action level of 500 *ug*/kg will be excavated and stabilized on site.

Institutional Controls

Institutional controls will be implemented to ensure that the solidification mass is not disturbed.

NAVAL AIR ENGINEERING CENTER (OU1), NJ

Federal Facility
February 4, 1991

The 7,400-acre Naval Air Engineering Center (NAEC) site is an active air base in Jackson and Manchester Townships, Ocean County, New Jersey. Activities conducted on site include program research, engineering, development testing and evaluation, and various warfare support services. Land use in the area includes residential, woodland, vast wetland, and associated floodplain areas. Approximately 65,400 residents of the townships are serviced by several municipal supply wells located within one mile of the site to the southeast and north. From 1916 to 1919, the Eddystone Chemical Company conducted chemical artillery testing on site. In 1921, the U.S. Navy took control of the site and conducted operations involving the use, handling, storage, and on-site disposal of hazardous substances in various on-site buildings. Site features within OU1 include a barrel storage area and fuel station (site 10), a fire training area with unlined lagoons and an oil/water separator (site 16), and an on-site fuel farm with inactive dry wells that were removed in 1982 (site 17). Preliminary investigations in 1983 by the U.S. Navy identified 44 on-site areas of possible soil and ground-water contamination, and determined that the primary sources of soil and ground-water contamination in OU1 (composed of sites 10, 16, and 17) were leaky valves and pipes, dispensing pumps, the underground fuel oil tanks, overflowing dry wells, and other accidental on-site chemical spills and releases. In 1988, NAEC removed and replaced the on-site tanks. This ROD provides an interim remedy for contaminated soil and ground water in OU1. The primary contaminants of concern affecting the ground water are VOCs including benzene, TCE, and xylenes; other organics including PAHs; and metals including arsenic and lead.

Selected Remedial Action

The selected RA for this site includes pumping and pretreating ground water to remove metals, residual amounts of free product, and solids, followed by off-site disposal of solids and free product, on-site treatment using air stripping and vapor phase carbon adsorption to remove VOCs, and polishing the effluent using granular activated carbon; spray irrigating or infiltrating the treated ground water over the on-site soil; regenerating the spent carbon off-site; and disposing of all solids, residual sludge and free product off site. The estimated capital cost for this RA is $700,000, with an annual O&M cost of $100,000 for 3 years.

Performance Standards or Goals

Chemical-specific clean-up goals for ground water will be addressed in the final remedy.

Institutional Controls

Not applicable.

NAVAL AIR ENGINEERING CENTER (OU2), NJ

Federal Facility
February 4, 1991

The 7,400-acre Naval Air Engineering Center site is an active air base in Jackson and Manchester Townships, Ocean County, New Jersey. Activities conducted on site include program research, engineering, developmental testing and evaluation, and various warfare support services. Land use in the area includes residential, woodland, vast wetlands, and associated floodplain areas. Approximately 65,400 residents of the townships are serviced by several municipal supply wells located within one mile of the site to the southeast, and north. From 1916 to 1919, the Eddystone Chemical Company conducted chemical artillery testing on site. In 1921, the U.S. Navy took control of the site and conducted operations involving the use, handling, storage, and on-site disposal of hazardous substances in various buildings. Preliminary investigations by the Navy from 1983 to 1986 identified potential on-site soil and ground-water contamination in 44 site areas, including area H, site 32, which has been designated as OU2 for remediation. Site 32 consists of the launching end of five test tracks and ancillary facilities including a drainage system designed to receive oil and fuel run-off from each track, a series of dry wells, and several USTs. Contamination in this area was thought to have been the result of improper disposal of waste in five dry wells, various spills, leaking valves, and other poor housekeeping practices. In 1988, the Navy excavated and removed off site the five dry wells, contaminated soil, and underground storage tanks to prevent potential discharges to ground water. This ROD provides an interim remedy for OU2, the ground-water contamination in area H, site 32. The focus of this OU is ground water, although some treatment of soil may occur. The primary contaminants of concern affecting the ground water are VOCs including PCE; other organics; and metals including lead.

Selected Remedial Action

The selected RA for this site includes pumping and pretreating ground water to remove metals, soil, and residual amounts of free product, followed by off-site disposal of solids and free product, and on-site treatment using air stripping and vapor phase carbon adsorption to remove VOCs; polishing the effluent using granular activated carbon; spray irrigating or infiltrating the treated ground water over the on-site soil to promote biodegradation; regenerating the spent carbon off site; and disposing of all solids, residual sludge, and free product off site. The estimated capital cost for this interim RA is $550,000 (latest estimate), with an annual O&M cost of $100,000 for 3 years.

Performance Standards or Goals

Chemical-specific ground-water clean-up levels will be addressed in the final remedy.

Institutional Controls

Not applicable.

NAVAL AIR ENGINEERING CENTER (OU3), NJ

Federal Facility
September 30, 1991

The 7,400-acre Naval Air Engineering Center site is an active air base in Jackson and Manchester Townships, Ocean County, New Jersey. Activities conducted on site include program research, engineering, development testing and evaluation, and various warfare support services. Land in the area includes residential areas, woodlands, vast wetlands, and associated floodplain areas. The site lies within the Toms River Drainage Basin, and adjacent to and south of the site are commercial cranberry bogs that drain into and out of the southeast section of the site. Approximately 65,400 residents of the townships are serviced by several municipal supply wells located within one mile of the site to the southeast and north. From 1916 to 1919, the Eddystone Chemical Company conducted chemical artillery testing on site. In 1921, the U.S. Navy took control of the site and conducted operations involving the use, handling, storage, and on-site disposal of hazardous substances in various on-site buildings. This ROD addresses OU3, which includes eight separate sites and a region known as area L. The sites include a disposal area (site 15), a gas station (site 18), an inactive disposal area (site 23), a contractor disposal area located along a drainage swale (site 26), recovery systems test sites (site 27), a recovery systems track site (site 30), a parachute jump circle (site 34), and a soil stabilization field test site (site 40). Area L is located in the northwestern corner of the facility in the vicinity of a BOMARC missile explosion area. The explosion resulted in the limited spread of a radioacative material, plutonium. The results of the RI show no evidence of significant contamination at the eight sites and area L. At most sites, contaminants were not detected. In instances where contaminants were detected, the levels were usually well below state and federal action levels. Furthermore, investigations conducted from 1985 to 1990 in area L also concluded that no significant levels of radiological contamination were present in ground water, soil, or sediment in this area. Therefore, there are no contaminants of concern affecting this site.

Selected Remedial Action

The selected RA for this site includes no further action because no significant levels of contaminants exist at the eight sites and area L. No additional action is necessary to protect human health or the environment. There are no costs associated with this no action remedy.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not applicable.

NAVAL AIR ENGINEERING CENTER (OU4), NJ

Federal Facility
September 30, 1991

The 7,400-acre Naval Air Engineering Center (NAEC) site, which contains many subsites, is a naval research design and testing facility near the Jackson and Manchester Townships, Ocean County, New Jersey. The site lies within the Toms River Drainage Basin and contains 1,300 acres of flood-prone areas. Land use in the area is part residential and part undeveloped. The estimated 65,400 people who reside within the Jackson and Manchester Townships receive their water from municipal wells. This ROD focuses on remediation of area E (site 28) within the NAEC site. Currently, area E features include a former oil storage shed, former paint locker, and five fuel storage containers. From 1957 to 1980, unknown quantities of waste oil, hydraulic fluids, and solvents were discharged in area E. In 1988, the RI identified elevated VOC levels and floating product, most likely gasoline, in the ground water. Subsequent investigations in 1990 discovered a gasoline leak in an underground pipe, which apparently was the source of ground-water contamination. On-site actions have included repairing the leak and excavating and disposing of 65 cubic yards of visually-contaminated soil. This ROD provides an interim remedy for ground-water contamination. Future RODs will address the remaining contaminated media including a final decision for ground water. The primary contaminants of concern affecting the ground water are VOCs including benzene, toluene, and xylenes; and other organics including PAHs.

Selected Remedial Action

The selected RA for this interim remedy includes on-site pumping and pretreating ground water using precipitation and filtration to remove metals, solids and residual amounts of free product, and air stripping to remove VOCs; filtering the effluent from the treatment process water using a granular activated carbon polishing filter, and discharging the treated water on site in a spray irrigation and infiltration system depending on the season; treating air emissions using granular activated carbon; regenerating and disposing of any spent carbon off site; and disposing of the resultant sludge from the treatment process off site. The estimated capital cost for this RA is $1,000,000, with an annual O&M cost of $100,000 for 3 years.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on state and federal MCLs.

Institutional Controls

Not provided.

NL INDUSTRIES, NJ
September 27, 1991

The 44-acre NL Industries site is an inactive, secondary lead smelting facility in Pedricktown, Salem County, New Jersey. Land use in the area is predominantly residential and industrial. The site is bordered by two tributaries to the Delaware River, which receive surface discharges from the site. The site overlies the Cape May aquifer, a potential source of drinking water for local residents. From 1972 to 1984, the site was used to recycle lead from spent automotive batteries, and the unused portions of the batteries were buried in an on-site landfill. During operations, batteries and other materials containing lead were stored on paved and non-paved areas on site; and drums and debris were scattered throughout the site, within and outside of buildings, and on the paved areas. There also are approximately 1,000,000 gallons of contaminated standing water and 200 cubic yards of associated sediment at the site. Between 1973 and 1980, the state cited the PRP for multiple violations of state air and water regulations. In 1989, EPA began a multi-phased removal action, which included consolidating and encapsulating debris and lead-bearing materials into separate piles totaling 9,800 cubic yards of kiln slag and 200 cubic yards of lead oxide; removing over 40,000 pounds of toxic and reactive materials; incinerating 2,200 empty drums off site; and constructing a chain-link fence to enclose the site. In addition, EPA conducted an FFS to address the remediation of slag and lead oxide piles, debris and contaminated building surfaces, standing water, and sediment. The FFS resulted in the issuance of this early RA ROD, designated as OU2. The nature and extent of remaining contamination on the site and areas adjacent to the site in various environmental media, such as soil, sediment, ground water, surface water, and air, are currently being evaluated and will be addressed as OU1 in a subsequent ROD. The primary contaminants of concern affecting the slag and lead oxide piles, sediment, debris, and standing surface water are metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes treating on site the slag and lead oxide piles using solidification/stabilization and placing the residual material on site; decontaminating debris and contaminated building surfaces, with off-site treatment and disposal of debris that cannot be decontaminated; treating and disposing of standing water, wash water from the decontamination process, and sediment off site; conducting environmental monitoring; and implementing institutional controls including land use restrictions. The estimated present worth cost for this RA is $4,987,000, which includes an annual O&M cost of $17,000.

Performance Standards or Goals

The selected remedy will attain all federal and state ARARs. Chemical-specific clean-up goals were not provided.

Institutional Controls

Institutional controls including land use restrictions will be implemented at the site.

ROCKAWAY BOROUGH WELLFIELD, NJ

September 30, 1991

The 2.1-square mile Rockaway Borough Wellfield site is a municipal well field in Rockaway Borough, Morris County, New Jersey. Land use in the area is predominantly residential. The estimated 10,000 people who reside in Rockaway Borough use the underlying glacial aquifer as their sole source of drinking water. Beginning in 1980, a number of state investigations revealed VOC-contaminated soil, sediment, and ground water, which had originated from several source areas within the Borough. In 1981, the Borough constructed a granular activated carbon adsorption treatment system that treated approximately 900,000 gallons per day of raw water pumped from the well field. Overall, the system has reduced VOC concentrations in the municipal water supply to levels meeting state and federal drinking water standards. A 1986 ROD provided for the continued operation and maintenance of the existing ground-water treatment system, for a continuation of the RI/FS to positively identify additional contaminant sources, and for further delineation of the full extent of contamination. The 1986 ROD did not, however, address ground-water restoration. Recently, EPA also has approved a state-initiated modification to the current treatment system to include the installation of an air stripper as the first stage in the treatment process. This ROD addresses final restoration of the contaminated on-site ground water to drinking water standards. A future ROD will address the need for remediation of the contaminant sources. The primary contaminants of concern affecting the ground water are VOCs including PCE and TCE; and metals including chromium and lead.

Selected Remedial Action

The selected RA for this site includes on-site pumping and treatment of ground water from two of three plumes of concern using chemical precipitation and air stripping, followed by reinjecting the treated ground water on site into the glacial aquifer; and conducting environmental monitoring. Under this RA, a single treatment facility would be necessary for the two treatment areas, and no active remedial measures would be taken for the third plume. The estimated present worth cost for this RA is $17,818,000, which includes an annual O&M cost of $1,502,000 for 27 years.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on the more stringent of federal or state MCLs, and include PCE 1 *ug*/l (state MCL) and TCE 1 *ug*/l (state MCL).

Institutional Controls

Not applicable.

ROEBLING STEEL, NJ

September 26, 1991

The 200-acre Roebling Steel site is an inactive steel wire and cable manufacturing facility in Florence Township, Burlington County, New Jersey. Site features include a 34-acre slag disposal area, and 55 buildings connected by a series of paved and unpaved access roads. Two portions of the slag area lie within the 100-year floodplain of the Delaware River. A public playground, known as the Southeast Park, is adjacent to the southeastern portion of the site, and land surrounding the site consists of farmlands, wetlands, and forested and residential areas. The Roebling Steel site produced steel products between 1906 and 1982. In recent years, parts of the site have been used as a storage facility for vinyl products, a warehouse facility, a polymer reclamation facility, a facility for repairing and refurbishing refrigerated trailers and shipping containers, a storage facility for insulation, and an equipment storage facility for a construction company. Approximately 1,458,000 cubic yards of slag material from steel making processes were used to fill in a large portion of the bordering Delaware River shoreline. In addition to the slag material, other potential sources of contamination on site include: process buildings containing chemical treatment baths, tanks, pits and sumps; a wastewater treatment plant; two sludge lagoons; friable asbestos insulation inside buildings and falling from pipes; 52 railroad cars containing fly ash, dry sludge, and debris; and a landfill containing rubble and debris. Because the site lacked properly operated environmental control facilities, several regulatory agencies have issued notices of noncompliances to site owners over the last 25 years. Based on federal investigations conducted in 1983, three removal actions were conducted. In 1985, the state removed explosive materials. In 1987, EPA removed lab pack containers, drums of corrosive and toxic materials, acid tanks, and compressed gas cylinders. In 1990, EPA removed fencing around the slag area. A 1990 ROD addressed the remaining drums, tanks, transformers, contaminated soil, baghouse dust, and chemical and tire piles. This ROD addresses soil and debris contamination in the slag area and in the Southeast Park as OU2. Future RODs will address final remedies for soil, sediment, debris, ground water, surface water, and air. The primary contaminants of concern affecting the soil and debris are VOCs including benzene, PCE, TCE, toluene, and xylenes; other organics including PAHs, PCBs, and pesticides; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes excavating and transporting approximately 160 cubic yards of contaminated soil from two areas of the Southeast Park to an off-site treatment and disposal facility; backfilling the excavated area with clean soil and revegetating the area; conducting additional surface and subsurface sampling to confirm the extent of contamination and to test for exceedances of regulatory levels; excavating and treating slag areas that are leaching contaminants using a mobile treatment unit that stabilizes the slag material; conducting a treatability test to determine the specific stabilization process; dewatering of any slag material found below the water table during excavation; collecting, treating, and disposing of extracted water; returning treated slag to an area above the water table; reprocessing or off-site disposal of any slag material leaching contaminants above regulatory levels; excavating and off-site disposal of localized areas of slag determined to interfere with or be unaffected by the solidification/ stabilization process; off-site treatment and disposal of slag if the RD determines that the volume of slag to be treated is small compared to the current estimate of

30,000 cubic yards; grading and capping the 34-acre slag area using a soil cover; providing riprap along the river shoreline to minimize erosion; long-term ground-water monitoring; and implementing institutional controls. The estimated present worth cost of this RA is $12,220,100, which includes an annual O&M cost of $344,200.

Performance Standards or Goals

No promulgated federal or state requirements for soil contamination exist. However, the remedy will comply with state interim soil action levels for carcinogenic PAHs and inorganic compounds in the slag and soil. The remedy also will comply with EPA's chemical-specific guidelines for lead in soil, which ranges from 500-1,000 mg/kg.

Institutional Controls

Institutional controls will be implemented to restrict future excavations through the soil cover.

SINCLAIR REFINERY, NY

September 30, 1991

The Sinclair Refinery site is a former refinery in Wellsville, Allegany County, New York. The site is composed of a 90-acre refinery area, 10-acre landfill area, and 14-acre off-site tank farm. Surrounding land use is primarily residential. The site borders the Genesee River, which is used as a local source of drinking water supplied by the Village of Wellsville Municipal System. The underlying ground-water flow at the site is generally to the north and east, discharging directly into the Genesee River. From 1901 to 1958, the site was used to process Pennsylvania grade crude oil until a fire in 1958 halted operations. Currently, some private companies and the State University of New York occupy the site. A 1981 SI revealed that debris from the eroding landfill area has washed into and contaminated the Genesee River. A 1985 ROD addressed OU1 and provided for: removal and disposal of drums; excavation and consolidation of the south landfill area and filling of the excavated area with clean soil; partial channelization of the Genesee River to protect the landfill from erosion and flooding; capping of the consolidated landfill; construction of a fence around the entire landfill site; and an evaluation of the refinery portion of the site. This ROD addresses OU2, remediation of the remaining contaminated areas at the site located within the 90-acre refinery area and the off-site tank farm including the contaminated ground water beneath the refinery. Data collected during the OU2 RI have not shown contaminant levels in landfill ground water to be in excess of federal and state standards; therefore, EPA has chosen not to address landfill ground-water remediation under this OU2 ROD. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene and xylenes, semi-volatile compounds including naphthalene and nitrobenzene, and metals including arsenic and lead.

Selected Remedial Action

The selected RA for this site includes excavating soil contaminated in excess of arsenic 25 mg/l and lead 1,000 mg/l to a depth of 1 foot; treating excavated soil on site prior to consolidation in the landfill; capping the landfill, and filling and revegetating excavated areas; conducting long-term monitoring of biota, surface water, ground water, and soil-gas to track any potential contaminant migration from the subsurface soil; on-site pumping and treatment of contaminated ground water followed by discharging the treated ground water on site to the Genesee River or off site to the POTW; and implementing institutional controls in the form of local zoning ordinances. This ROD also provides contingency measures for ground water all or some of which may be implemented based on the monitoring data colleted. These measures include variations in pumping rates, implementing engineering or institutional controls, monitoring specified wells, reevaluation of remedial technologies, and invoking chemical-specific ARAR waivers. The estimated present worth cost for this RA is $15,549,700, which includes an annual O&M cost of $750,183 for 30 years.

Performance Standards or Goals

Chemical-specific goals for soil include arsenic 25 mg/l and lead 1,000 mg/l. Ground water will be treated to attain federal MCLs or state standards.

Institutional Controls

Institutional controls will be recommended on site in the form of local zoning ordinances.

SOUTH JERSEY CLOTHING, NJ
September 26, 1991

The 1.2-acre South Jersey Clothing Company (SJCC) site is an active clothing manufacturing facility located in Minolta, Buena Borough, Atlantic County, New Jersey. Land use in the area is residential and commercial, and local residents obtain drinking water from the Borough municipal water supply system. On-site features include two buildings used for manufacturing operations, as well as the remains of a building damaged in a 1979 fire. Another Superfund site, the 3,000-square-foot Garden State Cleaners (GSC) site, is located 500 feet south of the South Jersey Clothing site. GSC site features include a small building covering much of the site. In 1940, SJCC began manufacturing military clothing using VOCs including TCE, as part of the dry cleaning process. Based on state records, wastewater containing TCE from these processes was routinely discharged directly onto the facility grounds, and other process waste was stored on site in leaking drums. In addition, State records indicate that the 1979 fire may have resulted in the release of an estimated 275 gallons of TCE from an on-site storage tank. State investigations in 1981 identified elevated TCE levels on site. Later in 1981, SJCC identified and removed thirty-three 55-gallon drums of TCE-contaminated soil; installed additional ground-water monitoring wells from 1981 to 1984; and installed a ground water pump and treatment system under a state order in 1985. In 1989, SJCC began installing a limited soil vapor extraction system in the vicinity of the TCE storage tank that reportedly ruptured in the 1979 fire, but this action was abandoned at the start of the RI. Because the SJCC and GSC sites are in proximity to one another and have similar contamination, both sites will be remediated concurrently. This ROD addresses soil and ground-water contamination at both the SJCC and GSC sites, as a final remedy. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, PCE, TCE, and toluene.

Selected Remedial Action

The selected RA for this site includes treating approximately 1,600 cubic yards of on-site contaminated soil using *in situ* vapor extraction; treating the contaminated wastewater from the vapor extraction processes on site using an air stripping column; treating air emissions using carbon adsorption units; pumping and on-site treatment of contaminated ground water using air stripping and carbon adsorption, followed by reinjecting the treated water upgradient from the site; regenerating spent activated carbon from both treatment processes off site; conducting long-term ground-water monitoring; and implementing temporary institutional controls. The estimated present worth cost for this RA at the SJCC site is $5,718,000, which includes an estimated annual O&M cost of $293,100 for 70 years. The estimated present worth cost for this RA at both the GSC and SJCC sites is $11,169,000, which includes an annual O&M cost of $542,000.

Performance Standards or Goals

Federal and state agencies have agreed to jointly establish ISAL clean-up goals of 1,000 *ug*/kg for PCE and TCE, given the predominance of the two compounds at the site. Ground-water remediation goals are based on the more stringent of SDWA federal and state MCLs, and include PCE 1 *ug*/l (state) and TCE 1 *ug*/l (state).

Institutional Controls

Temporary institutional controls will be implemented on site while the need for providing home treatment units for individual residents is evaluated.

SWOPE OIL & CHEMICAL, NJ

September 27, 1991

The 2-acre Swope Oil & Chemical site is a former chemical reclamation facility in Pennsauken, Camden County, New Jersey. Land use in the area is predominantly commercial and industrial, and Pennsauken Creek lies 0.8 miles northeast of the site. The estimated 10,000 residents use ground water from a public supply well screened in the lower underlying aquifer near the site as their drinking water supply. At the time site operations ceased, pertinent site features included a main building, distilling house, diked tank farm, open drum storage area, and an unlined lagoon. From 1965 to 1979, Swope Oil & Chemical used the site for the reclamation of chemicals. Site operations included buying, selling, manufacturing, and processing oils, chemicals, and paints, and discharging waste liquids and sludge to an excavated, unlined lagoon. Contaminated material also was contained within a diked tank farm and an exposed drum storage area. In 1975, state investigations showed that discharge of waste to on-site drainage ditches had resulted in probable migration of chemicals to Pennsauken Creek via storm sewers. The owners were cited for several disposal violations in 1975, and again in 1979, when the site operations ceased. Beginning in 1984, PRPs removed drummed waste and 3,000 tons of lagoon sludge, and also fenced the perimeter of the site. Later in 1984, air strippers were installed on Municipal Well 1 by the water commission to remove VOC contamination detected in the aquifer. A 1985 ROD provided for removal, off-site disposal, and treatment of storage tanks and their contents; demolition of on-site buildings; and excavation and off-site disposal of PCB-contaminated soil and sludge area material. This ROD addresses remediation of subsurface soil, which continues to leac contaminants into ground water, as OU 2. Future actions will evaluate whether further source control measures or ground-water actions are necessary. The primary contaminants of concern affecting the soil are VOCs including PCE and TCE, and other organics including DEHP and naphthalene.

Selected Remedial Action

The selected RA for this site includes treating on site approximately 153,000 cubic yards of contaminated unsaturated soil using *in situ* vacuum extraction with potential enhancement of biodegradation of soil contaminants, if the results of the treatability study so warrant; treating air emissions using carbon adsorption or thermal destruction prior to discharge, if necessary; and monitoring soil and ground water. The estimated present worth cost for this RA is $2,099,000, which includes estimated O&M costs of $397,500 for year 1 of the vapor extraction system and $234,200 a year for 5 years of ground-water monitoring.

Performance Standards or Goals

Chemical-specific soil clean-up goals are based on New Jersey ISALs and include 1 mg/kg for total VOCs and 10 mg/kg for semi-volatiles, and are designed to mitigate the threat of ground-water contamination.

Institutional Controls

Not provided.

UPPER DEERFIELD TOWNSHIP SANITARY LANDFILL, NJ

September 30, 1991

The 14-acre Upper Deerfield Township Sanitary Landfill is an inactive landfill located on a 27-acre tract of land in Upper Deerfield Township, Cumberland County, New Jersey. Land use in the area is primarily agricultural. The estimated 100 people who live within one mile of the site maintained individual water supply wells until the early 1980s. From 1938 to 1960, Seabrook Farms, Inc., a vegetable growing and processing company, operated the property as a gravel pit, and later as a waste disposal facility for its vegetative waste. During this time, pesticide residues and containers were allegedly disposed of at the site. Since 1960, Upper Deerfield Township has owned and operated the facility as a municipal sanitary landfill. A number of state investigations identified VOCs including vinyl chloride, chlorinated solvents, and mercury in excess of federal drinking water standards in ground water. In 1983, Upper Deerfield Township began to supply affected residents with bottled water, and in 1986, the township installed a public water supply well and distribution system. This ROD addresses ground water and air. Because EPA investigations showed that the ground-water and soil contamination associated with the site no longer posed a health threat under current or likely land use conditions, there are no contaminants of concern affecting this site.

Selected Remedial Action

The selected RA for this site includes no further action since previous investigations indicated that ground-water and soil contamination associated with the site no longer pose a health threat under current or likely future land use conditions. However, a comprehensive ground-water and air monitoring program will be implemented, which will include installing additional monitoring wells and sampling downgradient residential wells. In addition, sediment and surface water sampling also will be conducted. The estimated present worth cost for this RA is $2,380,000, which includes an annual O&M cost of $154,000.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not applicable.

WALDICK AEROSPACE DEVICES, NJ
March 29, 1991

The 1.72-acre Waldick Aerospace Devices site is a former aerospace parts manufacturing facility in Wall Township, Monmouth County, New Jersey. Land use in the area is predominantly commercial and industrial, with residential properties located to the east. Hannabrand Brook flows within 900 feet of the site before it merges with another stream that eventually drains into the Atlantic Ocean. The site overlies a sandy silt/sand aquifer system that is a potential source of drinking water. From 1979 to 1983, Waldick Aerospace Devices, Inc. used the site to manufacture electroplated quick-release pins for the aerospace industry. For at least the first 3 years of operation, wastewater containing metals and organic solvents was discharged directly onto the ground. In addition, used machine oil was allowed to drain out of perforated drums onto the ground. As a result of state and local inspections, a number of investigations were conducted by EPA, which revealed VOCs, organics, and metals in soil and ground water in excess of MCLs. In 1985, EPA conducted a removal action that involved disposing of all manufacturing-related chemicals from the facility off site. A 1987 ROD provided a source control remedy for soil that included in-situ air stripping to remove VOCs, excavation and off-site disposal of an area of metal-contaminated soil, and decontamination or demolition of on-site buildings. This ROD addresses both a final remedy for soil as a modification of the 1987 ROD, and an interim RA for ground water to prevent further ground-water contaminant migration. The modification to the 1987 source remedy is a result of additional investigations, which revealed that metals were widespread throughout the site, and that the volume of contaminated soil was less than half of the previously estimated amount. In addition, tests during RD revealed that *in situ* air stripping was inappropriate for the site. A future ROD will address a final remedy for the ground-water contamination. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE, TCE, and toluene; other organics; and metals including chromium and lead.

Selected Remedial Action

The selected modified remedy for the source contamination at this site includes excavating 8,000 cubic yards of contaminated soil; using on-site thermal treatment to remove organics; treating inorganic contaminated soil using solidification/stabilization; and backfilling or off-site disposal of the treated soil. The selected interim RA for ground water includes installing four ground-water extraction wells in the zone of highest contaminant concentration; using chemical precipitation to remove inorganics, and disposing of the resultant sludge off site; using air stripping to remove organics; reinjecting or infiltrating treated ground water into the aquifer, or discharging it to wetland areas to help offset any dewatering effects caused by ground-water extraction, if appropriate; and ground water monitoring. The estimated cost of the soil remediation is $3,420,000 to $5,913,569 depending on whether treated material is disposed of on site or off site, respectively. The estimated present worth cost for the ground-water RA is $5,923,372, which includes an annual O&M cost of $705,625.

Performance Standards or Goals

Ground water will be treated to achieve MCLs and non-zero MCLGs as part of the final RA. Chemical-specific clean-up levels, therefore, were not established.

Institutional Controls

Not provided.

WARWICK LANDFILL, NY
June 27, 1991

The 13-acre Warwick Landfill is an inactive municipal and industrial waste disposal site in the town of Warwick, Orange County, New York. Land use in the area is predominantly residential, and the site is surrounded by woodlands and wetlands. The estimated 3,000 people who reside approximately 1.5 miles northeast of the site use residential wells as a source of drinking water. From 1898 until its closure in 1978, the Warwick Landfill accepted municipal and industrial wastes and sludge. Landfill contamination is attributed to the unpermitted and illegal disposal practices conducted by waste haulers and trespassers. As a result of reports of illegal on-site dumping in 1979, and an inspection after a property transfer in 1984, state investigations were conducted, and revealed soil, sediment, ground-water, and surface water contamination throughout the site. This ROD addresses the contaminant source, the on-site landfill, and provides an interim ground-water remedy for OU1. The final remedy for ground water (OU2) will be addressed in a subsequent ROD. The primary contaminants of concern affecting the soil, and ground water are VOCs including benzene, TCE, toluene, and xylenes; other organics including PAHs and phenols; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes regrading the landfill mound, capping the landfill with a 22-acre multi-layer cover, and installing with a gas venting system; installing and maintaining point-of-use treatment systems consisting of granular activated carbon units at contaminated residential wells until a final ground-water remedy can be evaluated; sampling residential wells; monitoring ground water and air; evaluating wetlands adjacent to the property in an effort to mitigate potential threats from the site; and implementing institutional controls including deed restrictions, and site access restrictions such as fencing. The estimated present worth cost for this RA is $14,279,600 which includes an annual O&M cost of $526,300 for years 0 through 3 and $422,900 for years 4 through 30.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals will be addressed in the final RA but water at the point of use must meet federal MCLs.

Institutional Controls

Deed restrictions will be implemented to prevent disturbance of the cap.

WHITE CHEMICAL, NJ
September 26, 1991

The 4.4-acre White Chemical site is a former chemical manufacturing facility in Newark, Essex County, New Jersey. Land use in the area is predominantly industrial and residential, with an estimated daytime population of 12,000 within one-quarter mile of the site. On-site features include five major buildings and three smaller facility support buildings. From 1983 to 1990, White Chemical Corporation (WCC) used the site to manufacture acid chlorides and flame retardant compounds. As a result of state inspections, a number of investigations were initiated by the state and EPA that identified 10,900 55-gallon drums containing improperly stored hazardous substances; 150 gas cylinders; 126 storage tanks, vats, and process reactors; 12,000 laboratory-size containers; and other miscellaneous hazardous material present on site. In 1989, the state conducted several SI and issued notices of violation for improper management and storage of hazardous waste. In 1990, the state reinspected the site and again found various violations, and ordered WCC to clean up the site. As a result of WCC's failure to respond to any state notices or directives, the state initiated a removal action to stabilize the site. After removing 1,000 drums, the state exhausted its authorized funds and suspended operations. Shortly thereafter, the State requested that EPA consider conducting a removal action at the site. Later in 1990, EPA issued WCC a UAO to discontinue all site activities and evacuate all personnel. EPA also performed several site assessments and initiated stabilization activities under removal authorities. Ongoing actions include drum overpacking, segregating incompatible substances, and restaging containers. EPA removed an additional 3,200 empty 55-gallon drums and repaired the chain-link fence that secures the property. The contents of many containers are still unknown. This ROD addresses interim remedial measures for surface contamination. A future ROD will address additional remedial measures deemed necessary as a result of a comprehensive RI/FS. The primary contaminants of concern identified in the tanks, drums, and containers are VOCs including benzene and xylenes, other organics, inorganics, and shock-sensitive compounds.

Selected Remedial Action

The selected RA for this interim remedy includes continuing the site stabilization process performed during the ongoing removal action; compiling an inventory, staging incompatible substances, and consolidating compatible substances for on-site temporary storage; tranferring the contents of any container of questionable integrity to a new container; overpacking fuming or leaking containers; disposing of or recycling any empty containers, along with any extremely hazardous substances off site to ensure the stability of the site; possibly mobilizing a treatment system to treat or neutralize some of the on-site hazardous substances; decontaminating empty tanks, reaction vessels, and process piping, followed by on-site storage; transporting the contaminated material off site to a RCRA-approved treatment facility, to a hazardous waste disposal facility, or to an appropriate facility for recycling or processing; developing an emergency response contingency plan for responding to any emergencies that may occur during stabilization efforts, and possibly a transportation safety contingency plan for transporting hazardous substances; continuing implementation of site security measures; and conducting environmental monitoring, and additional investigations to fully characterize the nature and extent of contamination in other environmental media at the site, and to evaluate additional remedial measures. The estimated present worth cost for

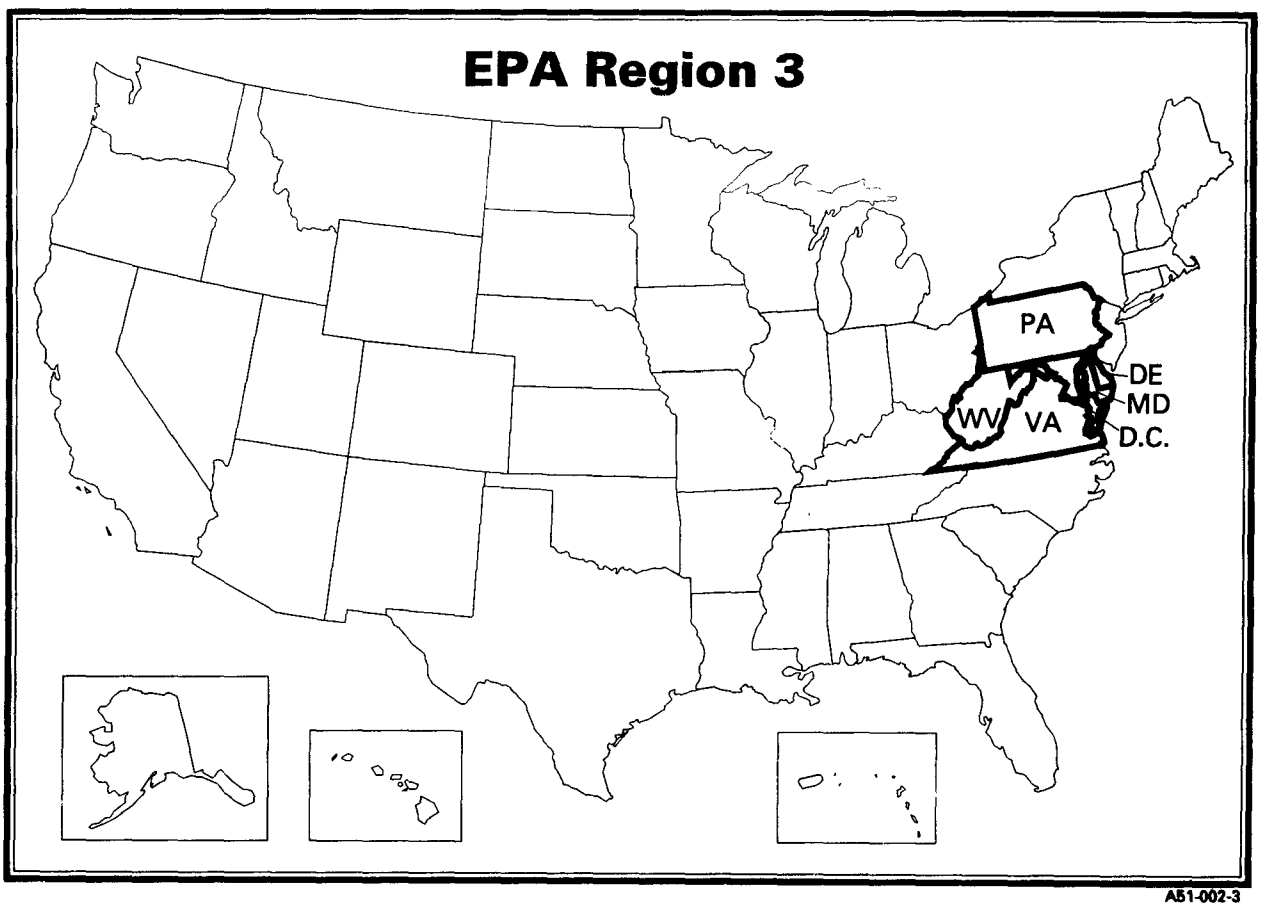
this RA is $22,096,000. No O&M costs are associated with this RA.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not applicable.



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ARROWHEAD ASSOCIATES/SCOVILL, VA

September 30, 1991

The 30-acre Arrowhead Associates/Scovill site is a cosmetic-case manufacturing and filling facility in Westmoreland County, Virginia. Land use in the area is predominantly agricultural, with several businesses. Also, woodlands and wetlands areas are located proximal to the site. There is a small stream, Scates Branch, that originates on site and flows to an off-site pond and creek. The site overlies a shallow aquifer that is used by an estimated 500 people as a drinking water supply. Ownership of the site has changed hands several times. From 1966 to 1979, Scovill, Inc., and later Arrowhead Associates, used the site for manufacturing cosmetic cases using electroplating, lacquering, and enameling processes. Once the plating process was complete, the solutions were discharged to on-site settling ponds. Supernatant from these ponds was either reused or discharged to surface water. Bottom waste and small amounts of other spent materials were stored in drums for subsequent off-site disposal. After 1979, site operations switched to cosmetic-case filling, and subsequently to wire harness manufacturing. Currently, Virginia Elastics uses the former plating area as a storage warehouse. Numerous investigations by the state and EPA revealed extensive soil and ground-water contamination. From 1986 to 1988, EPA conducted a two-phased removal action at the site. Phase I of the removal, conducted from 1986 to 1987, included removal of waste and various contaminated materials. Phase II, conducted from 1987 to 1988, consisted of treating and disposing of wastewater, sludge, and soil from the former settling ponds, and off-site disposal of contaminated soil from a drum storage area. In 1990, the ponds were filled and graded, and erosion control measures were installed. This ROD addresses final remediation of soil and ground water. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, PCE, TCE, toluene, and xylenes; and metals including chromium and lead.

Performance Standards or Goals

The selected RA for this site includes implementing *in situ* vacuum extraction of VOC-contaminated soil; on-site pumping and pretreatment of contaminated ground water using pH adjustment, precipitation, flocculation/ sedimentation, and filtration, followed by treatment using air stripping and carbon adsorption, and on-site discharge of the treated water to Scates Branch; disposing of residual sludge and residues from the ground-water treatment process off site; treating off-gases from the soil and ground-water treatment systems using carbon adsorption; and implementing environmental monitoring, and institutional controls including ground-water use restrictions. The estimated present worth cost for this RA action is $13,177,000, which includes an annual O&M cost of $11,833,000.

Performance Standards or Goals

Chemical-specific soil clean-up goals will be determined during the remedial design. Chemical-specific ground-water clean-up goals are based on SDWA MCLs and include benzene 5 *u*g/l, PCE 5 *u*g/l, and TCE 5 *u*g/l.

Institutional Controls

Ground-water use restrictions will be implemented to prevent the use of water from the contaminated aquifer until the aquifer has been remediated to acceptable levels.

AVCO LYCOMING-WILLIAMSPORT DIVISION, PA

June 28, 1991

The 28-acre AVCO Lycoming-Williamsport Division site is an active manufacturing facility in Williamsport, Pennsylvania. Surrounding land use is primarily residential. The site overlies a surficial glacial aquifer and a deeper bedrock aquifer that are used as seasonal sources of drinking water. Ground water is pumped from the Williamsport Municipal Water Authority (WMWA) well field located 3,000 feet south of the site. Wetlands are located near the site in the 100-year floodplain of Lycoming Creek and the Susquehanna River. From 1929 until present, various manufacturing companies including a bicycle and sewing machine manufacturing plant, a sandpaper plant, a tool and die shop, a silk plant, and aircraft engine manufacturing plant have been located on site. Possible sources of on-site contamination include improper waste disposal in a "dry well," laboratory chemical disposal in a coolant well, spillage and dumping in metal plating areas, a sludge holding lagoon, cutting oils from a metal chipster sump, degreasing areas, and chemical storage areas. The site also contains approximately 40 USTs that are presently being abandoned or upgraded. In 1984, the state identified VOC contamination in the WMWA well field. In 1985, monitoring and recovery wells were installed on site and off site to identify the source of contamination, which was determined to be the AVCO plant. In 1986, the state approved the AVCO RA plan, which included installation of an air stripping system to treat water from three on-site and two off-site recovery wells, and discharge to Lycoming Creek. This RA remains in effect. Between 1989 and 1991, a RI/FS study was conducted to further characterize the contamination and source areas. This ROD addresses management of migration of contaminated ground water from the on-site area. Remediation of off-site ground water will be addressed in a subsequent ROD. The primary contaminants of concern affecting the ground water are VOCs including TCE and metals including chromium.

Selected Remedial Action

The selected RA for this site includes pumping and treatment of contaminated ground water using an on-site treatment facility that utilizes precipitation, coagulation, flocculation, and air stripping; treating air stripper off-gases using BAT, possibly granular activated carbon or fume incineration; dewatering and off-site disposal of residual precipitation sludge and spent carbon filters; discharging treated water on site to surface water; monitoring ground water; and implementing institutional controls including land use restrictions. The estimated present worth cost for this RA is $9,300,000, which includes an annual O&M cost of $442,900 for 30 years.

Performance Standardds or Goals

Ground-water clean-up standards are based on the more stringent of federal MCLs or non-zero MCLGs, or background levels. Chemical-specific goals were not provided.

Institutional Controls

Land use restrictions will be implemented at the site.

BRODHEAD CREEK, PA
March 29, 1991

The 12-acre Brodhead Creek site is a former coal gasification plant in the Borough of Stroudsburg, Monroe County, Pennsylvania. The site occupies the floodplain area at the confluence of Brodhead and McMichael Creeks. Surrounding land use is commercial and residential. Site features include two earthen levees constructed to protect a nearby sewage treatment plant from potential floodwaters. From approximately 1888 to 1944, the coal gasification plant was operated along the west bank of Brodhead Creek. These activities produced a liquid coal tar product composed of PAHs, which was disposed of in an on-site open pit until the mid-1940s. In 1980, during construction repairs to the toe of the flood control levee, coal tar was observed seeping into Brodhead Creek. From 1981 to 1984, several state and federal emergency response measures and investigations were initiated on site. These included installing filter fences and underflow dams to intercept coal tar seepage, installing a coal tar recovery pit on the bank of Brodhead Creek, and constructing a slurry wall to mitigate on-site coal tar migration toward Brodhead Creek. In addition, from 1982 to 1983, the state and EPA conducted a program designed to remove coal tar from a backwater channel area, which involved excavating and dewatering 900 cubic yards of sediment and backfilling the area with clay and clean soil. Also during this time period, the PRPs installed recovery wells in the main coal tar pool and subsequently removed 8,000 gallons of coal tar. This ROD addresses contaminated subsurface soil containing free coal tar, and provides an interim remedy for the site. A future ROD will address on-site ground-water contamination and provide the final remedy for the subsurface soil. The primary contaminants of concern affecting the soil are VOCs including benzene, toluene, and xylenes; other organics including PAHs; and metals including arsenic.

Selected Remedial Action

The selected RA for this site includes an *in situ* innovative enhanced recovery process which entails installing hot water injection and extraction wells in the free coal tar areas composed of approximately 200 cubic yards of subsurface soil; recovering both coal tar and process water from extraction wells; separating the coal tar from the process water and disposing of the recovered coal tar at an off-site permitted incineration facility; treating the process water; discharging a portion of the treated process water to Brodhead Creek, and reinjecting the remainder of the treated water into the subsurface soil to enhance coal tar recovery; conducting a treatability study to evaluate the coal tar recovery process; monitoring ground water, sediment, and biota; and implementing deed restrictions, and site access restrictions such as fencing. The estimated present worth cost for this RA is $4,120,000, which includes a total O&M cost of $1,112,000.

Performance Standards or Goals

The enhanced recovery process will be applied to the free coal tar (i.e., coal tar at 100 percent pore volume saturation) areas, and will remove and treat 60 to 70 percent of the free coal tar. This process will prevent further leaching of contaminants into the shallow ground water.

Institutional Controls

Deed restrictions will be enacted to limit future site use.

CRYO-CHEM, PA
September 30, 1991

The 19-acre Cryo-Chem site is a metal fabrication facility in Worman, Earl Township, Berks County, Pennsylvania. Land use in the area is semi-rural, with a woodland area located northeast of the site, and an on-site stream west of the contaminated area. Between 1970 and 1982, chemical solvents were used at the facility at a rate of two to three 55-gallon drums per year. During this time, a chemical spill occurred at Cryo-Chem, but cannot be definitely linked to the source of contamination. Well sampling conducted between 1985 and 1987 showed ground-water contamination in monitoring and residential wells within 1 mile of the site, which led to a removal action that required the installation of activated carbon filter units in 20 affected homes. EPA has divided the site into three OUs for remediation. A 1989 ROD addressed OU1, the contaminated drinking water, by providing an alternate water supply. A 1990 ROD addressed the remediation of ground water using air stripping and carbon absorption as OU2. This ROD addresses contamination in soil caused by past facility operations, which continues to leach from the soil into the ground-water system. The primary contaminants of concern affecting the soil are VOCs including TCA, TCE, DCA, and PCE.

Selected Remedial Action

The selected RA for this site includes sampling the area to better define the extent of the contamination; treating the contaminated soil on site using vapor extraction; controlling air emissions using carbon absorption, and disposing of, or regenerating, any spent carbon; discharging any water captured during *in situ* vapor extraction to the pump and treat system currently under design; and conducting confirmation soil sampling and air monitoring. The estimated present worth cost for this RA ranges from $53,500 to $66,400 based on the treatment selected. There are no O&M costs associated with this RA.

Performance Standards or Goals

Although current background contaminant levels are less than federal standards, further remediation was deemed necessary to prevent additional leaching of contaminants from the soil to the ground water. EPA intends to run the soil vapor extraction system until it is effectively not removing any additional VOCs. EPA does not intend to continue remediation for OU3 beyond soil vapor extraction since it is known that the contaminant levels in soil will be below levels that are protective of human health.

Institutional Controls

Not provided.

DELTA QUARRIES/STOTLER LANDFILL, PA
March 29, 1991

The 137-acre Delta Quarries/Stotler Landfill site includes a 57-acre former landfill, and is located between the City of Altoona, Logan Township and the Village of Pinecroft, Antis Township, Pennsylvania. Land use in the area is rural. Several residences are approximately 35 feet east of the landfill boundary, and wetlands areas exist to the southeast and northeast. Residences and businesses in the vicinity of the site rely on private wells adjacent to the landfill for their drinking water supply. Beginning in 1964, two adjacent municipal landfills were operated on site, and in 1976 these operations were merged into one landfill, known as the Stotler Landfill. Delta Quarries and Disposal, Inc. purchased the landfill and continued to operate the facility until its closure in 1985. Reports from EPA, the state, and previous landfill operators indicate that municipal waste comprises 98 percent of the total landfilled waste; however, the landfill had accepted some industrial waste including organic solvents, process sludges and metals from electroplating operation, tramp oils and residues from sludge sedimentation basins, which have contaminated on-site soil and ground water in the landfill area. In 1984, the state and Delta Quarries entered into a consent order to develop and implement a closure plan for the landfill. In 1987, the site owners initiated the plan by placing a 4-foot soil cap over the landfill, vegetating the area, and installing sedimentation controls including interceptor berms, channels, and sedimentation basins. All elements of the closure plan were completed except installation of gas venting. This ROD addresses on-site ground-water contamination. The primary contaminants of concern affecting the ground water are VOCs including PCE, TCE, and vinyl chloride; and metals including manganese.

Selected Remedial Action

The selected RA for this site includes pumping and on-site pretreatment of ground water using precipitation to remove metals, if necessary, followed by on-site treatment using air stripping; discharging the treated water off site to Little Juniata River; controlling air emissions using activated carbon; monitoring ground water and surface water; maintaining the cap, and installing a gas venting system; conducting periodic site reviews; and implementing institutional controls including deed and land use restrictions, and site access restrictions such as fencing. The estimated present worth cost for this RA is $2,344,581, which includes a present worth O&M cost of $1,176,989 over 30 years.

Performance Standards or Goals

Chemical-specific ground-water clean-up standards are based on the more stringent of SDWA MCLs or background levels, and include 1,2-DCA 5 *ug*/l (MCL); cis-1,2-DCE 70 *ug*/l (MCL); trans-1,2-DCE 100 *ug*/l (MCL); chloroform 100 *ug*/l (MCL); PCE 5 *ug*/l (MCL); TCE 5 *ug*/l (MCL); and vinyl chloride 2 *ug*/l (MCL).

Institutional Controls

Land use restrictions will be implemented to prevent future actions that would disturb the landfill surface and waste. Deed restrictions will provide notice to any future property owners of potential hazards and likewise restrict the use of the property.

DIXIE CAVERNS COUNTY LANDFILL, VA

September 30, 1991

The 39-acre Dixie Caverns County Landfill is a former municipal landfill in Roanoke County, Virginia. The surrounding land is rural, with the nearest residence located one half mile from the site. The site is situated on a steep ridge between two valleys surrounded by heavily forested mountains traversed by small streams. Two unnamed headwater streams receive surface runoff from the site, and discharge to the the Roanoke River, which is located two miles south/southeast. The landfill is currently owned and was operated by the county of Roanoke from 1965 until its closure in 1976. During operation, Dixie Caverns Landfill accepted an estimated 440,000 cubic yards of municipal and industrial wastes including refuse, scrap metal, fly ash, and sludge. In 1983, EPA investigations identified several disposal areas including a discarded drum area, a sludge pit, and a large fly ash pile, which contained elevated levels of metals. In 1987, EPA conducted a removal action that addressed the drum and sludge areas; however, removal of the fly ash was suspended on EPA's recommendation. In 1987, the county developed a removal work plan proposing a proprietary stabilization process to treat the fly ash, and the plan was approved in 1988 with remediation levels set by EPA. Questions concerning the regulatory status of the waste caused delay in implementing the work plan. At that time, EPA recommended suspension of further removal activity pertaining to the fly ash because of uncertainty as to whether or not the County's plan would meet federal and state requirements. This ROD addresses the fly ash at the site as OU1. Future RODs will address other RAs based on RI/FS investigations. The primary contaminants of concern affecting the debris are metals including lead, cadmium, and zinc.

Selected Remedial Action

The selected RA for this interim remedy includes excavating and transporting approximately 9,000 cubic yards of fly ash off site to an EPA approved high temperature metals recovery technology facility for treatment and subsequent reuse; and implementing state dust and erosion and sediment controls during fly ash excavation. The present worth cost for the RA is $3,927,158. There are no O&M costs associated with this RA.

Performance Standards or Goals

Chemical-specific fly ash clean-up goals are based on on-site disposal criteria developed by EPA during the recent K061 LDR ruling, and include lead 0.095 mg/kg and cadmium 0.032 mg/kg.

Institutional Controls

Not applicable.

DORNEY ROAD, PA

September 30, 1991

The 27-acre Dorney Road site is a landfill in Upper Macungie Township, Lehigh County, Pennsylvania. Land use immediately surrounding the site is rural, residential, and agricultural. Approximately seven acres of wetlands, including ponded areas, are scattered throughout the site, with the greatest concentration of these areas in the north-central and southern parts of the site. The estimated 20 residents living within 1/4 mile of the site use ground water as the primary source of potable water. Prior to 1959, the site was used as an open pit iron mine. From 1959 to 1979, municipal and industrial wastes were disposed of in the on-site abandoned iron mine pit. In 1970, the state requested that the landfill be compacted and covered, but the owners failed to comply. The site was closed because the owners were unable to acquire a landfill permit to renew disposal operations. Further state investigations during 1970 to 1972 identified a variety of waste disposed of at the landfill including electric utility plant sludge, battery casings, barrels of petroleum products, and asbestos flooring waste. In 1986, EPA performed an emergency removal action to regrade the site to collect and contain on-site surface run-off. Although a soil cover was applied to portions of the site, the landfill was never graded and capped, and on-site waste continues to be exposed in areas. Seepage of landfill waste is the principal source of on-site ground-water contamination. A 1988 ROD addressed OU1 and provided for elimination of on-site ponded water; regrading and multi-layer capping of the site; installing run-on/run-off controls, ground-water monitoring; and implementing institutional controls including deed restrictions and site access restrictions including perimeter fencing. In 1991, EPA issued an ESD for OU1 requiring mitigation of wetlands areas affected during cap construction. This ROD addresses on-site ground-water contamination as OU2, and provides a final remedy for the site. The primary contaminants of concern affecting the ground water are VOCs including benzene and TCE; and metals including chromium and lead.

Selected Remedial Action

The selected RA for this site includes providing wellhead treatment using carbon adsorption for the private wells of affected residences, and ground-water monitoring. The estimated present worth cost for this RA is $274,040, which includes an annual O&M cost of $14,410.

Performance Standards or Goals

ARAR waivers will be issued for state standards, specifically those requiring remediation of on-site ground water to background levels and remediation of off-site ground water to MCLs on the basis of technical impracticability. In addition, data indicate that ground-water contamination appears to be naturally attenuating. Ground-water action clean-up levels are based on MCLs, risk levels, and state standards, and include benzene 5 *ug*/l, TCE 5 *ug*/l, chromium 100 *ug*/l, and lead 15 *ug*/l.

Institutional Controls

Not applicable.

EASTERN DIVERSIFIED METALS, PA
March 29, 1991

The 25-acre Eastern Diversified Metals (EDM) site is a former metals reclamation facility in Rush Township, Schuylkill County, Pennsylvania. Land use in the area is predominantly agricultural with small pockets of residential, commercial, and undeveloped land. In addition, a small westward moving stream traverses the site's southern border and discharges into the Little Schuylkill River, 250 feet west of the site. Before 1966, the site was owned by an aluminum manufacturing facility. From 1966 to 1977, EDM reclaimed copper and aluminum from metal wire and cable in an on-site processing building. Plastic insulation surrounding the metal wire and cable was mechanically stripped and separated, and the waste insulation was disposed of behind the processing facility. Over time, the insulation material formed a residual pile of "plastic fluff," the most distinctive site feature. In 1974, the state required EDM to install a leachate collection and treatment system on-site to monitor, collect, and treat leachate emanating from the fluff pile. Because of high biological oxygen demand concentrations in the leachate, a secondary treatment was designed and installed, channeling leachate using drainage ditches and collection trenches through an equalization lagoon to an on-site treatment plant. In 1977, EDM terminated operations, and in 1979 and 1980, residents complained of odors from the site and expressed health concerns. Subsequent state and EPA investigations from 1983 to 1985 determined that the fluff piles, soil, sediment, leachate, and ground water were contaminated by VOCs, other organics, and metals. This ROD addresses two of three OUs at the EDM site. This ROD provides a final remedy for "hot spot" fluff and soil areas, metal-contaminated sediment and soil, and miscellaneous debris as OU1; and provides an interim remedy for contaminated ground water as OU2. Future RODs will address the final selected actions for ground water (OU2), and the remainder of the fluff pile (OU3). The primary contaminants of concern affecting the soil, sediment, debris, ground water, and surface water are VOCs including TCE; other organics including dioxins and PCBs; and metals including lead.

Selected Remedial Action

The selected RA for this site includes removing 480 cubic yards of soil contaminated with lead above federal target levels from drainage ditches; excavating and incinerating, either on-site or off-site, 500 cubic yards of dioxin-contaminated fluff and 5,160 cubic yards of PCB-contaminated fluff and soil in excess of federal target levels; consolidating the on-site scattered fluff with the remainder of the fluff pile; removing 120 cubic yards of sand/silt/clay stream sediment contaminated by metals above federal target levels; conducting toxicity testing on incinerator residuals, miscellaneous debris, and possibly on soil and sediment depending on type of disposal or containment; disposing of incinerator residuals in an off-site municipal landfill or consolidating these with the remaining fluff pile on-site, if residuals pass the toxicity test; if residuals fail the toxicity test, treating with stabilization prior to disposal; disposing of on-site soil and/or sediment passing the EP toxicity test in an off-site municipal landfill; or if soil and sediment fail an EP toxicity test, stabilizing prior to disposal; disposing of miscellaneous debris passing the toxicity test in an off-site municipal landfill; or if miscellaneous debris fails the toxicity test, disposing of these materials in an appropriate RCRA unit; upgrading surface-water runon/runoff controls; installing a ground water collection trench

parallel to the existing trench to relieve overburden ground-water flow; treating ground water and leachate at an on-site treatment plant that utilizes equilization basins, clarification, discharge, and biological treatment, with on-site discharge; upgrading the wastewater treatment facility and existing equalization lagoon, or constructing a new lagoon to meet federal requirements; and further studying the practicability of deep ground-water restoration. The estimated present worth for this RA is $12,429,000, which includes a present worth O&M cost of $1,428,000 for 30 years.

Performance Standards or Goals

Chemical-specific goals for soil, sediment, and fluff are based on federal standards and include dioxin 20 *u*g/kg, lead 1,000 mg/kg, and PCBs 25 mg/kg. If fate and transport modeling shows that lower values are appropriate, those values will be used.

Institutional Controls

Not applicable.

FIRST PIEDMONT QUARRY 719, VA

June 28, 1991

The 4-acre First Piedmont Quarry Route 719 site is an inactive industrial and agricultural landfill located north of the city of Danville in Pittsylvania County, Virginia. Land in the area consists of open space and woodlands, with residential areas located to the south. The estimated 1,893 people living within two miles of the site obtain drinking water from wells or springs. Two small ponds and a wetlands area are located on site. In addition, the landfill is a ground-water discharge area for an underlying aquifer draining through the wetlands to Lawless Creek, which runs 1,400 feet northwest of the quarry. The site originally operated as a quarry for crushed stone. From 1970 to 1972, industrial and agricultural wastes were landfilled in the 2-acre quarry area of the site. Waste included hundreds of buried drums; tires; scrap rubber; approximately 15,000 gallons of a mixture of MS-20 (a floor degreaser containing PCE), water, carbon black, and detergent; off-specification batch materials containing trace amounts of lead oxide; soil; tobacco scraps; and wood. The landfill contains approximately 65,000 cubic yards of industrial and agricultural wastes and 3,000 cubic yards of soil. Two additional waste areas, the carbon black pile and the waste pile, have been identified on site near the western edge of the landfill. The carbon black pile contains 100 cubic yards of a tire reinforcement additive and contaminated soil, and the waste pile contains 10 cubic yards of steel and nylon cords, glass, waste rubber strips, and contaminated soil. In 1972, the state ordered waste disposal operations to cease as a result of a fire on the landfill. This ROD provides a final remedy for all site media including the landfill material, leachate, the carbon black pile and waste pile, and the contaminated northern drainage soil and sediment. The contaminants of concern affecting the site are metals including arsenic, lead, barium, antimony, and zinc.

Selected Remedial Action

The selected RA for this site includes excavating and disposing off site 1,080 tons of waste from the carbon black and waste piles along with the contaminated soil and sediment from the Northern drainage areas; performing a TCLP of excavated material to determine if it is RCRA characteristic waste, and if so, solidifying and stabilizing the excavated material prior to off-site disposal; filling the excavated carbon black and waste pile areas with clean soil; disposing of 30 to 40 drums from the surface of the landfill at a RCRA Subtitle C treatment facility; decontaminating and disposing of surface debris at an approved landfill; constructing a RCRA-cap and an associated leachate collection system over the 2-acre landfill area; covering the cap with six inches of soil and contouring soil to promote run-off, and revegetating the area; constructing run-off control berms in the northern drainage areas to lessen landfill cap run-offs; pretreating leachate, if necessary, prior to transporting to a POTW, or constructing an on-site treatment system with on-site discharge to surface water if the POTW will not accept the leachate; draining the north and south ponds, and transporting and discharging pond water off site to a POTW; monitoring ground water and conducting bioassays to assess the effectiveness of the removal of the carbon black pile and waste pile on the reduction of contaminant levels in the southern drainage; and implementing institutional controls including deed restrictions, and site access restrictions such as fencing. The estimated present worth cost for this RA is $2,154,000, which includes an annual O&M cost of $66,200.

Performance Standards or Goals

Not applicable.

Institutional Controls

Deed restrictions will be implemented on-site to prevent residential development of the site.

GREENWOOD CHEMICAL, VA

December 31, 1990

The 5-acre Greenwood Chemical site is a former chemical manufacturing facility in Newtown, Albemarle County, Virginia. Land use in the area is mixed residential and agricultural. On-site features include several buildings, storage sheds, a buried drum area, and seven former treatment lagoons. All residents who reside within 3 miles of the site are completely dependent on the ground water underlying the site for their drinking water supply. From the 1950s to 1985, either Cockerille Chemical Company or Greenwood Chemical Company used the site for manufacturing chemicals for industrial, agricultural, pharmaceutical, and photographic purposes. The companies stored, treated, and disposed of chemicals on site. In 1985, operations ceased at the facility following an explosion and fire. EPA investigations that were conducted after this fire identified elevated levels of cyanide, SVOCs, and VOCs in lagoons and ground water. In 1987, EPA removed buried and surface drums and containers of chemicals from the site, along with the sludge associated with three of the on-site lagoons. A 1989 ROD provided for off-site incineration, solidification and/or disposal of 4,500 cubic yards of contaminated soil, and removal of containerized chemicals. An explanation of significant differences issued in 1991 authorized the removal of three process buildings. This ROD addresses the contaminated ground water and surface water as OU2 and provides an interim remedy. A future ROD will address additional contamination of on-site soil. The primary contaminants of concern affecting the ground water and surface water are VOCs including benzene, PCE, TCE, and toluene; SVOCs including naphthalene; and metals including arsenic.

Selected Remedial Action

The selected RA for this site includes on-site pumping and treatment of contaminated ground and surface water using a treatment system consisting of precipitation, sedimentation, filtration, and UV/oxidation, followed by discharging the treated water on site to surface water; treating on-site sludge residuals from the ground-water treatment process, if necessary, prior to off-site disposal in a landfill; and monitoring ground and surface water. The estimated present worth cost for this RA is $3,218,000, which includes an estimated O&M cost of $1,419,000 for 5 years.

Performance Standards or Goals

Not provided.

Institutional Controls

Not provided.

HALBY CHEMICAL, DE
June 28, 1991

The 14-acre Halby Chemical site encompasses a chemical storage facility and associated warehouses in Wilmington, New Castle County, Delaware. Land use in the area is primarily industrial. Storm water run-off from the site generally flows toward a drainage ditch which discharges into the Christina River. From 1948 to 1977, the Halby Chemical Plant process plant area was used to produce sulfur compounds, and until 1969, a portion of the site was used to store arsenic-containing pyrite ore. From 1948 to 1964, the plant discharged all liquids into an adjacent marsh or lagoon, which drained into the Lobdell Canal before emptying into the Christina River. From 1964 to 1975, the plant acid wastewater was discharged to the public sewers. From 1975 to 1977, the owners periodically diverted the acid wastewater flow from the county sewer system to its pilot plant, and the treated wastewater was discharged to the lagoon. In July of 1977, the facility was issued a NPDES permit to discharge cooling water and effluent from the process plant treatment plant. The plant then closed in August 1977. Since 1977, Brandywine Chemical Company has used the site to receive and distribute bulk chemicals. As a result of citizen complaints about lagoon overflow, hydrogen sulfide-like odors, and numerous spills, a number of investigations were conducted by the state and EPA beginning in 1983, which identified leaking drums and stained soil. Analyses of samples taken during this site investigation revealed VOCs, organics, metals, and other carcinogenic compounds in the soil. This ROD addresses the first of two OUs and provides a final remedy for soil and debris in the process plant area. Contamination of air, surface water, ground water, and sediment in the marsh and lagoon areas will be addressed in a subsequent ROD as OU2. The primary contaminants of concern affecting the soil and debris are VOCs including benzene, TCE, toluene, and xylenes; other organics including PAHs; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes consolidating debris on site or disposing of all debris off site; excavating and stabilizing the top 6 inches of approximately 10,300 cubic yards of contaminated surface soil in the process plant area, followed by replacing the stabilized soil on site; capping the approximately 5,800 square yards residuals area with an asphalt cap; conducting soil monitoring; and implementing institutional controls including deed restrictions. The estimated present worth cost for this RA is $1,586,000, which includes an annual O&M cost of $43,000.

Performance Standards or Goals

The clean-up goals for soil contaminants including arsenic and carcinogenic PAHs are set at background levels. Additional sampling and analysis is required to ascertain background levels; however, approximate goals include arsenic 10 mg/kg and PAHs 1.2 mg/kg.

Institutional Controls

Deed restrictions will be implemented to prevent post-closure use of the property and possible damage to the cap.

HAVERTOWN PCP, PA

September 30, 1991

The 12- to 15-acre Havertown PCP site consists of a former wood treatment facility and an adjacent industrial facility in Haverford Township, Delaware County, Pennsylvania. Land use in the area is mixed residential and industrial. Naylors Run, a creek that drains the entire site, flows into Cobbs Creek, which joins Darby Creek before entering the Delaware River. Only three families who reside more than one mile from the site use the ground water as their drinking water supply. From 1947 to 1991, National Wood Preservers used the site for treating wood. Treated wood was air dried on drip racks in dirt areas around the site and stored in a dirt-covered storage yard. Chemicals were stored in several tanks adjacent to the facility. It has been estimated that up to one million gallons of spent wood preservatives were dumped into a nearby drip well. This disposal practice is believed to be a primary source of contamination to ground water and, ultimately, Naylors Run. From 1962 through 1989, the state conducted a number of investigations, which revealed PCP, oils, PAHs, dioxin, heavy metals, VOCs, and phenols in ground and surface water. In 1976, EPA initiated a response action, which included ground-water pumping and treatment, installing filter fences, sealing a sanitary sewer, and an attempt to grout two sewer pipes which discharged into Naylors Run. Currently, contaminated ground water still discharges into Naylors Run from a storm sewer pipe. A ROD addressed OU1, the cleanup of waste staged on site from previous investigative actions, and the interim remedial measure of designing and installing an oil/water separator at the storm drain outlet along Naylors Run. This ROD addresses an interim remedy for shallow ground water contamination, as OU2. A subsequent ROD will address sediment contamination in Naylors Run, soil contamination on site, potential deep ground-water contamination from on-site soil, and surface water and sediment contamination due to runoff from on-site soil, as OU3. The primary contaminants of concern affecting the ground water are VOCs including benzene, TCE, toluene, and xylenes; other organics including dioxin, oils, PAHs, PCP, and phenols; and metals including arsenic.

Performance Standards or Goals

The selected RA for this interim remedy includes installing two free product recovery wells with floating free product skimmers on site; installing a shallow ground water collection drain and pumping station, as well as additional ground-water wells to monitor shallow ground water; rehabilitating the existing storm sewer to reduce infiltration by lining the sewer, followed by directing all shallow ground water collected to the existing oil/water separator; constructing an on-site ground-water treatment plant, which will include chemical precipitation to remove inorganic compounds, with either a PACT system or an AOP, and granular activated carbon treatment as a reinforcement for the PACT or AOP to remove organics and destroy dioxins; treating effluent from the oil/water separator using the new treatment plant; discharging the effluent from the treatment plant on site to surface water; treating and disposing of any residuals off site; and ground-water monitoring. The estimated present worth cost for this RA ranges from $10,036,000 to $12,177,000, which includes an annual O&M cost ranging from $485,500 to $595,000 for 30 years.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on background levels, the more stringent of SDWA MCLs or MCLGs, or new limits set forth in the final RA. Ground water clean-up goals include benzene 5 *ug*/l (MCL), PCP 1 *ug*/l (MCL), TCE 5 *ug*/l (MCL), toluene 1,000 *ug*/l (MCL), xylenes 10,000 *ug*/l (MCL), and arsenic 50 *ug*/l (MCL).

Institutional Controls

Not provided.

HEBELKA AUTO SALVAGE YARD, PA
September 30, 1991

The 20-acre Hebelka Auto Salvage Yard site is an automobile junkyard in Weisenberg Township, Lehigh County, Pennsylvania. Land use in the area is predominantly agricultural, with four residential properties close to the site. The site is located within the headwaters of the Iron Run subdrainage basin. From 1958 to 1979, and again from 1989 to present, the site was used as an automobile junkyard and for salvage operations. Scrap iron was recovered from used storage tanks that were disposed on site, some of which still contained organic chemicals. In addition, during the past 10 to 15 years, approximately 1,000 cubic yards of used battery casings have been disposed of on site in two piles, along with empty storage tanks and drums, junked cars, and miscellaneous scrap metal. In 1985, EPA investigations identified elevated levels of lead and chromium in soil and sediment. A 1989 ROD addressed remediation of site areas with lead concentrations exceeding 560 mg/kg in soil, as well as the piles of scrap battery casings above these soil areas. The ROD also provided for removal and recycling of the battery casings, and excavation and treatment of soil using cement- or lime-based fixation processes. This ROD was developed to address soil outside of the high lead concentration areas, ground water, surface water, and air. However, because the site investigations have found no evidence of contamination in the media addressed in this ROD, there are no contaminants of concern.

Selected Remedial Action

The selected RA for this site includes no further action other than monitoring ground water and surface water of Iron Run annually, and a bioassessment of the creek. The estimated present worth cost for this RA is $66,300, which includes an annual O&M cost of $4,500 for 30 years. The cost for the follow-up bioassessment is $125,000.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not provided.

HELEVA LANDFILL, PA

Amendment
September 30, 1991

The 25-acre Heleva Landfill site is a former sanitary landfill in North Whitehall Township, Lehigh County, Pennsylvania. Land use in the area is predominantly rural with scattered residences. The estimated 150 people who reside within one-quarter mile of the site used the ground water underlying the site as their drinking water supply prior to 1986. From 1967 to 1981, the Heleva Landfill accepted municipal and industrial wastes, which included large volumes of liquid TCE. As a result of Heleva's denied requests for solid waste permits and refusal to implement a state-ordered biostimulation project, the state closed the landfill in 1981. A number of subsequent state investigations revealed ground-water contamination by VOCs, other organics, and DNAPLs at levels that exceeded state and federal ground water limits. A 1985 ROD addressed on-site ground-water contamination and provided for extending an existing water main; capping the entire landfill; constructing surface water diversions and gas venting systems; constructing an on-site ground-water treatment facility; establishing a pumping and treating system for the contaminated neargradient ground water; and ground-water sampling and monitoring. Construction of all of these major remedial activities has been completed except for the ground-water extraction and treatment component. This ROD amends the ground-water component based on data from the 1989 predesign study which determined that collection of downgradient ground water is technically feasible. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCE, toluene, and xylenes.

Selected Remedial Action

The amended RA for this site includes continuing with the selected remedy from the previous ROD and replacing the ground-water portion with extracting near gradient ground water to contain the highly contaminated dissolved plume immediately in the vicinity of DNAPL contamination in the ground water; pumping and on-site treatment of the downgradient portion of the aquifer, and discharging the treated ground-water on site to surface water. The estimated present worth cost for this amended RA is $40,950,000, which includes an annual O&M cost of $1,848,000 for 30 years.

Performance Standards or Goals

Downgradient ground water will be remediated to state background levels including benzene 0.2 *ug*/l, PCE 0.03 *ug*/l, TCE 0.03 *ug*/l, and toluene 0.2 *ug*/l. The state and federal ARARs for remediation of neargradient ground water to background levels and MCLs will be waived due to technical impracticability.

Institutional Controls

Not provided.

HELLERTOWN MANUFACTURING, PA

September 30, 1991

The 8.64-acre Hellertown Manufacturing site is an inactive spark plug manufacturing facility in Northampton County, Pennsylvania, approximately 1.5 miles south of Bethlehem. The site is bordered by commercial and residential areas, highway and railroad transportation corridors, Saucon Creek, and a wetlands area. On-site features include a 124,000-square-foot building, and five lagoons totaling 500,000 cubic feet. From 1930 to 1975, chemical waste including TCE, zinc plating waste, chrome dip waste, cleaners, and cutting oils generated during plating and degreasing processes were disposed of on site in the unlined lagoons. Waste from these activities then seeped into the local soil and rock strata. In 1976, after the facility began discharging treated wastewater into the municipal sewer system, the lagoons were backfilled, closed in place, and covered with topsoil. The material used to backfill the lagoons included rejected spark plugs, demolition material from road-building activities, and soil excavated during construction of the nearby Bethlehem wastewater treatment plant. Studies conducted in 1990 identified contamination by VOCs, metals, and organic compounds in lagoon backfill, soil, and in on-site ground water. The primary contaminants of concern affecting the soil and ground water and VOCs including benzene, DCE, PCE, TCE, vinyl chloride, and xylenes; other organics including PAHs; and metals including chromium.

Selected Remedial Action

The selected RA for this site includes capping the former 3.5-acre lagoon area with an impermeable asphalt and clay cover; pumping and on-site treatment of ground water using air tripping; removing solids using a settling tank or clarifier followed by filtration; discharging the treated effluent on site to Saucon Creek; long-term ground-water monitoring; controlling surface water run-off; and implementing institutional controls including deed restrictions. The estimated present worth cost for this RA is $2,250,000.

Performance Standards or Goals

Ground-water clean-up goals are based on SDWA MCLs or state background concentrations, whichever is the more stringent. Chemical-specific ground-water clean-up levels include benzene 0.2 *ug*/l (state background), PCE 0.03 *ug*/l (state background), TCE 0.12 *ug*/l (state background), and vinyl chloride 0.18 *ug*/l (state background).

Institutional Controls

Deed restrictions will be implemented to prohibit excavation of contaminated soil and the use of on-site ground water for domestic purposes.

INDUSTRIAL DRIVE, PA
March 29, 1991

The 30-acre Industrial Drive site is an active sanitary landfill and industrial facility in Williams Township, Northampton County, Pennsylvania. Land use in the area is industrial, residential, and agricultural. The site contains active and inactive sanitary landfills as well as active, inactive, and abandoned industrial facilities. The Lehigh River and Lehigh Canal are located northwest of the site, and a portion of the site rests upon the trace of a thrust plane known as the Musconetcong Fault. These conditions have created a complex geologic setting in which ground-water flow is governed by topography. Prior to 1961, the site was used for iron ore mining, industrial activities, and agricultural purposes. In 1961, sanitary landfill operations began on-site, and the site accepted municipal solid waste for disposal in an unlined landfill. By 1980, the landfill had expanded to 30 acres. In the late 1970s, local residents alleged that the now inactive unlined landfill had accepted hazardous waste that had contaminated local drinking water wells. Waste disposal in the unlined landfill ceased in 1986, but closure of the landfill has not been completed. In 1986, the state issued a permit for a 10-acre expansion of the landfill, which included a liner and leachate collection system. This expansion landfill is currently active, but there are no plans to further expand the landfill area. Contamination in local ground-water wells was first detected in 1983. Subsequently, the site has been divided into two OUs for remediation. A 1986 ROD addressed OU1, and provided for an alternate water supply by connecting numerous private well users to an existing municipal water supply. This ROD addresses OU2, the contaminated ground water and the low-level threat caused by the unlined municipal landfill. The primary contaminants of concern affecting the soil, debris, and ground water are VOCs including benzene, PCE, and TCE; other organics; and metals including chromium and lead.

Selected Remedial Action

The selected RA for this site includes closing and capping the unlined landfill area with a clay or synthetic cap; on site pumping and treatment of contaminated ground water using an air stripper, followed by carbon adsorption with on-site discharge of the treated ground water to the Lehigh River; regenerating spent carbon off site; and long-term monitoring of the closed landfill and ground water. If the selected remedy cannot meet the specified remediation goals, a contingency remedy will be implemented to prevent further migration of the plume, which will include a combination of containment technologies including ground-water extraction and treatment, and institutional controls. The estimated present worth cost for this RA is $12,775,000, which includes an annual O&M cost of $536,000 for the first year and $498,000 for years 2 to 45. There will be an additional O&M cost of $20,000 every 5 years.

Performance Standards or Goals

The goal of this RA is to remediate ground water to background levels as specified by state hazardous waste management regulations. Chemical-specific goals include benzene 0.2 *u*g/l, PCE 0.03 *u*g/l, TCE 0.03 *u*g/l, chromium 50 *u*g/l, and lead 5 *u*g/l.

Institutional Controls

Not provided.

McADOO ASSOCIATES, PA
September 30, 1991

The 9-acre McAdoo Associates site is an inactive strip and deep mining facility located in Kline Township, Schuylkill County, Pennsylvania. The site consists of two locations: the 8-acre McAdoo-Kline Township (MKT) location, and the single acre McAdoo-Blaine Street (MBS) location. The MKT location is situated at the site of an old (subsurface and surface strip) coal mine, and land adjacent to this location is industrial, abandoned, or contains reclaimed mine areas. The shallow aquifer at the MKT location consists of ground-water-filled mine workings and other subsurface voids beneath the MKT location, collectively called the "mine pool." The mine pool discharges at the Silverbrook discharge to the upper reaches of the Little Schuylkill River. Both the mine pool and the river have been severely affected by acid mine drainage. The MBS location is adjacent to a residential area and a mine spoil reclamation site, and is presently covered with gravel and used for vehicle storage. From the 1880s to the 1960s, strip and deep mining of anthracite coal occurred at the MKT location. Two rotary kiln furnaces and an upright liquid waste incinerator were installed on site between 1975 and 1976 to reclaim metals from waste sludges, reportedly using waste solvents as fuels. In 1979, EPA ordered the MKT location to close because of numerous environmental compliance problems. At the time of closure, the location contained an incinerator, a garage and off-site trailer, 6,790 drums of hazardous waste, four above-ground 15,000-gallon storage tanks, three above-ground 10,000-gallon tanks, and miscellaneous debris. The MBS location was used for the storage of waste oil and hazardous waste in five underground tanks. Activities at the MBS location were stopped by EPA in 1979. As a result of federal investigations, all drums and site features were removed from the MKT location between 1981 and 1988. A 1984 IRM for the MBS location provided for removal of underground tanks and contaminated soil, and a 1985 ROD addressed remediation of soil contamination at the MKT location. This ROD addresses sediment, ground water, and surface water at the MKT location, and ground water at the MBS location. EPA has determined that no further remedial action other than that already implemented at the site is required to ensure protection of human health and the environment; therefore, there are no contaminants of concern.

Selected Remedial Action

The selected RA for this site is no further action because previous interim remedial activities were adequate to protect human health and the environment. Ground-water monitoring at the MKT and MBS locations will be performed, including expanding the ongoing water quality monitoring program at the MKT location, and installing four ground-water monitoring wells at the MBS location. The estimated present worth cost for this no action remedy with ground water monitoring is $503,540, which includes an annual O&M cost of $434,000 for 30 years.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not applicable.

MID-ATLANTIC WOOD PRESERVERS, MD

December 31, 1990

The 3-acre Mid-Atlantic Wood Preservers (MAWP) site is a wood treatment facility in Harmans, Anne Arundel County, Maryland. Land use in the area is predominantly industrial and residential, and a wetland area traversed by Stony Run Creek lies 600 feet west of the site. Since 1974, the facility has been used for pressure treatment of lumber using chromate copper arsenate (CCA) as the wood preservative. The site is divided into two areas: a treatment yard on the eastern half of the site, and storage yard on the western half. The treatment yard contains CCA storage tanks, a pressure cylinder, and a drip pad area. In 1978, the county determined that water in a shallow residential well downgradient of the site was contaminated with high levels of hexavalent chromium. Subsequent investigations by the state in 1978 revealed that soil and ground-water contamination by chromium and arsenic was the result of an overflow pipe from a CCA storage tank. Under an agreement with the state, MAWP removed 26 cubic yards of contaminated soil beneath the overflow pipe, modified the CCA storage system, and installed a concrete drainage pad to collect drippings and reduce future contamination. However, off-site investigations by EPA in 1983 identified elevated levels of arsenic and chromium in ground water. Further EPA and MAWP studies documented on-site arsenic-contaminated soil, the result of removing treated wood prematurely from the drip area before it had dried, was the principal threat. In addition, these studies identified approximately 5,200 cubic yards of degraded soil, to an average depth of 2 feet, in the treatment yard drip pad area and in the western most third of the storage yard. Residential ground-water metal contamination levels were found to be at much lower levels than detected in earlier investigations; arsenic was not detected, and chromium was detected above the MCL in only one well. This ROD addresses contaminated on-site soil and ground water. The primary contaminants of concern affecting the soil and ground water are metals including arsenic and chromium.

Selected Remedial Action

The selected RA for this site includes excavating and stabilizing approximately 20 cubic yards of on-site soil contaminated with arsenic levels greater than 1,000 mg/kg (referred to as hot spots), followed by off-site disposal; capping the remaining soil with arsenic concentrations between 10 mg/kg and 1,000 mg/kg with an asphalt/concrete cap; constructing an enlarged and roofed drip pad which is consistent with new wood treating regulations; allowing natural attenuation to lower chromium levels in ground water; monitoring sediment, ground water, surface water, and air; and implementing institutional controls including deed restrictions. The estimated present worth cost for this RA is $322,400, which includes an annual O&M cost of $6,500 for 30 years.

Performance Standards or Goals

Chemical-specific goals for soil are based on achieving a 10^{-5} cancer risk level. The chemical-specific goals for ground water are based on federal MCLs including chromium 50 μg/l. EPA feels that MCLs will be achieved by natural attenuation within 3 months after construction is completed.

Institutional Controls

Deed restrictions will be implemented to ensure that the containment components are not compromised by future property use.

MIDDLETOWN AIR FIELD, PA

December 17, 1990

The 500-acre Middletown Air Field site is a former military airfield located between the towns of Highspire and Middletown in Dauphin County, Pennsylvania. Land in the area is used predominantly for industrial and commercial purposes. Several on-site wetlands areas, as well as the floodplain of a small stream, have been identified on site. From 1898 to 1917, the site was operated by the U.S. Army as a basic training camp. Subsequently, the site was used as an airfield by the Army/Air Force from 1918 until all on-site military operations ceased in 1966. Site features include several private manufacturing companies, an inactive landfill, and the Harrisburg International Airport (HIA). The site was divided into five distinct study areas where soil, sediment, ground water, and surface water investigations were conducted. These five study areas are: (1) the 30-acre runway area where, during the mid-1940s through 1956, waste from base operations was either incinerated or placed in a landfill; (2) the 150-acre industrial area where industrial operations such as paint stripping and metal finishing were conducted by the Air Force; (3) the 1-acre fire training pit area where combustible waste was burned during military training exercises; (4) the 7-acre north base landfill area where construction debris and miscellaneous drums were disposed of from 1950 to 1956; and (5) the Meade Heights housing area where, prior to housing construction, waste may have been disposed. Based on identification of on-site soil and ground-water contamination, the remedial action for the site was divided into five OUs that were slightly different from the study areas. These OUs and their respective media of concern are as follows: ground water for the site (OU1); the industrial area (soil) (OU2); the fire training pit area soil (OU3); the north base landfill area (ground water) (OU4); and Meade Heightshousing area (surface) (OU5). This ROD provides a final remedy for OU1 through OU4, and an interim remedy for OU5, which requires additional investigations to determine contamination sources. The primary contaminants of concern affecting the soil and ground water are VOCs including TCE; other organics including PAHs; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The combined selected RA for this site at OU1 through OU5 is continuing the operation of existing drinking water supply treatment systems, which include air stripping, followed by disinfection, and the current distribution system; monitoring and treating any additional source of drinking water from new wells and other HIA wells not used during routine operations; reconfiguring HIA ground-water production wells; monitoring ground water, surface water, sediment, and biota; preparing a health safety plan for any future activities that may disrupt surface soil; and implementing institutional controls including deed, land use, and ground-water use restrictions throughout the site. The estimated net present worth cost for the RA for OU1 through OU4 is $1,327,000. Capital costs for OU1 through OU4 total $118,000. There are no capital costs for OU5; but a net present worth cost of $55,000. Total net present worth cost for all five OUs is $1,382,000.

Performance Standards or Goals

Ground-water remediation goals for OU1 and OU4 are based on federal MCLs, and include lead 5 *ug*/l (proposed MCL). The state

ground-water ARAR for remediating the aquifer to meet background levels has been waived for technical impracticability, and the aquifer itself will be treated to meet MCLs.

Institutional Controls

Deed, land, and ground-water use restrictions will be implemented on-site.

MODERN SANITATION LANDFILL, PA
June 28, 1991

The 83-acre Modern Sanitation Landfill site is an active landfill in the Townships of Windsor and Lower Windsor, York County, Pennsylvania. Land use in the area is predominantly agricultural and residential, with nearby woodland areas. The site includes an old, inactive, unlined 66-acre landfill area, which is the subject of this ROD, and an adjacent active 17-acre double-lined landfill area to the north. Other site features include borrow areas for landfill soil cover material; ground-water extraction systems to the east, west, and south of the landfill; a wastewater treatment plant; a landfill gas-extraction system; and a low-permeability final cover system. Since the early 1940s, Modern Trash Removal has used the site for municipal, and non-hazardous and hazardous industrial waste stream disposal activities. Industrial waste disposed of on site includes inorganic production residues, pesticide waste sludge, PCB waste, and oil and paint waste. In 1977, a ground-water interceptor trench was constructed to collect leachate from the west side of the site. The collected water currently is pumped to the on-site treatment facility. In 1981, the state detected on-site ground-water contamination by VOCs on the western site border, and in 1983, determined that the western interceptor trench should be upgraded and modified, and that quarterly sampling of monitoring wells should be implemented to detect the leachate seeps and the presence of leachate constituents in ground water. As a result, extraction wells to augment the western interceptor trench were installed. Leachate studies in 1985 also identified organic contamination in the eastern site area; and, as a result, 13 extraction wells were installed along the eastern perimeter. Four surface impoundments were operated on site to treat ground water and leachate collected by the interceptor and extraction wells. In 1987, the surface impoundments were clean closed, and a replacement treatment facility, which included metal precipitation, filtration, and airstripping, was constructed. In addition, as of 1990, 64 of the 66-acre unlined landfill had been covered with a low permeability cap. This ROD provides a final remedy for the source of leachate seeps and ground-water constituents. The primary contaminants of concern affecting the soil, debris, and ground water are VOCs including benzene, PCE, TCE, toluene, and xylenes; and metals including lead.

Selected Remedial Action

The selected RA for this site includes completing the low permeability cap and final cover system over the 66-acre unlined landfill; expanding the existing ground-water extraction system on both the eastern and western sides of the site; maintaining the on-site wastewater treatment facility that treats extracted ground water with physical/chemical and biological treatment, followed by filtration and air stripping prior to discharge of the treated wastewater on site; managing the landfill gas collection system; and continuing ground- and surface-water monitoring. The present worth cost for this RA is $18,078,000, which includes an annual O&M cost of $1,175,000.

Performance Standards or Goals

Ground-water clean-up goals are based on state and federal standards and background contaminant levels, whichever are lower. Chemical-specific ground-water goals include benzene 5 *u*g/l (MCL), PCE 5 *u*g/l (MCL), and TCE 5 *u*g/l (PMCL).

Institutional Controls

Not provided.

NCR, MILLSBORO, DE
August 12, 1991

The 58-acre NCR, Millsboro site is a former manufacturing facility in Millsboro, Sussex County, Delaware. Land use in the area is mixed residential, agricultural, and industrial with a small stream, Iron Branch, bordering the site to the north and northeast. From 1965 to 1967, Dennis Mitchell Industries (DMI) conducted manufacturing operations on site. Reportedly, plating activities and other processes generated wastewater and sludge that were stored in an on-site lagoon. NCR Corporation purchased the plant in 1967 and manufactured mechanical cash registers from 1967 to 1975, and electronic terminal equipment from 1975 to 1980. NCR's activities included chromium plating, enameling, heat treating, and degreasing operations using TCE. TCE and oil waste were disposed of off site; and oil, grease, and paint wastes were drummed and stored on site prior to off-site disposal. Waste sludge associated with the chromium plating processes was treated on site and directed to on-site lagoons for sedimentation and clarification prior to discharge to Iron Branch. NCR also disposed of the waste sludge in a pit along the eastern boundary. From 1981 to 1983 under state direction, NCR conducted on-site investigations, which revealed ground-water contamination by VOCs and chromium above levels of concern. In 1981, NCR excavated and disposed of off site approximately 315 cubic yards of lagoon sludge and other waste during RCRA closure of the facility. In 1988, NCR installed a ground-water recovery well and air stripper to prevent continuing migration of a TCE ground-water plume. This ROD addresses a final remedy for ground-water contamination. The primary contaminants of concern affecting the ground water are VOCs, mainly TCE; and chromium.

Selected Remedial Action

The selected RA for this site includes pumping and treatment of contaminated ground water using air stripping, followed by carbon adsorption, and coagulation and filtration, if necessary, to remove chromium; controlling air emissions from the ground-water treatment system, if necessary; discharging the treated water on site to surface water and/or through ground-water infiltration galleries; conducting a well survey to identify all wells located within a one-mile radius of the site; conducting sediment, ground-water and surface water monitoring; and implementing institutional controls including ground-water use and deed restrictions. The estimated present worth cost for this RA is $4,749,000, which includes an annual O&M cost of $859,000.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on SDWA MCLs and non-zero MCLGs, and include TCE 5 *u*g/l (MCL) and chromium 100 *u*g/l (MCL). Discharge limitations are SDWA MCLs and non-zero MCLGs, SDWA underground injection control limits; CWA NPDES; CWA ambient water quality control and state requirements.

Institutional Controls

Deed and ground-water use restrictions will be implemented to prevent land and ground-water use.

OLD CITY OF YORK LANDFILL, PA
September 30, 1991

The 178-acre Old City of York Landfill site is a municipal waste landfill in Springfield Township, York County, Pennsylvania. Land in the surrounding area is predominantly agricultural and wooded. The site is bounded to the southeast and the northwest by tributaries to Codorus Creek, and these tributaries are partially fed by seeps discharging from the valley and hillsides near the landfill. Ten residences located within 0.25 mile of the site have or had ground water from domestic water wells as their drinking water supply. From 1961 until its closure in 1975, the city used 56 acres of the site as a landfill for municipal waste; however, some industrial waste was also disposed of at the site. In 1978, the property was sold to private owners. After local residents expressed concern over water quality, the state conducted a residential well sampling program from 1981 to 1985. VOCs were identified in six residential wells; as a result, public water main was installed at the site. In 1982, the state notified the city and site owners that operation of and existing conditions at the landfill were in violation of the Clean Streams Act and directed the city to conduct a site assessment to evaluate clean-up measures. During 1987 and 1989, the city, under a state order, installed a ground-water recovery and treatment system connected to an air stripping tower, which has not yet started operation. Eight on-site collection vaults containing a total of 1,120 cubic feet of orange-tinted sediment and water are located on the site. These vaults are part of an old leachate collection system that is no longer functioning. In 1991, the owner placed a deed restriction on the entire site to prevent ground-water and surface water usage, additional agricultural usage, subdivision of the property, and soil disturbance. This ROD addresses the long-term threats to soil, ground water, and surface water produced by the landfill and vault sediment. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, and TCE.

Selected Remedial Action

The selected RA for this site includes restoring and revegetating the soil cover in the northeastern portion of the site; disposing of vault sediment off site; installing a diversion swale along South Road; installing a ground-water recovery/treatment system using the existing air stripper, or adding additional ones, as needed, with on-site discharge to surface water; installing a landfill gas venting system with monitoring probes; maintaining perimeter fencing at the leachate collection values; and monitoring ground water, surface water, and sediment. The estimated present worth cost for this RA is $8,291,080 which includes an annual O&M cost of $259,080 for 30 years.

Performance Standards or Goals

Remediation of ground water will continue until contaminant levels meet the lower of site background levels, which are methods detection limits; and federal and state standards including SDWA MCLs, proposed MCLs, and risk-based levels.

Institutional Controls

Not provided.

PUBLICKER/CUYAHOGA WRECKING PLANT, PA
June 28, 1991

The 37-acre Publicker/Cuyahoga Wrecking Plant site is a former liquor and industrial alcohol distillery in Philadelphia, Philadelphia County, Pennsylvania. Surrounding land use is primarily industrial, with 400,000 people living within a 1-mile radius of the site. From 1912 until 1986 when the plant closed, alcohol distilling operations were conducted on site. From the 1970s to 1980s, the site was also used as a petroleum and chemical storage facility, which utilized 440 large above-ground tanks, stored chemicals, chemical laboratories, reaction vessels, production buildings, warehouses, a power plant, and several hundred miles of above-ground process lines, many of which were wrapped with asbestos insulation. In 1987, a CO_2 utilization area was destroyed in an on-site fire, which was accompanied by numerous explosions. Subsequent on-site inspections by EPA and the state identified leaking tanks, pits, and process lines containing fuel oil, and shock-sensitive explosive materials, and 7,000 gallons of reactive and flammable materials in fermentation tanks and grain dryers. In 1987, EPA stabilized the site by bulking flammable and explosive materials on site for future disposal, disposing of highly reactive laboratory wastes and cylinders off site, crushing 3,100 empty drums, wrapping overhead asbestos-covered process lines with plastic, and bagging and storing loose asbestos materials on site. A 1989 ROD addressed OU1 and provided for off-site treatment and disposal of hazardous waste streams and chemicals recovered from within the process lines, demolition of the above-ground process lines, and packaging and on-site storage of asbestos and other insulation materials. This ROD addresses a portion of OU2, specifically the bulked asbestos stored on site, any remaining asbestos material attached to overhead exterior pipelines, and a pile of asbestos debris near a loading pier. A subsequent ROD will address on-site soil and ground-water contamination. The primary contaminant of concern present as debris is asbestos, an inorganic.

Selected Remedial Action

The selected RA for this site includes removing approximately 150 cubic yards of asbestos from overhead extraction pipes and placing this material in plastic bags; staging this material, along with 6 cubic yards of asbestos from near a loading pier and 1,100 cubic yards of bagged asbestos from previous removal and remedial actions; and disposing of the staged asbestos off site. The estimated present worth cost for this RA is $293,420. There are no O&M costs associated with this RA.

Performance Standards or Goals

All bulked and remaining loose asbestos material will be removed from the site. No specific clean-up standard for asbestos was provided.

Institutional Controls

Not applicable.

RESIN DISPOSAL, PA
June 28, 1991

The 26-acre Resin Disposal site is an inactive industrial landfill and former coal strip mining area in Jefferson Borough, Allegheny County, Pennsylvania. The site is bordered to the north and west by residential areas, and to the east and south by undeveloped land. The site overlies a bedrock aquifer, and is also in contact with the Pittsburgh Coal Formation, a source of non-potable ground water. Prior to 1950, coal strip mining operations were conducted on and near the site. From 1950 to 1964, 85,000 tons of process waste consisting of petroleum and coal-derived chemicals mixed with clay were disposed of in a previously mined on-site area, and earthen dikes were used to contain these wastes. Between 1980 and 1984, private investigations identified that contaminants from the landfill had migrated to the Pittsburgh Coal Formation, and the soil and perched ground water downslope. Subsequently, the site owners installed a leachate collection system and an oil/water separator. EPA investigations in 1988 further characterized contaminated media and analyzed potential contaminant pathways. This ROD addresses source control, as well as preventing migration of contaminated ground water in the Pittsburgh Coal Formation. A subsequent ROD will address any remediation of ground water that may be necessary. The primary contaminants of concern affecting soil, debris, and ground water are VOCs including benzene, toluene, and xylenes; and other organics including napthalene, PAHs, and phenols.

Selected Remedial Action

The selected RA for this site includes capping the landfill with a multi-layer cap, and upgrading the landfill dike; relocating a sanitary sewer located along the northeast border of the landfill to allow future access without disturbing the landfill cap; installing a new oil/water separator for leachate treatment, with discharge of aqueous phases to a POTW, and possible off-site reclamation of NAPLs for use as an energy source; installing a skimmer well system to remove NAPLs from ground water for use as an energy source; monitoring ground water and surface water; and implementing institutional controls including deed restrictions, and site access restrictions such as fencing. The estimated present worth cost for this RA is $4,348,000, which includes an annual O&M cost of $132,000 for 30 years.

Performance Standards or Goals

Chemical-specific goals were not provided.

Institutional Controls

Deed and land use restrictions will be implemented at the site.

SAUNDERS SUPPLY, VA
September 30, 1991

The 7.3-acre Saunders Supply site is an active lumber yard facility in the Village of Chuckatuck, a rural area of the City of Suffolk, Virginia. Land use in the area is predominantly mixed residential and commercial. The site is composed of the Saunders Supply Company property and a portion of the adjacent Kelly property. Commercial establishments and residences are to the east of the facility, and a wooded area is to the west. From 1964 to 1991, the Saunders Supply Company used the site to chemically treat wood before distribution. Prior to 1984, treated wood was placed on pallets located directly on the ground near the wood treating process area. Subsequently, from 1984 to 1991 when the site ceased operations, treated wood was air-dried on a concrete drip pad. These improper treatment and disposal processes have contaminated on-site soil, sediment, and ground water. Principal site features include the treatment facilities, a former conical burn pit area, a former earthen separation pond, and a wastewater pond west of the site. Some drainage from the site discharges to storm sewers adjacent to the site boundary. After the state investigated the site, Saunders Supply was required to install monitoring wells, excavate the contaminated soil around the conical burn pit area, and install a recovery well. Treated water from the recovery well was recycled as the process water for the chemical treatment of lumber. EPA conducted additional investigations that revealed the presence of PCP, arsenic, and chromium in the ground water. This ROD addresses all media impacted by site contamination as a final remedy. The primary contaminants of concern affecting soil, sediment, debris, ground water, and surface water are organics including dioxins and PCP; and metals including arsenic and chromium.

Selected Remedial Action

The selected RA for this site includes draining the wastewater from the wastewater pond, followed by on-site or off-site treatment and discharge; excavating, treating using dechlorination, and off-site disposal of 700 tons of sediment from the wastewater pond and the former earthen separation pond; excavating, treating on site using low-temperature thermal desorption (LTTD), and off-site disposal of 24,300 tons of soil and sediment from the storm sewer exceeding 1.46 mg/kg PCP; regenerating spent carbon from the LTTD treatment process off site; treating ground water during the dewatering process prior to excavating the soil; discharging the treated water on site or off site based upon remedial design studies; testing the concrete pads for RCRA characteristic hazardous waste; scarification of the top 1 inch of the concrete pads and treating the removed material using solidification if determined to be RCRA characteristic waste, with subsequent off-site disposal along with the remainder of the concrete pads; removing and plugging preexisting wells; cleaning and sliplining the storm sewer; monitoring ground water; and implementing institutional controls including deed and ground-water use restrictions. The estimated present worth cost for this RA is $20,485,000, which includes an annual O&M cost of $15,000.

Performance Standards or Goals

The chemical-specific soil clean-up level is PCP 1.46 mg/kg. If ground water is discharged on site, treated effluent must meet state permit limits; or if discharged off site, treated effluent must meet levels set by the receiving facility.

Institutional Controls

Deed and ground-water use restrictions will be implemented on site.

SEALAND LIMITED, DE
September 30, 1991

The 2-acre Sealand Limited site, a former coal tar treatment and recycling facility, is located in Mt. Pleasant, New Castle County, Delaware. Land use in the area is primarily industrial and commercial. Current site features include a concrete slab, a one-story building, an abandoned rail spur, a gravel road, and miscellaneous debris. Ground water underlying the site is used as a source of drinking water. From 1971 until 1976, Adams Laboratory used the site for animal fat rendering activities. The property was subsequently sold to Conrail, which cleaned up the property to meet state standards in 1979. From 1982 to 1983, Conrail leased the property to Sealand. Sealand allegedly conducted treatment, processing, and recycling of coal to tar and off-specification creosote waste on site until abandoning the site in 1983. A 1983 state investigation discovered 21 steel tanks or hoppers; a 10,000-gallon wooden storage tank and 300 55-gallon steel drums, which were leaking liquids on site; a boiler house; and various mixing chambers and pressure vessels on the abandoned site. Additional studies by EPA and the State identified organics including PAHs, creosols, and solvents in the on-site soil, drums, and tanks. Subsequently in 1983, EPA conducted an emergency removal action at the site and removed off site 240,000 gallons of organic waste from within the wooden and steel tanks, and 320 drums. Additionally, EPA disposed of 122 cubic yards of solid waste, including 30 ubic yards of wooden tank debris and approximately 50 to 92 cubic yards of sludge and contaminated material off site. The owner voluntarily removed 239 drums of off-specification product. In addition, the storage tanks were cleaned and moved, and the tank and drum storage area was capped with clay. This ROD addresses on-site soil as the first and final OU. All hazardous materials contained in abandoned on-site tanks and drums were disposed of off site during the EPA removal action, and any remaining soil contaminants pose low risks for humans at the site. Based on this rationale, there are no primary contaminants of concern affecting this site.

Selected Remedial Action

The selected RA for this site is no action. There are no costs associated with this no action remedy.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not applicable.

STRASBURG LANDFILL, PA

June 28, 199

The 22-acre Strasburg Landfill site is an inactive landfill located within a 220-acre tract of land in Newlin and West Bradford Townships, Chester County, Pennsylvania. The site is characterized by hills draining toward Brandywine Creek and its floodplain, which forms the southern and western site boundaries. The nearest wetland is the Briar Run watershed located 600 feet east/southeast of the site. The 201 single-family residences that surround the site use ground water as a source of drinking water. Before landfilling operations began in 1973, the site was used as farmland. From 1978 to 1983, the landfill accepted industrial and heavy metal wastes and sludges. State investigations in 1979 determined that landfill operations had resulted in excessive siltation of Briar Run. In 1980, the state permanently prohibited the landfill from receiving industrial waste. In 1983, the owners were cited for violations, which they failed to correct, and the state ordered the landfill closed. Closure involved constructing a PVC cover and soil and vegetation layer. Subsequent studies detected VOCs in both on-site monitoring wells and off-site residential wells. The state initiated an interim action to control the leachate, which included collection and off-site treatment of leachate at a nearby municipal sewage plant and installing diversions to halt leachate flow. A 1989 ROD addressed contaminated residential wells and exposure pathways, and provided an interim remedy to limit site access. The purpose of this ROD is to limit direct contact and exposure to contaminants using site access restrictions, and to reduce further degradation of the landfill cover. Remediation of the landfill will be addressed in a future ROD. The primary contaminants of concern affecting this site are VOCs including benzene, PCE, TCE, and toluene; and metals including arsenic and chromium.

Selected Remedial Action

The selected interim RA for this site includes implementing site access restrictions including fencing that will encompass the immediate landfill area, access roads, the sediment pond, air stripping building, and monitoring wells; and maintaining the fence and the existing cap. The estimated total present worth cost for this RA is $823,020, which includes an annual O&M cost of $55,405.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not provided.

USA ABERDEEN - EDGEWOOD, MD

Federal Facility
September 27, 1991

The 17,000-acre USA Aberdeen - Edgewood site is a military ordnance installation in Edgewood, Maryland. The 4.5-acre Old O-Field site, which is the focus of this ROD, is a fenced hazardous waste and ordnance disposal area located within the lower half of the Gunpowder Neck in the Edgewood area of the Aberdeen Proving Ground. Land use in the area consists of military testing ranges, with a mixture of industrial, military, and civilian residential areas. The site overlies two aquifers that drain into Watson Creek and the Gunpowder River, which border the site. From 1941 to 1952, chemical-warfare agents including mustard, lewisite, adamsite, white phosphorus, munitions, contaminated equipment, and miscellaneous hazardous waste were disposed of in 35 on-site unlined pits and trenches. Studies have shown that chemicals buried within the pits have impacted ground water and also interconnecting surface water in Watson Creek. From 1949 to the mid-1970s, several decontamination and clean-up operations were conducted as a result of munitions explosions, which spread mustard into the surrounding soil, air, Watson Creek, and Gunpowder River. These operations included the application of 1,000 barrels of DANC containing chlorinated hydrocarbons; soaking the field with several hundred gallons of fuel oil and setting the field ablaze; dispersing lime into the surrounding trees to further reduce the amount of mustard present; and using supertropical bleach, lime, and sodium hydroxide to destroy chemical agents. Evidence shows that these decontamination efforts have contaminated the ground water with chlorinated hydrocarbons. Subsequent remediation activities were limited to removing and securing ordnance items on the surface. The site has been divided into three OUs for remediation. This ROD provides an interim remedy for contaminated ground water and its effect on surface water, as OU1. Future RODs will address contaminated on-site soil and surface water. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCE, and toluene; and metals including arsenic.

Selected Remedial Action

The selected RA for this interim remedy includes installing a downgradient extraction well network; pumping and on-site treatment of contaminated ground water using chemical precipitation, followed by ultraviolet-oxidation; monitoring the treated effluent, then discharging the effluent on site to the Gunpowder River; and disposing of the contaminated chemical precipitation filter cake sludge generated during the treatment process off site. The estimated present worth cost for this RA is $9,120,000, which includes an estimated annual O&M cost of $466,650 for 30 years.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on CWA ambient water quality criteria, and SDWA MCLs and proposed MCLs, and include benzene 5 *ug*/l (MCL), PCE 5 *ug*/l (MCL), TCE 5 *ug*/l (MCL), toluene 40 *ug*/l (PMCLs), and arsenic 50 *ug*/l (MCL).

Institutional Controls

None.

USA ABERDEEN, MICHAELSVILLE, MD

Federal Facility
September 27, 1991

The 79,000-acre USA Aberdeen site, also known as the U.S. Army Aberdeen Proving Ground (APG), is an active military installation used since 1917 for planning and testing weapons, munitions, vehicles, and equipment in Harford County, Maryland, near the head of the Chesapeake Bay. APG is divided into two functional areas: the 13,000-acre Edgewood area and the 17,000-acre Aberdeen area, which includes two landfills. These two areas are divided and drained by Bush River, as well as by numerous creeks. From 1922 to 1925, an unknown amount of World War I white phosphorus munitions (ordnance) was supposedly buried offshore of the Aberdeen area on the western side of the upper Chesapeake Bay. This 15-acre area, termed the White Phosphorus Underwater Munitions Burial Area (WPUMBA), is the focus of this ROD. The ordnance reportedly buried at the WPUMBA consisted of land mines, grenades, and artillery shells; in addition, bulk phosphorus may have been buried. In 1933, the WPUMBA was reportedly uncovered by a hurricane, resulting in a large waterfowl kill. However, no evidence of a disposal site at the WPUMBA was observed in historical or aerial photographs, and only one reference to the disposal area has been found. In addition to background searches, EPA conducted extensive electromagnetic and core sampling studies of the WPUMBA from 1988 to 1989. Sample results revealed only trace amounts of white phosphorus and only sporadic magnetic objects in sediment, and no phosphorus in surface water. Hence, no effective remedial action is possible at the site. Future RODs may be warranted if contamination is found. Therefore, there are no primary contaminants of concern affecting the site.

Selected Remedial Action

The selected RA for this site is no action with surface water monitoring after severe storms with hurricane strength winds or any other act which may disturb sediment. Water samples will be analyzed for phosphorus, using a detection limit of 0.01 *ug*/l, which is 10 percent of the established toxicity concentrations approved by EPA, and for metals using EPA detection limits. There are no present worth or O&M costs associated with this no action remedy.

Performance Standards or Goals

Not provided.

Institutional Controls

Current site restrictions will remain in place.

USA LETTERKENNY-PDO, PA

Federal Facility
August 2, 1991

The 250-acre USA Letterkenny-PDO site is within the 19,500-acre active U.S. Army facility in Chambersburg, Franklin County, Pennsylvania. Land use in the area is primarily agricultural, with scattered residences and military facilities. Shallow ground water at the head of the site flows toward and into Rocky Spring and Rocky Spring Lake. Since 1942, the U.S. Army has used the PDO Area to overhaul, rebuild, and test wheeled and tracked vehicles; distribute class III chemicals and petroleum; and store, maintain, demilitarize, modify, and demolish ammunition. These past industrial activities involved the on-site use of solvents, oils, hydrocarbons, and metals, which were disposed of in an oil burning pit and several drum storage revetments. From 1987 until 1989, a number of EPA investigations documented soil contamination near the drum storage area and the oil burning pit; and these areas are thought to be the primary sources of on-site contamination. This ROD addresses remediation of on-site soil as OU1. A subsequent ROD will address ground-water contamination as OU2. Because a majority of the soil contaminants have already moved down into the clays and silts of the underlying bedrock and ground water, soil contaminants now pose low risks for humans at the site, and no remediation of the soil is necessary. Based on this rationale, there are no primary contaminants of concern affecting this site.

Selected Remedial Action

The selected RA for this site is no action. There are no costs associated with this no action remedy.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not applicable.

USA LETTERKENNY SOUTHEAST AREA, PA

Federal Facility
August 2, 1991

The USA Letterkenny southeast area site is on a 19,500-acre active U.S. Army facility in Chambersburg, Franklin County, Pennsylvania. Land use in the area is primarily agricultural with scattered residences and military facilities. Ground water flowing beneath the southeast site discharges into two nearby streams. Drinking water in the 33 residences located within a 3-square-mile radius of the facility has been affected by ground-water contamination from the site. Since 1942, the U.S. Army has used the southeast area to overhaul, rebuild, and test wheeled and tracked vehicles; distribute Class III chemicals and petroleum; and store, maintain, demilitarize, modify, and demolish ammunition. These activities past industrial have involved the use and disposal of TCE, solvents, hydrocarbons, and metals. As a result of an IAG, EPA conducted several investigations which identified VOC-contamination of on-site soil in the K area associated with the various burial trenches, pits, and landfills used for hazardous waste disposal. This ROD addresses contaminated soil in the southeast area, and is the first OU for that area. Future RODs will address other contaminant source areas and ground water. The primary contaminants of concern affecting the soil are VOCs including TCE and xylenes.

Selected Remedial Action

The selected RA for this site includes excavating and treating on site 8,000 cubic yards of VOC-contaminated soil using low temperature thermal treatment; controlling vaporized contaminants using a secondary high-temperature combustor, or collecting these vapors by adsorption onto activated carbon; backfilling the residual ash on site; disposing of the residual carbon off site; and conducting soil monitoring. The estimated present worth cost for this RA is $1,539,191. There are no O&M costs associated with this RA.

Performance Standards or Goals

Soil excavation levels will be set at 225 μg/kg for all contaminants to ensure that the levels of indicator chemicals in ground water will meet the State ground water requirements.

Institutional Controls

Not provided.

WHITMOYER LABORATORIES (OU2), PA

December 17, 1990

The 22-acre Whitmoyer Laboratories site is an abandoned animal pharmaceutical manufacturing facility in Jackson Township, Lebanon County, Pennsylvania. Land use in the area is predominantly agricultural, and there are wetlands areas adjacent to the site. Part of the site lies within the 100-year floodplain of the Tulpehocken Creek-Union Canal, and an estimated 40 residences in the vicinity of the site use the underlying aquifer as their drinking water supply. From 1957 to 1964, Whitmoyer Laboratories, Inc., produced organic arsenicals on site. In 1964, the new site owners began storing concentrated waste in an on-site concrete vault and, until 1971, conducted on-site pumping and treatment of ground water and ocean dumping of waste. In 1977, sludge from ground water treatment was placed in on-site lagoons in the eastern area of the site. Between 1978 and 1982, the site changed ownership twice, and then in 1985, a RCRA site closure plan was filed. In 1986, EPA provided bottled water to residences with contaminated ground water. On-site contamination of soil and ground water has resulted from a combination of poor housekeeping, poor disposal practices, and improper storage of hazardous materials. In 1986, arsenic contamination was detected in nearby residential wells by EPA. When the site was abandoned in 1987, very little of the RCRA closure plan had been implemented. From 1988 to 1990, EPA removed the abandoned drums and laboratory waste from the site. A 1989 ROD provided for off-site removal of concentrated liquids in abandoned tanks and process vessels as the first OU1. This ROD addresses OU2, which includes remediation of chemical vault and lagoon waste, outdated products, miscellaneous chemicals and feedstocks, and contaminated site structures. A ROD for OU3 will addresses remediation of contaminated on-site soil and ground water. The primary contaminants of concern affecting the debris and sludge are VOCs including benzene, PCE, toluene, and xylenes; other organics including phenols; and metals including arsenic and lead.

Selected Remedial Action

The selected RA for this site includes excavating and incinerating on site approximately 3000 cubic yards of high organic content vault wastes, and approximately 101 cubic yards of miscellaneous products and feedstocks, followed by cement/pozzolan-based fixation, and disposing of the residual ash off site; treating approximately 1,500 cubic yards of low organic content vault waste using fixation or a similar fixation process, followed by off-site disposal; excavating and incinerating on site approximately 20 buried drums and 50 cubic yards of tank and process vessel residuals, followed by treating any residual ash using fixation, and off-site disposal of residuals; excavating approximately 24,000 cubic yards of arsenic-contaminated lagoon waste with levels above 10,000 mg/kg, followed by fixation of the hazardous lagoons wastes; and disposing of residuals along with nonhazardous waste and other products and feedstocks off site; demolishing buildings, associated tanks, vessels, processing equipment, and debris; incinerating on site any combustible debris exhibiting the RCRA arsenic toxicity characteristic, followed by off-site disposal; coating and sealing noncombustible permeable demolition debris prior to off-site disposal; surface cleaning of noncombustible impermeable demolition debris, which exhibit the RCRA arsenic toxicity characteristic and contaminated on-site structures before off-site disposal; and off-site disposal or recycling of untreated unsalvaged demolition debris. The estimated present worth cost for this RA is $45,800,000. There are no O&M

costs associated with this RA due to selection of off-site disposal for residuals.

Performance Standards or Goals

Chemical-specific debris and surface water clean-up goals were not provided, but clean up will be based on RCRA, CAA, CWA, and state standards.

Institutional Controls

Not provided.

WHITMOYER LABORATORIES (OU3), PA

December 31, 1990

The 22-acre Whitmoyer Laboratories site is an inactive laboratory facility in Jackson Township, Lebanon County, Pennsylvania. Land use in the area is predominantly agricultural with adjacent wetlands areas. In addition, part of the site lies within the 100-year floodplain of the Tolpehocken Creek-Union Canal. An estimated 20 residences in the vicinity of the site use the underlying aquifer as their drinking water supply. From 1957 to 1964, Whitmoyer Laboratories, Inc., produced organic arsenicals on site. In 1964, the new owners, Rohm & Haas, began storing concentrated waste in a concrete vault, and until 1971 conducted on-site ground-water pumping and treatment and ocean dumping of waste. In 1977, sludge from ground-water treatment was placed in lagoons in the eastern area of the site. Between 1978 and 1982, the site changed ownership twice, and then in 1985, a RCRA site closure plan was filed. In 1986, EPA began providing bottled water to residents with ground water contaminated by site activities. A public water supply line extension is currently being designed and will be constructed as part of a removal action. When the site was abandoned in 1987, very little of the RCRA closure plan had been implemented. From 1988 to 1990, EPA removed approximately 800 abandoned drums and laboratory waste off site. A 1989 ROD provided for remediation of hazardous concentrated liquids, including laboratory waste, abandoned at the site as OU1. A December 1990 ROD provided a remedy for vault and lagoon wastes, miscellaneous products and feedstocks, tanks, process vessels, and other on-site structures as OU2. This ROD addresses contaminated on-site soil, sediment, and ground water as OU3. The primary contaminants of concern affecting the soil, sediment, debris, and ground water are VOCs including benzene, TCE, and PCE; other organics including PAHs; and metals including arsenic.

Selected Remedial Action

The selected RA for this site includes excavating and fixation of approximately 61,000 cubic yards of soil/sediment with contaminant concentrations above the "principal threat" action levels using an iron-based or other fixation process, followed by off-site disposal; using biological treatment for approximately 5,600 cubic yards of soil/sediment with organic concentrations above the "principal threat" organic chemical action levels for the heavily contaminated soil either prior to or following fixation, followed by off-site disposal; excavating and consolidating on site in the vadose zone approximately 39,000 cubic yards of soil/sediment having contaminant concentrations below the "principal threat" action levels but above ground-water-based unsaturated soil clean-up targets, followed by capping with low-permeability materials; placing on site in the vadose zone approximately 16,000 cubic yards of soil/sediment with concentrations below the ground-water-based unsaturated soil action levels; soil capping any remaining contaminated surface soil that contains arsenic concentrations greater than 21 mg/kg and other disturbed areas, as needed; backfilling, grading, and revegetating the excavated areas; demolishing on-site structures, followed by salvaging non-hazardous debris and off-site disposal of unsalvaged debris; on-site pumping and treatment of contaminated ground water using physical, chemical, and possibly biological treatment, followed by either on-site discharge to surface water, reinjection into the aquifer, or both methods; disposing of any treatment residuals off site; conducting long-term ground-water monitoring; and implementing institutional controls including deed restrictions for the remaining contaminated areas. Additionally, this ROD provides a contingency for ground

water if it becomes technically impracticable to achieve clean-up goals. The contingent remedy includes pumping from the perimeter area only to prevent migration of the contaminant plume. The estimated present worth cost for this RA is $77,300,000, which includes annual O&M costs of $2,397,600 or $2,477,600 (depending on the ground-water discharge option chosen).

Performance Standards or Goals

Soil action levels for saturated and unsaturated soil and "principal threat" action levels were developed based on the threat due to inhalation/ingestion and to ground water using MCLs, RCRA TCLP, and health-based criteria. The target clean-up goal for surface soil is arsenic 21 mg/kg. The action levels for unsaturated soil include benzene 0.009 mg/kg, PCE 0.051 mg/kg, TCE 0.017 mg/kg, and arsenic 450 mg/kg. This will reduce the excess cancer risk level associated with inhalation/ingestion exposure to 10^{-6}. The action levels for saturated soil include benzene 0.002 mg/kg, PCE 0.012 mg/kg, TCE 0.004 mg/kg,and arsenic 210 *u*g/kg based on protection of ground water. Principal threat action levels include benzene 10 mg/kg, PCE 14 mg/kg, TCE 10 mg/kg, and arsenic 1,000 mg/kg. Ground-water clean-up goals are based on federal MCLs, proposed MCLs, and a 10^{-6} excess cancer risk level and reference dose equal to 1 for noncarcinogens. Chemical-specific ground water clean-up goals include benzene 0.005 mg/l (MCL), PCE 0.005 mg/l (PMCL), TCE 0.005 mg/l (MCL), and arsenic 0.05 mg/l. A state ARAR to remediate ground water to background levels will be waived because of technical impracticability. If the contingent remedy is employed, an ARAR to comply with SDWA MCLs will also be waived because of technical impracticability.

Institutional Controls

Deed restrictions will be implemented to prevent contact with remaining contaminated areas.

WILLIAM DICK LAGOONS, PA
June 28, 1991

The 4.4-acre William Dick Lagoons site is a chemical wastewater disposal site in West Caln Township, Chester County, Pennsylvania. Land use in the area is predominantly residential and agricultural, with adjacent woodlands. An estimated 30 residences located within 1,000 feet of the site use private wells for their drinking water supply. Two other Superfund sites are near the site: the Blosenski Landfill located 1.7 miles southeast; and the Welsh Landfill, 5 miles to the northwest. Originally, the site consisted of three unlined earthen lagoons or ponds covering 2.2 acres and an associated borrow area. From the 1950s to 1970, William Dick used the lagoons to dispose of wastewater left from cleaning the interiors of chemical and petroleum tank trailers owned primarily by Chemical Leaman Tank Lines (CLTL), and residual chemical products. In 1970, the state ordered the lagoons closed after 37 wild geese descended into the lagoons, and were coated with waste. Later in 1970, vandalism caused the release of an estimated 300,000 gallons of wastewater into Birch Run, a tributary of the west branch of Brandywine Creek. As a result of this discharge, more than 2,600 fish died, and water supplies that used Brandywine Creek as a water source were closed. In 1971, William Dick and CLTL began lagoon closure as part of a state agreement. Activities during 1971 included the addition of alum to the wastewater, spray irrigation of the treated wastewater into the woods, and covering and revegetating lagoons with soil. During 1985, site studies identified numerous organic compounds in soil samples, two spring-fed water supplies, and five wells. In 1988, EPA required CLTL to fence around the site, conduct yearly monitoring of residential wells, and install point-of-entry treatment systems for selected private wells. In 1990 and 1991, sampling revealed TCE andother contaminants in 30 to 40 private wells. As a result, CLTL installed point-of-entry carbon filtration units in 12 of the 30 to 40 homes where contamination in well water exceeded MCLs. This ROD provides an interim remedy and addresses contaminated residential water as OU1 and ground water as OU2. A future ROD will address source control and will provide a remedy for the cleanup of contaminated soil. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, and TCE; other organics including phenol; and metals.

Selected Remedial Action

The selected RA for this site includes providing an alternate water supply to affected residences by extending the city of Coatesville Authority's water line; installing a water storage tank near the site to provide storage and pressure feed for the water line connections; monitoring nearby springs; collecting hydrogeologic data; conducting initial pumping and on-site treatment of the contaminated ground-water plume using treatment components that will be selected during interim RD, which are expected to include chemical precipitation and one of more of the following: granular activated carbon, chemical oxidation, and air stripping, with possible emission controls; discharging the treated water on site to surface water; installing monitoring and recovery wells to further characterize the entire plume; and implementing institutional controls including ground-water use restrictions. The estimated present worth cost for this remedial action ranges from $5,991,000 to $7,028,000, which includes an annual O&M cost of $305,000 to $330,000 for the first 5

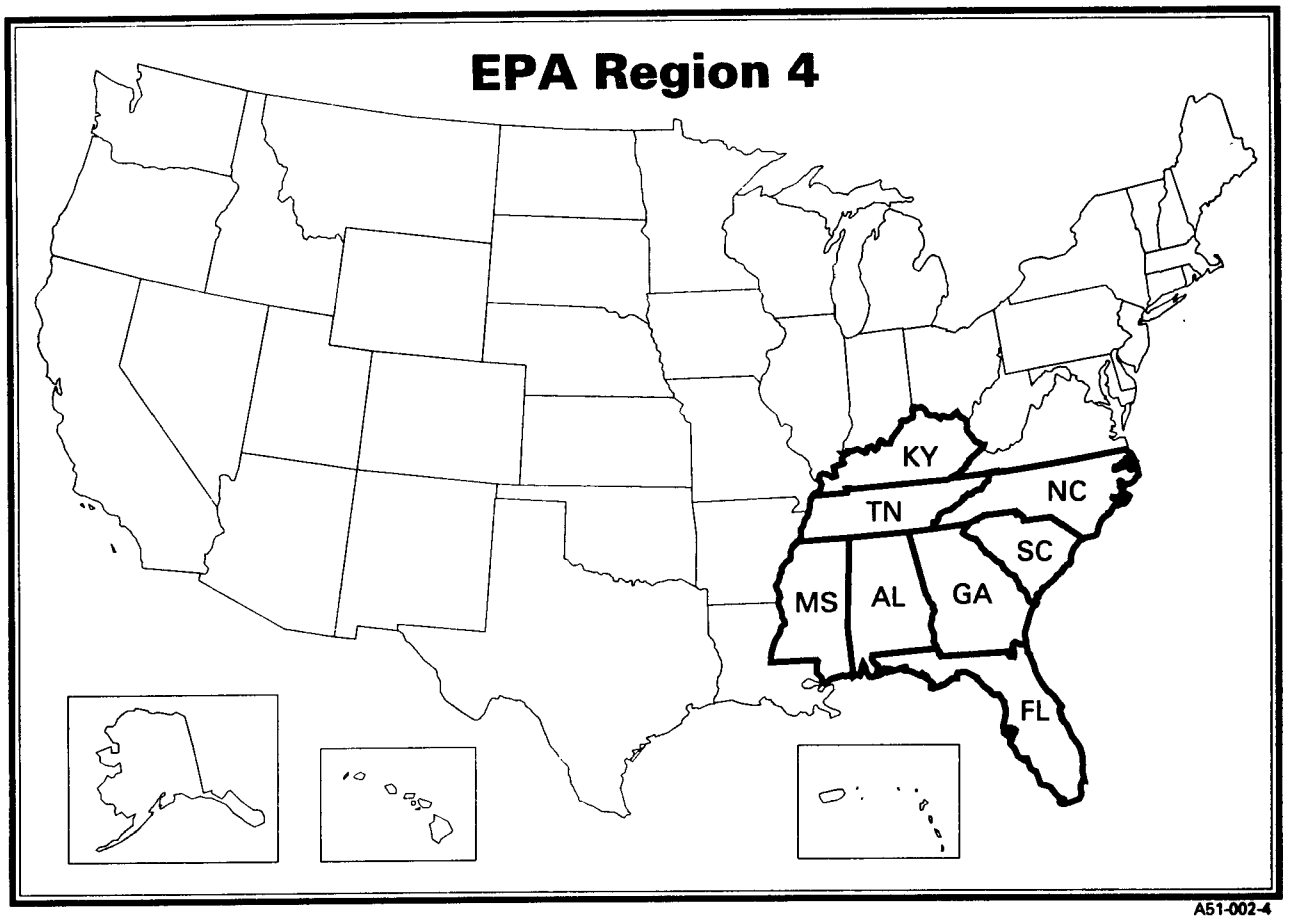
years, and $21,000 to 46,000 for years 6 through 30.

Performance Standards or Goals

For OU2, EPA is invoking a waiver for federal and state ground-water clean-up standards because the RA is an interim measure. Chemical-specific ground-water clean-up goals will be set in the final remedy.

Institutional Controls

Ground-water use restrictions will be implemented to prevent current and future residents from using the contaminated ground-water plume from the aquifer as their drinking water supply; to encourage the use of the newly installed waterline; and to demand periodical analysis for contaminants of ground-water wells not linked to the extended water line.



REGION 4

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ABERDEEN PESTICIDE DUMPS, NC

Amendment
September 30, 1991

The Aberdeen Pesticide Dumps site consists of a plant area and four disposal areas in Aberdeen, Moore County, North Carolina. The five areas are Farm Chemicals, Twin Sites, Fairway Six, McIver Dump, and Route 211. Surrounding land use is primarily residential with some light industry. Ground water is the main source of drinking water for local residents. From the 1930s until 1987, chemical companies neighboring the site blended or formulated pesticides at the formulation plant located on the Farm Chemicals area. During operations at the plant, substantial quantities of pesticide waste was disposed of or spilled on site. After investigations by EPA's Emergency Response Division in 1985 and 1986, several removal actions were conducted, including removing surface contaminants, drums, and soil in several areas. One removal action, conducted in 1988, resulted in the excavation of 22,000 cubic yards of contaminated soil, which was subsequently stockpiled in the Fairway Six area. This stockpile was designated as OU2. A 1989 ROD documented the selected remedy for OU2, which included on-site incineration of the stockpiled material and on-site disposal of the residual ash. OU2 has subsequently been redesignated as OU4 and implementation of the selected remedy postponed pending a selected remedy for OU1. A fourth removal action in 1989 resulted in the excavation and stockpiling of 3,200 cubic yards of pesticide-laden soil. In 1986, pesticides were detected in drinking water from four municipal wells and three private wells. A 1989 EPA investigation of the remaining areas of the site, designated as OU1, revealed a total of 98,733 cubic yards of contaminated soil, in addition to that stockpiled in the Fairway Six and MacIver Dump areas, that require remediation. This ROD concurrently addresses surface and subsurface soil contamination addressed in OU1 and the former OU2, and includes a change of treatment technology for the former OU2 from incineration to thermal desorption. The purpose of this response action is to prevent current or future exposure to the contaminated soil and to reduce further contaminant migration into the ground water. The primary contaminants of concern affecting the soil and debris are organics including pesticides; metals including arsenic, chromium, and lead; and asbestos, an inorganic.

Selected Remedial Action

The amended RA for this site includes conducting a treatability study using thermal desorption; excavating and treating a total of 123,933 cubic yards of soil from all five areas including previously excavated soil from the Fairway Six and McIver Dump areas using an on-site thermal desorption process that includes an activated carbon adsorption to treat off-gases, followed by off-site incineration of residual organics or disposal in another appropriate manner; disposing of the non-hazardous treated soil on site in the original excavated areas; on-site solidification and disposal of any residue that remains hazardous after thermal treatment; removing asbestos and building demolition at the Farm Chemicals area; and sampling and analyses of site soil, as necessary, to confirm clean-up status. A contingent remedy will be implemented if the results of the treatability study conclude that thermal desorption is ineffective or cost prohibitive. The contingent remedy will include all items detailed under the selected remedy except that incineration would be used as the treatment technology instead of thermal desorption. The estimated present worth cost for this RA is $29,115,000, which includes an annual O&M cost of $115,000.

Performance Standards or Goals

Chemical-specific soil excavation levels for each area are based on a 10^{-6} risk level and include arsenic 2,705 *u*g/kg and chromium 3,909 *u*g/kg. The selected remedy will attain federal and state ARARs including RCRA LDR requirements through a treatability variance for soil and debris. An organics reduction efficiency of 90 to 99.99 percent, as verified using the TCLP, will be attained. These reductions are not expected to achieve pesticide levels below background levels in the area. The ROD includes alternate treatability variance levels, which must be attained for various structural/functional groups.

Institutional Controls

Not applicable.

ARLINGTON BLENDING & PACKAGING, TN
June 28, 1991

The 2.3-acre Arlington Blending & Packaging site is an abandoned pesticide and herbicide blending and packaging facility in Arlington, Shelby County, Tennessee. Land use in the area is predominantly residential, agricultural, and light commercial. Site operations have contaminated two units of the underlying aquifer, which are not used as drinking water sources From 1971 to 1978, the Arlington Blending and Packaging Company operated on site to properly formulate and package various pesticide, herbicide, and other chemical formulations. During site operations, spills and leaks of chemicals occurred on site, which resulted in compounds soaking into soil and process building flooring, and migrating off site via surface run-off. Process water containing hazardous contaminants also was discharged to on-site ditches, contaminating adjacent properties including a residential area, nearby ditches, and other surface water bodies. In addition, numerous barrels and other containers were left on site. Site investigations revealed on-site and off-site contamination of soil and ground water. In 1983, EPA initiated a removal action, and excavated and removed 1,920 cubic yards of contaminated soil with chlordane levels in excess of 50 mg/kg and 112 drums containing chemical waste. In 1990, as a result of the RI data, EPA conducted another removal action and excavated and temporarily stored on site 70 cubic yards of contaminated soil from the adjacent residential property. This ROD addresses final remediation of primarily pesticide-contaminated soil and ground water. The primary contaminants of concern affecting the soil, debris, and ground water are VOCs including benzene; other organics including pesticides; and metals including arsenic.

Selected Remedial Action

The selected RA for this site includes excavating 24,000 cubic yards of contaminated soil and decontaminating the soil on site using ex-situ thermal desorption; backfilling excavated areas with treated soil; dechlorinating the resulting condensed organic liquid from the thermal desorption process, followed by off-site disposal of the residual concentrated organic liquid; treating and disposal of spent carbon or sludge off site; temporarily storing residuals on site, if needed prior to treatment to treatability levels and off-site disposal; treating soil containing levels of arsenic and/or other trace metals above action levels on site using solidification, followed by off-site disposal; decontaminating and demolishing on-site buildings, followed by off-site disposal; pumping and on-site treatment of contaminated ground water using activated carbon, followed by on-site discharge of the treated effluent to surface water or off site to a POTW; regenerating spent carbon granules off site; monitoring ground water; and providing for a contingency remedy that involves treating soil on site using thermal destruction instead of thermal desorption. The estimated present worth cost for this RA is $12,170,167, which includes a total present worth O&M cost of $1,605,256 for 30 years.

Performance Standards or Goals

Soil clean-up levels are based on protection of ground water and reduction of risk through long-term dermal contact and oral ingestion and include arsenic 25,000 *u*g/kg, which also takes into account background levels.

Chemical-specific ground-water clean-up goals are based on SDWA MCLs, and include benzene 5 *u*g/l.

Institutional Controls

Not applicable.

CAROLINA TRANSFORMER, NC
August 29, 1991

The 4.8-acre Carolina Transformer site is a former electrical transformer rebuilding and repair facility in Fayetteville, Cumberland County, North Carolina. Land use in the area is predominantly agricultural and residential, with a wooded/swamp-like area adjacent to the site. The site may overlie as many as three aquifers, of which only the shallow confined aquifer has been found to be contaminated. From 1967 to 1982, Carolina Transformer Company rebuilt and repaired electrical transformers on site. During site operations, PCB fluids were drained from transformers and improperly stored and managed. From 1978 to 1982, a number of EPA and state investigations identified PCB-contaminated soil and ground water. In 1982, the state determined that run-off from the site violated surface water quality standards for PCBs. In 1984, EPA began clean-up operations at the site, and removed and disposed of 975 tons of contaminated soil off site in a RCRA-permitted landfill. This ROD addresses final remediation of contaminated soil, sediment, debris, and ground water. The primary contaminants of concern affecting the soil, sediment, debris, and ground water are VOCs including benzene and toluene; other organics including dioxin and PCBs; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes excavating and treating on-site soil and sediment contaminated with PCBs in excess of 1 mg/kg using a solvent extraction process to separate the organic contaminants and polynuclear aromatic compounds from the soil and sediment and to lower the solubility and mobility of the inorganic contaminants; backfilling the excavated area with treated soil; solidifying soil and sediment that does not meet the RCRA toxicity characteristicrequirements; demolishing 970 cubic yards of roof and wall material from three on-site buildings and transporting the debris to an off-site landfill; treating any remaining structural material contaminated with PCBs in excess of 10 $ug/100\ cm^2$ using a solvent washing system; transporting 180 cubic yards of debris and solid waste to an off-site landfill for disposal and/or treatment; pumping and on-site treatment of contaminated ground water using precipitation to remove metals and activated carbon adsorption to remove VOCs, followed by on-site discharge to surface water or off-site discharge to a POTW; dewatering sludge generated from the ground water precipitation process, followed by off-site disposal; conducting ground-water monitoring; and establishing a contingency remedy for ground-water remediation, which includes ground-water engineering controls, ARAR waivers, institutional controls, continued monitoring of specified wells, and periodic reevaluation of remedial technologies if it is determined that certain portions of the aquifer cannot be restored to their beneficial uses. The estimated present worth cost for this RA is $10,474,500, with an O&M cost of $78,100 for years 0 through 1 and $17,400 for years 2 through 30.

Performance Standards or Goals

Chemical-specific soil/sediment clean-up goals are based on carcinogenic risk and EPA guidelines, and include dioxin 1.2×10^{-4} (carcinogenic risk) and total PCB 1 mg/kg (EPA guidelines). Chemical-specific ground-water clean-up goals are based on SDWA MCLGs, EPA guidance, and state standards, and include benzene 1 *ug*/l (state), chromium 50 *ug*/l (MCLG), lead 15 *ug*/l (EPA guidance), PCB-1260 0.1 *ug*/l (state), and toluene 1,000 *ug*/l (state).

Institutional Controls

Not applicable.

CHARLES MACON LAGOON & DRUM STORAGE, NC

September 30, 1991

The 17-acre Charles Macon Lagoon & Drum Storage site is a former oil recycling and antifreeze manufacturing facility in Richmond County, North Carolina. The site is composed of the 16-acre Charles Macon Lagoon & Drum Storage site and the 1-acre Dockery site, which is located 2,600 feet north of the Macon site. Land use in the area is agricultural, and woodlands cover over half of the site. The site overlies an unconfined aquifer, and surface runoff discharges to Pee Dee River, which runs one mile west of the site. A wetlands area exists between the site and the river. Four residences are within 100 yards of the site and receive drinking water from the municipal system. From 1979 to 1982, unpermitted waste oil recycling was conducted at the facility using a large boiler to separate the waste oil from other waste. Site features resulting from these activities include drum storage areas, 12 unlined or partially lined oil/water waste storage lagoons, buildings, two truck tankers, and 14 tanks. In 1980, state inspectors observed that several of the lagoons were overflowing with metal-contaminated oil and sludge contaminating the ground. They also discovered 175 deteriorating 55-gallon drums containing various chemicals including VOCs and other organics. In a 1981 EPA RCRA compliance inspection of the Macon site, 10 violations of RCRA regulations were cited. Subsequently, a court order required the PRPs to initiate clean-up activities at Macon in 1982, which led to identifying 2,100 drums, 10 tanks, and 11 lagoons of concern. Private funds were used to remove 300 drums and the contents of one lagoon, as well as to install two monitoring wells, before being depleted. EPA continued site activities in 1983 by removing 3,123 tons of waste and 137,000 gallons of oil. In 1984, EPA conducted similar removal activities at the Dockery site, removing 709 tons of waste. After removal activites for both properties had been completed in 1984, all but one lagoon, referred to as lagoon 10, had been excavated and backfilled. Because of the size of lagoon 10, EPA decided to backfill and cap the lagoon without excavating the contents. Recent investigations, however, revealed that site soil and ground water still pose a threat, particularly downgradient of source areas such as lagoon areas. This ROD addresses soil, vessels containing hazardous materials, and ground water, which is the principal threat at the site, and is a final remedy. The primary contaminants of concern affecting the soil, sludge, debris, and ground water are VOCs including PCE, TCE, toluene, and xylenes; other organics including PAHs; and metals including arsenic and chromium.

Selected Remedial Action

The selected RA for this site includes treating VOC-contaminated soil around the lagoon 7 area using *in situ* vapor extraction with a carbon adsorption system to remove off-gas organic contaminants; excavating and treating PAH-contaminated soil from lagoon 10 in an on-site, biological waste treatment cell equipped with a carbon adsorption system to control emissions, followed by returning the treated soil to lagoon 10 and covering with a low permeability cap; emptying and dismantling all vessels and demolishing buildings as necessary, and off-site disposal or recycling of hazardous and non-hazardous waste; further sampling of soil, sediments, and surface water; pumping and treatment of ground water using air stripping and coagulation/filtration, followed by discharging treated water to surface water if NPDES standards are met or to an infiltration gallery if standards are not met; and monitoring ground water. The estimated present worth cost

for this RA is $8,700,000, which includes an estimated present worth O&M cost of $5,400,000 for 30 years.

Performance Standards or Goals

The chemical-specific clean-up goal for the lagoon 7 area soil is PCE 3.0 mg/kg based on protection of ground water. The goal for lagoon 10 area soil is total carcinogenic PAHs 2.0 mg/kg based on risk. Chemical-specific ground-water remediation levels were based on the more stringent of federal or state standardsincluding PCE 0.7 *ug*/l (state), TCE 2.8 *ug*/l (state), toluene 1,000 *ug*/l (MCL), total xylenes 400 *ug*/l (state), chromium 50 *ug*/l (state), and lead 15 *ug*/l (CERCLA).

Institutional Controls

Not provided.

CIBA-GEIGY, AL
September 30, 1991

The 1,500-acre Ciba-Geigy site is an active chemical manufacturer in an industrial area in McIntosh, Washington County, Alabama. A wetlands area borders the site property, and part of the site lies within the floodplain of the Tombigbee River. From 1952 to present, Ciba-Geigy, formerly Geigy Chemical Corporation, has produced various chemicals including DDT, laundry products, herbicides, insecticides, agricultural chelating agents, sequestering agents, plastic resins and additives, antioxidants, and specialty chemicals. In 1982, during an investigation of an adjacent chemical company, EPA identified on-site contamination in a drinking water well on the Ciba-Geigy property. In 1985, EPA issued a RCRA permit that included a corrective action plan requiring Ciba-Geigy to remove and treat ground-water and surface water contamination at the site. EPA performed further investigations to determine the extent of contamination, and revealed 11 areas of waste management and potential contamination. These areas contain a variety of waste, debris, and pesticide by-products and residues. In 1987, as part of the corrective action plan requirements, Ciba-Geigy installed an additional wastewater treatment system and ground-water monitoring wells. A 1989 ROD provided for treatment of the contaminated shallow alluvial aquifer by using the on-site wastewater treatment plant as OU1. This ROD addresses highly contaminated soil and sludge at 10 of the 11 former waste management areas as OU2. Future RODs will address contamination within the floodplain including the lower portions of an on-site drainage ditch and areas in the Tombigbee River in proximity of the site (OU3), and contamination in the remaining untreated former waste management area and the upland portions of the drainage ditch (OU4). The primary contaminants of concern affecting the soil, sludge, and debris are VOCs including benzene and toluene; other organics including PCBs and pesticides (e.g., DDT); and metals including lead.

Selected Remedial Action

The selected RA for the site includes excavating contaminated soil and sludge from within the 10 disposal areas until established clean-up levels are reached or to a maximum depth of 20 feet; treating 65,000 cubic yards of highly-contaminated soil and sludge on site using thermal treatment; evaluating the possibility of pretreatment via solvent extraction, low temperature thermal treatment, or critical fluid injection and implementing this process, if advantageous; treating 62,300 cubic yards of moderately contaminated soil and sludge using stabilization/solidification or a proven innovative technology; obtaining a treatability variance to dispose of the treated soil and residual ash in an on-site landvault; treating deep soil areas, where risk-based levels have not been achieved during excavation to the depth of 20 feet, using in-situ soil flushing combined with isolation walls, extraction wells alone, or possibly extraction wells in combination with in-situ vacuum extraction or in-situ bioremediation, whichever is found to most effective; backfilling and revegetating the excavated areas; operating and maintaining the landvaults for a minimum of 30 years; monitoring ground water; and implementing institutional controls where necessary including land and ground-water use restrictions. The present worth costs for this RA range from $94,000,000, if solidification of low level contaminated soil is effective, to $120,250,000, if incineration of all contaminated material is required. O&M costs were not provided.

Performance Standards or Goals

Chemical-specific soil clean-up goals are based on soil depth. For soil to a depth of less than 12 inches, goals are based on 10^{-6} risk level for carcinogens, and an HI=1 for non-carcinogens. Chemical-specific goals for surface soil include DDT 17 mg/kg. Subsurface soil clean-up goals are based on ground-water protection levels, as well as a 10^{-4} risk level for carcinogens and a HI=1 for non-carcinogens, and include DDT 5,034 to 7,500 mg/kg depending on the area.

Institutional Controls

Deed restrictions will be implemented to prevent ground-water usage and to minimize land use until clean-up levels are achieved.

GOLDEN STRIP SEPTIC TANK, SC

September 12, 1991

The 55-acre Golden Strip Septic Tank (GSST) site is an inactive waste hauling and disposal facility in Simpsonville, Greenville County, South Carolina. Land use in the area is predominantly residential. The estimated 638 residents who reside within a quarter-mile of the site use public water as their drinking water supply. From 1960 to 1975, GSST used the site to dispose of industrial and septic wastes in five unlined lagoons. In 1975, GSST applied for an industrial solid waste permit to dispose of liquid waste, but the state denied the permit because the proposed disposal method was unacceptable. Subsequently, in 1978, GSST discontinued waste collection, hauling, and disposal, and filled in three of the five lagoons by pushing in surrounding berms. State investigations of the site began in 1972 and included a site survey of lagoons and the surrounding area. The state continued its monitoring after the lagoons were filled and graded in 1978, and the results of the monitoring led to additional investigations by EPA in 1984 and 1986 and an RI and supplemental RI from 1989 to 1990 and 1990 to 1991, respectively. EPA identified metal contamination in lagoon soil and sludge, and limited contamination of ground water. In addition, 27 abandoned drums that contained low levels of contaminants were found on the east side of the site. Six of the drums have been placed in overpack drums and stored in an on-site temporary drum storage area. This ROD addresses remediation of contaminated soil, as well as sludge and surface water from the lagoons, as a final remedy. Ground-water contamination is expected to naturally attenuate within two to five years after source remediation occurs. The primary contaminants of concern affecting the soil, sludge, and surface water are VOCs including benzene, PCE, toluene, and xylenes; other organics; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes excavating and treating on site approximately 22,400 cubic yards of soil and 4,200 cubic yards of sludge using solidification/fixation; backfilling the treated residuals, covering the area with clean soil, and revegetating the site; discharging off site 1.9 million gallons of impounded surface water from Lagoons 1 and 4 to a POTW; disposing of drummed liquids, along with other surface water; establishing ACLs for the MCLs that are periodically exceeded in the ground water to ensure that source control measures have a positive effect on ground water; conducting long-term ground-water and surface water monitoring; investigating further the contamination from the abandoned on-site drums; and implementing institutional controls to control site development. The estimated present worth cost for this RA is $4,529,000, which includes an annual O&M cost of $991,500.

Performance Standards or Goals

Chemical-specific soil clean-up goals are based on health-based criteria and include arsenic 18 mg/kg, cadmium 65 mg/kg, chromium 580 mg/kg, lead 500 mg/kg, PCE 56 mg/kg, toluene 12,000 mg/kg, and xylenes 120,000 mg/kg. Ground-water ACLs will be established based on the arithmetic mean of the first four samples of each constituent for that well. For means that do not exceed the MCLs, the MCL will be the applicable standard against which ground-water monitoring results will be compared.

Institutional Controls

Institutional controls will be implemented to control site development.

HERCULES 009 LANDFILL, GA
June 27, 1991

The 16.5-acre Hercules 009 Landfill site is in Brunswick, Glynn County, Georgia. Land use in the area is predominantly commercial and residential. On-site features in the northern seven acres of the site are a landfill area with six disposal cells containing approximately 33,000 cubic yards of one percent toxaphene sludge, a drainage ditch, and a drainage culvert. Most of the estimated 1,400 residents within three miles of the site are connected to a public water supply, except for six homes and a church that use private wells as their drinking water supply. From 1948 to 1980, Hercules, Inc., manufactured the agricultural pesticide toxaphene. Waste from the manufacturing process was accumulated by storing toxaphene-contaminated wastewater in the off-site settling ponds. In 1975, the state permitted the site to accept and dispose of pesticide waste, including toxaphene, in the 009 landfill site. Also disposed of in the landfill area were empty toxaphene product drums, process sludges, glass, rubble, and trash. In 1979, a state inspection detected elevated levels of toxaphene in sediment and surface water in the adjacent drainage ditch, and in 1980, the state revoked Hercules' operating permit. In 1983, the state required Hercules to install a ground-water monitoring system to assess site contamination. In 1984, because toxaphene was found in a deep/shallow well cluster in the aquifer beneath the site, additional ground-water monitoring wells were installed. Hercules closed, covered, and seeded all landfill cells in accordance with state solid waste permits. This ROD addresses OU2, the contaminated ground water, as an interim action. Future RODs will fully address the principal threat posed by the site. The primary contaminants of concern affecting the ground water are organics including pesticides.

Selected Remedial Action

The selected RA for this interim remedy includes extending municipal water lines and connecting all residences with private wells and the church to the municipal water supply; and implementing institutional controls, including ground-water use restrictions. The estimated capital cost for this RA is $106,000. There are no O&M costs associated with this RA.

Performance Standards or Goals

Clean-up levels for ground water will be addressed in the final remedy.

Institutional Controls

Institutional controls will be implemented to prevent consumption of contaminated ground water.

INTERSTATE LEAD (ILCO), AL

September 30, 1991

The Interstate Lead (ILCO) site consists of seven subsites located in and around the City of Leeds, Jefferson County, Alabama. The site includes an 8.5-acre active lead smelting facility and its parking lot, a service station; a manufacturing company; a church parking lot; a 1.4-acre residential property; a municipal landfill; and a restaurant. Land use in the area is mixed industrial and residential. Parts of the ILCO site overlie the Fort Payne Chert and Ordovician Undifferentiated aquifers, both of which are sources of drinking water for the City of Leeds. Since 1970, ILCO has manufactured refined lead alloys through the smelting and refining of lead-bearing scrap metals including lead-acid automobile batteries. The resultant furnace slag has been disposed of at the seven subsites along with battery casings and wastewater treatment sludge. From 1973 to 1984, ILCO stored furnace slag, battery chips, and wastewater treatment sludge in piles at the main facility and also used this waste as fill material at the other site areas. Additionally, some waste was disposed of at the municipal landfill. State investigations in 1983 and 1984, and a number of subsequent EPA investigations, identified metal contamination in on-site soil, sediment, ground water, surface water, and air. In 1984, EPA conducted an emergency removal action at the church subsite, and removed and disposed of approximately 5,000 cubic yards of waste material and soil off site. This ROD provides a final remedy for soil contamination at all of the subsites except the main facility portion of subsite #1, and ground-water contamination at four of the subsites as OU1. Future RODs will address sediment, ground water, and surface water contamination at the main facility. The primary contaminants of concern affecting the soil, sediment, debris, and ground water are metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected source control RA for the ILCO parking lot and the restaurant subsites includes excavating soil and sediment with lead concentrations exceeding 300 mg/kg and 50 mg/kg, respectively; controlling dust with water spray during excavation and removal; dewatering the sediment; treating the contaminated material on site using solidification and stabilization; replacing the treated soil into the excavated areas in compliance with RCRA requirements, and capping the areas; removing battery casings and other debris with solidification of battery casing material, and on-site disposal of solidified material and off-site disposal of other debris; and conducting air monitoring. The selected source control RA for the service station, the manufacturing company, the residential property, and church subsites includes excavating and treating soil using solidification and stabilization at a centrally located treatment area in the parking lot subsite; disposing of treated material at the ILCO parking lot with filling and revegetation of excavated areas with clean soil, or disposing of treated materials in the original excavated areas with implementation of institutional controls including deed restrictions; removal of sediments exceeding 50 mg/kg lead, dewatering, and treating the sediment along with the soil; and air monitoring. The selected source control RA for the municipal landfill includes constructing a multi-layer cap over soil contaminated with lead concentrations exceeding 300 mg/kg; implementing institutional controls including land use restrictions, and access restrictions; and ground-water monitoring. The selected ground-water RA for the resturant, manufacturing facility, and residential property subsites includes natural attenuation and implementing institutional controls. The selected ground-water

RA for the municipal landfill includes pumping and on-site treatment of contaminated ground water using chemical/physical methods, followed by on-site discharge; solidifying generated sludge if necessary to meet LDRs before disposal; and ground-water monitoring. The estimated present worth cost for this RA is $29,009,000, which includes a present worth O&M cost of $689,000 for 30 years.

Performance Standards or Goals

Clean-up goals for soil are based on leachability modeling and health-based levels, and include lead 300 mg/kg (leachability), arsenic 10 mg/kg (health-based), and chromium 1,750 mg/kg (health-based). The clean-up goal for sediment is a regional aquatic species protection level and is set at lead 50 mg/kg. Ground-water clean-up goals are based on federal MCLs or proposed MCLs, and EPA guidance criteria. Chemical-specific goals include arsenic 50 *u*g/l (MCL), chromium 50 *u*g/l (MCL), and lead 15 *u*g/l (EPA).

Institutional Controls

Land use restrictions will be implemented to prevent disturbance of the cap at the landfill subsite. Deed restrictions will be implemented at the manufacturing facility, residential property, and church subsites if solidified material is disposed of in original excavations.

MALLORY CAPACITOR, TN
August 29, 1991

The 8.6-acre Mallory Capacitor site is a former electrical capacitor manufacturing facility in Waynesboro, Wayne County, Tennessee. Land use in the area is mixed residential, commercial, and industrial, with the Green River bordering the site to the east. There are 54 private wells located within a one-mile radius of the site that draw on the Fort Payne Formation aquifer for ground water. The Mallory Capacitor Company was operated from 1969 to 1979 by Duracell, and from 1979 to 1984 by Emhart Industries to manufacture electrical capacitors on site using TCE as part of the process. Process liquid waste was stored in underground storage tanks on site. From 1976 to 1980, clean-up actions were implemented by Emhart to remove PCB-contaminated materials from process equipment within the manufacturing facility. These actions also included removing the UST adjacent to the plant and associated surrounding PCB-contaminated soil. In 1984, routine TCE still bottom testing revealed PCB-containing still bottoms. The facility was subsequently shut down because of unsafe working conditions. Subsequent studies revealed significant levels of PCBs on portions of the plant structure, in process equipment, and in soil; and elevated VOC levels also were identified in ground water. This ROD addresses contaminated ground water as a final remedy. The primary contaminants of concern affecting the ground water are VOCs including 1,2-DCE and TCE; and other organics including PCBs.

Selected Remedial Action

The selected RA for this site includes ground-water pumping and on-site treatment using air stripping; removing precipitates using filtration and carbon adsorption, followed by on-site discharge to the Green River or off-site discharge to a POTW; monitoring ground water; conducting additional investigations to assess the extent of off-site ground-water contamination and the impact to surface waters; and implementing institutional controls including deed and ground-water use restrictions. If it is determined that, based on site conditions, PCBs are resistant to removal by pumping and that ground water cannot be restored to beneficial use for any or all of the contaminants, all of the following long-term management measures may be implemented: employing engineering controls as containment measures; invoking chemical-specific ARAR waivers for aquifer cleanup based on technical impracticability; implementing institutional controls to restrict access to the aquifer; reevaluating remedial technologies for ground-water remediation; and continued monitoring of specified wells. The estimated present worth cost for this RA is $3,005,000.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on SDWA MCLs, and include PCBs 0.5 *ug*/l, TCE 5 mg/l, and cis- and trans-1,2-DCE 70 ug and 100 *ug*/l, respectively.

Institutional Controls

Deed and ground-water use restrictions will be implemented to prevent consumption of contaminated ground water.

MAXEY FLATS NUCLEAR DISPOSAL, KY

September 30, 1991

The 280-acre Maxey Flats Nuclear Disposal site is an inactive low-level radioactive waste disposal facility in Fleming County, Kentucky. Land use in the area is predominantly agricultural and residential, with mixed woodlands surrounding the site. The estimated 663 people who reside within 2.5 miles of the site use the public water supply for drinking purposes. From 1962 to 1977, Nuclear Engineering Company, Inc. (NECO), operated a solid by-product, source, and special nuclear material disposal facility under a license with the state. During this time, NECO disposed of approximately 4,750,000 cubic feet of low-level radioactive waste in an approximately 45-acre area, designated as the "Restricted Area." The majority of the waste was disposed of in unlined trenches, but concrete capped "hot wells" consisting of coated steel pipe, tile, or concrete also were used for disposal of small-volume waste with high-specific activity. The waste was deposited in 52 disposal trenches within 27 acres of the restricted area in both solid and solidified-liquid form and were both containerized and deposited loosely. Several state investigations in the 1970s revealed that leachate contaminated with tritium and other radioactive substances was migrating from the disposal trenches to unrestricted areas. In 1977, the state ordered NECO to cease the receipt and burial of radioactive waste. From 1973 to 1986, an evaporator was operated on site as a means of managing the large volume of water infiltrating the disposal trenches as well as wastewater generated by on-site activities. The evaporator processed more than 6,000,000 gallons of liquids, leaving behind evaporatory concentrates that were stored in on-site above-ground tanks, and eventually disposed of in an on-site trench. In 1979, the state initiated stabilization and maintenance activities including installing a temporary PVC cover over the disposal trenches to minimize rainfall infiltration. In 1988, EPA conducted a two-phase removal action to handle the threat posed by 11 on-site 20,000-gallon tanks of questionable structural integrity located in a tank farm building. Phase I consisted of installing a heater in the tank farm building to prevent the freezing and rupturing of tank valves and fittings. Phase II consisted of solidifying approximately 286,000 gallons of radioactive liquids stored in the 11 tanks and water on the floor of the tank farm building. The solidified blocks will be disposed of on site in a newly constructed trench. This ROD addresses final remediation of soil, debris, and associated leachate. The primary contaminants of concern affecting the soil and debris are VOCs including benzene, TCE, and toluene; metals including arsenic and lead; and radioactive materials.

Selected Remedial Action

The selected RA for this site includes extracting, solidifying, and disposing on site of approximately 3,000,000 gallons of trench leachate; demolishing and disposing of site structures on site; excavating additional disposal trenches for disposal of site debris and solidified leachate; installing an approximately 50-acre initial cap consisting of a clay and synthetic liner after disposal of solidified leachate and debris in the trenches; maintaining and periodically replacing the initial cap synthetic liner as needed every 20 to 25 years; re-contouring the capped disposal area as needed to enhance the management of surface water run-on and run-off; temporarily storing any additional wastes generated after constructing the initial cap on site, followed by solidification and on-site disposal of waste in a newly constructed disposal trench; installing a ground-water flow barrier, if necessary; installing an infiltration monitoring system to continuously verify remedy performance and detect the accumulation of leachate in disposal trenches; installing a final

engineered multi-layer cap once natural subsidence of the trenches has nearly ceased, which could take 100 years; installing permanent surface water control features; monitoring soil, sediment, surface water, ground water, leachate, air, selected environmental indicators, and rates of subsidence; procuring a buffer zone adjacent to the site to prevent deforestation or erosion of the hill slopes, which could affect the integrity of the selected remedy, and to provide an area for monitoring; and implementing institutional controls including land use restrictions. The estimated present worth cost for this RA is $33,500,000, which includes a present worth O&M cost of $10,097,549.

Performance Standards or Goals

Implementation of this remedy will result in the reduction of risk from 10^{-1} to 10^{-4}.

Institutional Controls

Institutional controls will be implemented to restrict land use.

MEDLEY FARMS, SC
May 29, 1991

The 7-acre Medley Farms site is a former waste disposal area located on a private farm used as pasture six miles south of Gaffney, Cherokee County, South Carolina. Land use in the area is predominantly agricultural and light residential, and six private wells are within a one-mile radius of the site. The site overlies a shallow saprolitic and a deeper bedrock aquifer. All residents in the near vicinity of the site are connected to the public water distribution system. From 1973 to 1976, the site was used for disposal of drummed and other waste material. In 1983, the state identified approximately 2,000 deteriorating 55-gallon drums and numerous plastic containers scattered throughout the site. Other observations included a chemical odor in the air, several excavation pits containing discolored water and drums, and stressed vegetation. Several state and EPA studies identified VOCs and other organics in on-site soil. In 1983, EPA removed 5,383 55-gallon and 15-gallon containers; disposed of empty drums off site; bulked 24,000 gallons of liquid waste, with off-site incineration of the waste, and crushed and disposed of the empty drums off site; excavated and disposed of 2,132 cubic yards of contaminated soil off site; drained 70,000 gallons of water from six small lagoons, followed by treatment using a pressurized sand/gravel/ activated carbon filtration system to remove organic contaminants; and backfilled the lagoons with clean soil. Following this removal action, EPA conducted a geological study to determine the potential for ground-water contamination. Subsequent EPA studies identified VOCs in both soil and ground water. This ROD addresses soil and ground-water contamination as a final remedy. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, PCE, and TCE; and other organics including pesticides and PCBs.

Selected Remedial Action

The selected RA for this site includes treating contaminated soil on site using *in situ* vapor extraction, and controlling air emissions using carbon adsorption; regenerating or disposing of the spent carbon; pumping and treatment of contaminated ground water using precipitation, flocculation, ion exchange, or some other method of metal removal if necessary, followed by air stripping; discharging the treated water on site to surface water; and monitoring ground water, surface water, soil, and sediment. If the ground-water treatment system cannot meet the specified remediation goals, contingency measures and goals will be implemented including engineering controls or institutional controls, invoking chemical-specific ARAR waivers, or reevaluating remedial technologies for ground-water restoration. The estimated present worth cost for this RA is $2,404,000, which includes an annual O&M cost of $1,451,000 for 30 years.

Performance Standards or Goals

Chemical-specific soil clean-up goals were derived from calculations based on leachate modeling, and include PCE 1,600 *ug*/kg and TCE 500 *ug*/kg. Chemical-specific ground-water clean-up goals are based on SDWA MCLs and proposed MCLs, and include benzene 5 *ug*/l (MCL), PCE 5 *ug*/l (MCL), and TCE 5 *ug*/l (MCL).

Institutional Controls

Ground-water use restrictions may be implemented to restrict access to those portions of the aquifer which may remain above health-based levels.

MONSANTO, GA
December 7, 1990

The 75-acre Monsanto site is a former industrial plant located three miles southeast of Augusta, Georgia. Land use in the area is predominantly industrial, with a wetland area located approximately 4,570 feet from the site. In addition, the site is approximately three miles from the Savannah River, an important source of water for the Augusta area. The plant began operations in 1962. From 1966 to 1974, approximately 1500 pounds of arsenic were placed in two on-site landfills. The landfills were covered with soil, crowned with gravel, seeded with grass, and closed in 1971 and 1977, respectively. Ground-water investigations conducted in 1979 and 1980 by Monsanto identified arsenic in the surficial aquifer in excess of the federal MCL. In 1983, Monsanto, through a state action, excavated the materials in the landfills and disposed of them off site. Soil samples collected from the bottom of the excavated area did not exceed the EP toxicity standard for arsenic. This final ROD addresses ground-water contamination. The primary contaminant of concern affecting the ground water is arsenic, a metal.

Selected Remedial Action

The selected RA for this site includes monitoring ground water to evaluate compliance with GPALs; pumping and discharging ground water to an off-site POTW, in the event that non-compliance with GPALs occurs; monitoring ground water for two years following EPA's acceptance that the MCL has been attained. The estimated present worth cost for this RA is $600,000.

Performance Standards or Goals

The chemical-specific and GPAL ground-water clean-up goal for arsenic is 0.05 mg/l based on SDWA MCLs.

Institutional Controls

Not provided.

OAK RIDGE RESERVATION (USDOE) (OU2), TN

Federal Facility
June 28, 1991

The Oak Ridge Reservation (ORR) (USDOE) site is an inactive uranium recovery landfill in Oak Ridge, Anderson County, Tennessee. The United Nuclear Corporation (UNC) disposal site, which comprises OU2, is one of several hundred waste disposal sites or areas of contamination at the ORR site requiring Superfund remedial action. From 1982 to 1984, the 1.3-acre disposal site received 11,000 55-gallon drums of cement-fixed sludge, 18,000 drums of contaminated soil, and 288 wooden boxes of contaminated building and process equipment demolition debris from the decommissioned UNC uranium recovery facility in Wood River Junction, Rhode Island. The waste was placed in 5- to 50-foot deep pits and covered with polyvinyl chloride sheeting. Although some drums and boxes have deteriorated, rusted, or split open, investigations show that migration of contaminants to soil and ground water has not yet occurred. This ROD addresses the drummed soil, sludge, and debris to prevent future ground-water contamination. Subsequent RODs are planned to fully address the principal threats posed by the ORR site. The primary contaminants of concern affecting the soil, sludge, and debris are nitrite, an inorganic; and strontium-90, a radioactive material.

Selected Remedial Action

The selected RA for this site includes clearing and grubbing sparse vegetation; placing a multi-layer cover over the drums, soil, sludge, and debris; revegetating the area and backfilling over the UNC waste with additional soil; and monitoring ground water. The estimated present worth cost for this RA is $1,467,500, which includes an annual O&M cost of $93,600 for year 1 and $69,800 for years 2 through 30.

Performance Standards or Goals

The selected remedy will prevent future contamination of ground water from landfill waste. Accordingly, the remedy will meet the SDWA MCL for nitrate 10 mg/l at downgradient wells and meet a 10^{-6} risk level for strontium-90.

Institutional Controls

Not provided.

OAK RIDGE RESERVATION (USDOE) (OU3), TN

Federal Facility
September 19, 1991

The Oak Ridge Reservation (ORR) (USDOE) (OU3) site is an active nuclear weapons component manufacturing facility located in Oak Ridge, Anderson County, Tennessee. The Y-12 plant, which is addressed as OU3, is one of several hundred waste disposal sites or areas of contamination at the ORR site requiring Superfund remedial action. The site occupies the upper reaches of East Fork Poplar Creek (EFPC) in Bear Creek Valley. From 1940 to the present, the Y-12 plant has been used to produce nuclear weapons components. From 1955 to 1963, mercury was used in a column-exchange process to separate lithium isotopes. Mercury spills from this process resulted in mercury and mercury-contaminated sediment being pumped from the basements of buildings into three concrete sedimentation tanks connected to storm sewers, which discharge to EFPC. Testing of the three concrete tanks showed that the tank sediment contained mercury, and that contaminated waste is still being discharged into two of the three tanks. This ROD focuses on the contaminated sediment in the sedimentation tanks as an interim action. Future RODs will address principal threats posed by plant conditions including eliminating mercury from the storm sewer system. The primary contaminants of concern affecting the sediment are mercury, a metal, and radioactive materials.

Selected Remedial Action

The selected interim RA for this site includes removing mercury-contaminated sediment, liquids, solids, oils, and oily water from tanks, followed by off-site treatment and disposal; stabilizing mixed waste from one of the tanks, followed by on-site disposal; screening the wastewater removed from the tanks for hazardous and radiological contamination prior to sediment removal, followed by on-site treatment of the wastewater; solidifying mixed waste, followed by on-site storage; and monitoring ground water and sediment. The estimated capital cost for this RA is $0, with an annual O&M cost of $586,000. This interim remedy is expected to take only 5 months to implement.

Performance Standards or Goals

Not provided.

Institutional Controls

Not provided.

OAK RIDGE RESERVATION (USDOE) (OU4), TN

Federal Facility
September 19, 1991

The Oak Ridge Reservation (ORR) (USDOE) (OU4) site is a former uranium isotope processing subsite in Oak Ridge, Roan County, Tennessee. The 1,700-acre K-25 site, which comprises OU4, is one of several hundred waste disposal sites or areas of contamination at the ORR site requiring Superfund remedial action. Land use in the area is predominantly residential. Three drum storage areas are located in the northeastern portion of the site and consist of two adjacent asphalt pads covering six acres on the north side of Mitchell Branch, a small stream. A curb surrounding the pads directs water to a catch basin for each yard, all of which discharge to Mitchell Branch. Built in the 1940s, the K-25 site was used to separate uranium isotopes by gaseous diffusion with placement of resulting waste and sludge in collection ponds. The storage yards were constructed to temporarily store sludge that was removed, stabilized, and drummed during closure of the collection ponds from 1987 to 1989. The storage yards contain 36,000 ninety-gallon drums of stabilized sludge, 29,000 ninety-gallon drums of raw sludge, and 16,000 gallons of raw sludge in tanks, contaminated with mixed radioactive and hazardous waste. The drums have started to deteriorate and develop pin hole leaks resulting in the release of small quantities of liquids to the pads. In addition, depressions have been observed in the asphalt pads causing stacked drums to lean. This ROD addresses the sludge stored at the storage yards as an interim action to prevent or mitigate releases to the environment. Future RODs will address sludge remediation and disposal. The primary contaminants of concern affecting the sludge are metals and radioactive materials.

Selected Remedial Action

The selected RA for this interim remedy includes eliminating free liquids in sludge through filter press, thermal drying, or similar methods; repacking dry sludge, followed by on-site storage of containers in existing or new indoor facilities awaiting remediation and disposal; and processing liquids removed from the sludge through existing treatment facilities. The estimated capital cost for this RA is $69,000,000, with an annual O&M cost of $400,000. This interim remedy is expected to take 20 months.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not provided.

PETROLEUM PRODUCTS, FL
October 5, 1990

The Petroleum Products site is an inactive oil processing plant in Pembroke Park, Broward County, Florida. The area surrounding the site is highly developed with industrial, commercial, and residential properties. The Petroleum Products (PPC) site lies within the radius of two major municipal wellfields. Current site features include an industrial warehouse complex, a fenced area with several dozen drums of investigation-derived waste, a french drain system, and several monitoring and abandoned storm drainage wells. PPC began on-site operations as a processor and broker of waste oil in 1958. Several tanks were located in a tank farm area bounded on the east and north by several large areas of standing water, which served as a culvert drainage system. Sludge generated during oil refinery processes were disposed of on site in unlined disposal pits. In 1970, a major rainfall caused the on-site disposal pit to overflow, producing an oil slick on the lakes of a nearby trailer park. Subsequently, all disposal pits were filled in, but it is suspected that sludge was mixed with clean fill and returned to the pit or spread over the property. Drainage at the site was then upgraded to a french drain system and drainage wells, which relieved flooding of the site and permitted flushing of former disposal pit contamination into the groundwater. In 1971, PPC ended all on-site refining operations. The property was subsequently used as a storage and distribution facility. In 1979, at the request of the County, PPC cleaned up portions of the site including two oil-soaked areas. In 1983, the state required PPC to remove additional waste oils and submit a detailed site sampling plan. Subsequent sampling identified that the ground water had been contaminated by oils, VOCs, petroleum hydrocarbons, and inorganic compounds. In addition, a state investigation conducted in 1984 revealed that 20,000 to 60,000 gallons of free oil were present in a ground-water plume centered on the tank farm area and that fluctuations in the water table had led to soil contamination by these oils. In response to an 1985 administrative order, PPC emptied, cleaned, and rendered inoperable all tanks; tested all oil, water, and sludge before disposal or recycling; removed and encapsulated asbestos from a boiler house; and transported 262 drums of sludge off site. In 1985, the state installed a free product recovery system to recover oil floating under the site, and a concrete pit was installed in an on-site warehouse to contain free oil seeping up through the floor. This ROD addresses the first OU, enhancement of the free product recovery system as an interim remedy. A future ROD will address source control and ground-water treatment. The primary contaminants of concern affecting the ground water are metals, including chromium and lead; and oils.

Selected Remedial Action

The selected RA for this site includes abandoning the damaged monitoring wells that remain on site; abandoning the storm drainage wells on-site, which put the Biscayne aquifer at risk; monitoring private wells in the vicinity; enhancing the present free product recovery system to remove a larger volume of oil and to contain the contaminated ground-water plume; and disposing of waste oil off site at an approved refinery. The estimated capital cost for this RA is $660,000, with an estimated O&M cost of $83,000.

Performance Standards or Goals

This interim remedy will enhance the free product recovery system and reduce the threat of contaminant migration into municipal wells; therefore, clean-up goals were not provided.

Institutional Controls

Not applicable.

SANGAMO/TWELVE-MILE/HARTWELL PCB, SC

December 19, 1990

The 253-acre Sangamo/Twelve-Mile/Hartwell PCB site consists of seven separate disposal areas in Pickens County, South Carolina. These areas consist of the Sangamo Plant area and six private disposal areas located off site of the Sangamo Plant, which are designated as the Breazeale, Nix, Dodgens, Cross Roads, John Trotter, and Welborn areas. Land in the general area is predominantly forested, and there are several nearby lakes and streams including Lake Hartwell and the Twelve-Mile Creek basin. Since 1955, Sangamo Weston, Inc., has manufactured electrolytic, mica, and power factor capacitors. PCBs were used as dielectric fluid in power factor capacitors. Prior to 1972, waste materials containing PCBs were landfilled in the seven disposal areas. These PCB-contaminated materials included scrap capacitors and aluminum hydroxide sludge from an on-site wastewater treatment plant. In the mid-1970s, state and federal environmental monitoring programs led to the detection of PCBs in the sediment of Lake Hartwell, in its tributaries, and in the soil of Sangamo Weston's dump sites. In addition, PCBs were detected in fish samples at two sites in the Twelve-Mile Creek area of Lake Hartwell. In 1980, Sangamo Weston, Inc., removed a total of 17,711 cubic yards of PCB-contaminated soil and debris from the Nix and Dodgens areas, and disposed of it in a landfill on the Sangamo Plant property. In 1986, a geotextile liner and soil cap were installed as an interim measure to retard the migration of PCB contamination from the Breazeale site. In 1989, EPA removed off site 7,285 tons of PCB-contaminated soil and debris from the Sangamo Plant area to a RCRA landfill, and 6,684 capacitors were taken to an off-site incinerator. This ROD addresses the first of two OUs, and provides for remediation of the ground-water and source contamination at the seven disposal areas. A future ROD will address the contamination of the Twelve-Mile Creek basin and Lake Hartwell. The primary contaminants of concern affecting the soil, sludge, debris, and ground water are VOCs including PCE and TCE; and other organics including PCBs.

Selected Remedial Action

The selected RA for this site includes excavating materials contaminated with greater than 1 mg/kg of PCBs at the Nix and Welborn areas; excavating materials contaminated with greater than 25 mg/kg of PCBs at the Sangamo Plant area; excavating materials contaminated with greater than 10 mg/kg of PCBs at the Breazeale, Dodgens, Cross Roads, and John Trotter areas; transporting the excavated materials to the Sangamo Plant area for staging and treatment; treating on site all excavated materials using thermal desorption technology and carbon adsorption to control off-gases; placing the treated soil within the plant area; filling each of the private areas with two feet of clean fill where contaminated materials with PCBs greater than 1 mg/kg remain, specifically the Trotter, Dodgens, Breazeale, and Cross Roads areas; ground-water pumping and on-site treatment at the Dodgens, Breazeale, Cross Roads, and Sangamo Plant areas using air stripping and/or carbon adsorption; and discharging treated water on site to surface water. The estimated present worth cost for this RA ranges from $47,900,000 to $63,300,000 depending on aquifer characteristics and the volume of excavated solids. No O&M costs were provided for this RA.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on SDWA MCLs and include

PCBs 0.0005 mg/l (proposed MCL), PCE 0.005 mg/l (MCL), and TCE 0.005 mg/l (MCL). Chemical-specific clean-up goals for soil, sludge, and debris include treatment to a level of PCB 2 mg/kg. Soil with greater than PCB 1 mg/kg remaining at the various areas will be covered with 2 feet of clean fill.

Institutional Controls

Not provided.

SHERWOOD MEDICAL INDUSTRIES, FL
March 27, 1991

The 42-acre Sherwood Medical Industries (SMI) site is an active medical supply manufacturing facility just outside the city limits of Deland, Volusia County, Florida. Land use in the area is commercial and residential. Lake Miller is along the western boundary, and a wooded swampy area is located to the south of the site. The underlying Floridan aquifer, which is restrictively connected to the contaminated surficial aquifer, is the drinking water source for local residents. From 1959 to present, SMI has used the site for manufacturing medical supplies, primarily hypodermic needles. From 1971 to 1980, SMI disposed of approximately two tons of liquid and sludge waste into two unlined percolation ponds on site. At that time, solids were removed from the ponds and placed into on-site, unlined impoundments. From 1980 to 1982, SMI analyzed the contents of the impoundments and disposed of the waste in an off-site landfill. Initial site investigations conducted by SMI and the state identified ground-water contamination in on-site wells. In 1987, the state requested that SMI perform additional investigations to determine the nature and extent of ground-water contamination, and to evaluate the need to implement IRMs. Based on the observed on-site contamination of the Floridan Aquifer, the state required SMI to conduct extensive ground-water testing and monitoring, and to provide bottled water to an affected residence. In 1990, the state approved SMI's design work plan, which outlined further interim measures to be conducted at the site including installation of a ground-water pump and treat system. This ROD addresses an interim remedy for the surficial aquifer to prevent the contaminant plume from spreading off site and migrating vertically into the Floridan aquifer. Future RODs will fully address the principal threats posed by the conditions at the site. The primary contaminants of concern affecting the ground water are VOCs including PCE and TCE.

Selected Remedial Action

The selected RA for this interim remedy includes installing a system of recovery wells in the on-site surficial aquifer; and pumping and treatment of contaminated ground water using air stripping, followed by on-site discharge of the treated water to Lake Miller. The estimated capital cost for this interim RA is $400,000, with an annual O&M cost of $35,000.

Performance Standards or Goals

Treated ground water will meet all federal and state water quality standards for discharge to surface water. Final clean-up levels will be addressed in a future ROD.

Institutional Controls

Not provided.

SMITH'S FARM BROOKS, KY

Amendment
September 30, 1991

The 500-acre Smith's Farm Brooks site is a former hazardous waste disposal area located in Brooks, Bullitt County, Kentucky. The site is bordered on the north, east, and west by forested hills and on the south by a residential area. The site includes a 37.5-acre landfill that, until recently, was permitted by the state for the disposal of solid waste. The site also includes an 80-acre area upgradient of the permitted landfill on a mile-long ridge between two intermittent creeks where the unpermitted disposal of drums containing hazardous waste occurred over a 20-year period. This area has been divided into two areas known as area A and area B. As a result of EPA investigations in 1984 that revealed chemicals leaking from drums, EPA removed 6,000 drums of surface waste, excavated contaminated soil, and implemented site stabilization and erosion prevention measures. A 1989 ROD addressed source control in the 80-acre area through thermal destruction. Investigations during the RD revealed lower levels of PCBs and a lower volume of soil requiring treatment than what was previously estimated in the RI, making incineration less practical. This ROD amends the 1989 ROD and provides source control in the 80-acre area using chemical treatment, rather than thermal treatment. A second OU will address remaining potential threats associated with the landfill, deep ground-water aquifers, and other suspected areas of drum disposal. The primary contaminants of concern affecting the soil, sediment, and debris are organics including PCBs and PAHs, and metals including lead.

Selected Remedial Action

The amended RA for this site includes excavating 16,000 cubic yards of contaminated soil and excavating contaminated stream sediment in area B, as defined in the RI/FS; treating area B soil and sediment on site by a chemical process, possibly dechlorination or hydrocarbon removal using APEG or BEST, respectively, and by a solidification/fixation process; overpacking debris from area B and disposing of the overpacked debris and all treated soil and sediment from area B on site within area A; consolidating the contaminated soil, sediment, and debris from peripheral areas of area A into area A; recontouring area A; constructing and maintaining retaining walls, surface run-on/run-off control systems, and a leachate collection system in area A, with on-site or off-site treatment and disposal of leachate; capping area A with a RCRA cap after all material from area A and B have been disposed of in area A; ground-water monitoring; and implementing institutional controls including land use restrictions, and site access restrictions. The estimated present worth cost for this RA ranges from $22,000,000 to $25,000,000, based on the treatment selected. O&M costs were not provided.

Performance Standards or Goals

Action levels for contaminated soil and/or sediment were determined based on an excess lifetime cancer risk of 10^{-5}, with the exception of lead, which was based on an HI < 1. Chemical-specific goals for soil include PAHs 2 mg/kg and lead 500 mg/kg, and for sediment PAHs 5 mg/kg and PCBs 2 mg/kg.

Institutional Controls

Land use restrictions will be implemented on site to limit further site use.

TRI-CITY INDUSTRIAL DISPOSAL, KY

August 28, 1991

The 349-acre Tri-City Industrial Disposal site is an inactive industrial waste landfill located in Brooks, Bullitt County, Kentucky. Land use in the area is predominantly agricultural and residential. The estimated 300 people who reside within one mile of the site use ground water from a thin unconfined limestone aquifer as their drinking water supply. Ground water discharges via several springs including the Cox and Klapper Springs. From 1964 to 1967, Tri-City Industrial Services, Inc., used the site to dispose of industrial waste including scrap lumber, fiberglass insulation materials, drummed liquid waste, and bulk liquids that were poured onto the ground. In 1968, state officials reported that highly volatile liquid waste resembling paint thinners were disposed of on site. The site was a source of citizen complaints about the condition of the landfill, explosions, fires, and smoke during the disposal operations. A number of state and EPA investigations that were conducted between 1965 and 1989 identified contaminants including PCBs, phenols, metals, and various organic compounds in on-site soil, waste, and residential springs. In 1988, EPA provided local residents with an alternate water supply, and conducted an emergency removal action to excavate and remove approximately 165 drums in generally good condition, other crushed and empty drums, metal containers, auto parts, 400 gallons of free liquids, and over 800 cubic yards of suspected contaminated soil. This ROD addresses ground water contamination as OU1. Should the confirmatory sampling of soil, sediment, and air conducted in OU1 reveal unacceptable levels of hazardous contaminants, additional measures may be necessary and will be implemented as OU2. The primary contaminants of concern affecting the ground water are VOCs including PCE, TCE, DCE, toluene, and vinyl chloride.

Selected Remedial Action

The selected RA for this site includes installing a carbon adsorption system at the Cox Spring; treating contaminated ground water using carbon adsorption and discharging the treated ground water to tributaries downstream of the springs; conducting a leachability test to determine whether spent carbon is a hazardous waste; regenerating, or treating and disposing of spent carbon off site; continuing to provide potable water to residents who previously used contaminated ground water as potable water until acceptable levels are reached; confirmatory sampling of soil, sediment, and ambient air to assess the effectiveness of EPA's 1988 emergency removal action; long-term monitoring of ground water, surface water, sediment, and ecology; implementing a worker health and safety program; and implementing institutional controls including ground-water use restrictions. The estimated present worth cost for this RA is $2,098,000, which includes an annual O&M cost of $89,890 for the first year, $70,686 for years 2 and 3, and $66,330 for years 4 through 30.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on SDWA MCLs or non-zero MCLGs, and include PCE 5 *ug*/l (MCL), TCE 5 *ug*/l (MCL), toluene 1,000 *ug*/l (MCL), and xylenes 10,000 *ug*/l (MCL).

Institutional Controls

Ground-water restrictions will be implemented to restrict the potable use of ground water con-taining or potentially containing levels of contamination above MCLs or non-zero MCLGs.

USA ANNISTON ARMY DEPOT, AL

Federal Facility
September 26, 1991

The 15,200-acre USA Anniston Army Depot site is an active equipment rework facility for the U.S. Army in Anniston, Calhoun County, Alabama. The site is divided into several areas including a southeast industrial area, which is the focus of this ROD. Land use in the area is predominantly residential. An estimated 72,000 residents in Calhoun County use Coldwater Springs, located 1.5 miles south of the site, as their primary source of drinking water. The Army initially used the depot to store munitions, and subsequently, to overhaul and repair combat vehicles. Various types of liquid and solid hazardous wastes were generated including electroplating waste containing metals and organic solvents from cleaning operations. Waste was disposed of in various landfills, trenches, disposal pits, and lagoons located in the southeast industrial area and throughout the site. A number of EPA and state site investigations have revealed contamination by VOCs, other organic compounds, inorganics, and metals in the on-site ground water. Between 1978 and 1983, several on-site actions were taken by the Army to remove contaminated sludge and soil. In 1990, the Army completed and began operating a ground-water pumping and treatment system. This ROD addresses an interim remedy for ground-water contamination beneath the southeast industrial area as the first OU. Future RODs may address further contamination in the southeast industrial portion of the site. The primary contaminants of concern affecting the ground water are VOCs including PCE and TCE; other organics including phenols; and metals including chromium.

Selected Remedial Action

The selected RA for this site includes continuing to use the existing ground-water pumping and treatment system using air stripping to remove VOCs, followed by charcoal filtration to remove phenols; discharging the treated ground water on site to surface water; and continued operation of the dewatering and treatment system. The estimated present worth cost for this RA is $945,000, which includes an annual O&M cost of $60,000. The capital cost is estimated at $895,000.

Performance Standards or Goals

Chemical-specific ground-water goals will be addressed in the final RA for the site.

Institutional Controls

Not applicable.

USAF ROBINS AIR FORCE BASE, GA

Federal Facility
June 25, 1991

The 46.5-acre USAF Robins Air Force Base (AFB) site is a logistics management and repair center for aircraft, missiles, and support systems in Warner Robins, Houston County, Georgia. The Zone 1 area, which includes a 45-acre inactive landfill and a 1.5-acre sludge lagoon is part of the 8,855-acre Robins AFB. Land use in the area is mixed residential and industrial. A wetlands area borders the site to the east; in addition, part of the site lies within the 100-year floodplain of the Ocmulgee River. From 1965 to 1978, an on-site landfill (landfill no. 4) was used for disposal of general refuse, and industrial and hazardous wastes. From 1962 to 1978, the sludge lagoon was used for disposal of wastewater treatment plant sludge and other liquid waste. Types of waste generated at the facility included electroplating waste, organic solvents from cleaning operations, and pesticides, all of which were disposed of in the lagoon and landfill areas. Robins AFB conducted a study in 1982 to identify and assess on-site hazardous waste disposal practices. Disposal areas were grouped into eight zones based on location and type of activity. Zone 1 has been divided into three OUs. This ROD, which focuses on OU1, addresses the remediation of landfill no. 4 and the sludge lagoon. Subsequent RODs will address remediation of the neighboring wetlands and surface waters (OU2) and the ground water adjacent to landfill no. 4 and the sludge lagoon (OU3). The primary contaminants of concern affecting the soil and ground water are VOCs including PCE and TCE; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes treating 15,000 cubic yards of soil in the sludge lagoon using *in situ* soil vapor extraction; removing volatile contaminants from the air using condensation, distillation, and carbon adsorption; controlling and treating landfill leachate; renovating the landfill cover; treating the sludge lagoon to remove VOCs, treating metals on site in the sludge lagoon using solidification; on-site pumping and treatment of ground water; diverting surface water near the sludge lagoon; conducting long-term soil testing; and monitoring ground and surface water. The estimated present worth cost for this RA ranges from $9,430,000 to $24,000,000 with an annual O&M cost ranging from $321,400 to $334,400, depending on the components of the landfill cap.

Performance Standards or Goals

Contaminant-specific remediation goals have not been established for soil at the sludge lagoon because they are dependent on establishment of ground-water goals, which will be developed in a subsequent ROD.

Institutional Controls

Not provided.

VELSICOL CHEMICAL, TN
June 27, 1991

The 242-acre Velsicol Chemical site is a former plant waste landfill located near the city of Toone, Hardeman County, Tennessee. Land use in the area is predominantly agricultural with a wetlands area, 26 residences, and numerous creeks located within one mile of the site. In addition, part of the site overlies a surficial aquifer that was used as a potable water supply in the area. From 1964 to 1973, Velsicol Chemical Corporation used the site to dispose of industrial and chemical plant waste. Waste was disposed of in trenches excavated on 27 acres of the property. The site was closed in 1973 because of the possibility of contaminated ground water migrating off site. By late 1978, state and federal investigations had confirmed ground-water contamination in private wells, and a public water supply was provided in early 1979. In 1980, a 35-acre low permeability clay cap was placed over the disposal area to control and minimize additional impacts from the site. This ROD addresses off-site ground-water contamination as OU1 and will prevent additional on-site ground-water contamination from migrating from the disposal areas. Future RODs will address other site contamination and principal threats. The primary contaminants of concern affecting the ground water are VOCs including carbon tetrachloride, chloroform, toluene, and xylenes; and other organics including pesticides.

Selected Remedial Action

The selected RA for this site includes installing extraction wells on site and off site to restore the contaminated ground water to acceptable drinking water standards; constructing an on-site ground-water treatment plant and treating contaminated ground water using solids removal, air stripping, and final ground-water polishing prior to discharge; discharging the treated water on site to nearby surface water bodies; treating off-gases with carbon adsorption; monitoring ground water; maintaining the ground-water treatment system and the disposal area cover; and implementing institutional controls including deed and ground-water use restrictions. The selected RA is contingent upon the performance data collected during operation. If the selected remedy cannot meet the specified remediation goals, contingency measures may include alternating pumping at wells to eliminate stagnation points; pulse pumping at wells to allow aquifer equilibration and encourage adsorbed contaminants to partition into ground water; and installing additional extraction wells to facilitate or accelerate cleanup of the contaminant plume. The estimated present worth cost for this RA is $11,644,000, which includes an annual O&M cost of $696,000.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on SDWA MCLs and health-based criteria, and include carbon tetrachloride 0.005 mg/l (MCL), chloroform, 0.006 mg/l, toluene 1 mg/l (MCL), and xylenes 10 mg/l (MCL).

Institutional Controls

Deed restrictions will be established to identify the presence, quantity, and nature of waste in the disposal area and ground water, and limit uses of both until remediation is complete.

WRIGLEY CHARCOAL, TN
September 30, 1991

The 81-acre Wrigley Charcoal site is a former multi-use industrial operations area in the town of Wrigley, Hickman County, Tennessee. Land use in the area is industrial and residential, with approximately 1,000 people residing within a one-mile radius of the site. From 1881 to 1985, the site has been used mainly for pig iron and wood retorting/wood distillation by-product manufacturing. Additional activities conducted between 1978 and 1985 included usage of several remaining on-site buildings for metals machining, copper recovery, and storage of drummed industrial waste. Remaining primary site buildings used for these later activities include a warehouse; a dryer building; a maintenance building; and a storage shed. Improper disposal procedures have resulted in soil, sediment, and debris contamination by semi-volatile organic compounds in coal-tars (mainly PAHs and phenols), VOCs, metals, and asbestos. EPA investigations have identified four major areas of on-site contamination. These four areas are as follows: the 35-acre primary site containing coal-tar contaminants; the three-acre storage basin area that also contains coal tar contaminants; the 40-acre irrigation field (including an abandoned wastewater lagoon) that was used for spray irrigation (disposal) and degradation of PAH and phenolic wastewaters; and the 3.5-acre athletic field, a field used by local residents, which is filled with blast furnace slag and soil derived from the primary site from 1938-1950. The primary site, which includes a warehouse, a dryer building, a maintenance building, and a storage shed, was an industrial production facility for iron, charcoal, and wood distillation products from 1888 to 1966. The primary site was later used for metals machining, storage of waste products, and recovery of copper from transformers. The storage basin and irrigation field were built in the late 1950s to receive wastewater from the primary site. In 1988, EPA performed a removal activity, which stabilized the site by installing clay backfilled culverts covered with erosion control fabric; installing sheet piling to stabilize the banks; retaining the tar pits; removing eight cubic yards of asbestos material; solidifying approximately 130 cubic yards of tar pit waste, followed by off-site incineration of the solidified material; establishing a vegetative cover for the tar pit cover; constructing a spillway; and off-site landfilling of debris. This ROD addresses interim remediation of remaining contaminated soil, sediment, and debris, and will reduce the risks at the primary site and storage basin by eliminating the most imminent and substantial threats while permanent solutions are developed for the entire site. Future RODs may address remediation of the contaminated primary site soil, tar pits and tar cubes, as well as the storage basin; coal-tar waste, friable roofing ACM, and any on-site ground-water problems. The primary contaminants of concern affecting the soil are VOCs; other organics including PAHs, and phenols; metals including arsenic, chromium, and lead; and asbestos, an inorganic.

Selected Remedial Action

The selected RA for this site includes excavating, stabilizing, and disposing of off site approximately 15 cubic yards of metallic waste from the burn pit; consolidating and securing on site approximately 120 drums of transformers; excavating, incinerating, stabilizing, and disposing of off site 14 waste drums, 29 cubic yards of process tank sludge, and 122.5 cubic yards of black coal tar waste located in three separate areas; decontaminating the tanks; excavating and disposing of visibly friable

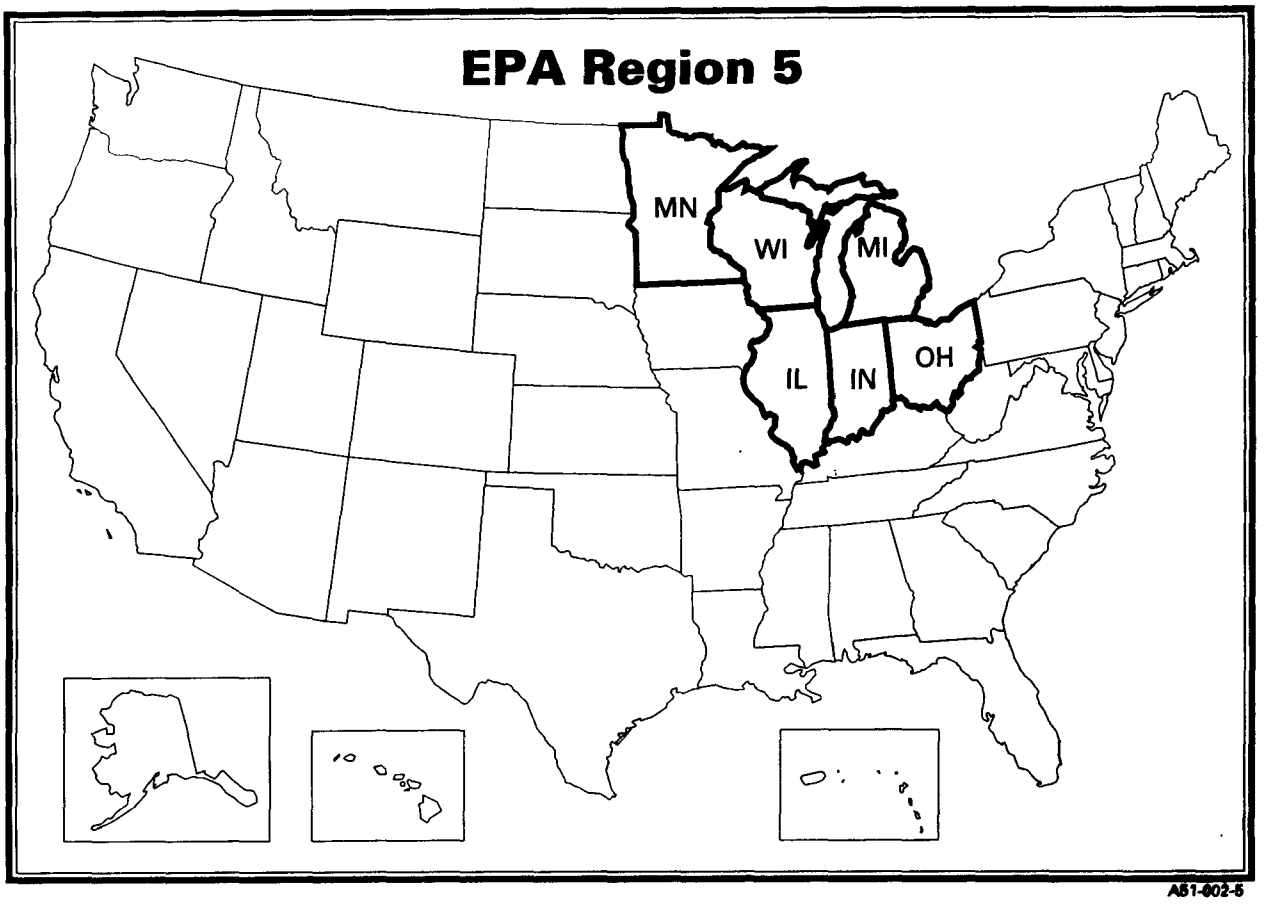
asbestos material in the soil and buildings within the primary site; re-engineering of the spillway to accommodate flood waters; sorting and disposing of site surface waste and debris piles (including tar-cubes; pieces of ACM, crushed drums and metallic debris) off site, or temporarily consolidating these on site for future remediation; conducting soil investigations and continued sampling and analysis; and implementing institutional controls including deed restrictions, and site access restriction such as fencing. The estimated present worth cost for this RA is $984,998. O&M costs were not provided.

Performance Standards or Goals

The remedy will attempt to meet RCRA LDR BAT requirements for coal-tar waste using incineration and stabilization; and burn-pit waste using stabilization. Chemical-specific clean-up criteria include chromium 0.5-6 mg/kg, lead 0.1-3 mg/kg, arsenic 0.3-1 mg/kg, and PAHs 0.5-20 mg/kg.

Institutional Controls

Deed restrictions will be implemented at the site.



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ACME SOLVENT RECLAIMING, IL
December 31, 1990

The 20-acre Acme Solvent Reclaiming site is a former industrial disposal site in Winnebago County, Illinois. Land use in the area is mixed agricultural and residential. The site is bounded by an active quarry to the north, farmland to the south and east, and the Pagel's Pit Superfund site to the west. An on-site stream, which is a tributary of Kilbuck Creek, eventually drains into the Rock River to the south. The site overlies two aquifers, which are used by the estimated 400 residents who live within two miles of the site as their drinking water supply. From 1960 to 1973, Acme Solvent Reclaiming disposed of paints, oils, and still bottoms on site from its solvent reclamation plant. Waste was dumped into depressions created from previous quarrying and landscaping operations, and empty drums also were stored on site. State investigations in 1981 identified elevated levels of chlorinated organic compounds in ground water. A 1985 ROD provided for excavation and on-site incineration of 26,000 cubic yards of contaminated soil and sludge, supplying home carbon treatment units to affected residences, and further study of ground water and bedrock. During illegal removal actions taken by PRPs in 1986, 40,000 tons of soil and sludge were removed from the site. A 4,000-ton waste pile and two tanks containing contaminated liquids remain on site, and since then an additional 2,000 tons of on-site contaminated soil and sludge has been discovered. This ROD will address waste areas remaining after the 1986 removal, including soil, bedrock, and ground water, as part of OU2. A future ROD will address an area of ground-water contamination between the Acme Solvent Reclaiming and Pagel's Pit sites as OU3. The primary contaminants of concern affecting the soil, sludge, and ground water are VOCs including benzene, PCE, TCE, and xylenes; other organics including PCBs; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes excavating and treating 6,000 tons of soil and sludge from two waste areas, using low-temperature thermal stripping; treating residuals using solidification, if necessary, followed by on-site or off-site disposal; treating the remaining contaminated soil and possibly bedrock using soil/bedrock vapor extraction; consolidating the remaining contaminated soil on site with any treatment residuals, followed by capping; incinerating off site 8,000 gallons of liquids and sludge from two remaining tanks, and disposing of the tanks off site; providing an alternate water supply to residents with contaminated wells; pumping and on-site treatment of VOC-contaminated ground water with discharge to surface water; monitoring ground water; and implementing institutional controls including deed and ground-water use and restrictions. The estimated present worth cost for this RA ranges from $14,633,000 to $16,233,000, which includes an annual O&M cost of $908,400.

Performance Standards or Goals

Chemical-specific clean-up goals for soil are based on a lifetime excess cancer risk level of 10^{-5}. All waste area soil exceeding PCBs 10 mg/kg must be excavated and treated. In addition, all soil exceeding 10 mg/kg above background levels using a photoionization device will be excavated. Any soils remaining after excavation and residuals landfilled on site must meet the site-specific VOC cleanup standards including benzene 69 *ug*/kg, TCE 140 *ug*/kg, and PCE 1,200 *ug*/kg. Chemical-specific clean-up goals for ground water are based on SDWA MCLs, MCLGs, as well as 10^{-5} excess cancer risk criteria, and include benzene 5 *ug*/l (MCL), PCE 5 *ug*/l (MCL), and TCE 5 *ug*/l (MCL).

Institutional Controls

Deed and ground-water use restrictions will be implemented to prevent use of contaminated ground water by residents.

ALLIED CHEMICAL AND IRONTON COKE, OH

December 28, 1990

The 95-acre Allied Chemical and Ironton Coke site is composed of a former coke plant and an operating tar plant in Ironton, Lawrence County, Ohio. The site is located within a coal mining region, and surrounding land use is predominantly industrial and residential. The Ohio River, a source of drinking water for the city of Ironton, lies approximately 500 feet to the west of the tar plant. On-site lagoons lie within the 100-year floodplain of the Ohio River, with portions of the lagoons inundated sufficiently to maintain wetlands vegetation. From approximately 1920 to the late 1960s, wastewater and solid waste including coke and coal fines, tank car sludge, boiler ash, and weak ammonia liquor were discharged into swampy areas east of the coke plant, which are adjacent to Ice Creek, a tributary to the Ohio River. From the early 1970s until the coke plant closed in 1982, a series of four lagoons in the eastern area of the plant were used to treat process wastewater, stormwater run-off, and waste sludge; and a fifth lagoon was used to dispose of solid waste. Tar plant operations began on site in 1945. Types of waste generated included anthracene residues and salts, coal tar pitch scrap, and phthalic anhydride residues, which were disposed of on site in the Goldcamp disposal area, a former sand pit adjoining the tar plant. Extensive studies and on-site investigations identified contamination in on-site soil in the coke plant and tar plant areas, lagoon sediment, Ice Creek sediment downstream of the site, and ground water beneath and surrounding the site. A 1988 ROD addressed the Gold Camp disposal area and documented installation of a cap and slurry wall, pumping and treatment of contaminated ground water, and provisions for supplemental study and remediation of non-aqueous phase contaminants found on top of the bedrock. This ROD addresses contamination at all areas not previously addressed, and provides a final remedy at the site. The primary contaminants of concern affecting the soil, sediment, and ground water are VOCs including benzene; other organics including PAHs and phenols; metals including arsenic; and other inorganics including cyanide.

Selected Remedial Action

The selected RA for this site includes excavating and incinerating on site approximately 122,000 cubic yards of waste material from lagoon 5, and 31,000 cubic yards of waste coal, followed by on-site waste fuel recovery (re-use of the waste heat generated during incineration), and disposing of the residual ash off site; in-situ bioremediation of approximately 475,000 cubic yards of waste material from lagoons 1 through 4, the residual soil of lagoon 5, and the adjacent inner and outer dikes; excavating and on-site bioremediation on a prepared pad of approximately 40,000 cubic yards of soil from the coke and tar plant soil; pumping and treatment of ground water at a future on-site treatment facility, with on-site reinjection or off-site discharge; monitoring ground water on site and downgradient of Ice Creek, and developing a contingency plan in the event that contaminant migration is encountered; pilot testing the effectiveness of *in situ* bioremediation and developing a contingency plan for an alternative RA for lagoons 1 through 4, if necessary; and implementing institutional controls including deed restrictions, and site access restrictions such as fencing. The estimated capital cost for this RA is $21,000,000, with an estimated total O&M cost of $28,500,000. Total estimated cost is $49,500,000.

Performance Standards or Goals

The waste fuel recovery system shall be designed and operated to achieve a 99.99 percent destruction of carcinogenic PAHs. Lagoon 5 materials will be excavated until EPA visibly determines that natural stream sediment has been encountered. Bioremediation of soil and lagoon sediment must reduce PAHs to attain a cancer risk level of 10^{-4} to 10^{-6} and an HI<1. Chemical-specific levels for bioremediated soil include PAHs 0.97 mg/kg and arsenic 0.56 mg/kg. Chemical-specific goals for soil include PAHs 1.4 mg/kg of organic carbon and benzene 0.485 mg/kg of organic carbon. Leach tests will be performed on the treated waste materials to determine the concentrations of arsenic and cyanide that will be protective of the ground water. Ground-water clean-up goals are based on site-specific risk assessment, MCLs, and Health Advisories. Chemical-specific ground-water goals include benzene 0.005 mg/l, phenol 4 mg/l, total PAHs 0.005 mg/l, and arsenic 0.05 mg/l.

Institutional Controls

Deed restrictions will be implemented to prevent any future residential or recreational use of the site.

ANDERSON DEVELOPMENT, MI

Amendment
September 30, 1991

The Anderson Development site is an active chemical manufacturing facility in Adrian, Lenawee County, Michigan. The site occupies approximately 12.5 acres within a 40-acre industrial park, which is surrounded by residential areas. Site features include several on-site buildings used for manufacturing, storage, laboratories, and offices, as well as a 0.5-acre former process wastewater pretreatment lagoon containing lagoon sludge and an underlying clay layer. From 1970 to 1979, the Anderson Development Corporation (ADC) produced specialty chemicals on site including 4,4-methylene bis (2-chlororaniline) (MBOCA), a hardening agent for the production of polyurethane plastics. Untreated process wastewater was discharged directly to surface water until 1973, when the State discovered aniline in a side drain from the facility. Later in 1973, ADC began separating process wastewater from its cooling water, with subsequent discharge of wastewater to a POTW. At the POTW, MBOCA was settled out with other solids and applied to the land, which has led to contamination at the POTW drying beds. In 1979, the State ordered the POTW not to accept the waste stream because of the decreased efficiency of the POTW resulting from MBOCA contamination. In 1979, after MBOCA was found in on-site sediment, production of the chemical ceased. In 1980 and 1981, the site owner and the State cleaned up all contaminated site areas, except for the on-site lagoon and the adjacent soil, with MBOCA levels greater than 1 mg/kg by decontaminating the plant, sweeping streets, shampooing/vacuuming residential carpet, and removing some contaminated surface soil off site. A 1990 ROD addressed site contamination of surface soil, lagoon sludge, and underlying lagoon clay. This ROD amends the 1990 ROD, which provided for treatment of the contaminated media using *in situ* vitrification, and documents the selection of low temperature thermal desorption (LTTD) as the preferred treatment technology, based on cost and other concerns. The primary contaminants of concern affecting the soil and lagoon sludge are VOCs including toluene and MBOCA and its degradation products; and metals.

Selected Remedial Action

The selected amended remedial action for this site includes excavating and staging 3,000 to 4,000 tons of contaminated soil, clay, and lagoon sludge with MBOCA concentrations above the 1.6 mg/kg clean-up action level in an LTTD device; performing treatability studies to evaluate effectiveness of the LTTD technology, then, if effective, treating the contaminated soil, clay, and sludge on site using LTTD; placing the treated soil, sludge, and clay into the excavated lagoon, covering the lagoon with clean soil, and regrading the area; or if the results of the treatability study indicate that LTTD is unacceptable, using *in situ* vitrification as the alternate remediation technology; collecting off-gases and treating the gases using an air pollution control train, which includes a scrubber system, air filters, and carbon adsorption beds; treating aqueous streams from the air pollution control train using liquid phase activated carbon beds; thermally regenerating or disposing of spent carbon and fines from the particulate removal equipment off site; and monitoring ground water and air. The estimated cost of the LTTD treatment options for this amended remedial action is $1,100,000.

Performance Standards or Goals

The "action" or clean-up level for MBOCA, the primary contaminant of concern, is 1,684 μg/kg, calculated based on EPA guidance documentation, and corresponds to the excess lifetime cancer risk level of 10^{-6}. Other volatile, semi-volatile and inorganic contaminant cleanup standards are consistent with state standards.

Institutional Controls

Not applicable.

BERLIN & FARRO, MI
September 30, 1991

The 40-acre Berlin and Farro site is a former liquid incineration and landfill facility in Gaines Township, Genesee County, Michigan. Land near the site consists of woodland and agricultural areas. In addition, the site overlies two aquifers, which provide well water to the approximately 80 permanent homes located within a 1/2 mile radius of the site. From 1971 to 1975, Berlin and Farro Liquid Incineration, Inc. used the site to accept and store industrial waste prior to incineration, and disposed of crushed drums in a 1.1-acre on-site landfill. During this period, the owners failed to comply with air emission standards, on-site storage volume limits, and permit standards that prohibited on-site disposal of waste other than solid waste. The facility also operated two unauthorized waste storage lagoons and two unlined storage lagoons; illegally buried five tanks of wastewater; buried liquid waste; operated USTs; poured liquid waste into subsurface agricultural drains; and dumped thousands of gallons of barrelled waste into two on-site pits. In 1975, Berlin and Farro's permits were revoked; however, illegal dumping of industrial waste into the lagoons apparently continued after the site was closed. Several separate clean-up actions were undertaken by the PRPs, the state, and EPA during the early to mid-1980s. These activities included, but were not limited to, removing lagoon sludge, the incinerator facility, five underground tanks, an agricultural drain and paint sludge trench, surface debris, drums, waste piles and soil, and 1,000,000 gallons of contaminated water; backfilling the lagoons and old drum landfill; and constructing settling ponds. This ROD addresses the final remedy for contaminated soil, sediment, and ground water at the Berlin and Farro site. The primary contaminants of concern affecting the soil, sediment, and ground water are VOCs including benzene, PCE, TCE, toluene, and xylenes; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes excavating, partially treating using solidification, and consolidating (in an on-site RCRA containment cell) contaminated soil and sediment from the central site area and sediment from an off-site drain (treatment of the materials will remove free liquids and render characteristic waste and non-characteristic RCRA waste); collection and treating leachate from the cell; backfilling, covering with soil and revegetating the excavated on-site areas; regrading the excavated areas of the drain; pumping and treatment of ground water from the shallow portion of the aquifer using a system of collection trenches, followed by treatment using air stripping and on-site discharge to the drain; treating off-gas emissions from the ground-water treatment system; monitoring ground water; and implementing institutional controls including deed restrictions. The estimated present worth cost for this RA is $8,119,300, which includes an annual O&M cost of $233,100 for 30 years.

Performance Standards or Goals

Chemical-specific soil and sediment clean-up goals are based on state health-based standards and include benzene 0.02 mg/kg, lead 20.8 mg/kg, toluene 16 mg/kg, and xylenes 6 mg/kg. Chemical-specific ground-water clean-up goals are based on health standards, and include benzene 1 *ug*/l.

Institutional Controls

Deed restrictions will be implemented to prevent the installation of drinking wells on the site during remediation.

BETTER BRITE PLATING CHROME & ZINC, WI

June 28, 1991

The 2-acre Better Brite Plating Chrome & Zinc site is composed of two plating facilities in De Pere, Brown County, Wisconsin. The site includes the 1.5-acre Chrome Shop and the 0.5-acre Zinc Shop, which are located approximately 0.5 miles apart. Because of their proximity and related backgrounds, the two sites were jointly nominated to the NPL and are addressed as a single site in this ROD. Land use in the area is predominantly residential and commercial, with a wetlands located approximately 0.25 mile from the site. The estimated 15,000 area residents use the municipal wells drawing from the deep aquifer as a drinking water supply. A municipal well located approximately 250 feet from the site is thought to influence the ground-water flow in the contaminated shallow aquifer, but impacts have not been observed in the municipal well on-site. From 1963 to the early 1970s, the Zinc Shop primarily plated chrome switching later to zinc. The Zinc Shop has a long history of improper operational procedures and spills into the surrounding soil. Wastewater and/or plating solutions routinely leaked between the floor and sill plate of the building. Reportedly, underground vertical plating tanks were used early on. The Chrome Shop began chrome plating operations during the early 1970s using several above-ground tanks and four buried vertical tanks in the plating process. In 1978 and 1979, the Chrome Shop was found to be responsible for surface spills, which resulted in construction of a shallow ground water extraction system around a portion of the site. Later, it was determined that the underground plating tanks from the Chrome Shop had leaked an unknown amount of plating solution and VOCs into the on-site ground water. Consequently, in 1985, the owner of the Chrome Shop filed for bankruptcy and operations ceased in 1986. In 1987, the state installed ground-water monitoring wells at the site, which identified contamination by metals and VOCs in soil and ground water. In 1989, the Zinc Shop closed, and a private contractor removed the building that housed the Chrome Shop. The state constructed a clay cap and fenced around the area of highest soil contamination. In 1990, the Zinc Shop owner failed to comply with an administrative order to conduct clean-up activities. Subsequently, EPA performed an emergency removal action, which included shipping 350 cubic yards of hazardous and solid waste off site and constructing a ground-water collection sump. Ground water is collected, stored temporarily, and treated on site. The residual chromium sludge from the ground-water treatment is sent off site for recycling. Later in 1990, EPA performed an additional emergency response, and provided for the construction of a wastewater pretreatment system and an extraction system to collect and pretreat shallow ground water prior to discharge off site to the De Pere wastewater system. This ROD addresses OU1, contaminated ground water and surface water, as an interim action. Future RODs will address remaining soil and ground-water contamination. The primary contaminants of concern affecting the ground water and surface water are VOCs including 1,1,1-TCA and 1,1-DCA; other organics; and metals including chromium, cyanide, and lead.

Selected Remedial Action

The selected RA for this interim remedy includes continuing and expanding the current operation of the ground-water extraction system and pretreatment facility, which will include pretreatment of the additional water collected by the surface-water and ground-water collection systems, and the Chrome and Zinc Shops, with discharge to the De Pere wastewater system; improving surface-water drainage, and constructing berms to control surface-water run-off and to prevent contaminant migration; installing monitoring wells; fencing both shops; and applying siding materials on the exterior of the building at the Zinc Shop. The estimated

present worth cost for this RA is $500,000, which includes an annual O&M cost of $60,000.

Performance Standards or Goals

All ARARs will be met during the final action for the site.

Institutional Controls

Not applicable.

BUCKEYE RECLAMATION, OH
August 19, 1991

The 658-acre Buckeye Reclamation site contains a 50-acre former landfill in Richland Township, Belmont County, Ohio. Land use in the area is predominantly agricultural, rural residential, and strip mining. A total of 46 domestic wells and springs are located within one mile of the site. The site is situated in the King's Run drainage ravine, and is bordered by King's Run to the east and an unnamed run to the west. King's Run flows to the south into Little McMahon Creek. The original topography of the valley has been altered by coal mining and landfill operations. Prior to 1940, the site served as a disposal area for coal mine refuse. The county licensed the area as a public solid waste landfill in 1971, and the facility accepted general trash, rubbish, and nonhazardous waste. The landfill also accepted industrial sludge and liquids, most of which were received between 1976 and 1979, and deposited in the waste pit located in the northern section of the landfill. Solid industrial wastes also were disposed of with municipal wastes elsewhere in the landfill. In 1980, the Waste Pit was filled with sludge, mine spoil, and overburden soil; covered with soil and garbage; and seeded. Results of the RI indicate various levels of contamination in all media sampled, except air. This ROD addresses the remediation of contaminated leachate and ground water and eliminates exposure to contaminated surface soil. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, TCE, and toluene; other organics including PAHs; and metals including arsenic, chromium, beryllium, and lead.

Selected Remedial Action

The selected RA for this site includes capping the entire landfill area, including the waste pit and suspected sources of recharge for the waste pit and water bearing zones, with a solid waste landfill cap; installing a leachate seep and ground-water collection system; treating collected wastewater with constructed wetlands and discharging the treated water on site to Little McMahon Creek; conducting long-term ground and surface water monitoring; and implementing institutional controls including deed, land, and ground-water use restrictions, as well as site access restrictions including fencing. The estimated present worth cost for this RA is $48,663,000, which includes an annual O&M cost of $99,000 for 30 years.

Performance Standards or Goals

EPA is invoking a waiver of RCRA closure requirements due to the steepness of the landfill slopes, which makes construction of a RCRA Subtitle C cap technically impracticable. Contaminants discharged from the wetlands treatment system will not exceed NPDES discharge limits. The limits may be modified to more stringent levels if proven feasible.

Institutional Controls

Deed, land, and ground-water use restrictions will be implemented at the site.

CARTER INDUSTRIALS, MI
September 18, 1991

The 3.5-acre Carter Industrials site is a former scrap metal storage and salvage operation in Detroit, Michigan. Surrounding land use is mixed residential and light industrial in an urban setting. On-site features include several buildings, two shelters, an incinerator, a 1,000-gallon underground gasoline storage tank, and seven piles consisting of approximately 46,000 cubic yards of PCB-contaminated soil and debris. From 1966 until 1986, the site was used as a scrap metal salvage and storage facility, changing ownership several times during the period. Items accepted for salvage included electrical capacitors and transformers. During salvage operations, dielectric fluid containing PCBs was spilled from the capacitors and transformers directly onto the on-site soil. Adjacent commercial, residential, and municipal properties have been contaminated by direct run-off of spilled material, storm water run-off, wind-blown dust, and tracking of spilled material by vehicles. In 1986, the state identified elevated levels of PCBs in on-site soil, which was later confirmed by EPA investigations. Consequently, in 1986, as part of a removal action, EPA stabilized the site by diverting surface water run-off to on-site interception trenches and a treatment system; excavating and consolidating on-site contaminated soil and debris along with off-site residential debris into seven on-site piles; decontaminating and disposing of debris off site; decontaminating alleys and streets within a 4-square block area; and fencing the site. Also in 1986, the state removed and disposed of all PCB-contaminated soil with levels between 10 to 50 mg/kg from surrounding residential areas off site. In 1989, the PRPs covered on-site piles of contaminated material with geotextile and vegetative cover to provide temporary containment. This ROD addresses remediation of remaining on-site and off-site source material. A subsequent ROD will address the need for remediation of contaminated sewer lines running from the site. The primary contaminants of concern affecting the soil and debris are organics including PCBs; and metals including arsenic, cadmium, and lead.

Selected Remedial Action

The selected RA for this site includes excavating approximately 46,000 cubic yards of on-site and off-site soil contaminated with greater than 1 mg/kg PCBs; treating on-site and off-site soil and debris with greater than 10 mg/kg PCBs on-site using low temperature thermal desorption, and solidifying any material that fails the TCLP; disposing of all on-site and off-site material contaminated with PCBs 1 mg/kg to 10 mg/kg, including all treatment residuals with less than 10 mg/kg PCBs in an on-site containment cell with a clay and soil cover; disposing of any material that cannot meet the above on-site disposal criteria off site; installing a leachate collection and pumpout system in the containment cell; decontaminating and demolishing three on-site buildings, and containing the decontaminated debris in the cell; removing a UST and its contents, with off-site treatment or disposal of the contents, and on-site decontamination and off-site disposal of the tank; excavating and treating tank-contaminated soil; monitoring leachate and air; and implementing institutional controls including deed restrictions, and site access restrictions such as fencing. The estimated present worth cost for this RA is $19,508,000. There are no O&M costs associated with this RA.

Performance Standards or Goals

The clean-up goal of 1 mg/kg PCBs in soil and debris is based on EPA guidance on RA for Superfund sites with PCB contamination. All soil and debris with greater than 10 mg/kg PCBs will be treated on site. Soil and treatment residuals with 1 to 10 mg/kg PCBs will be contained on site. Soil clean-up levels for metal contaminants are based on leachability testing (or

detection limits) and include arsenic 50 *u*g/kg, cadmium 80 *u*g/kg, and lead 100 *u*g/kg. An ARAR waiver will be invoked for the Michigan Solid Waste Management Rule that specifies isolation distances for sanitary landfills.

Institutional Controls

Institutional controls including deed restrictions will be implemented at the site.

CHEM-CENTRAL, MI
September 30, 1991

The 2-acre Chem-Central site is a bulk chemical storage facility in Wyoming, Kent County, Michigan. Land use in the area is a mixture of residential and commercial. An estimated 10,000 people live within one mile of the site and receive their water supply via the municipal distribution system. Two creeks, Cole Drain and Plaster Creek, lie in proximity to the site. Cole Drain, which has been included as part of the site, empties into Plaster Creek 2,500 feet north of the site. In addition, two hotels are located 800 feet from the site. Since 1957, Chem-Central has used the site to receive and hold bulk chemicals by truck and railroad tanker before redistribution to various industries. Facilities at the site include a building with two loading docks and a rail spur on the west side of the plant. Approximately 10 above-ground storage tanks are located along the plant's north side and are surrounded by a concrete containment wall and paved ground surface. Between 1957 and 1962, hazardous substances entered the ground as a result of faulty construction of a T-arm pipe used to transfer liquid products from bulk storage tanks to small delivery trucks. Additional hazardous substances may have entered the ground through accidental spills. In 1977, a routine state biological survey of Plaster Creek identified a contaminated ditch containing oils with organic compounds including PCBs and metals that was discharging into Cole Drain. In 1977, the state attempted to stop the oil flow by damming the ditch. In 1978, EPA excavated sludge from the ditch and removed the sludge using twelve 55-gallon drums for off-site disposal. Oils, ground water, and various contaminants continued to enter the ditch, and the state unsuccessfully attempted to filter oil out of the water. Between 1978 and 1986, the state and EPA focused their efforts on finding and eliminating the source of the ditch contamination through extensive investigations of area soil, ground water, and surface water. Results indicated that ground water and soil surrounding and north of the Chem-Central plant were contaminated with volatile and semi-volatile organic compounds. In 1980, the state required Chem-Central to clean up the contamination and to institute a ground-water monitoring program. Consequently, between 1984 and 1985, three ground-water extraction wells, an interceptor trench, and a treatment system using an air stripper were installed. Contaminated water, soil, and sludge were removed from the ditch and placed in hazardous waste landfills, and the ditch was backfilled with clean soil. This ROD addresses a remedy for contaminated on-site soil, contaminated off-site soil surrounding and north of the plant, and the addresses a remedy for contaminated on-site soil, contaminated off-site soil surrounding and north of the plant, and the ground-water contamination plume emanating from the plant and spreading 1,800 feet northward. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE, TCE, and toluene; and other organics including PAHs and PCBs.

Selected Remedial Action

The selected RA for this site includes installing an *in situ* vapor extraction system for on-site soil and two off-site soil areas north of the property, using a network of horizontal piping, collecting contaminated vapors in the soil source area at the vacuum pump, and treating these vapors using a vapor phase carbon adsorption system before discharge to the atmosphere; continuing the operation and maintenance of the current ground-water collection and treatment system; installing, operating, and maintaining an expansion of the current off-site ground-water collection system either by extending the current interceptor trench further east or north, or by constructing two additional purge wells east of the current interceptor trench; installing and operating a purge well in the deep lens of contaminated ground water beneath the main aquifer, and

connecting this well to the pump and treat system; treating contaminated ground water using an air stripper with off-site discharge to a POTW; collecting oil in the purge wells, and disposing of the oil at an off-site facility; monitoring ground water; and implementing institutional controls including deed restrictions. The estimated present worth cost for this RA is $2,099,000, which includes an annual O&M cost of $170,000; or $2,131,000, which includes an annual O&M cost of $172,900, depending on which off-site ground-water collection option is used.

Performance Standards or Goals

Contaminant goals for soil are based on 10^{-6} cancer level or the HLSC. Clean-up levels in soil must be reduced to less than 20 times the ground-water standard for each chemical, or TCLP must produce leachate with contaminant levels below the ground-water clean-up levels. Chemical-specific ground-water clean-up goals are based on health-based criteria including 10^{-6} risk level or HLSC and state levels including TCE 3 *ug*/l (health-based), PCE 0.7 *ug*/l (health-based), and toluene 100 *ug*/l.

Institutional Controls

Deed restrictions will be implemented to prevent installation of water wells in the site area and to prohibit development that might disturb on-site and some off-site soil.

CONRAIL RAILYARD ELKHART, IN
June 28, 1991

The 2,500-acre Conrail Railyard Elkhart site is composed of a 675-acre railroad facility and adjacent areas of contamination to the northeast and northwest in Elkhart County, Indiana. Major surface water bodies in the vicinity are the St. Joseph River, located one mile north of the site, and the Baugo Bay located to the west of the site, which have adjacent wetlands and floodplain areas. From 1956 to the present, the site has been used as a classification and distribution point for rail freight cars. Car repair, engine cleaning, and diesel refueling activities were conducted on site. Reported on-site spills and releases of oil, diesel fuel, hydrochloric acid, caustic soda, and various petroleum-related substances from 1976 to 1986 have occurred on site. EPA investigations during the mid-1980s detected elevated levels of TCE in ground water downgradient from the railyard, and in the subsurface soil at various points on site. After initially providing bottled water, in-house carbon filters were provided to 76 residences. This ROD provides for the containment of the contaminated ground-water plume, as an interim action, and provides for a safe and permanent drinking water supply. A subsequent ROD will address contaminated soil and ground water, and set final ground-water remediation levels. The primary contaminants of concern affecting the ground water are VOCs including TCE and carbon tetrachloride.

Selected Remedial Action

The selected RA for this site includes pumping and treatment of ground water using prefiltration and air stripping, and discharging the treated water on site to the St. Joseph River; treating air emissions, if needed, using carbon adsorption with off-site regeneration and disposal of the spent carbon; conducting treatability studies to determine treatment system design parameters; providing an alternate water supply by extending the municipal distribution system to 505 residences/businesses; monitoring ground water; and implementing institutional controls, including ground-water use restrictions, and site access restrictions such as fencing. The estimated present worth cost for this RA is $3,969,300, which includes an annual O&M cost of $125,000 for 20 years.

Performance Standards or Goals

Final soil and ground-water performance standards will be addressed during remediation of OU2.

Institutional Controls

Ground-water use restrictions will be utilized to limit exposure to the area of contamination.

DAKHUE SANITARY LANDFILL, MN
June 28, 1991

The 80-acre Dakhue Sanitary Landfill site is an inactive sanitary waste municipal landfill located in Hampton Township, Dakota County, Minnesota. Land use in the area is agricultural and residential. The landfill overlies a sand and gravel surficial aquifer that is not a drinking water source and that extends downgradient of the site. However, 15 residential wells are located within one mile of the site, and a municipal water supply well is located over three miles south of the site, all of which extract ground water from a deeper aquifer. Investigations are ongoing to determine whether the two aquifers are hydraulically connected. From 1971 to 1988, Dakhue Sanitary Landfill, Inc., owned and operated the landfill and accepted mixed municipal and commercial wastes, and small amounts of industrial waste. State investigations conducted between 1983 and 1989 identified a variety of contaminants on site. Investigations during the RI/FS identified VOCs, organics, and inorganics in the surficial on-site aquifer, and it has been determined that the possible source of contamination is related to the municipal, industrial, and commercial waste disposed on site in the landfill. Ongoing investigations are required to further define on-site ground-water contamination. As a result, the site will be remediated as two OUs. This ROD addresses the source of the contamination as OU1. A future ROD will address ground-water contamination and possible remediation of the downgradient plume, as OU2. The primary contaminants of concern affecting the soil and debris are organics including phenols; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes capping the site with a final cover system consisting of a gas control layer, a barrier of low-permeability material, and a drainage layer; revegetating the area; treating air emissions from gas vents; conducting air and ground-water monitoring; and installing a fence around the site perimeter. The capital cost for this RA is $9,800,000, which includes an estimated annual O&M cost of $54,000 for 2 years.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not provided.

ENVIRO-CHEM (NORTHSIDE SANITARY LANDFILL), IN

Amendment
June 7, 1991

The Enviro-Chem site is a former waste recovery/reclamation/brokerage facility in Boone County, Indiana. Adjacent to the site is another Superfund site, the Northside Sanitary Landfill (NSL) which, prior to this ROD amendment, was to be remediated in a combined remedy for both sites. Land use in the area is agricultural to the south and east, and residential to the north and west, with approximately 50 residences located within one mile of the sites. Run-off from the sites is collected in a ditch which flows off site and eventually empties into a reservoir that provides approximately six percent of the drinking water for the city of Indianapolis. Enviro-Chem began operations in 1977 as a recovery/reclamation/brokerage facility, accepting solvents, oils and other waste from industrial clients. Accumulation of contaminated stormwater on site, poor management of the drum inventory, and several spills led to state and EPA investigations of the site. Between 1977 and 1981, the state permitted Enviro-Chem to dispose of part of its waste at the adjacent NSL. In 1981, a consent decree was issued against Enviro-Chem giving them until November 1982 to comply with environmental laws and regulations. In May 1982, the state ordered Enviro-Chem to close and environmentally secure the site because it failed to reduce hazardous waste inventories. Subsequently, two emergency removal actions were conducted to remove the major sources of contamination. From 1983 to 1984, approximately 30,000 drums, 220,000 gallons of waste, and 5,650 cubic yards of soil and sludge were removed off site and treated. In 1985, 20,000 gallons of contaminated water were removed. A 1987 ROD provided a combined remedy for both NSL and Enviro-Chem due to their proximity and other similarities. The 1987 ROD addressed source control through soil excavating, dewatering, and on-site disposal, followed by capping; pumping and on-site treatment of ground water; and implementing deed and access restrictions. However, since the signing of the ROD, EPA and the state have been engaged in negotiating with the PRPs for each site. These negotiations have resulted in separate, complementary remedies and individual consent decrees for each site, and modifications to the original selected remedy. This ROD amends the 1987 ROD and provides a comprehensive site remedy for the Enviro-Chem site addressing source control instead of ground-water remediation. The primary contaminants of concern affecting the soil are VOCs including PCE, TCE, toluene; and other organics including phenols.

Selected Remedial Action

The amended RA for this site includes treating contaminated soil on site using soil vapor extraction with a granulated activated carbon system to control the extracted vapor, if necessary; and implementing a contingent remedy for a subsurface ground-water collection and treatment system, based on monitoring results, if clean-up objectives are not reached in five years. Other remedial actions documented in the 1991 ROD amendment include capping the site, implementing site access restrictions, and monitoring of the subsurface and surface water are not affected by this amendment. The estimated present worth for this RA ranges between $5,000,000 and $9,000,000. No O&M costs were provided for this RA.

Performance Standards or Goals

Soil clean-up goals are based on ingestion of subsurface water at the site boundary, and are calculated from the acceptable subsurface water concentrations assuming a dilution of leachate to

subsurface water of 1:196, and using established partition coefficients. Chemical-specific soil clean-up goals include phenol 9,800 *ug*/kg, TCE 240 *ug*/kg, PCE 130 *ug*/kg, toluene 238,000 *ug*/kg, and total xylenes 195,000 *ug*/kg.

Institutional Controls

Not provided.

FADROWSKI DRUM DISPOSAL, WI

June 10, 1991

The 20-acre Fadrowski Drum Disposal site is an inactive industrial landfill within the city of Franklin, Milwaukee County, Wisconsin. Surrounding land use is mixed residential and commercial. The western portion of the site lies within the floodplain of the Root River, and approximately nine acres of wetlands are located on site. From 1970 until 1982 when the property was sold, the site was an unregulated and unlicensed landfill allowed only to receive clean earth fill containing construction debris. However, hazardous waste, including several hundred drums of unknown material and lubricant sludges, were illegally buried on site. State investigations in 1981 identified evidence of improper disposal of solid waste including crushed drums, and boiler and foundry waste. In 1982, the site was purchased by Menard, Inc. with plans to use the property as a source of fill material. In 1983, excavation began on site and during this work various containers of waste and sludge were uncovered, some drums were inadvertently crushed, and liquids and sludge were released into on-site soil. The state directed the site owners to contain the exposed waste until it could be sampled and characterized, but instead the owners constructed berms, then covered the waste material with clay, without approval. The RI/FS was conducted by a PRP, Acme Printing Ink, Co. The RI located several buried drums and identified locations likely to contain additional buried drums. Miscellaneous low-level soil and sediment contamination was also delineated. Ground water in the thick, continuous layer of clay below the site was found to contain low levels of cyanide, mercury, chromium, and barium. EPA sampling has shown that nearby residential water supplies have not been impacted by the contamination. This ROD addresses soil contamination to prevent or reduce the migration of contaminants into the ground water. The primary contaminants of concern affecting the soil, sediment, and debris are VOCs including toluene and xylenes; other organics including PAHs and pesticides including DDT; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes excavating previously identified drums and 25 cubic yards of hazardous soil, and recycling, or treating and disposing of the drummed waste off site; constructing trenches to locate and excavate additional containerized waste and the surrounding characteristically hazardous soil; treating any contaminated soil on site, followed by off-site disposal of the residuals; constructing a landfill cap and a leachate collection system, and disposing of any leachate exceeding state levels off site at a POTW or RCRA treatment facility; allowing natural attenuation to remediate ground water; monitoring ground water and surface water for 30 years to ensure effectiveness of the cap; and implementing institutional controls to limit land and ground-water use, and site access restrictions such as fencing. If ground-water conditions worsen or do not improve over a reasonable period of time, EPA may evaluate the options for a ground-water treatment program. The estimated present worth cost for this RA is $2,230,000, which includes an annual O&M cost of $32,100 for 30 years.

Performance Standards or Goals

Through removal of buried drums and the containment of remaining low-level contamination, it is anticipated that ground water

will meet clean-up standards through natural attenuation. Ground-water clean-up standards are based on Wisconsin PALs, which are more stringent than federal standards.

Institutional Controls

Land and ground-water use restrictions will be implemented on site.

FOLKERTSMA REFUSE, MI
June 28, 1991

The 8-acre Folkertsma Refuse site is an inactive industrial landfill in Walker, Kent County, Michigan. Surrounding land use is primarily industrial with a few private residences in the vicinity. The site is partially bordered by woodlands, and migration of contaminants has impacted a 100-year floodplain and scattered wetland areas of Indian Mill Creek located to the south. The site overlies surficial glacial and bedrock aquifers, both of which are used for local drinking water supplies. On-site features include an uncapped landfill, a man-made creek and a drainage ditch that join and discharge to Indian Mill Creek, an office building, and three warehouses. Prior to 1965, the site was used as a muck farm. From 1965 until 1972, industrial waste including foundry sand, chemical products, construction debris, and other industrial waste was disposed of in the on-site landfill. The primary fill material in the landfill is foundry sand. Since 1972, the site has been operated as a pallet repair and manufacturing facility. In 1984, EPA identified elevated contaminant levels in the on-site drainage ditch sediment, but not in on-site ground water. Further investigations in 1985 and 1988 characterized on-site and off-site (Indian Mill Creek) contamination, and determined the potential for future ground-water contamination. This ROD addresses engineering controls for source material and management of migration of contaminated ground water as a final remedy. The primary contaminants of concern affecting the landfilled material, sediment, and ground water are VOCs; other organics including SVOCs and PCBs; and metals including arsenic, chromium, and nickel.

Selected Remedial Action

The selected RA for this site includes excavating and dewatering approximately 1,300 cubic yards of contaminated sediment from the man-made creek, the drainage ditch, and Indian Mill Creek, and consolidating these within the landfill area; capping the landfill area with a clay cap and revegetated soil cover installing passive landfill gas vents, if necessary; converting the man-made creek and the drainage ditch to permeable subsurface drains to provide for landfill surface drainage; monitoring ground water and surface water; and implementing institutional controls such as deed and ground-water use restrictions, as well as site access restrictions such as fencing. The estimated present worth cost for this RA is $1,500,000, which includes an annual O&M cost of $58,000 for the first year. O&M costs for subsequent years were not provided.

Performance Standards or Goals

The RA is designed to reduce the excess lifetime cancer risk to the 10^{-4} to 10^{-6} level and the noncarcinogenic HI < 1. Chemical-specific clean-up goals were not provided.

Institutional Controls

Deed and ground-water use restrictions will be implemented at the site to prevent future disturbances of the cap and landfill materials, and future installation of drinking water wells.

FULTZ LANDFILL, OH
September 30, 1991

The 30-acre Fultz Landfill site is a privately owned inactive sanitary landfill on the north slope of a ridge that overlies abandoned coal mines in Jackson Township, Guernsey County, Ohio. Land use in the vicinity of the site is primarily rural to the south, north, and east; and residential and light industrial to the west. The site lies within the drainage basin of Wills Creek, which flows north adjacent to the site and is used by the city of Cambridge as the municipal water supply. The northern half of the landfill lies in an unreclaimed strip mine where surface mine spoil and natural soil form a shallow aquifer. The southern half of the landfill lies 25 to 80 feet above an abandoned flooded underground mine in the same coal seam as the strip mine. The flooded underground mine forms an aquifer, which also is utilized for drinking water. Six ponds, designated as wetlands, are located on the north side of the landfill in the area of unreclaimed strip mine spoil. Surface-water runoff and leachate from the landfill collect in several of these ponds. From 1958 to 1968, the landfill was operated as an open dump. In 1969, the site was licensed by the county and began to accept household, commercial, and industrial solid waste. During the 1970s, the landfill operator was cited for various violations including inadequate daily cover of waste, receiving unauthorized waste, leachate runoff, blowing debris, and open dumping; and in 1985, on-site landfill operations ceased. Disposal records show that an estimated 6,240 drums containing chlorinated and non-chlorinated solvents and plating sludge were disposed of in the landfill. Records also show that drummed liquid and semi-liquid waste were disposed of on site, and some of the solvents were poured directly onto the ground and burned. Investigations in 1988 by EPA indicated that ground-water and leachate contaminants emanating from the site have contaminated the shallow aquifer and, to a lesser extent, the deep mine aquifer. This ROD addresses all contaminated media, and provides a final remedy for the site. The primary contaminants of concern affecting the soil, sediment, debris, ground water, and surface water are VOCs including benzene, PCE, TCE, toluene, and xylenes; other organics including PAHs and phenols; metals including arsenic, chromium, and lead; and other inorganics.

Selected Remedial Action

The selected RA for this site includes constructing a containment berm and capping the entire 30 acres of the landfill with a multi-layer cap; installing structural supports for voids in the underground mine to prevent cap damage by subsidence; constructing an on-site treatment plant and leachate collection system; pumping and on-site treatment of contaminated ground water and leachate using oxidation and precipitation to remove metals, and filtration and carbon adsorption to remove organics, or using another treatment based on the outcome of a bench-scale treatability study; discharging the treated effluent on site to surface water; regenerating spent carbon or disposing of the carbon off site; disposing of sludge resulting from the treatment plant processes off site; constructing surface-water and sediment controls to divert runoff away from the landfill; mitigating affected wetlands; providing an alternate water supply for contaminated residential wells by connecting these homes to a municipal water supply; monitoring soil, sediment, ground water, and air; and implementing institutional controls including deed restrictions to limit ground-water and land use, and site access restrictions including fencing. The estimated present worth cost for this RA is $19,480,700, which includes an annual O&M cost of $218,000 for 30 years.

Performance Standards or Goals

For ground-water remediation, site-related contaminants that appear upgradient will be reduced to their respective background concentrations. Other non-background contaminants will be reduced to SDWA MCLs, or to a cumulative carcinogenic risk no greater than 10^{-6} or an HI<1. Discharge of treated leachate and ground water must meet CWA and state requirements. Chemical-specific remediation goals were not provided.

Institutional Controls

Deed, land, and ground-water use restrictions will be implemented at the site.

G&H LANDFILL, MI
December 21, 1990

The 70-acre G&H Landfill site is an inactive landfill in Shelby Township, Macomb County, Michigan. Surrounding land use is predominantly residential with adjacent light industrial facilities and a recreational area that includes wetland and woodland habitats. The site overlies two ground-water aquifers, the uppermost of which is the source of drinking water for some eastern area residences and industries. A portion of the site is located within the 100-year floodplain of the Clinton River. The site is subdivided into three landfill areas: a 44-acre Phase I landfill area, a 17-acre Phase II area, and an 8-acre Phase III landfill area. From 1955 to 1973, G&H landfill accepted municipal refuse, and solid and liquid industrial wastes including solvents, paints, varnishes, and lacquers. In addition, from 1955 to 1967, waste oil and water mixtures were disposed of at the landfill. Several unsuccessful attempts were made by the landfill operators to reclaim the oil, by pumping the oil into settling ponds. After the oil was allowed to settle, the volatile components evaporated, and the resulting sludge was periodically removed and buried in the landfill. In 1965 and 1966, the state determined that improper liquid waste disposal operations and waste oil disposal/reclamation activities at the landfill were contributing to on-site ground-water contamination and oil seeps south of the site. Based on these findings, all disposal operations were ordered to cease. The landfill continued to operate as a sanitary landfill until 1973, at which time it was closed without a proper closure plan. From 1982 to 1989, EPA initiated four removal actions at the site to restrict public access to contaminated ground water and oil seeps, and to prevent the migration of PCB-contaminated oil. In 1989, approximately 2,400 gallons of a PCB-contaminated oil and water mixture were removed and disposed of at an off-site thermal destruction facility. The site has been divided into two OUs for remediation. This ROD addresses contaminated soil, sediment, and landfill material (OU1); and the contaminated ground-water plume, landfill leachate, and oil seep (OU2). The ground-water contaminant plume and the solvent/oil-contaminated soil and landfill debris in the Phase I landfill area have been identified as the principal threat. The primary contaminants of concern affecting the soil, sediment, debris, and ground water are VOCs including benzene, TCE, toluene, and xylenes; other organics including PCBs; metals including arsenic, chromium, and lead; and oils.

Selected Remedial Action

The selected RA for this site includes constructing a landfill cover over the site to meet current state landfill closure requirements; constructing a subsurface barrier wall around the perimeter of the landfill areas and oil seeps; instituting leachate collection and treatment; excavating soil and sediment outside the slurry wall with PCB concentrations greater than or equal to 1 mg/kg, followed by consolidating these under the landfill cover if less than 500 mg/kg, or treating the soil and waste using off-site incineration, vitrification, or some other technology approved by EPA for the destruction of PCBs if concentrations are greater than or equal to 500 mg/kg; replacing affected wetlands; pumping and treating the contaminated ground-water plume outside the slurry wall, followed by on-site discharge to the adjacent Clinton River or to a treatment plant if pretreatment criteria are met; connecting nearby residents to the local municipal water supply; monitoring ground water, surface water, and air; and implementing deed and ground-water use restrictions, and site access restrictions such as fencing. The estimated present worth cost for this RA is $40,000,000, which includes an estimated annual O&M cost of $750,000 for 30 years.

Performance Standards or Goals

Excavated soil and sediment will be treated to 1 mg/kg to destroy PCBs if PCB concentrations are greater than or equal to 500 mg/kg, or will be consolidated in the landfill if PCB concentrations are less than 500 mg/kg. Ground-water clean-up standards are based on state standards and SDWA MCLs. Chemical-specific goals include vinyl chloride 0.02 *u*g/l (state), benzene 1 *u*g/l (state), PCE 0.7 *u*g/l (state), TCE 3 *u*g/l (state), xylenes 20 *u*g/l (state), arsenic 0.02 *u*g/l (state) (may change; arsenic standard will be established based on background), and lead 5 *u*g/l (state).

An ESD is adjusting several ground-water standards. Existing standards less than 1 *u*g/l will be adjusted to 1 *u*g/l for carcinogens, which is the approximate detection limit for chemicals of concern. Standards less than 1 *u*g/l for inorganics will be adjusted to background levels to be determined by EPA.

Institutional Controls

Deed and ground-water use restrictions will be implemented to supplement engineering controls as appropriate until cleanup standards are met.

KENTWOOD LANDFILL, MI
March 29, 1991

The 72-acre Kentwood Landfill site is an inactive municipal landfill in Kentwood, Kent County, Michigan. Land use in the area is primarily residential and recreational. Twenty-two residences surrounding the site use ground water as their drinking water supply. Landfilling operations at the site began in the 1950s, and continued intermittently until the county capped and closed the landfill in 1976. The site consists of two municipally-owned landfill areas: a larger original landfill; and a 20-acre southern extension located south-southeast of the original landfill. Both landfills are constructed into the uppermost aquifer beneath the site, and as a result, the landfilled waste including garbage, rubbish, construction, and demolition waste are in direct contact with the upper aquifer ground water. Site disposal records show no indication of RCRA hazardous waste present at the site. In 1983, construction of a leachate collection system to pump leachate to a POTW was completed on the eastern side of the original landfill, however, contamination from leachate is still of concern. The primary contaminants of concern affecting the debris, ground water, and leachate are VOCs including benzene, PCE, and TCE; other organics; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes improving the landfill cap to include gas controls and a leachate collection system; pumping and pretreating ground water on site along with collected leachate, as needed, before discharging to a POTW; monitoring sediment, ground water, surface water, and air; and implementing institutional controls including deed and ground-water use restrictions, and site access restrictions such as fencing. If for any reason the leachate or contaminated ground water cannot be treated by the POTW, these liquids will be treated on site, with subsequent on-site discharge to surface water. The estimated present worth cost for this RA is $5,700,000, which includes an annual O&M cost of $210,000 for years 0 through 9, and $200,000 for years 10 through 30.

Performance Standards or Goals

Chemical-specific clean-up goals for ground water in the aquifer are based on SDWA MCLs and state standards including benzene 1 *ug*/l (state), PCE 0.7 *ug*/l (state), TCE 3 *ug*/l (state), arsenic 0.02 *ug*/l (state), chromium 30 *ug*/l (state), and lead 5 *ug*/l (state).

Institutional Controls

Deed restrictions will be implemented to prevent cap erosion, exposure to site contaminants, and to provide site security. Ground-water use restrictions will be implemented in areas with contaminated ground water.

LEMBERGER LANDFILL, WI

September 23, 1991

The 45-acre Lemberger Landfill (LL) site is a former land disposal facility in Manitowoc County, Wisconsin. The site is located within one-quarter mile of another Superfund site, the 45-acre Lemberger Transport & Recycling (LTR) site. Land use in the area is predominantly agricultural, with four residences within 1,000 feet of the sites. Ground water as well as the Branch River, located less than one mile west of both sites, are used as sources of drinking water. From 1940 to 1969, Franklin Township used 21 acres of the LL site as an open dump. After 1970, the state licensed the landfill to receive only municipal waste and power plant fly ash and bottom ash. In 1976, the LL site ceased operations except for disposal of fly ash to bring the site to final grade. All industrial waste was diverted to the nearby LTR site. From 1970 to 1976, LTR received industrial waste and a variety of liquids, sludge, and slurries, which were deposited on site in unlined trenches. As a result of reports of contaminated material seeping onto local properties, a number of state investigations were conducted that identified VOCs levels above state standards in residential wells. Affected residences received deeper replacement wells that have not shown contamination. Because of the proximity of the sites and similarity in the types of waste, the LL and LTR sites will be remediated concurrently. This ROD provides a final remedy for source contamination at the LL site and ground-water contamination at both the LL and LTR sites, as OU1. A future ROD will address the landfill contents at the LTR site, as OU2. The primary contaminants of concern affecting the soil, sediment, debris, and ground water are VOCs including PCE, TCE, toluene, and xylenes; other organics including PCBs and pesticides; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes clearing and regrading the waste area to smooth out the existing cap; constructing a multi-layer cap with a vegetative cover to minimize cap erosion; constructing a slurry wall around the perimeter of the waste; installing at least one small volume extraction well in the upper aquifer to collect ground water within the slurry wall; building an on-site treatment facility at the LL site, and treating contaminated ground water from both sites using electrochemical precipitation to remove inorganic contaminants and granular activated carbon to remove organic contaminants, unless treatability studies deem another technology to be more effective; blending water extracted from the slurry wall with ground water extracted for remediation, and treating these at the treatment facility; temporarily storing the residual sludge on site in 55-gallon drums, followed by disposing of residual sludge as part of the future LTR source control remedy or treating and disposing the sludge off site at a RCRA landfill according to federal and state regulations; recycling spent carbon, if possible; discharging the treated effluent on site to the Branch River; providing an alternate water supply to residents whose water supply is disrupted due to the operation of the extraction system; investigating and mitigating any affected wetlands; monitoring ground water; and possibly implementing institutional controls including deed and ground-water use restrictions, and constructing a security fence around the treatment facility to limit site access. The estimated present worth cost for this RA is $19,200,000, which includes an annual O&M cost of $731,000 for years 0 and 1 and $596,000 for years 2 through 30.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on the most stringent of state standards, SDWA MCLS, and risk-based levels, and include TCE 0.18 *u*g/l (state), PCE 0.1 *u*g/l (state), toluene 68.6 *u*g/l (state), xylenes 124 *u*g/l (state), arsenic 5 *u*g/l (state), chromium 5 *u*g/l (state), lead 5 *u*g/l (state), and PCBs 0.5 *u*g/l (PMCL).

Institutional Controls

Deed restrictions may be used to limit the use of contaminated ground water.

LEMBERGER TRANSPORT & RECYCLING, WI
September 23, 1991

The 45-acre Lemberger Transport and Recycling (LTR) site is a former land disposal facility in Manitowoc County, Wisconsin. The site is located within one-quarter mile of the 45-acre Lemberger Landfill (LL) site. Land use in the area is predominantly agricultural, with four residences within 1,000 feet of the site. Ground water as well as the Branch River, located less than one mile west of both sites, are used as sources of drinking water. From 1970 to 1976, the LTR site received industrial waste and a variety of liquids, sludge, and slurries, which were deposited in unlined trenches. From 1940 to 1969, Franklin Township used 21 acres of the LL site as an open dump. After 1970, the state licensed the landfill to receive only municipal waste and power plant fly ash and bottom ash. All industrial waste was diverted to the nearby LTR site. Reports of contaminated material seeping onto local properties prompted state investigations that revealed VOCs in residential wells in excess of state standards. Affected residences received deeper replacement wells that have not shown contamination. Because of the similarity of contamination and proximity of the sites, the LTR and LL sites will be addressed concurrently. This ROD provides a final remedy for ground-water contamination at both the LTR and LL sites, as the first OU1. A future ROD will address the landfill contents at the LTR site, as OU2. The primary contaminants of concern affecting the ground water are VOCs including PCE, TCE, toluene, and xylenes; other organics including PCBs and pesticides; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes building an on-site treatment facility at the LL site and treating contaminated ground water from both sites using electrochemical precipitation to remove inorganic contaminants and granular activated carbon to remove organic contaminants, unless treatability studies deem another technology to be more effective; blending water extracted from the slurry wall to be constructed at the LL site with ground water extracted for remediation, and treating it on site at the treatment facility; temporarily storing residual sludge on site, then treating and disposing of the residual sludge as part of the future LTR source control remedy or treating and disposing the sludge off site at a RCRA landfill according to federal and state regulations; recycling spent carbon, if possible; discharging the treated effluent into the Branch River; providing an alternate water supply to residents whose water supply is disrupted due to the operation of the extraction system; investigating and mitigating any affected wetlands; monitoring ground water; and possibly implementing institutional controls including deed and ground-water use restrictions, and constructing a security fence around the treatment facility to limit general accessibility to the facility and the potential for public exposure. The estimated present worth cost for this RA is $19,200,000, which includes the source control remedy for the LL site and an annual O&M cost of $731,000 for years 0 and 1 and $596,000 for years 2 through 30.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on the most stringent of state standards, SDWA MCLs, and risk-based levels, and include PCE 0.1 *ug*/l (state), TCE 0.18 *ug*/l (state), toluene 68.6 *ug*/l (state), xylenes 124 *ug*/l (state), arsenic 5 *ug*/l (state), chromium 5 *ug*/l (state), lead 5 *ug*/l (state), and PCBs 0.5 *ug*/l (PMCL).

Institutional Controls

Deed restrictions may be used to limit the use of contaminated ground water.

MacGILLIS & GIBBS/BELL LUMBER & POLE, MN

September 30, 1991

The MacGillis & Gibbs/Bell Lumber & Pole site consists of two active, adjacent wood preserving facilities, referred to as the M&G and Bell facilities, in New Brighton, Ramsey County, Minnesota. Land use in the area is residential and commercial. Several lakes, streams, and wetlands are located within two miles of the site. Most local residents receive drinking water from 10 municipal wells, the nearest of which is located one-quarter mile southeast of the site. There are also a limited number of residential wells existing in the area. This ROD addresses the 24-acre M&G facility on the eastern portion of the site. Site features include a disposal area in the west-central portion of the facility used to dispose of PCP-contaminated wood chips, settled solids, spent treatment solutions, and copper chromium arsenic (CCA) contaminated drum shells; on-site drums; and a storage area. From the late 1920s to 1970, M&G used the site to treat wood poles with various preservatives including creosote and PCP. Process wastewater from these activities may have been discharged to the disposal pond. In 1970, M&G began using only CCA for treatment and began recycling the process solution within the treatment system. Investigations conducted by EPA have detected contamination of the on-site surface and subsurface soil and ground water, which is thought to be a result of leaking pipes, drippings from treated poles, contamination from the disposal area, and an on-site spill of 4,000 to 5,000 gallons of CCA in 1979. In 1988, M&G conducted initial clean-up activities by overpacking and storing on site approximately 200 deteriorated drums containing PCP-contaminated soil and waste. In 1989, a thick layer of PCP-contaminated oil, referred to as the LNAPL plume, was identified floating on the upper aquifer. Subsequently, a pump was installed in an on-site well to recover the oil, which is currently stored on site in the drum storage facility. In 1988, EPA initiated pilot tests for soil washing to remove PCP and PAHs from contaminated on-site soil, and in 1989 initiated tests for a mobile biological ground-water treatment system. EPA has divided the site into two OUs for remediation. OU1 will address remediation within the on-site disposal area of the M&G facility. OU2 will address ground-water remediation for the entire site, as well as remediation of soil, process and storage tanks, and waste containers outside of the disposal area. This ROD provides an interim remedy for OU2. The primary contaminants of concern affecting the soil, debris, sludge, and ground water are organics including dioxins, PAHs, and PCP and metals including arsenic and chromium.

Selected Remedial Action

The selected RA for this site includes removing 100,000 gallons of PCP waste oil and sludge from abandoned, above-ground and underground PCP process/storage tanks; decontaminating, dismantling, and disposing off site of the waste process/storage tanks; separating PCP waste and decontamination liquids into oil and water phases using an oil/water separator; plugging a discharge line from one of the underground vaults to the disposal off-site area; pumping ground water from beneath the LNAPL plume to enhance LNAPL recovery via a ground-water depression/oil extraction process; containing and on-site storage of PCP-contaminated oil and sludge from tanks, residuals from ground-water/wastewater treatment facility, and LNAPL oil from ground water; treating ground water, and tank and tank decontamination wastewater using an on-site bioremediation wastewater treatment facility and, if necessary, a carbon adsorption polishing unit; discharging effluent water off site to a POTW; monitoring the

LNAPL plume; and implementing site access restrictions. The selected remedy may be modified to include a technology referred to as the contained recovery of oily waste process if the process proves successful in a pilot test. The estimated present worth cost for this RA is $3,542,543, which includes an annual O&M cost of $336,000.

Performance Standards or Goals

Chemical-specific clean-up goals were not provided for this interim remedy.

Institutional Controls

Not provided.

MAIN STREET WELL FIELD, IN
March 29, 1991

The 48-acre Main Street Well Field (MSWF) site is in Elkhart, Elkhart County, Indiana. The well field provides the primary water supply for the 44,000 city residents. Adjacent to the site are several industrial properties including Excel and Durakool to the east, and Elkhart Products to the west, which used TCE and other organic solvents as part of their operations. The site is bounded by Christiana Creek to the north and the St. Joseph River to the south. MSWF is located in both a wetlands and a floodplain, and overlies a sole source aquifer. Since the early 1900s, an on-site treatment and pumping station has been used for the purification and distribution of water to the surrounding community. The well field contains 17 production wells, two interceptors used as production wells, two 2 million gallon storage tanks, an air stripper facility, and recharge ponds. Site contamination first occurred during the 1950s when phenols from a nearby fuel tank farm, east of the well field, were detected in on-site wells. The contamination was mitigated by excavating six recharge ponds and diverting the water to those ponds from Christiana Creek. During routine sampling in 1981, EPA identified TCE contamination in on-site wells. Sampling wells were installed on the Excel and Durakool properties, and the results of this testing indicated these industries were the likely sources of contamination. Subsequently in 1981, the city constructed two eastern interceptor wells, which discharged to Christiana Creek, and removed the nearby production wells from service. As a result, TCE levels in finishing and production wells dropped significantly. In 1984, TCE levels on the west side of the field increased, and EPA suspected a second plume had impacted the well field. A 1985 ROD provided for construction of an air stripping facility to treat water from the seven production wells and the two eastside interceptions. Subsequent investigations further characterized on-site contamination and led to the discovery of a TCE-contaminated paint layer on the soil in eastern area of the site. This ROD addresses management of migration of the western contaminant plume, as well as source control on the east side of the well field. A third remedial action may be necessary if further on-site contamination is identified. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE, TCE, and xylenes; other organics including PAHs; and metals including arsenic.

Selected Remedial Action

The selected RA for this site includes treating 22,000 cubic feet of contaminated soil by *in situ* vacuum extraction; removing the 60 cubic yards of soil containing the paint layer, followed by off-site incineration or suitable treatment based on waste characterization and off-site disposal in accordance with the LDRs soil and debris treatability variance; constructing new interceptor wells on the west side of the field; continued pumping and treatment of ground water using the existing air stripping unit; ground-water monitoring; and implementing institutional controls including deed restrictions. The estimated present worth cost for this RA is $3,370,000, which includes an estimated annual O&M cost of $130,000 for 20 years.

Performance Standards or Goals

Performance standards for soil and ground water are based on a 10^{-5} excess lifetime cancer risk. Chemical-specific goals for soil include TCE 100 *ug*/kg. Interceptor wells will remain operational as long as plumes entering the field have cancer risk levels greater than 10^{-6}. Chemical-specific goals for ground water include PCE 0.6 *ug*/l and TCE 1 *ug*/l.

Institutional Controls

Deed restrictions will be implemented on the east side of the site until specified clean-up standards are met and maintained for five years. The city of Elkhart has requested that prevention of residential exposure from the west side be accomplished by whatever means necessary.

MICHIGAN DISPOSAL SERVICE, MI
September 30, 1991

The 68-acre Michigan Disposal Service Landfill site is an inactive municipal landfill in Kalamazoo, Kalamazoo County, Michigan. Land use in the area is predominantly industrial, commercial, and residential. The eastern border of the site lies within a wetland and the 100-year floodplain of nearby Davis Creek. From 1925 to 1961, the site was owned and operated by private parties as a municipal landfill. Forty-seven acres of the total site were used as a landfill. In 1961, the city of Kalamazoo purchased the property and began accepting waste from residences, businesses, and local industries. The majority of this waste was incinerated on site, with on-site disposal of the ash. From 1968 to 1981, the site was licensed to accept only inert waste, and incineration ceased due to new air pollution regulations. In 1981, the site was sold, and subsequently, was operated as a licensed landfill. During the mid-1980s, the state conducted investigations as part of a landfill extension request. These on-site studies documented that waste leaching from the landfill had contaminated on-site soil, sediment, and ground water. To continue landfill operations, the owners were ordered to install a collection system to intercept leachate prior to entry into Davis Creek to prevent contamination of the creek. This ROD addresses on-site contaminated soil, sediment, ground water, and surface water, as a final remedy. The primary contaminants of concern affecting the soil, sediment, debris, ground water, and surface water are VOCs including benzene; other organics including PCBs; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes installing a clay cap and revegetating the landfill contents; installing a leachate collection system and a gas venting system for the landfill; pumping and pretreating ground water on site, as required, followed by off-site discharge of the ground water/leachate to a POTW; monitoring all media; and implementing institutional controls, and site access restrictions including fencing. The estimated present worth cost for this RA is $8,269,500, which includes an annual O&M of $253,800 for 20 years.

Performance Standards or Goals

Ground-water clean-up goals are based on SDWA and state standards. Chemical-specific goals for ground water include benzene 1 *u*g/l (state), arsenic 0.02 *u*g/l (state), and lead 5 *u*g/l (state).

Institutional Controls

Deed and ground-water use restrictions will be implemented to prevent exposure to site contaminants.

MOTOR WHEEL, MI
September 30, 1991

The 24-acre Motor Wheel site is an inactive industrial waste disposal site in Lansing, Ingham County, Michigan. Land use in the area is predominantly industrial. The site overlies a glacial till and a glacial aquifer. From 1938 to 1978, the Motor Wheel Corporation used the site for the disposal of solid and liquid industrial wastes including paints, solvents, liquid acids and caustics, and sludge. Waste was disposed of in tanks, barrels, seepage ponds, and open fill operations. An estimated 210,000 cubic yards of waste fill is in place on site. As a result of disposal practices, contaminants have leached through the soil and into the underlying glacial aquifer and perched zone. Between 1970 and 1982, at least three on-site clean-up actions were initiated. In 1970, the state required the removal and off-site disposal of solid waste, paint sludge, and oils from seepage ponds and backfilling of excavated pond areas. In 1978, industrial waste and degraded soil were excavated and stockpiled on site under a clay cover. In 1982, the site owners removed three 10,000-gallon tanks, their contents, and surrounding contaminated soil, along with contaminated fill material containing an unknown quantity of drums. This ROD addresses the waste mass and ground-water contamination in the perched zone and the glacial aquifer. The primary contaminants of concern affecting the soil, debris, and ground water are VOCs including benzene, PCE, TCE, toluene, and xylenes; organics including PAHs, PCBs, and pesticides; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes backfilling the northern portion of the fill area with 125,000 cubic yards of fill; capping the disposal area with a 14.9-acre multi-media cap; installing a slurry wall at the western and southern boundary of the disposal area; installing ground-water recovery wells or trenches downgradient, and a collection transfer system to deliver water to an on-site treatment facility; pretreating ground water on site to remove iron and manganese using aeration, clarification, and filtration if needed, followed by on-site treatment using air stripping and carbon adsorption; using activated alumina to remove fluoride from ground water, followed by off-site discharge of the treated water to a POTW; monitoring ground water; and implementing institutional controls including deed and ground-water use restrictions, and site access restrictions such as fencing. The estimated present worth cost for this RA is $30,720,300, which includes a capital cost of $11,083,300 and an annual O&M cost of $1,277,400 for 30 years.

Performance Standards or Goals

Ground-water clean-up goals are based on state health-based standards or MDLs, whichever is higher. Chemical-specific goals include benzene 1 *ug*/l (state), PCE 1 *ug*/l (MDL), TCE 3 *ug*/l (state), toluene 800 *ug*/l (state), xylenes 300 *ug*/l (state), and lead 5 *ug*/l (state).

Institutional Controls

Deed and ground-water use restrictions will be implemented on site.

NATIONAL PRESTO INDUSTRIES, WI
September 30, 1991

The 325-acre National Presto Industries site is a former munitions and metal-working facility in Eau Claire, Chippewa County, Wisconsin, adjacent to the town of Hallie. Surrounding land use is light residential and commercial, and the Chippewa River is located approximately two miles north and west of the site. Lake Hallie is located approximately one mile north of the site. The site overlies a buried pre-glacial valley that serves as a primary source of drinking water. From 1942 until 1945, the site was a government-owned, contractor-operated producer of gunpowder, small arms, and radar tubes. The site was owned by National Presto Industries (NPI) since 1948. Initially, NPI manufactured cookware and consumer products, and generated waste streams consisting of metals, oils, grease, and spent solvents during operations. Also, beginning in 1951, artillery shell fuses and aircraft parts were produced by NPI under military contracts. Metal projectiles production began in 1954 under separate contracts. Early waste-handling practices included the use of dry wells and seepage pits with overflow from the pits discharged to a former sand and gravel pit via gravity flow. Waste was discharged directly to the sand and gravel pit. During the 1960s, three additional lagoons were constructed as percolation ponds with the former sand and gravel pit serving as a settling pond. A major waste stream generated from the defense-related activities was a spent forge compound, composed of mineral oil, graphite, VOCs, and asphalt, which accounts for much of the sludge in the bottom of one of the settling ponds. From 1966 to 1969, the spent forge compound also was landfilled on site. Subsequently, the spent forge compound was recycled as part of the manufacturing process. Based on their investigations, EPA required NPI to provide bottled water to an area in Hallie where private wells were contaminated or threatened by contamination from confirmed on-site sources. A 1990 ROD provided a permanent alternate water supply in the form of hookups of affected residents and businesses to municipal distribution systems. Further investigations by EPA helped determine the presence of four major contaminants migrating from the NPI site. This ROD addresses management of migration as an interim remedy. A subsequent ROD will address final remedies for both on-site source control and ground water. The primary contaminants of concern affecting the ground water are VOCs including PCE, TCA, and TCE.

Selected Remedial Action

The selected RA for this interim remedy includes on-site pumping and treatment of ground water using two cascade aeration units; discharging the treated water to on-site storm sewers for transport to surface water; conducting further studies to determine the need for pretreatment of ground water; installing a dedicated pipe system for surface water discharge if the storm sewer system cannot be utilized; and conducting long-term ground-water monitoring. The estimated present worth cost for this RA is $1,290,000, which includes an annual O&M cost of $163,000 for years 0 and 1 and $104,000 for years 2 through 30.

Performance Standards or Goals

Treated water must meet the requirements of CWA ambient water quality criteria and state standards for discharge to surface water. Chemical-specific goals are not provided, but will be developed as part of subsequent investigations.

Institutional Controls

Not provided.

NORTHSIDE SANITARY LANDFILL (ENVIRO-CHEM), IN

Amendment
July 31, 1991

The Northside Sanitary Landfill site is a hazardous and solid waste disposal facility in Boone County, Indiana. Adjacent to the Northside Sanitary Landfill (NSL) site is another Superfund site, Enviro-Chem which, prior to this ROD amendment, was to be remediated in a combined remedy for both sites. Land use in the area is agricultural to the south and east, and residential to the north and west, with approximately 50 residences located within one mile of the sites. Run-off from the sites is collected in a ditch, which flows off site and eventually empties into a reservoir that supplies approximately six percent of the drinking water for the city of Indianapolis. NSL began operating as a landfill between 1955 and 1962. By 1981, NSL was operating as a hazardous waste disposal facility and had accepted at least 16 million gallons of hazardous substances including paint sludge, acids, spent acids, and waste oil. Throughout its operation history, NSL was allegedly accepting an abundance of unapproved waste from off-site facilities including Enviro-Chem, an adjacent waste recovery, reclamation and brokering facility. Additionally, EPA and the state cited NSL for numerous operational deficiencies. In 1983, NSL's hazardous waste and solid waste operators permits were denied because of leachate collection problems, acceptance of unapproved waste, and deficiencies in its closure, post-closure and ground-water assessment plans. The state then ordered NSL to perform several remedial measures including installing a functioning leachate collection system around the entire perimeter of the landfill, installing a slurry wall or another measure to prevent ground-water migration, monitoring ground water, and to discontinue acceptance of solid waste except for that amount needed to adequately contour the site. A 1987 ROD provided a combined remedy for both the NSL and Enviro-Chem sites due to their proximity and other similarities. The 1987 ROD addressed source control capping; pumping and on-site treatment of ground water; and implementing deed and access restrictions. Since the signing of the ROD, EPA and the state have been engaged in negotiations with the PRPs for each site. These negotiations have resulted in separate, complimentary remedies and individual consent decrees for each site, and modifications to the original selected remedy. This ROD amendment provides a comprehensive remedy and addresses both source control and ground-water remediation. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, PCE, TCE, and toluene; other organics including phenols; metals including arsenic, chromium, and lead; and oils.

Selected Remedial Action

The amended RA for this site includes constructing a pipeline to pump ground water and leachate off site to the city sewer system at the city wastewater treatment plant and constructing a hydraulic isolation wall system south and west of NSL to prevent uncontaminated ground water from entering the ground-water leachate collection trench. If for any reason the city treatment plant cannot be used, this ROD amendment provides a contingency for on-site treatment of ground water followed by on-site discharge to surface water as specified in the 1987 ROD; treatment at another wastewater treatment plant; or another alternative consistent with the CWA. Other RA documented in the 1987 ROD including constructing a RCRA cap and gas venting system; collecting leachate and ground water in a trench system; monitoring ground water, surface water, and leachate; and implementing

site access restrictions are not affected by this amendment. The estimated present worth cost for this RA ranges from $25,000,000 to $30,000,000. No O&M costs were provided for this RA.

Performance Standards or Goals

Chemical-specific ground-water and leachate clean-up goals are based on federal ambient water quality criteria (WQC) and state water quality standards (WQS), and include arsenic 0.0175 *ug*/l (WQS), benzene 40 *ug*/l (WQS), chromium 11 *ug*/l (WQS), lead 10 *ug*/l (WQS), PCE 8.85 *ug*/l (WQS), phenols 570 *ug*/l (WQC), TCE 80.7 *ug*/l (WQS), and toluene 3,400 *ug*/l (WQC).

Institutional Controls

Not provided.

NOVACO INDUSTRIES, MI

Amendment
September 5, 1991

The 2.6-acre Novaco Industries site is a one building site in Temperance, Michigan. Land use in the area is predominantly residential and agricultural. The estimated 85 residences located within a half-mile of the site use the underlying sand/gravel and limestone aquifer as their drinking water supply. In 1979, a chromic acid leak occurred from a 1,870 gallon underground storage tank at Novaco, which led to chromium contamination of an on-site well. Subsequent sampling from 1979 to 1982 detected chromium in wells of properties adjacent to the site, and as a result new wells were installed in the uncontaminated lower aquifer. Later in 1979, Novaco Industries began pumping and treatment of 122,000 gallons of contaminated ground water, removing 400 pounds of hexavalent chromium. In 1983, the state sampled several residential wells, and chromium was not detected above background levels. However, sampling of ground-water monitoring wells in 1984 and 1985 revealed chromium contamination levels in excess of the MCL. A 1986 ROD addressed a final remedy for ground-water contamination and provided for ground-water pumping and treatment using electrochemical reduction/ion exchange polishing, followed by on-site discharge to surface water. This ROD amends the 1986 ROD. Pre-design studies during 1988 have determined that contaminant levels have continued to decrease over time, and there is no longer any indication of a chromium contaminant plume. Therefore, based on these data, there are no contaminants of concern affecting the site.

Selected Remedial Action

The amended RA for this site is no further action. Although no significant contamination is present at the site, EPA recommends that nested wells be installed and ground-water monitoring be implemented to evaluate the attenuation process. However, if contaminant levels for hexavalent chromium exceed 50 *ug*/l for two consecutive periods of monitoring, the remedy from the 1986 ROD will be implemented. There are no costs associated with this no action remedy.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not applicable.

OAK GROVE SANITARY LANDFILL, MN

December 21, 1990

The 45-acre Oak Grove Sanitary Landfill is a former municipal and industrial solid waste landfill in Oak Grove Township, Anoka County, Minnesota. Land consists of low regions of uplands and sand dunes interspersed among numerous lakes and wetlands. The nearby developed land use in the area is agricultural and residential. The site overlies two aquifers, which are separated by a semi-confining layer. The deeper aquifer provides regional potable water and supplies many area residential wells. Landfill operations began in 1967 and continued until 1984, when the operating license was suspended. An estimated 2.5 million cubic yards of waste is present in the landfill including acidic oil sludge, paint and solvent waste, foundry sands and sludge, inorganic acids, metal sludge, and chlorinated and unchlorinated organic compounds from pesticide manufacturing. In addition, lime sludge was used as a cover material on two thirds of the landfill. A 1988 ROD addressed the sources of contamination by containing the on-site waste and contaminated soil with a cover. EPA investigations in 1989 determined that the contaminated shallow aquifer discharges directly to the surface water of the adjoining wetlands where ground-water contamination is being reduced by natural attenuation, and thus, limiting migration of contaminants to the surface water. This ROD addresses remediation of contaminated shallow ground water, prevention of significant impacts on surface water from the discharge of contaminated shallow ground water, and provides for continued use of the deep aquifer as a drinking water supply. The primary contaminants of concern affecting the ground water are VOCs including benzene, toluene, and xylenes; and metals including arsenic.

Selected Remedial Action

The selected RA for this site includes long term monitoring of the shallow and deep aquifers, surface water, and sediment at a frequency of three times per year for the first year and semi-annually thereafter; natural attenuation of shallow ground water; abandoning non-essential wells; and implementing institutional controls including ground-water use restrictions. The estimated present worth cost for this RA is $800,000, which includes an annual O&M cost of $90,000 for the first year and $70,000 for subsequent years.

Performance Standards or Goals

Sediment, ground-water, and surface-water monitoring will assure that contaminant levels do not exceed SDWA MCLs, CWA ambient water quality controls, and state surface-water quality standards.

Institutional Controls

Institutional controls will be implemented for the placement of drinking water wells.

ORGANIC CHEMICALS, MI
September 30, 1991

The 5-acre Organic Chemicals site is an inactive solvent reclamation and chemicals manufacturing facility in Grandville, Kent County, Michigan. The site includes several on-site buildings, structures, above-ground storage tanks, and drum storage areas, a boiler facility, a wastewater treatment facility, and a seepage lagoon. Wetlands potentially are located 1,900 feet northwest of the site, and the Grand River is located 0.95 miles to the north of the site. A succession of petroleum-related industries leased the land for petroleum refining from 1941 to 1945, followed by transport and storage operations from 1945 to 1966. Organic Chemicals Inc., (OCI) began site operations in 1968. Company records show that between 1968 and 1980, process waste and cooling water including RCRA hazardous waste was discharged to the on-site seepage lagoon. In 1979, 2,200 gallons of lacquer thinner were spilled onto the ground on site and subsequently, some of the spilled thinner was recovered and disposed of on site in the seepage lagoon. In 1980, discharges to the lagoon ceased, and the company installed a wastewater pretreatment system, which discharged waste to the sanitary sewer system. Subsequently, in 1981, the seepage lagoon sludge was excavated and disposed of off site. In 1983, EPA documented on-site soil and potential ground-water contamination resulting from the solvent-contaminated seepage lagoon. Additionally, in 1986, the state determined that OCI was illegally disposing of sludge and other hazardous residuals from the on-site solvent recovery operations by placing these into drums or rolloff containers along with routine non-hazardous waste materials. Analysis of the drum and container contents and soil samples from the vicinity of these storage units revealed the presence of VOCs and other organics. During 1987, OCI, as part of a voluntary investigation, discovered and removed 150 buried drums containing sludge and liquid residues off site, and identified further on-site soil contamination. Federal and state investigations have determined that site contamination has resulted from past operation of the seepage lagoon by OCI, chemical spills at the site and past oil-related activities. EPA has divided the remediation into two response actions. This ROD addresses contamination in the upper ground-water system, as an interim remedy. A future ROD will constitute the final response at the site by addressing the remaining on-site ground water and soil contamination. The primary contaminants of concern affecting the ground water are VOCs including benzene, toluene, and xylenes; and other organics including PAHs and pesticides.

Selected Remedial Action

The selected RA for this site includes on-site pumping and treatment of ground water using a treatment system consisting of an equalization/sedimentation basin, two granular activated carbon vessels, and an air stripper polishing unit; discharging the treated water on site to the Grand River; disposing of treatment carbon residuals in an off-site landfill; conducting a treatability study and pump test to determine the proper treatment train and pumping rates; and ground-water monitoring. The estimated present worth cost for this interim RA is $5,931,000, which includes an annual O&M cost of $317,000.

Performance Standards or Goals

This RA is only part of a total RA and will attain ground-water cleanup ARARs during future response actions.

Institutional Controls

Not provided.

OSSINEKE GROUND WATER CONTAMINATION, MI

June 28, 1991

The Ossineke Ground Water Contamination site is an area overlying a contaminated aquifer in Ossineke, Alpena County, Michigan. Land use in the area is predominantly residential and commercial, with wetlands areas bordering the west and northeast boundaries of the site. The site hydrogeology is characterized by an upper aquifer and lower confined aquifer, both of which supply drinking water to local residents. Historically, there have been two contaminant source areas of concern within Ossineke. Area 1 is in the center of the town of Ossineke where two gas stations are located, consisting of USTs, and a former automobile rustproofing shop. In 1973, the rustproofing shop closed, the garage floor was reportedly washed with chlorinated solvents, and the residue was disposed of on the ground behind the shop. Area 2 is a laundry and dry cleaning facility that has an associated wash water pond containing chlorinated hydrocarbons and VOCs. In 1977, citizen complaints about odors from drinking water obtained from the upper aquifer prompted a number of state investigations, which revealed extensive on-site ground-water contamination in the upper aquifer. Consequently, the state advised all users of the upper aquifer to stop using their wells. In 1982, the state discovered that a snow plow had hit a gasoline pump causing an unknown amount of gasoline to spill and, subsequently, contaminate the basements of several businesses. In 1986,the state replaced residential wells affected by ground-water contamination. Because the contaminants of concern have been confirmed to be related to petroleum releases from USTs, the Superfund program does not have the authority to address cleanup under CERCLA.

Selected Remedial Action

The selected RA for this site is that no further action be taken under CERCLA Section 101, and that the site be transferred to the EPA Office of Underground Storage Tanks (OUST). In 1990, a formal transfer of the project from OSWER to OUST occurred. There are no costs associated with this no action remedy.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not applicable.

PAGEL'S PIT, IL
June 28, 1991

The 100-acre Pagel's Pit site is an active sanitary landfill facility in a predominantly rural area of Winnebago County, Illinois. Surrounding land use is mixed agricultural, rural residential, commercial, and industrial. The site is bounded on the west by Killbuck Creek. Another Superfund site, Acme Solvent Reclaiming, Inc., is located east and upgradient of Pagel's Pit. The Acme Solvent site has been shown to have contaminated the ground water in the downgradient direction. The landfill at the Pagel's Pit site is a former sand and gravel quarry with a sealed asphalt liner that covers about 47 acres. The landfill, which began operating in 1972, accepted primarily municipal waste, sewage sludge, and limited amounts of Illinois special waste. Beginning in 1980, a network of gas extraction wells was installed to remove landfill gas that is generated by the waste. Gas collected from the wells is used as a fuel source for a sludge drying operation. Some of these wells also are used for leachate collection along with the manholes installed in the landfill. In 1990, it was estimated that the landfill contained about 4,700,000 cubic yards of waste and had five to seven years of operating capacity remaining. It has been determined that the landfill has caused contamination of the ground water. This ROD addresses the landfill waste and contaminated ground water at the downgradient side of the site as OU1. A future ROD will address ground-water contamination in the southeast corner of the site that is undergoing further study. The primary contaminants of concern affecting the groundwater are VOCs including 1,2-dichloroethene and vinyl chloride; and metals including arsenic, barium, manganese, thallium and zinc.

Selected Remedial Action

The selected RA for this site includes constructing a sanitary landfill cover for the waste disposal area; pumping ground water along the west side of the site; removing inorganics by treating with ion exchange or coagulation/flocculation, if necessary, prior to on-site treatment using carbon adsorption or air stripping, followed by carbon polishing of the treated water, with on-site discharge to surface water; removing spent carbon off site for regeneration or disposal; extracting and treating leachate off site at a POTW; extracting landfill gas and using the gas for fuel, or flaring the gas; monitoring ground water, leachate, and air; maintaining all RA components; and implementing institutional controls including deed restrictions. The estimated present worth cost for this RA is $9,800,000 or $11,000,000, which includes O&M costs of $310,000 or $248,000 for 30 years, depending on the process selected.

Performance Standards or Goals

Ground-water goals are based on currently promulgated MCLs or non-zero MCLGs, except for arsenic and 1,1,-dichloroethene, or a risk level of 10^{-5} or an HI=1 for contaminants without MCLs. Chemical-specific goals were not provided.

Institutional Controls

Deed restrictions may be implemented to limit the development of property, and the placement of new wells on the property and adjacent to the site.

PINE BEND SANITARY LANDFILL, MN

September 30, 1991

The Pine Bend Sanitary Landfill (PBSL) site is located one mile east of the Mississippi River in Inver Grove Heights, Dakota County, Minnesota. Land use in the area is residential and industrial. The terrain is generally flat and contains an immature drainage system resulting in numerous on-site ponds and wetlands. The site is composed of two landfills: the 255-acre active PBSL and the inactive 52-acre Crosby American Demolition Landfill (CADL). PBSL began operation in 1971 as a mixed municipal solid waste facility. CADL accepted compressed bales of municipal solid waste from 1971 to 1974, and later, from 1976 to 1989 also accepted demolition waste. Hydrogeologic data from the site show that the two landfills are considered one site because their ground-water plumes commingle within a common surficial aquifer. The resulting plume moves through the surficial aquifer and is believed to eventually discharge to the Mississippi River via springs in the river bottom. In 1983, elevated levels of VOCs were detected in the surficial ground water beneath the site, and low levels of VOCs were identified in numerous downgradient commercial and residential wells. This contamination is believed to be the result of precipitation infiltrating through the permeable landfill material and coming in contact with buried waste. Since 1986, at the request of the state, CADL has provided bottled water to residences with contaminated wells to minimize the risk of VOC-contamination migrating from the PBSL/CADL site. This ROD addresses ground-water contamination as the first of three OUs. Future RODs will address source control and final remediation of ground water. The primary contaminants of concern affecting the site are VOCs including benzene, PCE, TCE, and toluene.

Selected Remedial Action

The selected RA for this site includes providing a permanent alternative water supply by extending the existing Inver Grove Heights municipal water supply; connecting impacted or potentially impacted premises to the municipal water supply; and permanently sealing the potentially affected on-site private water supply wells. The estimated present worth cost for this RA is $2,649,499, which includes an annual O&M cost of $30,350 for 30 years.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not provided.

RASMUSSEN'S DUMP, MI
March 28, 1991

The 33-acre Rasmussen's Dump site is a former industrial and domestic waste disposal area in Green Oak Township, Livingston County, Michigan. Surrounding land is predominantly wooded with some residential and agricultural development. Area residents rely solely on the aquifer underlying the site for their drinking water supply. The site is adjacent to the Spiegelberg Landfill, another Superfund site. During the 1960s and early 1970s, domestic, industrial, and drummed hazardous waste was disposed of on approximately one-third of the site. Many incidences of on-site burning of waste were reported during operational years of the facility. Landfill operations ended in 1977 without complying with state laws on proper capping or closure. Sand and gravel mining, which began following site closure, caused unearthed waste fill and drummed waste to be redistributed around the site. In 1981, the state detected low levels of ground-water contamination on site. This contamination includes: two on-site contaminated ground-water plumes and four areas of soil contamination referred to as the top of the municipal landfill (TML), the northeast buried drum area (NEBD), the industrial waste area (IW), and the probable drum storage, leakage, disposal area (PDSLD). In 1984, EPA removed approximately 3,000 drums and 250 cubic yards of contaminated on-site soil. In 1990, the PRPs removed an additional 650 on-site drums, waste, and associated visibly contaminated soil from the TML, NEBD, and IW areas, thereby reducing the risk posed by the areas. Testing in the PDSLD area indicated that soil contamination resulting from drum leakage continues to migrate into the soil directly above the ground-water table or into the ground water itself, and poses a continuing ground-water threat. This ROD provides a final remedy for on-site contaminated soil and ground water. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, TCE, toluene, and xylenes; other organics including ketones, chlorinated hydrocarbons, and phenols; and metals including cadmium, and lead.

Selected Remedial Action

The selected RA for this site includes capping the waste in the TML and NEBD areas, and removing and disposing of waste drums unearthed during cap construction off site at a RCRA facility; ground-water pumping and treatment using chemical precipitation followed by pH adjustment to remove metal contaminants, a biological treatment system to remove organic ground-water contaminants, and air stripping and granular activated carbon to remove residual organic contaminants as necessary; discharging the treated ground water on site through a seepage basin in the IW and PDSLD areas to flush area soil monitoring ground water; continuing residential well sampling in conjunction with sampling for the adjacent Spiegelberg Superfund site; and implementing institutional controls including deed restrictions, and site access restrictions such as fencing. The estimated capital cost for this RA is $7,320,000, with an annual O&M cost of $4,580,000.

Performance Standards or Goals

Soil contaminant levels in the PDSLD/IW areas will be reduced to less than 20 times the ground-water clean-up level for each chemical; or leach tests performed on the PDSLD/IW soil must produce leachate with concentrations below the ground-water clean-up levels. Ground-water clean-up goals are based on a 10^{-6} cancer risk level, HLSC detection limits, taste and odor threshold, state standards, and risk- and health-based criteria. Chemical-specific goals for ground water include benzene 1.2 *ug*/l

(risk), TCE 3 *u*g/l (10^{-6} risk level), toluene 800 *u*g/l (T&O), xylenes 300 *u*g/l (T&O), cadmium 4 *u*g/l, and lead 5 *u*g/l (HLSC). Cleanup for cadmium and lead will not be required if filtered lead and cadmium samples are 5 *u*g/l and 4 *u*g/l, respectively, or if on-site filtered lead and cadmium levels are greater than 5 *u*g/l and 4 *u*g/l respectively and these on-site filtered lead and cadmium levels are equal to or less than their corresponding filtered background levels.

Institutional Controls

Deed restrictions will be implemented at the site to prevent future intrusive land uses.

SOUTH MACOMB DISPOSAL #9, 9A, MI

August 13, 1991

The 159-acre South Macomb Disposal #9, 9A site contains two inactive municipal landfills in Macomb Township, Macomb County, Michigan. Land use in the area is predominantly agricultural and rural, with several adjacent residences. A small stream, the McBride Drain, runs along the western and southern boundaries of the site, and there is a possible wetlands area located at the site. Until 1989, the estimated 34 residents in the immediate vicinity of the site used shallow and intermediate aquifers associated with contamination from landfills as their drinking water supply. From 1968 to 1975, South Macomb Disposal Authority (SMDA), a municipal corporation, used the site to facilitate the management and disposal of municipal refuse for five towns in Macomb County. SMDA acquired the 75-acre area #9 in 1968, accepted 680,000 cubic yards of municipal waste, and capped the area with soil in 1971. Subsequently, SMDA acquired the adjacent 84-acre area 9A in 1970, filled it with 1,200,000 cubic yards of municipal waste, and capped the area with a mixture of sand, clay and silt in 1975. As a result of reported fish kills and continued reports of leachate seepage into McBride Drain, a number of state investigations between 1976 and 1982 verified that the site was the source of the leachate problem and prompted SMDA to upgrade and expand leachate collection systems along various portions of area 9A. From 1983 to 1984, the state investigations detected VOC-contaminated ground water in several residential wells near the site. Consequently, from 1985 to 1988, SMDA constructed an additional leachate collection system on area #9, and a slurry wall across the northern portion of area #9. In 1989, Macomb Township connected residences near the site to the municipal water supply. This ROD addresses on-site contaminated ground water as OU1. A future ROD will address the landfill contents as OU2. The primary contaminants of concern affecting the ground water are VOCs including benzene and toluene; other organics including phenols; and metals including arsenic and chromium.

Selected Remedial Action

The selected RA for this site includes installing extraction wells in the intermediate aquifer, both within and outside the site boundary and subsurface drains in the shallow aquifer along the periphery of the waste deposits in both sites #9 and 9A; collecting ground water and leachate in a series of collection sumps, followed by pumping to the on-site ground-water treatment system; treating the contaminated ground water on site using air stripping, followed by granular activated carbon, oxidation/precipitation, and granular media filtration, with on-site discharge of the treated water to McBride Drain; disposing of any treatment residuals off site; extending the existing slurry wall along the east side of area #9; providing a municipal water supply to any residences within a one-half mile radius of the site that are not currently attached; conducting long-term monitoring of ground water, surface water, sediment of McBride Drain, leachate, air, and residential wells; and implementing institutional controls including deed and ground-water restrictions, and site access restrictions including fencing. The estimated present worth cost for this RA is $9,264,000, which includes an annual O&M cost of $224,000.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on the more stringent of state standards or SDWA MCLs, and include benzene 2*u*g/l (state), toluene 100 *u*g/l (state), phenols 1,100 *u*g/l (state), arsenic 1 *u*g/l (state), and chromium 100 *u*g/l (MCL).

Institutional Controls

Deed and ground-water restrictions will be implemented on site to prevent future development of the landfill and to limit site access.

SOUTHEAST ROCKFORD GROUNDWATER CONTAMINATION, IL

June 14, 1991

The 2 to 3 square mile Southeast Rockford Groundwater Contamination site is a residential area with contaminated private wells in Winnebago County, Rockford, Illinois. The site is in a predominantly urban residential area that includes retail and commercial operations. Surrounding land use is industrial. During sampling from 1981 to 1984, the city of Rockford identified elevated VOC levels in ground water. Subsequently, in 1985, four municipal wells including municipal well #35 and several private wells were closed. In 1984, after plating waste was illegally disposed of in a well, EPA conducted investigations that identified contamination by VOCs and inorganics in municipal and private wells. From 1986 to 1989, further EPA investigations defined a 1.2-mile contaminated area. In 1989, EPA initiated an emergency action including temporarily providing bottled water and attaching carbon filters at affected residences and ultimately connecting wells to the city water supply if VOC-contamination exceeded 25 percent of the removal action level. This ROD addresses the elimination of risk to residents of the southeast Rockford area due to contaminated ground water. A subsequent ROD will address remediation of the contaminated ground-water plume. The primary contaminants of concern affecting the ground water are VOCs including PCE and TCE.

Selected Remedial Action

The selected RA for this interim remedy includes providing an alternate water supply by constructing and extending water mains, and installing connections and service to the city distribution system for affected residents; reactivating municipal well #35 after constructing a granular activated carbon water treatment facility at the well; and abandoning contaminated private wells. The estimated present worth cost for this RA is $5,820,000, which includes an annual O&M cost of $436,800 for years 1 through 5 and $58,800 for years 6 through 30.

Performance Standards or Goals

Ground-water clean-up standards are based on state and federal standards. No chemical-specific clean-up standards were provided in the ROD.

Institutional Controls

Not provided.

STOUGHTON CITY LANDFILL, WI

September 30, 1991

The 27-acre Stoughton City Landfill site is a former waste disposal facility in Stoughton, Dane County, Wisconsin. The site was an uncontrolled dump site from 1952 to 1969, and later from 1969 to 1977 operated as a state-licensed landfill covering approximately 15 acres. Land use in the area is predominantly agricultural and residential, with several wetlands areas located adjacent to the site. In addition, part of the site lies within the 100-year floodplain of the Yahara River, located west of the site. From 1954 until 1962, liquid waste was commonly poured over garbage and burned. In addition, some liquid waste was poured down holes drilled to test auger drilling equipment. From 1969 to 1977, both solid and liquid municipal wastes were disposed of at the Stoughton Landfill. In 1977, the state required that the site be closed and initiated closure activities that included constructing a trash transfer station, placing cover materials, applying topsoil, and seeding. As a result of improper disposal activities, a number of investigations were conducted by the state and EPA that revealed ground-water contamination resulting from leachate discharge and surface water run-off from the landfill. This ROD addresses soil and ground water contaminated by leaching landfilled waste. The primary contaminants of concern affecting the soil, debris, and ground water are VOCs including benzene, THF, toluene, and xylenes; other organics including PAHs; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes placing a solid waste disposal facility cap over the site; excavating waste in contact with ground water along the southeastern and northeastern sections of the site and consolidating this waste under the cap; pumping and treatment of contaminated ground water unless additional monitoring indicates that ground-water extraction is not required to achieve compliance with state quality standards, and subsequent on-site discharge of the treated ground water to the Yahara River in compliance with NPDES effluent limitations; long-term monitoring of ground water; and implementing institutional controls and site security measures including fencing the entire site perimeter. The estimated present worth cost for this RA is $7,546,000, which includes an annual O&M cost of $329,600 for years 0 through 5 and $146,600 for years 6 through 30.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on state preventive action limits (PALs), and include THF 10 *ug*/l.

Institutional Controls

Land use restrictions will be implemented to prevent the installation of a well within 1,200 feet of the property boundary and residential development of the site.

STURGIS MUNICIPAL WELLS, MI

September 30, 1991

The 5 square mile Sturgis Municipal Wells site is an active municipal well field in Sturgis, St. Joseph County, Michigan. Land use in the area is predominantly mixed industrial and residential, with several wetlands areas located near the site. The estimated 10,000 residents of Sturgis use the intermediate and deep aquifers as their drinking water supply. The site includes the former Wade Electric facility, which closed in 1966 and burned down in 1974, and the Kirsch Company, which operated as a manufacturing facility until 1980. These two properties have been identified as two source areas responsible for the ground-water contamination in the aquifer used for the municipal water supply. State investigations starting in 1982 identified contaminated soil and VOC-contaminated ground-water on site and extensive ground-water contamination in various wells throughout the city. This ROD addresses final remediation of soil and ground water. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, PCE, and TCE; and other organics including PAHs.

Selected Remedial Action

The selected RA for this site includes treating VOC-contaminated soil using vapor extraction, followed by activated carbon adsorption to capture off-gases; regenerating carbon off site; excavating and disposing of off site 10,890 cubic yards of low level PAH-contaminated soil (10,000 cubic yards from the Kirsch property and 890 cubic yards from the Wade property); on-site pumping and treatment of ground water using air stripping, followed by vapor phase granular activated carbon to treat off-gases; discharging the treated water on site either to surface water via a storm sewer or made available for use by the municipal water system; ground-water monitoring; and implementing institutional controls, and site access restrictions including fencing. A contingency plan would be developed to allow for the rapid installation of a mobile water supply treatment system, should it be required at any of the existing municipal supply wells. The estimated present worth cost for this RA is $13,810,000 for discharge of treated ground water to a storm sewer, which includes an annual O&M cost of $644,600 for years 0 through 3 and $598,000 for years 4 through 30.

Performance Standards or Goals

Chemical-specific soil clean-up goals for VOCs are based on state standards, and include PCE 14 *u*g/kg and TCE 60 *u*g/kg. Soil containing PAHs will be excavated to 330 mg/kg, based on state standards. Chemical-specific ground-water clean-up goals are based on state standards, and include benzene 1 *u*g/l, PCE 1 *u*g/l, and TCE 3 *u*g/l.

Institutional Controls

Ground-water use restrictions will be implemented to prevent further installation of wells in the city of Sturgis pending restoration of the well field and associated aquifers.

SUMMIT NATIONAL LIQUID DISPOSAL SERVICE, OH

Amendment
November 2, 1990

The 11.5-acre Summit National Liquid Disposal Service site is a former liquid waste disposal facility in rural Deerfield Township, Ohio. The site contains two ponds, an inactive incinerator, and several vacant buildings. Surrounding the site are several residences, two landfills, light industries, and farmland. Fifteen to twenty residential wells are located within 1,000 feet of the site. From 1973 to 1978, Summit National operated a solvent recycling and waste disposal facility on site. Oil, resins, sludge, pesticide and plating waste, and other liquid waste was stored, incinerated, and buried or dumped on site during facility operations. In 1978, the state ordered Summit National to stop accepting waste material and to remove all liquid waste from the site. In 1980, EPA removed three bulk tanks, which contained approximately 7,500 gallons of hexachlorocyclopentadiene along with contaminated soil, and treated some contaminated water. In 1981, the state and eight of the potentially responsible parties removed additional drums, tanks, surface debris, and a small amount of contaminated soil from the site. Subsequently, EPA took interim measures to control the migration of contaminants off site and excavated an UST. During the RI/FS, conducted from 1984 to 1987, EPA documented on-site contamination of soil, sediment, ground water, and surface water by a variety of organic and inorganic compounds. Contaminated property outside the site perimeters also was found. This ROD amends a 1988 ROD that provided for remediation of contaminated soil, sediment, debris, ground water, and surface water. Based on further site investigations, EPA modified their original goal of containing contaminated media to one of long-term clean up at the site. In both the 1990 proposed remedy for this ROD amendment and the 1988 ROD, the remedy for the most highly contaminated soil and sediment is excavation and treatment; however, the ground-water extraction method in the 1990 proposed remedy was significantly different from the 1988 ROD and employed a different technology that will result in long-term soil cleaning, thus eliminating the need for containment of contaminants with a slurry wall and multi-layer cap as provided in the 1988 ROD. The primary contaminants of concern affecting the soil, sediment, debris, ground water, and surface water are VOCs including benzene, TCE, toluene, and xylenes; other organics including PAHs, PCBs, and phenols; and metals including arsenic and chromium.

Selected Remedial Action

The amended RA for this site includes expanding site boundaries to include contaminated areas along the site perimeters; excavating and incinerating on site 24,000 cubic yards of soil excavated to a depth of 2 feet, 4,000 cubic yards of sediment from the site perimeter, drainage ditches and off-site ponds, and 900 to 1,600 buried drums, followed by backfilling the residual ash on site, or disposing of the ash off site in a RCRA facility if the waste does not meet EPA performance standards; regrading the site; installing a permeable soil cover over 10.6 acres of the site with gas vents for treating and monitoring potential air emissions; dismantling and/or demolishing all on-site structures, and disposing of debris on site; collecting ground water from the upper aquifer via pipes and drains, and constructing additional extraction wells in the lower aquifer to augment the pipe and drain system, followed by treating ground-water on site; collecting and treating on-site surface water from the two on-site ponds and drainage ditches using precipitation, flocculation, coagulation, oil and water separation, filtration, and carbon adsorption using a pipe and drain collection

system; excavating sediment after dewatering the ponds and ditches; relocating one vacant residence; rerouting the south and east drainage ditches to an uncontaminated area.

Performance Standards or Goals

Performance standards and goals were detailed in the 1988 ROD. Soil cleanup will attain a 2×10^{-5} cancer risk level. Discharge levels for treated ground water and surface water will meet federal and/or state water quality standards. Individual clean-up goals for soil and ground-water contaminants were not provided.

Institutional Controls

Deed restrictions will be implemented to control future site usage.

THERMO CHEM, MI
September 30, 1991

The 9.5-acre Thermo Chem site is composed of an inactive solvent and chemical waste reprocessing, refining, and incineration facility, and an inactive waste hauling facility in Egelston Township, Muskegon County, Michigan. The area surrounding the site consists of residential areas, light manufacturing and commercial buildings, and undeveloped woodlands. The site is adjacent to two other Superfund sites: the SCA Independent Landfill site, and the Bofors Nobel site, which are located approximately 1,800 feet south and 1.25 miles east of the site, respectively. Site features include a warehouse, an incinerator, above-ground storage tanks, a laboratory, and process buildings and associated lagoons. A trout stream, Black Creek, is located approximately 1,500 feet south of the site and forms a broad and flat wetland. From 1969 to 1980, Thermo Chem received, distilled, and regenerated solvents, paint waste, and antifreeze into usable solvents. Unrecoverable materials and by-products including sludge and residues were incinerated on site. The Thomas Solvent Company, which lies adjacent to, and is owned by Thermo Chem, has been included as part of the site because it is suspected to be a source of ground-water contamination. The Thomas Solvent Company was operated as a hazardous waste hauling facility for Thermo Chem and collected waste for recycling and returned the material to customers. Wastewater generated from the distillation and equipment-cleaning process at Thermo-Chem was discharged on site into a series of three interconnected lagoons. In addition, approximately 3,500 drums containing raw and recycled materials were stored in an on-site UST farm area during the years of operation. Former on-site personnel indicated that sludge was occasionally buried on site, and that on-site chemical spills frequently occurred. In response to investigation activities during 1988 and 1991, EPA conducted an emergency removal of drums and materials containing hazardous waste. Federal investigations in 1990 indicated that contaminant releases were one source of ground-water contamination. This ROD addresses the source of contamination by remediation of soil, sludge, debris, and ground water up to the point where ground water discharges into Black Creek as OU1. A future ROD will address OU2, the contamination problems within Black Creek and ground-water contamination south of Black Creek. The primary contaminants of concern affecting the soil, sludge, debris, and ground water are VOCs including benzene, toluene, and xylenes; other organics including PAHs, PCBs, and pesticides; metals including arsenic, chromium, and lead; and other inorganics.

Selected Remedial Action

The selected RA for this site includes excavating, removing, and incinerating off site approximately 2,000 cubic yards of soil and sludge; treating and disposing off site any ash or residuals produced from off-site incineration; installing an *in situ* vapor extraction system and treating on site approximately 9.5 acres of remaining contaminated soil; conducting a treatability study to determine the feasibility of enhancing the natural biodegradation of organic compounds in the soil undergoing *in situ* vapor extraction system treatment; treating gases emitted from the extraction wells using a fume-rich incinerator; treating liquid from the vapor extraction process on site; covering the site with clean soil and vegetation, if necessary; decontaminating, demolishing, and disposing off site all on-site buildings and structures; on-site pumping and treatment of ground water using filtration, air stripping, metal precipitation, and pH adjustment, followed by treating off-gases using carbon adsorption and on-site discharge of the treated ground water to Black Creek; treating and disposing all residue, sludge, spent

carbon, or spent coagulants and flocculent at an off-site landfill; conducting additional treatability and leachability tests to determine the need for further excavation and/or treatment; and implementing institutional controls including land use restrictions. The estimated present worth cost for this RA is $24,300,000, which includes an annual O&M cost of $1,091,000 for 30 years.

Performance Standards or Goals

Soil clean-up standards are based on state standards and a carcinogenic risk level of 10^{-6}. Ground-water clean-up standards are based on state standards. Chemical-specific goals for soil include benzene 10 mg/kg, toluene 2 mg/kg, xylenes 1 mg/kg, PAHs 0.2 mg/kg to 0.6 mg/kg, PCBs 1 mg/kg, pesticides 0.0000006 to 0.00005 mg/kg, arsenic 0.0004 mg/kg, chromium 0.04 mg/kg, lead 9 mg/kg, and inorganics other than metals 0.08 mg/kg. Chemical-specific goals for ground water include benzene 1 *u*g/l, toluene 100 *u*g/l, xylenes 59 *u*g/l, PAHs 10 *u*g/1 to 29 *u*g/l, arsenic 0.02 *u*g/l, and inorganics other than metals 4 *u*g/l.

Institutional Controls

Land use restrictions will be implemented on site.

VERONA WELL FIELD, MI
June 28, 1991

The Verona Well Field site consists of a well field, three contaminant sources, and the ground water between the source areas and the well field in Battle Creek, Calhoun County, Michigan. Surrounding land use is mixed residential and industrial. Part of the site lies within the 100-year floodplain of the Battle Creek River, which runs southwesterly through the site. The site overlies a surficial glacial aquifer and a deeper bedrock aquifer, both of which are local sources of drinking water. The estimated 53,000 people who reside within the city of Battle Creek and several surrounding communities and industries use the Verona Well Field, screened within the bedrock aquifer, as their primary drinking water source. From 1964 until 1984, the Thomas Solvent Company stored, blended, repackaged, distributed, and disposed of industrial solvents at both their Thomas Solvent Raymond Road (TSRR) facility and their Thomas Solvent Annex facility. Three source areas of contamination have been identified on site, including the TSRR and Annex facilities, and a paint shop in the Grand Trunk Western Railroad (GTWRR) marshalling switching yard. Contamination of the on-site soil has resulted from surface spills, leaking drums, and leaking underground storage tanks. During the 1960s and 1970s, the paint shop in a car department at the GTWRR used solvents for degreasing and cleaning purposes. Spent solvents were either disposed of directly on the ground or in a drum pit outside the car department building. In 1981, ground-water contamination was discovered at the site, which resulted in a number of investigations conducted by the state and EPA. In 1984, an IRM provided for the conversion of 12 production wells into purge wells, and the installation of three new production wells and an air stripper. A 1985 ROD addressed remediation of soil and ground water at the TSRR facility, and provided for treatment of contaminated soil using vapor extraction with off-gas treatment, and pumping and treatment of contaminated ground water. This ROD addresses the second and final OU for soil and ground-water contamination at the site. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, PCE, TCE, toluene, and xylenes; other organics including phenols; and metals including arsenic and chromium.

Selected Remedial Action

The selected RA for this site includes treating soil at the Thomas Solvent Annex and the GTWRR paint shop area using *in situ* soil vapor extraction; continuing the operation of the existing purge wells and air stripper; installing additional purge wells, and treating extracted ground water from the well field and source areas on site using air stripping and vapor phase carbon adsorption, with on-site discharge to surface water; and monitoring ground water, soil, surface water discharge, and air. The estimated present worth cost for this RA is $15,300,000, which includes an annual O&M cost of $840,000 for a maximum of 30 years.

Performance Standards or Goals

Clean-up goals for soil and ground water are based on state standards. Chemical-specific goals for soil include benzene 20 *u*g/kg, PCE 10 *u*g/kg, TCE 60 *u*g/kg, toluene 16,000 *u*g/kg, xylenes 6,000 *u*g/kg, arsenic 0.4 *u*g/kg, and chromium 2,000 *u*g/kg. Chemical-specific goals for ground water include benzene 1 *u*g/l, PCE 0.7 *u*g/l, TCE 3 *u*g/l, toluene 800 *u*g/l, xylenes 300 *u*g/l, arsenic 0.02 *u*g/l, and chromium 100 *u*g/l.

Institutional Controls

Not provided.

WASHINGTON COUNTY LANDFILL, MN

November 15, 1990

The 40-acre Washington County Landfill site is an inactive sanitary landfill in Lake Elmo, Washington County, Minnesota. Land use in the area is predominantly residential and agricultural. Lake Jane is located 250 feet north of the landfill. The site overlies the St. Peter Sandstone and Prairie du Chien Dolomite aquifers, both of which are sources of drinking water for an estimated 3,000 residents living within three miles of the site. From 1969 to 1975, Washington and Ramsey counties used the site as a sanitary landfill. The landfill is located in an old gravel pit, and was constructed without a liner. An area of approximately 35 acres was filled with solid waste to an average depth of approximately 30 feet. About 2.57 million cubic yards of solid waste, excluding cover material, were disposed of in the landfill. The waste was primarily composed of residential waste with smaller amounts of demolition and commercial waste. Monitoring by Washington County in 1981 revealed low-level VOC contamination, which poses a health risk based on long-term ingestion of ground water. In 1983, four nearby private wells also were found to contain low levels of VOCs, and drinking water well advisories were issued. A 1984 ROD provided for the installation and operation of a ground-water gradient control and spray-irrigation treatment system at the landfill. It also provided a safe drinking water supply to residents with drinking water well advisories and initiated monitoring of the ground-water gradient control system. This ROD addresses a final remedy for drinking water supply as part of a second OU. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCE, and xylenes.

Selected Remedial Action

The selected RA for this site includes providing a municipal drinking water supply system to supply drinking water to 10 homes with private wells that have been affected by the contaminant plume; and continuing operation of the gradient control well and spray-irrigation treatment system for the first OU, which consists of four gradient control wells, two on-site spray-irrigation treatment areas, and on-site discharge to surface water. The estimated present worth cost of this RA is $400,000, which includes an annual O&M cost of $2,469.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on recommended allowable limits established by the state and include benzene 7 *ug*/l, PCE 6.6 *ug*/l, TCE 31 *ug*/l, and xylenes 400 *ug*/l.

Institutional Controls

Not provided.

ZANESVILLE WELL FIELD, OH
September 30, 1991

The 100-acre Zanesville Well Field site is an active manufacturing and municipal well site in Zanesville, Ohio. The site is composed of the 28-acre United Technologies Automotive (UTA) facility and the 72-acre city of Zanesville Well Field. Land use in the area is predominantly residential and industrial. The Muskingum River borders the manufacturing area on the west and the well field on the east. From 1929 to the present, the UTA property was used for various types of manufacturing activities. During the early 1970s, a 10-foot wide, 75-foot deep on-site well was filled in by using demolition material and approximately 121 steel drums, some of which contained TCE. Additionally, TCE-based solvents were stored in a bulk storage tank adjacent to the well, and other waste solvents were stored in drums located near storm sewer basins. After EPA investigations in 1981 revealed VOC contamination in on-site ground water, the use of three wells at the Zanesville Well Field was discontinued. In 1983, approximately 145 tons of waste were removed from the filled in well by UTA when the well was properly abandoned and sealed. Two of the three on-site wells are currently part of a ground-water interceptor system, in which extracted contaminated water is discharged directly to the Muskingum River. This ROD addresses contaminated soil on and around the UTA facility, contaminated ground water under and around the Zanesville Well Field and the UTA facility, and the sources of the ground-water contamination. The primary contaminants of concern affecting the soil and ground water are VOCs including TCE and dichloroethylene; metals including arsenic, chromium, and lead; and other inorganics.

Selected Remedial Action

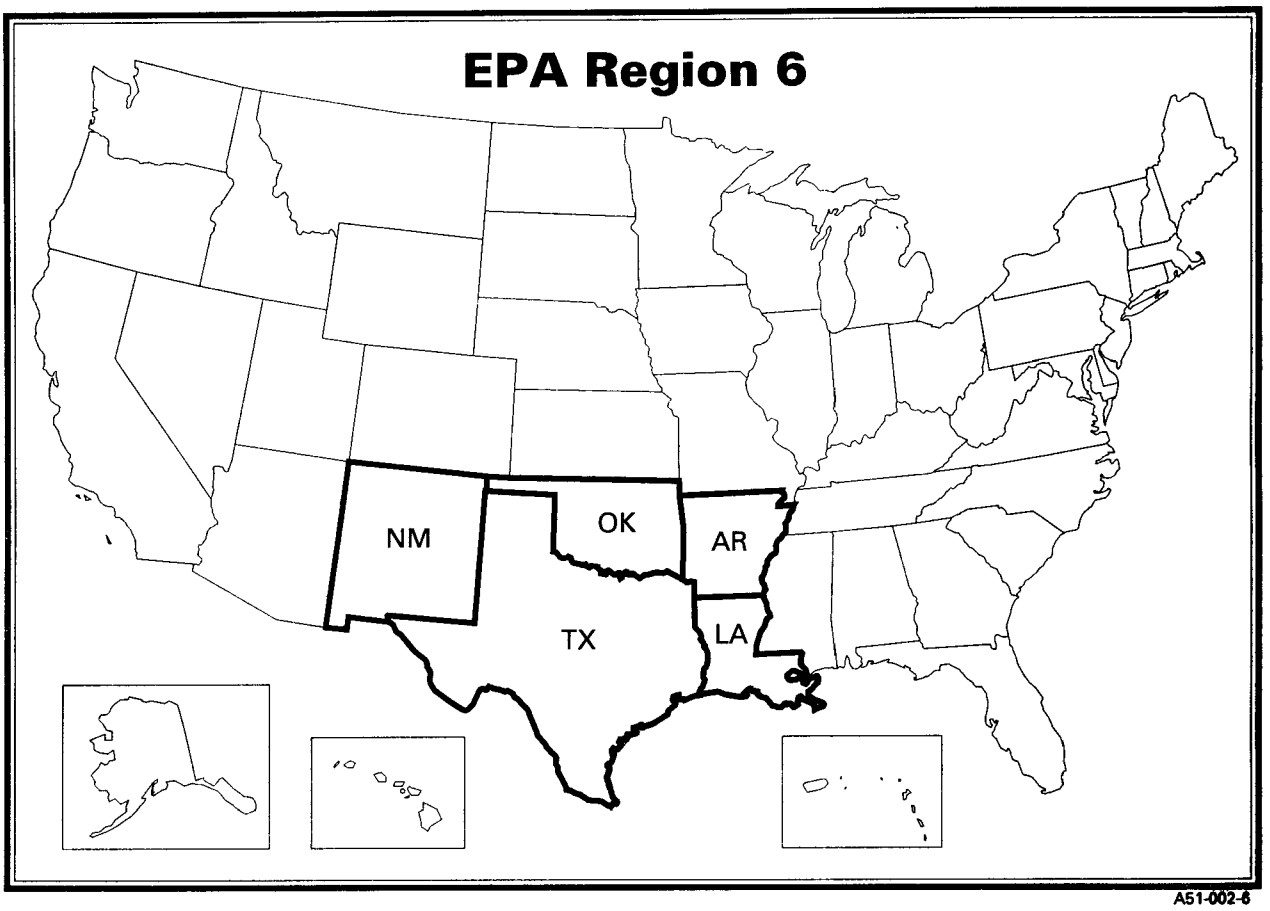
The selected RA for this site includes treating approximately 36,000 cubic yards of soil and source areas contaminated by VOCs using *in situ* vapor extraction, followed by activated carbon to control off-gases; regenerating the spent carbon from the air stripping process; treating on site 1,800 cubic yards of inorganic-contaminated soil using soil washing; replacing the treated soil on site; disposing of the concentrated waste and treatment residuals off site, with further treatment, if needed; pumping and on-site treatment of contaminated ground water using air stripping; and implementing site access restrictions to the UTA property, and to the interceptor wells, discharge pipes, and treatment facilities located in the Zanesville Well Field. The estimated present worth cost for this RA is $2,972,450, which includes a present worth O&M cost of $1,952,300.

Performance Standards or Goals

Chemical-specific soil clean-up goals are based on risk-based levels for a cumulative excess lifetime cancer risk less than 10^{-6} and an HI < 1, and include TCE 6.3 *ug*/kg and lead 12 mg/kg. Chemical-specific ground-water clean-up goals are based on SDWA MCLs, and include TCE 5 *ug*/l.

Institutional Controls

Deed restrictions will be implemented to control future use of the UTA facility until soil clean-up levels have been met and to control the use and placement of wells in the affected area until ground-water clean-up levels have been met.



REGION 6

Site	State	Page
Cimarron Mining	NM	376
Petro-Chemical (Turtle Bayou)	TX	377

CIMARRON MINING, NM

September 6, 1991

The Cimarron Mining site consists of two inactive ore-processing mills in Carrizozo, Lincoln County, New Mexico. OU2, which is the focus of this ROD, addresses contamination at the 7.5-acre Sierra Blanca mill location. Land use in the area is predominantly residential, with an estimated 900 people residing within a half mile north/northwest of the site. On-site features at the Sierra Blanca location include two buildings, four discharge pits, one cinder block trench, a septic tank system, and numerous process tanks and material piles. Prior to 1970, Scott-Tex, Inc., used the site to recover a variety of metals from ores transported to the site. In the early 1970s, the mill was temporarily shut down, and ownership was transferred to the town of Carrizozo. The site was then leased and used to recover platinum and silver from ore material. In 1982, after a possible spill occurred at the Cimarron mill, milling operations were relocated to the Sierra Blanca mill. During operations, the facility discharged contaminated liquids on site and produced approximately 570 cubic yards of contaminated material piles and other waste sludge. In 1990, EPA investigations revealed 43 cubic yards of tank sediment, 182 cubic yards of material pile soil and rock, and 345 cubic yards of discharge pit sediment and soil contaminated with high concentrations of metals, particularly lead at the Sierra Blanca location. A 1990 ROD addressed contamination of the original Cimarron mill, as OU1. This ROD addresses the final remedial action of the soil and waste piles at the Sierra Blanca mill location, as OU2. The primary contaminants of concern affecting the soil, sediment, debris, and sludge are metals including arsenic and lead.

Selected Remedial Action

The selected RA for the site includes excavating and treating on site 225 cubic yards of contaminated material piles and tank sediment, including cinder block trench sediment that failed the TCLP test, using cement solidification and stabilization; excavating and disposing of 345 cubic yards of contaminated surficial soil and sludge that did not fail the TCLP test in an on-site discharge pit along with the solidified/stabilized waste; capping the discharge pit with an impermeable cover; removing all process drums, and decontaminating tanks and associated piping on site; filling in the discharge pits and the cinder block trench with on-site soil and covering with clean fill; installing additional ground-water monitoring wells; monitoring ground water; and implementing institutional controls including deed restrictions, and site access restrictions including fencing and zoning ordinances. The estimated present worth cost for this RA is $79,000, which includes a total present worth O&M cost of $10,000.

Performance Standards or Goals

Chemical- and action-specific soil clean-up goals for lead are based on the *Interim Guidance on Establishing Soil Lead Clean-up Levels at Superfund Sites*, and remediation levels will not exceed lead 500 mg/kg.

Institutional Controls

Deed restrictions will be implemented to regulate use of property, to notify potential buyers of past activities, and to restrict permissible uses.

PETRO-CHEMICAL (TURTLE BAYOU), TX

September 6, 1991

The 500-acre Petro-Chemical (Turtle Bayou) site is in Liberty County, Texas. Current land use in the area is divided among cropland, pasture, range, forest, and small rural communities. The site overlies two aquifers and is located partially within the Turtle Bayou floodplain. Since 1929, the site has been used for cattle grazing, timber collection, and rice farming. Since 1971, numerous undocumented disposal activities occurred on site involving primarily petrochemical waste. Waste oils were dumped in unlined pits and also spread onto Frontier Park Road, an access road through the site. These disposal activities have resulted in contamination of on-site soil and ground water. Waste samples collected during state and EPA investigations indicated elevated concentrations of metals, VOCs, and organics. A 1987 ROD addressed OU1, and provided for excavation of highly contaminated soil from Frontier Park Road; placement of the highly contaminated soil in a temporary RCRA vault; filling excavated areas with clean soil; and resurfacing the entire length of the road. This ROD for OU2 focuses on three areas of contamination at the site affecting soil and ground-water contamination, known as the main waste area, the east disposal area, and the Bayou disposal area. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene and xylenes; other organics including PAHs; and metals including lead.

Selected Remedial Action

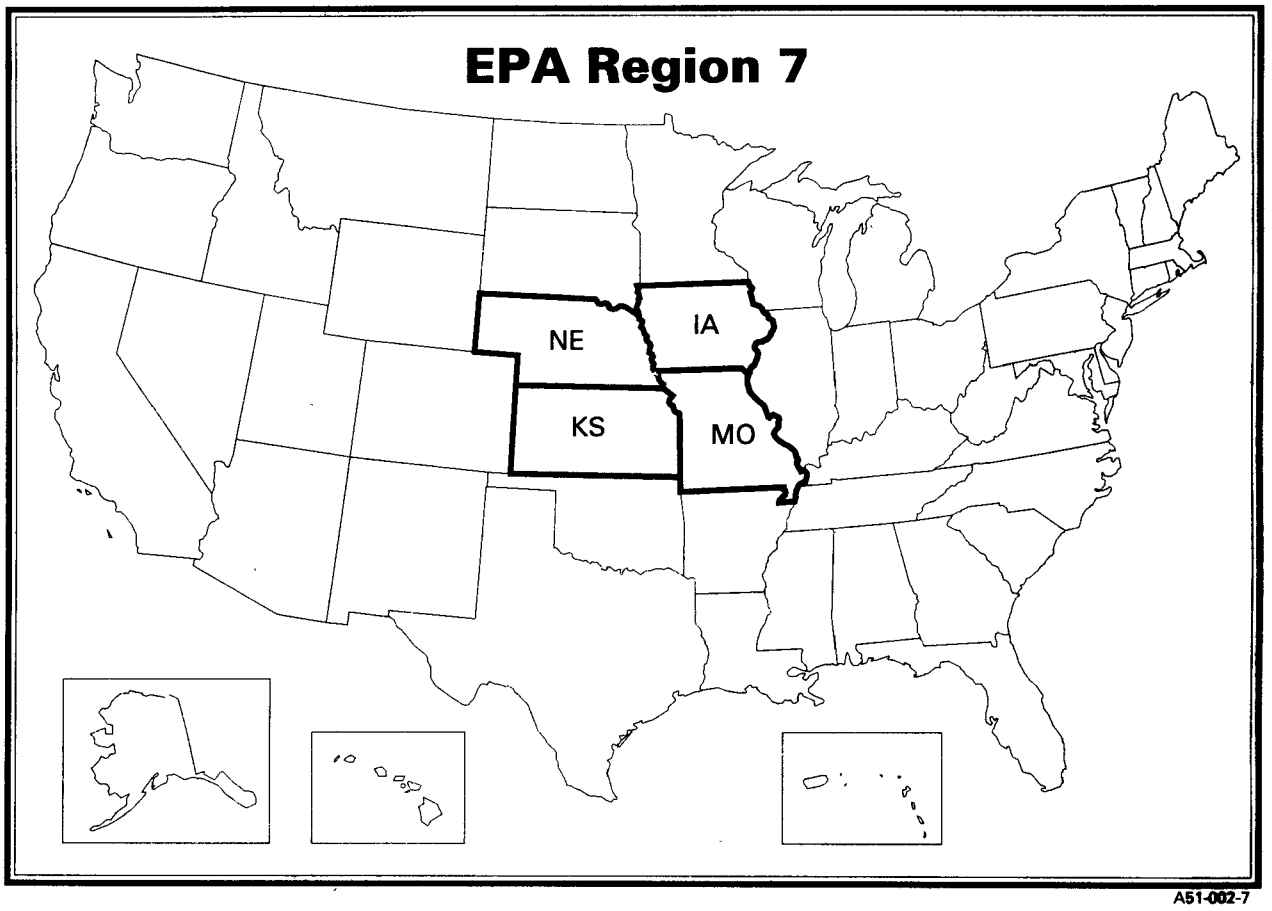
The selected RA for this site includes treating 302,800 cubic yards of contaminated soil on site using *in situ* vapor extraction to remove VOCs, including injecting air below affected soil to enhance removal of VOCs below the shallow water bearing zone; controlling vertical air infiltration using an engineered soil and synthetic liner cap; consolidating lead-contaminated soil in the main waste area, followed by capping; using a slurry wall to control horizontal migration of ground water; treating extracted vapors from soil and ground water using catalytic thermal destruction; treating ground water using *in situ* vapor extraction/air stripping, including injecting air at the base of the shallow water-bearing zone to remove VOCs from ground water; monitoring ground water; and installing structures to control surface-water runon and runoff. The estimated present worth cost for this RA is $26,430,000, which includes a total present worth O&M cost of $11,466,000.

Performance Standards or Goals

Clean-up goals for soil are based on a leaching model used to determine the remedial levels in soil required to protect the ground water. Chemical-specific soil clean-up goals include benzene 0.35 mg/kg and 10 mg/kg for soil at depths of greater than 10 feet and less than 10 feet, respectively (leachate model), and lead 500 mg/kg (interim guidance). Chemical-specific ground-water clean-up goals include benzene 5 *ug*/l (MCL), lead 15 *ug*/l (EPA policy action level), and xylenes 10,000 *ug*/l (health-based).

Institutional Controls

Not provided.



REGION 7

Site	State	Page
E.I. Dupont De Nemours (County RD X23)	IA	380
Ellisville Area	MO	381
Ellisville Area (Amendment)	MO	382
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E.I. DUPONT DE NEMOURS (COUNTY RD X23), IA

May 28, 1991

The E.I. DuPont De Nemours (County RD X23) site is a paint waste disposal site 3.5 miles south of West Point in Lee County, Iowa. The site is divided into two subsites, McCarl and Baier, which are three-fourths of a mile apart. Land in the area is agricultural, residential, and woodlands. The nearest residence is located 500 feet from the McCarl subsite. The site overlies two water-bearing units, separated by 75 feet of very low permeable clay. The Baier subsite was used as the primary disposal site, and the McCarl subsite, purchased in 1986, was used when weather did not allow access to the Baier site. From 1949 to 1953, an estimated 48,000 to 72,000 55-gallon waste drums were disposed of at the two sites. Paint waste was generally placed in trenches and burned, resulting in an estimated 4,500 to 7,000 tons of ash remaining on site. Paint cans, ash-like material, and sludge casting were also visible on the surface of the site. In 1983, an EPA investigation of the Baier Farm detected levels of metals and organics in excess of soil background levels. In addition, ground-water monitoring wells, installed during 1985 and 1986, detected metal concentrations above MCLs. A 1989 investigation identified the source of contamination as paint disposed of on site. Removal from the Baier site was scheduled for July 1989 by a UAO from EPA to DuPont, but deferred by a February 1990 amendment. This ROD addresses the soil, debris, and ground water, as a final remedy. The ground water was determined to be of little threat and is not further addressed by this ROD. The primary contaminants of concern affecting the soil and debris at both subsites are VOCs including TCE, toluene, and xylenes; and metals including arsenic, chromium and lead.

Selected Remedial Action

The selected RA for the site includes stabilizing/solidifying the contaminated soil at both subsites, and covering the stabilized mass with clean soil and vegetation; removing and disposing off site all surface debris not amenable to solidification at an authorized RCRA landfill; monitoring ground water; and implementing institutional controls including deed restrictions. The estimated present worth cost for this RA is $1,400,000. There are no O&M costs associated with this RA.

Performance Standards or Goals

Chemical-specific soil clean-up goals are based on health-based criteria, and include lead 350 *u*g/kg, selenium 10 *u*g/kg, and cadmium 20 *u*g/kg.

Institutional Controls

Institutional controls including deed restrictions will be implemented on site.

ELLISVILLE AREA, MO
September 30, 1991

The Ellisville Area site is a former waste oil disposal site in Ellisville, St. Louis County, Missouri. The site consists of the 11.6-acre Bliss property and four contiguous properties where hazardous substances have been identified. Land use in the area is mixed residential, rural, and recreational. Surface run-off at the site drains to Caulks Creek, a tributary of Bonhomme Creek, which enters the Missouri River about one mile upstream of a city of St. Louis waterworks intake. The site does not lie in a floodplain, but flooding of Caulks Creek occurs during periods of heavy rain. During the 1960's and 1970's, Bliss Waste Oil Company used the site to transport and dispose of waste oil products (some of which were contaminated with dioxin), industrial waste, and chemical waste. Liquid waste were poured into pits, applied to the ground surface, and stored in drums and buried. Dioxin-contaminated waste oil was applied directly to surface soil for dust control, and spillage from trucks also occurred. Investigations conducted from 1982 through 1983 concluded that site contamination was not affecting the ground water; however, some on-site surface migration of contaminated soil and sediment had occurred. In 1985, the State constructed a diversion dike to redirect stormwater runoff, which flowed through a fill area containing buried drums; and fenced the site. A 1986 ROD selected a final remedy for non-dioxin wastes at the site and an interim remedy for dioxin waste at the site including excavation and interim on-site storage of dioxin-contaminated materials. The interim remedy has not been implemented. A 1988 ROD established the availability of a thermal treatment unit at the Times Beach site to treat dioxin-contaminated sites in eastern Missouri including the Ellisville Area. This ROD provides a final remedy for dioxin-contaminated soil, which involves excavation and direct transport of dioxin wastes off site for treatment. The 1986 remedy for non-dioxin waste is not affected. The primary contaminant of concern affecting the soil is dioxin, an organic.

Selected Remedial Action

The selected RA for this site includes excavating and direct transportation of approximately 7,000 cubic yards of dioxin-contaminated soil for treatment at an off-site temporary thermal treatment unit constructed at the Times Beach site; disposing of treatment residuals at the Times Beach site as nonhazardous solid waste if delisting criteria are met, or retreating at Times Beach or managing residuals off site as a hazardous waste if delisting criteria are not met. The estimated present worth cost for this RA is $17,530,000. There are no O&M costs associated with this RA.

Performance Standards or Goals

Performance standards for the thermal treatment of soil include six-nines (99.9999 percent) destruction and removal efficiency and delisting of the thermal treatment residue.

Institutional Controls

Not applicable.

ELLISVILLE AREA, MO

Amendment
September 30, 1991

The Ellisville Area site is a former waste oil disposal site in Ellisville, St. Louis County, Missouri. The site consists of the 11.6-acre Bliss property and four contiguous properties where hazardous substances have been identified. Land use in the area is mixed residential, rural, and recreational. Surface runoff at the site drains to Caulks Creek, a tributary of Bonhomme Creek, which enters the Missouri River about one mile upstream of a city of St. Louis waterworks intake. The site does not lie in a floodplain, but flooding of Caulks Creek occurs during periods of heavy rain. During the 1960's and 1970's, Bliss Waste Oil Company used the site to transport and dispose of waste oil products (some of which were contaminated with dioxin), industrial waste, and chemical waste. Liquid waste was poured into pits, applied to the ground surface, and stored in drums and buried. Dioxin-contaminated waste oil was applied directly to surface soil for dust control, and spillage from trucks also occurred. Investigations conducted from 1982 through 1983 concluded that site contamination was not affecting the ground water; however, some on-site surface migration of contaminated soil and sediment had occurred. In 1985, the state constructed a diversion dike to redirect stormwater run-off, which flowed through a fill area containing buried drums; and fenced the site. A 1986 ROD selected a final remedy for non-dioxin waste at the site and an interim remedy for dioxin waste at the site including excavation and interim on-site storage of dioxin-contaminated materials. The interim remedy has not been implemented. A 1988 ROD established the availability of a thermal treatment unit at the Times Beach site to treat dioxin-contaminated sites in eastern Missouri including the Ellisville area. This ROD amends the 1986 ROD because the pending availability of a thermal treatment unit at Times Beach has prompted EPA to reconsider the need for excavation and interim on-site storage. This ROD also provides a final remedy for dioxin-contaminated soil, which involves excavation and direct transport of dioxin waste off site for treatment. The 1986 remedy for non-dioxin waste is not affected. The primary contaminant of concern affecting the soil is dioxin, an organic.

Selected Remedial Action

The amended RA for this site includes excavating, and direct transportation of approximately 7,000 cubic yards of dioxin-contaminated soil for treatment at an off-site temporary thermal treatment unit constructed at the Times Beach site; disposing of treatment residuals at the Times Beach site as nonhazardous solid waste, if delisting criteria are met, or retreating at Times Beach or managing residuals off site as a hazardous waste if delisting criteria are not met. No costs were provided for this amended RA.

Performance Standards or Goals

Performance standards for the thermal treatment of soil include six-nines (99.9999 percent) destruction and removal efficiency and delisting of the thermal treatment residue.

Institutional Controls

Not applicable.

HASTINGS GROUNDWATER CONTAMINATION (OU1), NE

September 30, 1991

The Hastings Groundwater Contamination site consists of localized areas where the aquifer is contaminated with industrial chemicals, primarily VOCs, in the city of Hastings, Adams County, Nebraska. This ROD addresses part of the Colorado Avenue subsite, which is one of several Hasting Groundwater Contamination subsites. This subsite consists of contaminated soil at three industrial properties, which was addressed in a 1988 ROD as OU9, and a ground-water contaminant plume approximately one mile long, which is the subject of this ROD and referred to as OU1. Land use in the area is residential and industrial. The West Fork Big River lies to the north of the site, and the site is characterized by a nearly flat ground surface with a gentle slope to the southeast. The estimated 23,000 residents of Hastings obtain their drinking water from a municipal system that taps into the underlying sole-source aquifer. From 1967 to 1982, Dravo Corporation, the former owner of one of the industrial properties, manufactured heating and air conditioning equipment on site and discharged chlorinated solvents from its vapor degreasing process into sanitary and storm sewers. Leaky sewer joints and discharge of storm drains to open ditches have resulted in seepage of chlorinated compounds into the soil, and eventually into the aquifer. In 1983, after 30 years of non-use, Hastings municipal well #18 was put back online to pump ground water, but complaints from citizens about the odor and taste of the water prompted the city to remove the well from service. In 1985, EPA investigated on-site ground-water contamination, including well #18, and identified on-site TCA, TCE, and PCE contamination. Monitoring wells showed that the contaminant plume extended about one mile eastward in the direction of ground-water flow. The source of this contamination was traced to Dravo's industrial facility. All affected wells were subsequently shut down. A 1988 ROD addressed the soil component of the Colorado Avenue subsite as OU9 and identified treatment using soil vapor and vacuum extraction technologies, followed by treatment of extracted vapor using an activated carbon system, and monitoring soil, ground water, and air. This ROD addresses the ground-water contamination component as OU1. Future RODs may address additional source control measures, subsurface monitoring, ground water extraction and treatment, wellhead protection and treatment, and provide institutional controls. The primary contaminants of concern affecting the ground water are VOCs including DCE, PCE, and TCE.

Selected Remedial Action

The selected RA for this interim remedy includes managing the contaminant plume by pumping a number of pore volumes (5,550,000 gallons) of VOC-contaminated ground water, treating the extracted ground-water on site using granular activated carbon (with a contingency to use air stripping and emissions treatment, or UV oxidation), and reusing or reinjecting the treated ground water; regenerating spent carbon off site; and monitoring ground-water quality to measure effectiveness of the interim action. The estimated present worth cost for this RA is $6,061,000, which includes an annual O&M cost ranging from $269,000 to $767,000 for 10 years. EPA has increased the estimated RA timeframe for this interim action to 15 years. The total present worth cost of the RA will increase from the 10 year estimate primarily due to a longer period of O&M.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on state and federal MCLs, and include PCE 0.005 mg/l and TCE 0.005 mg/l.

Institutional Controls

Ground-water use restrictions will continue to be implemented on site to prevent pumping of contaminated ground water into the city distribution system.

HASTINGS GROUNDWATER CONTAMINATION (OUs 10 & 2), NE

September 30, 1991

The Hastings Groundwater Contamination site consists of localized areas where an aquifer is contaminated with industrial chemicals in or near the city of Hastings, Adams County, Nebraska. Both the source control OU10 and ground-water OU2 of the North Landfill, a 13.4-acre former municipal landfill, are addressed by this ROD. Land use near the landfill is mixed residential and commercial with an active railroad directly north of the site. The estimated 23,000 residents of Hastings obtain their drinking water from the municipal water system, which taps into the underlying sole-source aquifer. As early as 1938, brickmakers obtained clay source materials from the area of the landfill. From 1961 to 1964, the city of Hastings operated a municipal landfill on site and accepted municipal and industrial waste including waste containing VOCs. The landfill was initially capped, and later in the 1970's an additional two feet of capping materials were added. In 1983, ground-water contamination was discovered when the state sampled the Hastings public water supply system in response to citizen complaints about water quality. EPA investigations have identified VOCs including benzene, TCE, DCE, and vinyl chloride in the ground water adjacent to and downgradient from the site. In 1985, soil-gas samples indicated that the vadose zone above the aquifer was contaminated. This ROD provides an interim remedy for both OUs. Future RODs may address additional source control measures, subsurface monitoring, ground-water extraction and treatment, wellhead protection and treatment, and provision of institutional controls. The primary contaminants of concern affecting the soil and ground water are VOCs including TCE, DCE, and vinyl chloride.

Selected Remedial Action

The selected RA for this interim remedy includes geotechnical testing of the existing landfill cap, improving the present cap through regrading to promote surface run-off, and revegetating the landfill surface; pumping and on-site treatment of contaminated ground water with a technology to be determined after further testing, but will be either air stripping or UV oxidation; monitoring the vadose zone, saturated zones, and ground water; and implementing institutional controls including deed restrictions, and site access restrictions such as fencing. The estimated present worth cost for this RA will range from $2,300,000 to $4,000,000, based on ground-water treatment and discharge options.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on SDWA MCLs, and include TCE 5 *u*g/l, cis 2-DCE 70 *u*g/l, trans 1,2-DCE 100 *u*g/l, and vinyl chloride 2 *u*g/l.

Institutional Controls

Deed restrictions will be implemented on site to prevent construction, and ensure cap integrity.

JOHN DEERE (OTTUMWA WORKS LANDFILL), IA

September 23, 1991

The 105-acre John Deere (Ottumwa Works Landfill) site is an active agricultural equipment manufacturing and assembly facility in Ottumwa, Wapello County, Iowa. Land use in the area is predominantly residential, with wetlands located within 1,000 feet of the site across the Des Moines River. All of the site lies within the 100-year floodplain of the Des Moines River, and a drainage ditch borders the site on the east side. The estimated 27,000 Ottumwa residents use municipal water obtained from the Des Moines River as their drinking water supply. The municipal intake is located approximately 1,000 feet upgradient from the site. Black Lake, located 150 feet east of the site, is used as an additional water source on an infrequent basis, contributing approximately 1.0 to 1.5 percent of the total annual volume of water distributed by the Ottumwa Water Works. From 1911 to 1973, Deere & Company buried plant-generated waste including solvents, paint sludge, heat treating cyanide, heat treating sludge, petroleum distillates, and foundry sand in the shallow alluvium underlying the site. After landfilling, some of the waste was burned on site on a regular basis. In 1965, Deere & Company acquired the southwestern portion of the site, which had been used previously as a salvage yard. In the late 1980s, investigations of the disposal areas identified subsurface soil and ground-water contamination by VOCs, other organics, and metals. This ROD addresses the disposal areas, the drainage ditch, and Black Lake surface water. The primary contaminants of concern affecting the soil, sediment, and debris are organics including PAHs; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes implementing institutional controls including deed restrictions, and site access restrictions including maintaining the perimeter fence. The estimated present worth cost for this RA is $4,000. There are no O&M costs associated with this RA since fence maintenance is covered by the facility's operating budget.

Performance Standards or Goals

Not provided.

Institutional Controls

Institutional controls including deed restrictions will be implemented to prevent exposure to site contaminants.

KEM-PEST LABORATORIES, MO

December 31, 1990

The 6-acre Kem-Pest Laboratories site is a former pesticide production facility located in Cape Girardeau County, Missouri. Site features include a concrete block building that housed the pesticide formulation operation and currently holds approximately 11,200 gallons of contaminated water in its basement; six storage tanks used for storing solvents and oil; and a lagoon used for the disposal of sewage and plant waste. An unconfined aquifer system lies within the alluvial and colluvial deposits at the site. From 1965 to 1977, Kem-Pest Laboratories formulated various pesticide products including liquid pesticides, granular insecticides and herbicides, and pesticide dust on site. Waste generated from pesticide production contained several pesticides including aldrin, dieldrin, endrin, and heptachlor. Plant waste was disposed of in the on-site lagoon. No production or disposal activities have occurred on site since 1977, and the lagoon was backfilled with clay by the owner in 1981. Based on federal assessments and investigations conducted in 1981, it was determined that the lagoon and the formulation building were the most significant sources of site contamination. Ground-water contamination has occurred from the migration of contaminants from the soil within the lagoon; ground water may also act as a flushing mechanism for contaminants in the subsurface soil. A 1989 ROD addressed OU1, the contaminated surface soil in the lagoon; surface soil in the lagoon area and near the formulation building; and sediment in drainage channels on site and off site. This ROD addresses pesticide contamination in the formulation building, ground water, and surface water, as OU2. The primary contaminants of concern affecting debris and surface water are VOCs including benzene; other organics including pesticides; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes decontaminating the formulation building by surface layer removal; dismantling approximately 50 tons of interior structures and formulation equipment not amenable to decontamination, followed by off-site incineration and disposal of decontaminated and dismantled debris; implementing additional decontamination measures including scarification and applying a sealant to the concrete floors, if necessary; collecting and treating on-site approximately 11,200 gallons of water that has collected in the basement of the formulation building using activated carbon adsorption, with on-site discharge of the water and off-site carbon regeneration or disposal; long-term ground-water and surface monitoring; anenting institutional controls. The estimated present worth cost for this RA is $727,000, which includes an annual O&M cost of $5,000 for 30 years.

Performance Standards or Goals

No federal or state clean-up standards exist for remediation of contaminated structures in regard to risks posed by direct contact. EPA has determined that a 10^{-5} individual lifetime excess cancer risk will be protective of human health from risks associated with contaminated structures. Performance standards for inhalation of pesticides are the worker permissible exposure limits as defined by OSHA regulations including aldrin 0.25 mg/m^3 and dieldrin 0.25 mg/m^3.

Institutional Controls

Institutional controls will be implemented to limit future use of the formulation building to commercial or industrial activities.

LEE CHEMICAL, MO
March 21, 1991

The 2.5-acre Lee Chemical site is a former water treatment plant and chemical repacking and distributing facility in Liberty, Clay County, Missouri. Land use in the area is commercial and rural. The estimated 17,000 people who reside in Liberty obtain drinking water from municipal water wells located approximately 2,000 feet southeast of the site. These wells draw water from the alluvial aquifer underlying the site. From 1920 to 1962, the city of Liberty used the site as the city's water treatment plant. From 1965 until 1975, when the city repossessed the property, the site was leased to Lee Chemical Company for packaging and distributing commercial and industrial cleaning solvents and other chemicals, some of which were reprocessed on site in 55-gallon drums. In 1977, as required by EPA, the city removed and disposed of approximately three hundred 55-gallon drums of waste off site. In 1979, low levels of TCE were detected in the public water supply wells. Subsequent EPA and state investigations revealed contaminated ground water and soil, and deteriorated drums and chemical containers, and in 1982 the city and state identified the site as a source of TCE contamination in the public water supply. In 1983, the on-site water plant building and its contents were demolished and disposed of off site. In 1984, in an effort to contain the contaminated ground-water plume and reduce TCE levels in the water supply, the city discharged water from the most highly contaminated of its municipal water wells through an abandoned sewer line to the Missouri River and Shoal Creek. Later that year, an abandoned municipal well on site was added to the plume control measure and the discharge was diverted to an abandoned water main to nearby Town Branch Creek. Currently, no detectable levels of TCE are found in wells connected to the water supply system. This ROD addresses soil and ground-water contamination, and provides a final remedy for the site. The primary contaminants of concern affecting the soil and ground water are VOCs including TCE.

Selected Remedial Action

The selected RA for this site includes installing an *in situ* aqueous soil washing system consisting of infiltration trenches to enhance the flushing of contaminants from on-site soil to the underlying aquifer; pumping ground water to flush contaminants from the underlying aquifer to the extraction system and to control ground-water movement away from the site, followed by on-site discharge to surface water; implementing a contingency phase ground-water treatment project consisting of air stripping or other treatment methods, if additional treatment of discharge water becomes necessary to meet health based risk levels, existing NPDES permit limits, or other ARARs; and monitoring ground water and air. The estimated present worth cost for this RA is $550,000, which includes an annual O&M cost of $52,000 for 5 years. If treatment is deemed necessary, the revised present worth cost for this RA is $670,000, which includes an annual O&M cost of $67,000 for 5 years.

Performance Standards or Goals

Chemical-specific goals for soil were not provided. Chemical-specific ground-water clean-up goals are based on SDWA MCLs and include 1,1,2-TCE 5 *u*g/l (MCL).

Institutional Controls

Not applicable.

LEHIGH PORTLAND CEMENT, IA
June 28, 1991

The Lehigh Portland Cement site is composed of two areas: the 150-acre Lehigh Portland Cement Company (LPCC) cement production facility, and the 410-acre Lime Creek Nature Center (LCNC), in Mason, Gordo County, Iowa. Land use in the area is rural, agricultural, and industrial. The site overlies an aquifer that serves as a source of water for 12 nearby wells; and municipal water is obtained from a deeper aquifer. Calmus Creek borders the site and discharges to the Winnebago River, located within a mile of the site. From 1911 to the present, the LPCC has manufactured cement products. As a result of operations, site features currently include four abandoned quarries at the LPCC area, which were worked until the 1950's and subsequently were filled in with water, and numerous tailings piles. The water bodies are known as Blue Waters Pond, Arch Pond, Cooling Waters Pond, and Area C Pond. During its history, the LPCC disposed of cement kiln dust (CKD) in several on-site piles and in Area C Pond. The LCNC area was used by LPCC to quarry materials until 1979, and subsequently was backfilled with CKD from the parent site and sold. Consequently, the LCNC quarries also have become ponds, including Quarry Pond. In 1981, hydrochemical tests of Blue Waters Pond on the LPCC area indicated high alkalinity. Subsequent investigations indicated that the ponds on the LCNC area also have high pH levels, although water quality is better than at the LPCC area. Testing showed that CKD was the cause of high alkalinity, and that contamination of the aquifers has occurred. In addition, a flow control structure installed on the southeastern corner of Blue Waters Pond allowed highly alkaline water to discharge into Calmus Creek. Subsequently, overflow prevention measures at Blue Waters Pond were implemented by LPCC, but seepage to Calmus Creek continued. This ROD addresses the CKD, ground water, and surface water as a final remedy. Elevated pH of ground water and surface water also is of potential concern.

Selected Remedial Action

The selected RA for the LPCC area includes dewatering Blue Waters, Area C, and Arch Ponds, and treating pond water using acid neutralization, followed by ion exchange or reverse osmosis if needed, with on site discharge; excavating and consolidating CKD from Blue Waters and Arch Ponds within Area C Pond, followed by constructing a clay cap over Area C Pond; constructing a cap over the existing area known as the CKD reclamation area; collecting shallow ground water via sumps and a seep collection system constructed in the base of Blue Waters and Area C Ponds, and treating the ground water in the on-site treatment system before on-site discharge; monitoring ground water, surface water, and treated discharge; and providing institutional controls including deed restrictions. The selected RA for the LCNC area includes constructing a dam across Quarry Pond and draining the western portion of the pond; excavating CKD within the western portion of Quarry Pond and consolidating the CKD within an exhausted quarry east of the pond; constructing a clay cap over the exhausted quarry; consolidating CKD from all other LCNC areas in the Badlands area, and constructing a clay cap over the consolidated material; allowing Quarry Pond to refill; and monitoring ground water and surface water. The estimated present worth cost for RA at the LPCC area is $3,400,000, and for the LCNC area is $1,600,000. No O&M costs were provided for the RA.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals for both the LPCC and LCNC areas are based on the more stringent of SDWA MCLs and state standards, and include arsenic 0.00003 mg/l (state), lead 0.015 mg/l (state), chromium 0.5 mg/l (MCL), and pH 6.5 to 8.5 (secondary MCL).

Institutional Controls

Deed restrictions will be implemented at the LPCC area.

MID-AMERICA TANNING, IA
September 24, 1991

The 98.7-acre Mid-America Tanning site is a former leather tannery in Sergeant Bluff, Woodbury County, Iowa. Surrounding land use is mixed industrial and agricultural. A portion of the site is bordered by Oxbow Lake and lies within the 100-year floodplain. The Missouri River is approximately 1.5 miles to the southwest of the site and receives discharges from Oxbow Lake. The facility began on-site processing of animal hides in 1970. From 1973 to 1989, the site was used intermittently under various owners as a chrome tanning operation. Process wastewater containing debris, chromium, and other chemicals was discharged to on-site lagoons and impoundments. Sludge generated from the process was disposed on site in the surficial soil or in disposal trenches. Occasional system overloads resulted in overflow of chromium wastewater into Oxbow Lake. In 1980, the state confirmed the on-site burial of chromium-containing sludge in trenches, and the company was cited for permit violations. A 1985 EPA investigation identified excessive chromium contamination in on-site soil, sediment, and ground water. In 1990, EPA conducted a removal action that included excavating and consolidating on-site 1,290 cubic yards of sludge from the trench disposal area. This ROD addresses the contaminated soil, impoundment sediment and water, and the excavated trench material. A future ROD will address on-site ground-water contamination. The primary contaminant of concern affecting the soil, sediment, debris, sludge, and surface water are metals including chromium and lead.

Selected Remedial Action

The selected RA for the site includes treating 8,300 cubic yards of contaminated soil and 44,500 cubic yards of impoundment sediment on site using *in situ* immobilization; immobilizing 1,293 cubic yards of consolidated trench sludge on site, followed by either on-site or off-site disposal; removing and disposing of debris off site and discharging impoundment water on site through an NPDES-permitted outfall or treatment, if needed, with off-site discharge to a POTW; capping contaminated areas, and grading and seeding top soil; conducting ground-water monitoring; and implementing institutional controls including deed restrictions. A contingent remedy using *ex situ* immobilization will be implemented if treatability studies determine that the selected remedy is inadequate. The estimated present worth cost for this RA is $4,857,000, which includes an annual O&M cost of $21,000.

Performance Standards or Goals

Federal and state clean-up standards for chromium have not been established at this time. Clean-up objectives are based on a 10^{-4} cancer risk to human health and include hexavalent chromium 2,490 mg/kg.

Institutional Controls

Deed restrictions will be implemented at the site to ensure that it is not used for residential or agricultural purposes, and that buildings are not constructed on the capped areas.

PEOPLES NATURAL GAS, IA

September 16, 1991

The 5-acre Peoples Natural Gas site is a former coal gasification plant in Dubuque County, Iowa. The city of Dubuque maintains a public works garage on the eastern portion of the site, and the Iowa Department of Transportation owns the western portion. The site is located 300 feet west of the Mississippi River, and is within the Mississippi River floodplain. In addition, the site overlies a silty sand unit and an alluvial aquifer, which has been determined to be a potential source of drinking water. Surrounding land use is primarily industrial and commercial, with adjacent residential areas. From at least the 1930s to 1954, the site was used to manufacture gas. By-products produced during this process included coal tar, which was stored in an underground tank and an above-ground tank, and cyanide-bearing woodchips, which were buried on the eastern portion of the site. From 1954 to 1964, the site was used as a natural gas distribution, storage, and maintenance facility. In 1986, EPA investigations identified extensive contamination of on-site soil and ground water at the site. In 1989, the PRPs conducted a removal action that included excavating 5,500 cubic yards of PAH-contaminated soil from the western portion of the site, removing tanks used to store coal tar, installing a leachate collection system to prevent contamination from leaching into the alluvial aquifer; and implementing institutional controls. This ROD addresses both soil and ground-water contamination, as a final remedy. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, toluene, and xylenes; and other organics including PAHs.

Selected Remedial Action

The selected RA for this site includes excavating and incinerating an estimated 18,500 cubic yards of contaminated soil off site; treating the soil and ground water within the silty sand unit, which are contaminated with coal tar waste using *in situ* bioremediation; pumping and on-site treatment of contaminated ground water using air stripping followed by off site and storm sewers discharge to a POTW; ground-water and air monitoring; and implementing institutional controls such as ground-water and land use restrictions, as well as site access restrictions including fencing. A contingency for ground-water treatment includes engineering controls and an ARAR waiver if the extraction system does not achieve clean-up levels. The estimated present worth cost for this RA is $8,000,000, which includes an estimated O&M cost of $788,000 for 10 years.

Performance Standards or Goals

Federal and state clean-up standards for soil have not been established at this time. Therefore, goals for soil clean up are based on a carcinogenic risk level of 10^{-4}, and include 500 mg/kg for total PAHs and carcinogenic PAHs 100 mg/kg. Remediation levels for ground water are based on SDWA MCLs, and include benzene at 1 *ug*/l.

Institutional Controls

Ground-water and land use restrictions will be implemented on site to prevent direct contact with contaminants.

SHAW AVENUE DUMP, IA

September 26, 1991

The 26-acre Shaw Avenue Dump site is a chemical waste site in Charles City, Floyd County, Iowa. Land use in the area is predominantly residential. Part of the site lies within the 100-year floodplain of the Cedar River, and a wetlands area is located approximately 600 feet south of the site. From 1899 to 1964, Charles City used the site as a municipal landfill for waste incineration, and disposal of liming sludge from the city's POTW and asphaltic materials continue to be disposed of in the landfill. Additionally, from 1949 to 1953, chemical waste generated by chemical batch processing of arsenic and compounds used in the production of animal pharmaceuticals at Salsbury Laboratories were disposed of on site. Between 1977 and 1981, the state issued reports based on studies of the site and surface water that documented elevated levels of metals in an abandoned gravel pit near the site. Approximately 14,000 to 28,000 cubic feet of chemical waste and 10,000 tons of solid waste from the POTW, including sludge containing hazardous waste from Salsbury Laboratories, and associated contaminated soil are currently present on site. Leaching of contaminants, especially arsenic, from 370 cubic yards of chemical fill and adjacent soil into ground water is thought to be the principal threat at the site. A 200-gallon UST is located within the vicinity of the chemical fill, and also is considered to be a possible source of on-site contamination. This ROD addresses the chemical fill and surrounding contaminated soil, and the underground gasoline tank as OU1. A future ROD will address contaminated ground water as OU2. The primary contaminants of concern affecting the soil and debris are VOCs including benzene, toluene, and xylenes; other organics including PAHs; metals including arsenic and lead; and other inorganics.

Selected Remedial Action

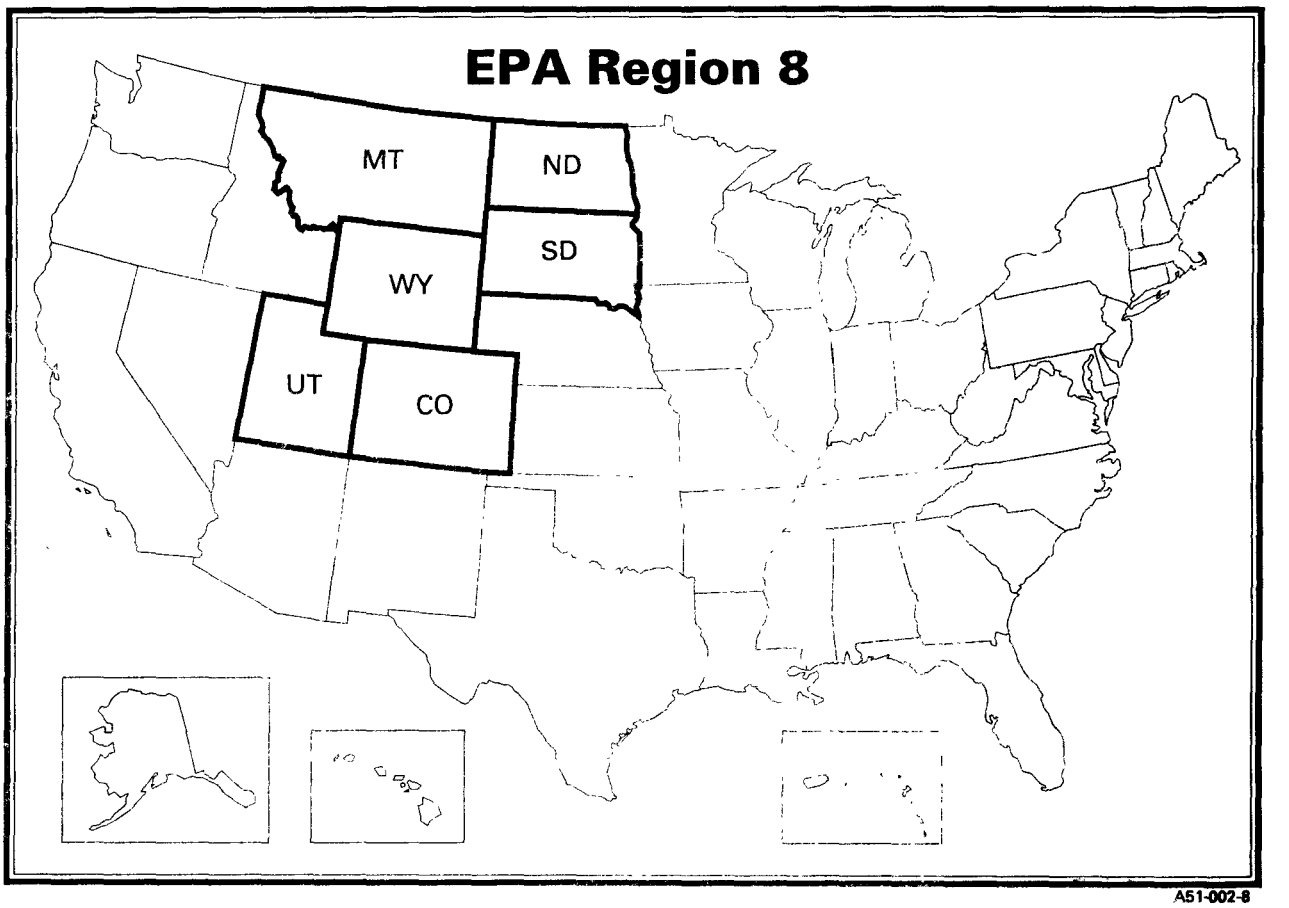
The selected RA for this site includes treating the chemical fill and soil using *in situ* fixation and stabilization, followed by constructing a low permeability cap over the fixed and stabilized fill; conducting treatability studies to determine the effectiveness of the treatment, and if treatment is not effective, issuing an ESD and disposing of the waste off site; removing and disposing of off site the underground gasoline tank; monitoring ground water quality; and implementing institutional controls including deed restrictions, and site access restrictions including fencing. The estimated present worth cost for this RA is $513,400, which includes an annual present worth O&M cost of $65,550.

Performance Standards or Goals

Action-specific soil clean-up goals are based on state and federal standards, RCRA LDRs, OSHA, RCRA TCLP, and UST regulations, and include arsenic 50 mg/kg and cadmium 20 mg/kg.

Institutional Controls

Deed restrictions will be implemented to prevent construction, installation, and maintenance of any ground water wells. Access easements also will be implemented to prevent unauthorized entry to the site.



REGION 8

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ANACONDA SMELTER, MT

September 23, 1991

The 6,000-acre Anaconda Smelter site is a former copper and ore processing facility in Deer Lodge County, Montana. Land use in the area is predominantly residential. The site is bounded on the north and east, respectively, by the Warm Springs Creek and Mill Creek, both of which are potential sources of drinking water. From 1884 until 1980 when activities ceased, the site was used for ore processing and smelting operations. Flue dust was generated as a by-product of copper smelting operations. The majority of flue dust that was generated was reprocessed, and the remaining portion was stockpiled at nine locations on and around the site. In 1988, EPA conducted an investigation to determine the nature and extent of the flue dust contamination. A 1988 ROD addressed the Mill Creek OU15 and documented the relocation of residents from the community surrounding the smelter site as the selected RA. This ROD addresses the flue dust OU11. Subsequent RODs will address further site contamination in adjacent soil, ground water, and surface water. The primary contaminants of concern affecting this site from the flue dust materials are metals including arsenic, cadmium, and lead.

Selected Remedial Action

The selected RA for this site includes excavating a total of approximately 316,500 cubic yards of flue dust from the nine flue dust locations and treating the dust on site using cement/silicate based stabilization; disposing of the treated residuals in an on-site engineered repository, which will include a soil or clay liner and a leachate collection system; conducting air and ground-water monitoring; and implementing institutional controls including land use restrictions, and site access restrictions. The estimated capital cost for this RA is $25,338,000, with an annual O&M cost of $10,000.

Performance Standards or Goals

The treatment levels of flue dust cement/silicate based stabilization will render the material non-hazardous by meeting RCRA TCLP regulatory limits, and include levels that will limit leaching of contaminants to ground water to arsenic 5.0 mg/l, cadmium 1.0 mg/l, and lead 5.0 mg/l.

Institutional Controls

Land use restrictions will be implemented.

BRODERICK WOOD PRODUCTS, CO

Amendment
September 24, 1991

The 64-acre Broderick Wood Products (BWP) site is a former wood treatment facility in Adams County, Colorado. Land use in the area is predominantly industrial. The site is one-half mile south of Clear Creek, a perennial stream. The nearest residences are less than one-eighth mile north of the site. From 1947 to 1981, BWP used the site for treating power poles, fence posts, railroad ties, and other wood products. Process waste from the on-site plant were disposed on site in two unlined surface impoundments in the northwest corner of the site. Waste seepage occurred just north of the site and was burned off starting in 1955. Also, four other ponds were periodically used for this purpose, and several fires have occurred on site. In 1981, BWP submitted a RCRA permitting application and obtained interim status to operate its facility, but ceased operations because of economic conditions. As a result of the waste disposal practices at BWP, a number of investigations were conducted by EPA and the state. In 1981 and 1982, EPA noted several violations of RCRA requirements; and other site investigations identified possible contamination of a trench near the surface impoundments that had reportedly been used for the disposal of solid waste, and ground-water contamination downgradient of the surface impoundments. Additionally, a fire in 1985 damaged the treatment plant building. Water that was used to fight the fire has been contaminated with asbestos and remains in the basement of the building. A 1988 ROD addressed interim source control treatment of on-site sludge, as OU 1, and provided for excavation and on-site incineration of impoundment sludge, on-site incineration or stockpiling of visibly contaminated soil found beneath the sludge, and treatment of water in the impoundments and buildings. Based on new technical data and cost information EPA has decided against using incineration as treatment in OU1. This ROD amends the 1988 remedy for sludge treatment. A future ROD will address the final remedy for the site by providing treatment of contaminated soil, debris, and surface and ground water, as OU2. The primary contaminants of concern affecting the sludge are VOCs including toluene and xylenes; other organics including dioxin and PAHs; and metals including lead.

Selected Remedial Action

The amended RA for this site includes excavating and preparing 950 cubic yards of solid sludge, 1,220 cubic yards of liquid sludge, and 500 gallons of oil collected from the sludge from temporary storage cells within the impoundments area; and transporting sludge and oil to a permitted recycling facility to reclaim creosote for use at other wood treating facilities, followed by off-site incineration of recycler residues, and off-site disposal of incinerator ash in a permitted landfill. The estimated total cost for this RA ranges from $2,058,200 to $2,191,000. O&M costs are included in the capital costs because treatment will occur off site.

Performance Standards or Goals

Chemical-specific sludge clean-up goals are based on RCRA land disposal restrictions and include lead 0.51 mg/l, toluene 28 mg/kg, and xylenes 33 mg/kg.

Institutional Controls

Not applicable.

CENTRAL CITY-CLEAR CREEK, CO
September 30, 1991

The Central City-Clear Creek site is an active mining facility in Central City, Clear Creek and Gilpin counties, Colorado. Land use in the area is predominantly commercial and recreational, and an artificial wetlands area is located on site. The site lies within the 400-square mile drainage basin of Clear Creek, which serves as a drinking water source for several municipalities. Gold mining operations began on site in 1859 and portions of the site became some of the most heavily mined areas of Colorado. Extraction of surface ores led to an increase in the depth of the mining and, consequently, drainage tunnels were constructed to control water drainage problems. Presently, six major mine drainage tunnels are thought to be principal discharge sources of acid mine water containing high concentrations of metals to surface waters including Clear Creek and its tributaries. In addition, over 21 mine tailings piles with an estimated total volume of over 2,000,000 cubic yards at numerous locations throughout the site are thought to be major sources of contamination. In response to site contamination, EPA has conducted three removal actions since 1987. In 1987, EPA conducted a removal action to prevent the collapse of a mine waste pile. Also in 1987, EPA conducted a second removal action, which involved connecting three residences with private wells to the municipal public water supply. In 1991, EPA conducted a third removal action, which involved removing uncontaminated mercury from a small trailer. Because of the complexity of the site, EPA divided the site into several OUs for remediation. A 1987 ROD addressed OU1 and provided for passive treatment of acid mine water discharge from five discharging tunnels: National, Gregory Incline, Argo Tunnel, Big Five, and Quartz Hill tunnels. A 1988 ROD addressed OU2 and provided for the remediation of mine waste piles in the immediate proximity of the five discharging tunnels. This ROD supersedes the remedy provided for OU1 in the 1987 ROD by including active treatment of the Argo Tunnel and delaying a decision on treating the discharges from the Big Five, National and Quartz Hill tunnels, and the Gregory Incline. EPA will consider a subsequent ROD to address treatment of the remaining on-site tunnels pending further monitoring and treatability studies. The primary contaminants of concern affecting the ground water are metals including arsenic, cadmium, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes constructing physical barriers for mine waste piles (to reduce metals loading to surface water and human health risks from ingestion or inhalation of metals); treating discharges from the Burleigh tunnel passively through the use of man-made wetlands; treating discharges from the Argo tunnel actively along with ground water pumped from the immediate area; providing an alternate water supply where needed; invoking an interim action waiver of ARARs for discharges from the National, Quartz Hill, and Big Five tunnels, and the Gregory Incline, and invoking a technical impracticality waiver for restoring ground water to MCLs; collecting discharges from the National and Quartz Hill tunnels, and Gregory Incline with final disposition to be established pending further monitoring and treatability studies; and implementing institutional controls. The estimated present worth cost for this RA is $23,510,000, which includes an annual O&M cost of $1,204,000 for 30 years.

Performance Standards or Goals

The passive treatment system will remove approximately 99.5 percent of the zinc, 99.84 percent of the copper, and 9.7 percent of the manganese from tunnel discharge. Active treatment will remove 100 percent of the zinc and manganese, and 99.84 percent of the copper.

Institutional Controls

Engineering and institutional controls will be implemented to prevent exposure to site contaminants.

CHEMICAL SALES (NEW LOCATION) (OU1), CO
June 27, 1991

The Chemical Sales (CS) (New Location) (OU 1) site is an active chemical sales and storage facility in Commerce City, Adams and Denver Counties, Colorado. Land use in the area is predominantly industrial, and there are six residences located on the northern portion of the site. The site is bounded by Sand Creek to the north and lies within the 100-year floodplain of the creek. An estimated 30,000 people who reside near the site use the alluvial aquifer as the principal source of drinking water. Since 1976, CS has used the site to store and sell organic chemicals and acids. Site features include a warehouse and tank farm including an associated system of above-ground tanks and USTs and pipelines. Between 1985 and 1990, three on-site chemical releases of hazardous substances into the soil and ground water from the CS facility were reported. In 1985, approximately 200 gallons of methylene chloride were spilled into on-site soil during a chemical transfer. The second release was in 1986 when rain water contaminated with several VOCs was discharged into a nearby drainage ditch. The third release occurred in 1990, when approximately 3,700 gallons of methanol were spilled on the ground surface near the CS tank farm. Several EPA investigations confirmed the release of hazardous substances into the ground water from the CS Property. The site has been divided into three OUs for remediation. This ROD addresses remediation of soil and ground-water contamination south of Sand Creek, as OU1. Future RODs will address other site contamination including the ground water plume and associated contamination (OU2), and residential exposure to contaminated wells and domestic water from the municipal water supply (OU3). The primary contaminants of concern affecting the soil and ground water are VOCs including PCE and TCE.

Selected Remedial Action

The selected RA for this site includes treating contaminated on-site soil using vapor extraction; treating air emissions with catalytic oxidation; recirculating exhaust from the catalytic oxidation system into the contaminated soil; pumping and on-site treatment of ground water in the source area and plume area using air stripping, followed by reinjecting the treated water from the source area wells and reinfiltrating treated water from the plume area through on-site discharge; monitoring ground water, treated water, and air; providing public notice of potential health threat from contamination ground water; and implementing institutional controls including ground-water use restrictions. The estimated cost for this RA is $2,081,000. No O&M costs were provided for this RA.

Performance Standards or Goals

Chemical-specific soil clean-up goals are based on an acceptable concentration of leachate multiplied by the partitioning coefficient for the soil, and include PCE 0.150 mg/l and TCE 0.115 mg/l. Chemical-specific ground-water clean-up goals are based on SDWA MCLs, and include PCE 0.005 mg/l and TCE 0.005 mg/l.

Institutional Controls

Not applicable.

CHEMICAL SALES (NEW LOCATION) (OU2), CO
June 27, 1991

The Chemical Sales (CS) (New Location) (OU 2) site is an active chemical sales and storage facility in Commerce City, Adams County, Colorado. Land use in the area is predominantly industrial. The site is a portion of a four-square-mile-area, which consists of single and multi-family residences, small business, municipal facilities, and agricultural and undeveloped land. Part of the site lies within the 100-year floodplain of Sand Creek, which borders the site. An estimated 30,000 residents near the site use the alluvial aquifer as their principal source of drinking water. Since 1976, CS has used the site to store and sell a variety of organic chemicals and acids. On-site features include a warehouse and tank farm, including an associated system of aboveground and underground storage tanks and pipelines. Between 1985 and 1990, three on-site chemical releases of hazardous substances from the CS facility into on-site soil and ground water were documented. First in 1985, approximately 200 gallons of methylene chloride were released during a chemical transfer. The second release occurred in 1986 when VOC-contaminated rain water was discharged into a nearby drainage ditch. In 1990, approximately 3,700 gallons of methanol were spilled onto the ground near the CS tank farm. The site has been divided into three OUs for remediation. A previous ROD addressed on-site soil and ground-water contamination as OU1. This ROD addresses OU2, the VOC-contaminated ground-water plume, which is north of Sand Creek. A subsequent ROD will address residential exposure to the contaminated alluvial aquifer. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, and TCE.

Selected Remedial Action

The selected RA for OU2 of this site includes pumping and on-site treatment of ground water using air stripping, followed by on-site reinjection of treated water into the aquifer; annual ground-water monitoring; and voluntary abandonment of bedrock wells. The estimated present worth cost for this RA is $2,420,000, which includes an annual O&M cost of $223,000 for years 0 through 8 and $27,000 for years 8 through 20.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on SDWA MCLs, and include benzene 5 *ug*/l (MCL), PCE 5 *ug*/l (MCL), and TCE 5 *ug*/l (MCL).

Institutional Controls

Not applicable.

CHEMICAL SALES (NEW LOCATION) (OU3), CO

June 27, 1991

The Chemical Sales (CS) (New Location) (OU 3) site is an active chemical sales and storage facility in Commerce City, Adams County, Colorado. Land use in the area is predominantly industrial. This area is part of a 4-square-mile area, which consists of single and multifamily residences, small businesses, municipal facilities, and agricultural and undeveloped land. An estimated 30,000 residents near the site use the alluvial aquifer as the principal source of drinking water. Since 1976, CS has used the site to store and sell a variety of organic chemicals and acids. On-site features include a warehouse, a tank farm, and an associated system of USTs and pipelines. Between 1985 and 1990, three on-site chemical releases of hazardous substances into the soil and ground water from the CS facility were documented. First, in 1985, approximately 200 gallons of methylene chloride were released during an on-site chemical transfer. Second, in 1986, VOC-contaminated rain water was discharged into a nearby drainage ditch. Third, in 1990, approximately 3,000 gallons of methanol were spilled on the ground surface near the CS tank farm. EPA investigations confirmed the release of hazardous substances into ground water from the CS property. This site has been divided into three OUs for remediation. Two previous 1991 RODs have addressed soil and ground-water contamination as OU1 and OU2. This ROD addresses OU3, residual exposure to site contaminants through domestic use of underlying alluvial aquifers. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, and TCE.

Selected Remedial Action

The selected RA for this site includes connecting residences currently using wells for domestic water supply to the South Adams County Water Supply District (SACWSD); installing home-activated carbon units in homes not readily accessible to SACWSD; implementing ground-water monitoring for benzene; and providing public notification of the potential health threat from contaminated ground water. The estimated present worth cost for this RA is $157,000, which includes an annual O&M cost of $5,520 for 30 years. Future costs for activated carbon treatment units have not been estimated, and residents may be expected to pay small annual O&M costs.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals were not provided.

Institutional Controls

Not applicable.

HILL AIR FORCE BASE, UT

Federal Facility
September 30, 1991

The 6,700-acre Hill Air Force Base (Hill AFB) site is an active military facility situated between the cities of Ogden and Salt Lake City, covering portions of Davis and Weber Counties, Utah. This ROD addresses part of OU2, which consists of two unlined disposal trenches, seeps, and springs, and confined and unconfined aquifers. Land use in the area is mainly agricultural and residential. Both South Weber and Hill AFB obtain drinking water from deep wells in confined aquifers. Because the base covers a large area, the Air Force has grouped geographically adjacent contaminated areas into seven OUs. From 1967 to 1975, Hill AFB disposed of waste solvents and sludge from degreasing operations in the on-site disposal trenches. It is estimated that 100,000 to 1,000,000 gallons of TCE bottoms from the solvent recovery unit, sludge from vapor degreasers, and plating-tank sludge bottoms were disposed of in these trenches. Federal investigations from 1983 to 1986 identified VOC contamination in on-site and off-site ground water. As a result of these investigations, Hill AFB began collection and treatment of contaminated ground water from seeps and springs in 1986. In addition, an alternate water supply was provided to five properties to prevent the use of contaminated ground water from seeps and springs. This ROD addresses the interim remediation of OU2 subsurface soil and ground water by removing a DNAPL source and thus preventing contaminants from reaching aquifers currently used as drinking water sources. A subsequent ROD will provide a final remedy for OU2 soil, ground water, surface water, and air. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE, TCE, toluene, and xylenes.

Selected Remedial Action

The selected RA for this interim remedy includes installing and maintaining a source recovery system to remove DNAPL contamination from the subsurface; pumping DNAPL-contaminated ground water, with on-site discharge to a pretreatment facility to separate DNAPL from ground water using a steam stripper; temporarily storing the DNAPL on site in steel tanks, followed by transporting the waste off site for incineration; installing a pipeline from the site to the base IWTP; treating the pretreated ground water at the IWTP using air stripping, followed by carbon adsorption; discharging the treated water off site to a POTW; and monitoring DNAPL collection and treatment during remediation activities. The estimated present worth cost for this RA is $3,710,000, which includes an annual O&M cost of $1,000,000 for 2 years.

Performance Standards or Goals

Actual chemical-specific standards or goals will be set in a future ROD.

Institutional Controls

Not applicable.

ROCKY FLATS PLANT (USDOE), CO

Federal Facility
January 25, 1991

The Rocky Flats Plant (USDOE) site is part of the 6,550-acre nuclear weapons research, development, production, and plutonium processing complex in Jefferson County, Colorado. The plant is composed of the 450-acre Rocky Flats Plant (RFP) security area and the remaining buffer area. Land use in the area is predominantly rural and agricultural with several new residential areas under development. This ROD addresses OU 2, which includes the 903 Pad and Lip, and Mound and East Trenches Areas, which are located southeast of the RFP. The site lies within the South Walnut Creek and Woman Creek drainage basins. The South Walnut Creek Basin and Woman Creek surface water serve as a source of drinking water. Since 1951, the Department of Energy (DOE) used the site for manufacturing components for nuclear weapons, processing plutonium, and fabricating, machining, and assembling components from metals. A number of past on-site storage and disposal activities are potential sources of contamination. From 1958 to 1967, drums containing radioactively contaminated oils and solvents were stored on site, with some of the drums corroding and leaking approximately 5,000 gallons of liquid into the soil. During a clean up and removal effort of the drum storage area, winds distributed plutonium to the south and east. Prior to 1968, sanitary sewage sludge and flattened drums contaminated with uranium and plutonium were disposed of in on-site trenches, and drums of uranium-contaminated oil were burned in on-site pits. During the 1950s and 1960s, reactive metals including lithium, and solvents were destroyed on-site. In addition, various bottled gases were detoxified on site between 1982 and 1983. Current waste handling practices involve on-site and off-site recycling of hazardous materials, and off-site disposal of solid radioactive materials at another DOE facility. DOE has conducted a number of investigations that revealed VOCs, metals, and radionuclides above background levels in soil, sediment, ground water, and surface water. A 1969 clean-up action attempted to remove corroded and leaking drums of radioactive waste from an on-site area, remove contaminated soil, and cap the soil. In 1970, approximately 1,405 drums containing radioactive waste were removed and disposed of off site. A 1990 ROD addressed contaminated ground water. This ROD provides an interim remedy for contaminated South Walnut Creek Basin surface waters as part of OU2. The primary contaminants of concern affecting the surface water are VOCs including carbon tetrachloride, PCE, and TCE; and radioactive materials.

Selected Remedial Action

The selected RA for this interim remedy includes collecting surface water using diversion; treating surface water using precipitation and cross-flow membrane filtration to remove suspended solids and radionuclides, followed by liquid-phase activated carbon to remove organic contaminants; discharging the treated water on site to South Walnut Creek; conducting treatability studies; and monitoring surface water. The estimated present worth cost for this RA is $4,850,600, which includes an annual O&M cost of $361,600.

Performance Standards or Goals

Chemical-specific surface water clean-up goals will be based on the most stringent of state and federal allowable limits as set forth in ARARs, and will apply to the final RA.

Institutional Controls

Not provided.

ROCKY MOUNTAIN ARSENAL (OU21), CO

Federal Facility
June 6, 1991

The Rocky Mountain Arsenal (RMA) (OU 21) site comprises part of the 17,000-acre RMA site, which is a former U.S. Army chemical warfare and incendiary munitions manufacturing and assembly plant in Adams County Colorado. From the 1950s until late 1969, the U.S. Army used the RMA facility to produce the nerve agent GB (isopropylmethyl-phosphono-fluoridate). In addition, between 1947 and 1982, private industries leased major portions of the plant's facilities to manufacture various insecticides and herbicides. From 1970 through 1982, U.S. Army facility operations have primarily involved the destruction of chemical warfare materials. Because final remediation of the RMA site will take many years to complete, 13 IRAs were determined necessary prior to implementing the final on-post ROD. The south tank farm plume (STFP), OU21, is one of several areas being addressed as part of the other contaminated sources IRA. The STFP is located in the southern half of sections 1 and 2 of the RMA site. From 1947 to 1978, STF tanks 464A, 464B, and others were used intermittently to store bicycloheptadiene (BCHPD) and dicyclopentadiene (DCPD) bottoms generated from pesticide manufacturing. In addition, mixtures of BCHPD, DCPD, and fuel oil were pumped onto the ground, or collected or buried on site during tank cleanings. From 1960 to 1963, leakage of BCHPD/DCPD bottoms occurred from a pipe connected to tank 464A, and additional spills occurred in 1964 and 1978. The exact spill locations and amounts are generally not known. Additionally, in 1948, a large spill of benzene containing toluene and xylene impurities occurred in the STF. A number of U.S. Army investigations have revealed ground-water contamination originating from the areas of LNAPL located near tank 464A. Recent investigations have shown that the STFP does not pose significant risk to public health or the environment, as originally suspected, because data indicate that the plume will not migrate into nearby Lake Ladora or Lake Derby prior to implementation of the final remedy. In addition, biodegradation of the plume may be occurring. This ROD addresses interim management of migration of the STFP and is consistent with the final response action. The primary contaminants of concern affecting the ground water are VOCs including benzene, toluene, and xylenes.

Selected Remedial Action

The selected interim RA for this site includes performing one-time comprehensive ground-water monitoring throughout the STFP to verify the extent and migration rate of STFP constituents and the existence of conditions conductive for biodegradation within the STFP and conducting annual ground-water monitoring including performing quarterly measurement of STFP water levels. No cost information was provided for this interim RA.

Performance Standards or Goals

Not applicable.

Institutional Controls

Not provided.

ROCKY MOUNTAIN ARSENAL (OU26), CO

Federal Facility
September 5, 1991

The Rocky Mountain Arsenal (RMA) (OU 26) site comprises part of the 17,000-acre RMA site, which is a former U.S. Army chemical warfare and incendiary munitions manufacturing and assembly plant in Adams County, Colorado. From the 1950s until late 1969, the U.S. Army used the RMA facility to produce the nerve agent GB (isopropylmethyl-phosphono-fluoridate). In addition, between 1947 and 1982, private industries leased major portions of the plant facilities to manufacture various insecticides and herbicides. Since 1970, U.S. Army facility operations primarily have involved the destruction of chemical warfare materials. Because final remediation of the RMA site will take many years to complete, 13 IRAs were determined necessary prior to implementing the final on-post ROD. OU26, which is one of these 13 IRAs, is composed of the piping and equipment in the buildings in the north and south Plants at RMA. From 1987 to 1989, the U.S. Army surveyed and sampled the former chemical process equipment and piping in the north and south plants. In 1990, the U.S. Army decontaminated piping and equipment in some buildings in the north plant, and sampled 2,354 one-ton containers. This ROD addresses contaminated piping and equipment in numerous buildings in the north and south plants, and contaminated one-ton containers. This IRA will facilitate the final remedy for the clean up of chemical process buildings and structures, by verifying the decontamination status of chemical process piping, equipment, and one-ton containers, and decontaminating these structures and one-ton containers, as necessary, to allow for reuse or disposal of the equipment and piping. The primary contaminants of concern affecting the debris and air are the chemical agents GB (Agent GB, Sarin), HD (Agent Mustard), L (Agent Lewisite), and VX (Agent VX).

Selected Remedial Action

The selected RA for this site includes sampling to determine the level of decontamination inside piping and equipment as identified in the sampling operations in the north and south plants; decontaminating piping, equipment, and one-ton containers; and dismantling piping and equipment. No cost information was provided for this interim RA.

Performance Standards or Goals

Chemical-specific standards for air are based on federal regulations and include GB 0.0001 mg/m^3, HD 0.003 mg/m^3, L 0.003 mg/m^3, and VX 0.0001 mg/m^3.

Institutional Controls

Not provided.

WASATCH CHEMICAL (LOT 6), UT
March 29, 1991

The 18-acre Wasatch Chemical (Lot 6) site is an active chemical production, storage, and distribution facility in Salt Lake City, Utah. Land use in the area is predominantly industrial. The site lies one-half mile east of the Jordan River, within the center of the Jordan River Valley. The site overlies a thick aquifer that is a regional source of potable water. Surface water run-off from the site is drained by a series of ditches, which ultimately discharge to the Great Salt Lake. From 1957 to 1986, Wasatch Chemical Company and other tenants used the site for production, packaging, storage, and distribution of various chemical products, including industrial chemicals, acids, solvents, pesticides, and fertilizers. Process wastes, including dioxins, were directed toward an on-site evaporation pond, stored in 40 drums, and also discharged directly in the ground and possibly into the Salt Lake City sewer system. Noncompliance with state and federal hazardous waste storage practices and disposal standards prompted a number of state investigations, which revealed elevated levels of VOCs in on-site soil and sludge, and PCE in ground water. In 1986, as part of a removal action, EPA removed 40 drums and cylinders and other contaminated materials off site. This ROD addresses contamination of on-site soil, sludge, and ground water as a final remedy. The primary contaminants of concern affecting the soil, sludge, and ground water are VOCs including PCE, TCE, toluene, and xylenes; and other organics including pesticides, herbicides, and dioxins.

Selected Remedial Action

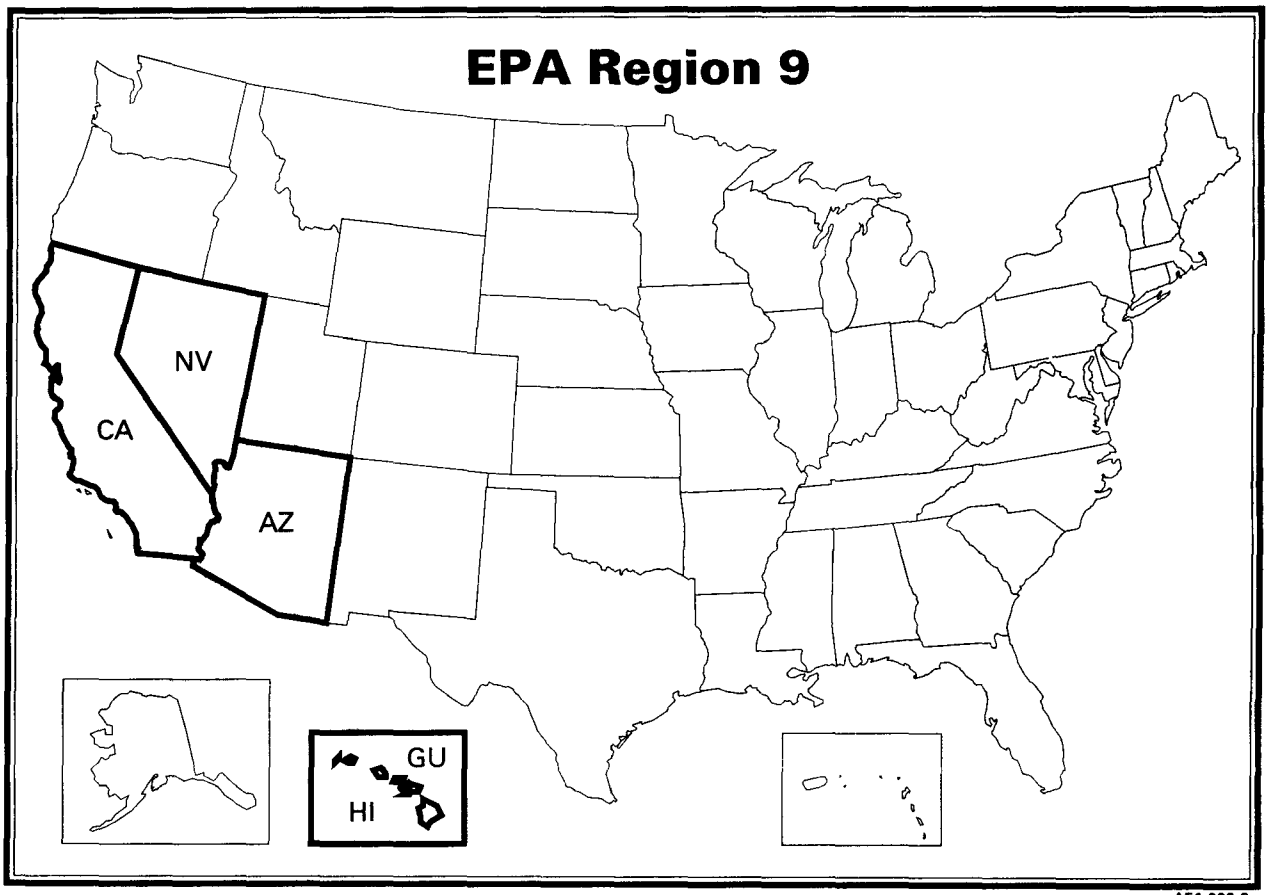
The selected RA for this site includes excavating and consolidating 3,587 cubic yards of contaminated soil and sludge and 650 gallons of liquid waste in the former evaporation pond; treating these materials on site using *in situ* vitrification; excavating and land farming 1,111 cubic yards of hydrocarbon-contaminated soil; sealing the surface of the site using asphalt paving; pumping and on-site treatment of 20.4 million gallons of contaminated ground water using air stripping; controlling air emissions with carbon adsorption, if needed, followed by off-site disposal of residuals; and implementing institutional controls including deed and ground-water use restrictions. The estimated present worth cost for this RA is $3,900,000, which includes an estimated annual O&M cost of $33,000 for 30 years.

Performance Standards or Goals

Soil cleanup goals are based on health-based action levels and include PCE 103,000 *ug*/kg, TCE 22,000 *ug*/kg and dioxin < 1 *ug*/kg (based on RCRA LDRs). Ground-water action levels are based on SDWA MCLs and proposed MCLs, and include PCE 5 *ug*/l (MCL) and TCE 5 *ug*/l (MCL).

Institutional Controls

Deed and ground-water use restrictions will be implemented to prevent land and ground-water access and use at the site.



A51-002-9

REGION 9

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ADVANCED MICRO DEVICES 901/902 (SIGNETICS) (TRW MICROWAVE), CA

September 11, 1991

The 3-acre Advanced Micro Devices (AMD) site is an active semiconductor manufacturing facility in Sunnyvale, Santa Clara County, California. The site is part of a larger study area that includes four OUs: the AMD 901/902 site, the Signetics site, the single acre TRW Microwave site, and a 100-acre off-site contaminated ground-water plume. Land use in the area is predominantly commercial and industrial. Residential property lies to the north and west of the main facilities and overlies portions of the off-site ground-water OU. Six aquifers are associated with the study area including a deeper aquifer confirmed only at the TRW and Signetics sites. Currently, the contaminated ground water is not used as a drinking water supply, but the state considers several of the aquifers to be potential drinking water sources. From 1969 to the present, AMD has used its portion of the study area for manufacturing semiconductors using organic solvents, acids, and metals. These substances also were used in semiconductor manufacturing at the Signetics and TRW sites from 1964 to the present and from 1974 to 1986, respectively. As a result of a leakage from the acid neutralization system at the AMD site, a number of investigations were conducted that revealed extensive contamination of on-site soil and ground water. Leakage from an underground waste solvent storage tank at the Signetics site and responses to an information questionnaire regarding an underground tanks investigation at the TRW site resulted in a number of investigations that revealed extensive contamination of soil and ground water. Several initial remedial measures were conducted at the AMD OU. During 1983 and 1984, acid neutralization sumps and approximately 217 cubic yards of contaminated soil were removed. From 1984 to 1988, remediation of ground water was implemented using extraction wells and dewatering sumps. Several initial remedial measures also were conducted at the Signetics OU. From 1982 to present, ground water has been pumped from various site locations and treated using air stripping and carbon adsorption, followed by air stripping to control off-gases and reuse of the treated water in industrial processes. Contaminated soil has been removed from three separate locations, including 4,720 cubic yards of soil from a waste solvent storage tank area in 1983. In 1989, three vapor extraction wells were installed to treat contaminated soil. Several initial remedial measures also have been conducted at the TRW OU. From 1983 to 1984, an underground waste solvent storage tank and 120 cubic yards of on-site contaminated soil were removed. From 1984 to present, ground water has been pumped and treated using air stripping, followed by on-site discharge to surface water. In addition, two ground- water extraction systems pump contaminated ground water from the 100-acre off-site plume. The extracted water is treated at a neighboring AMD facility using air stripping, followed by liquid phase granular activated carbon polisher and on-site discharge to surface water, or reuse by the facility. This ROD collectively addresses final remediation of soil and ground water in the four separate OUs within the study area. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE and TCE; and other organics.

Selected Remedial Action

The selected RA for this site includes separate remedies for the four different OUs of the study area. The remedy for the AMD OU includes excavating 37 cubic yards of on-site contaminated soil, followed by off-site

incineration and/or disposal, and backfilling the excavation with clean soil; and continuing on-site pumping and treatment of ground water using air stripping and carbon adsorption of off-gases, followed by reuse of the treated water. The remedy for the Signetics OU includes expanding the on-site soil vapor extraction system and continuing on-site pumping and treatment of ground water using air stripping, followed by aqueous-phase carbon polishing, reuse of the treated water, and vapor-phase carbon treatment of the effluent air stream. The remedy for the TRW OU includes continuing on-site pumping and treatment of ground water using air stripping, followed by on-site discharge of treated water to surface water. The remedy for the off-site ground-water OU includes continuing and expanding the pumping and treatment system for contaminated ground water using air stripping and aqueous-phase carbon adsorption, followed by reuse of the treated water or on-site discharge to surface water, and off-site regeneration of spent carbon. Each OU also will involve continuing ground-water monitoring, and implementing institutional controls including deed and ground-water use restrictions. The estimated present worth cost for the RA for all OUs is $11,900,000, which includes an estimated O&M cost of $225,000 for the AMD OU; $236,000 for the Signetics OU; and $255,000 for the off-site ground water OU. No annual O&M cost was provided for the TRW OU.

Performance Standards or Goals

Chemical-specific soil clean-up goals have been set at background or total VOCs 1 mg/kg based on state policy. Chemical-specific ground-water clean-up goals are based on state and federal MCLs, and include PCE 5 *u*g/l (state) and TCE 5 *u*g/l (state).

Institutional Controls

Deed and ground-water use restrictions will be implemented to prevent human exposure to contaminated ground water during the clean-up period.

ADVANCED MICRO DEVICES #915, CA

August 26, 1991

The Advanced Micro Devices (AMD) #915 site is an active semiconductor manufacturing facility in Santa Clara County, California. The site consists of approximately five acres and contains three physical structures, the largest of which is a 116,000-square-feet building known as AMD 915. The site is in the Santa Clara Valley, and the facility lies within an industrial park bordered by residential areas. Ground water from this basin provides up to 50 percent of the municipal drinking water for 1.4 million residents of the Santa Clara Valley. The site overlies three aquifers, one of which is known as the B aquifer, which is approximately 20 to 100 feet below the surface. AMD 915 was built in 1974, and on-site manufacturing processes have involved the use of solvents, caustics, and acids. Eleven chemical storage or treatment areas have been documented at the AMD 915 facility including three underground acid neutralization systems, two above-ground drum storage areas, and six underground tank complexes. Two of the acid neutralization systems remain in operation, as well as one drum storage area, and two tank complexes. Records indicate that solvent waste and other materials were stored in underground tanks, and as many as 28 separate underground tanks may have been in service at various times. In 1981, site investigations discovered soil contamination during a planned UST removal. Two leaking underground tanks were identified, and 7,000 cubic yards of contaminated soil were removed. The majority of these tanks now have been removed from service or replaced. In 1982, ground-water contamination also was addressed and found to be limited to the B aquifer. Additional off-site sources of ground-water contamination may have a significant effect on the AMD 915 site including commingling of ground-water contamination. The most notable of these are AMD 901/902 facilities, Signetics, and FEI Microwave. Two interim RAs for soil were completed during 1981 and 1982, including off-site removal and disposal of a waste solvent tank, and the removal of one acid neutralization system and 5,500 cubic yards of soil. In 1982, ground-water pumping and treatment using air stripping and carbon adsorption began on site using existing building dewatering sumps. This was supplemented with the installation of a series of wells during 1982 and 1988. This ROD addresses remediation of on-site contaminated ground water. The primary contaminants of concern affecting the ground water are VOCs including benzene, TCE, toluene, and xylenes; other organics; and metals including arsenic and chromium.

Selected Remedial Action

The selected RA for this site includes continuing the operation of eight existing ground-water extraction wells; and treating contaminated ground water on site using air stripping and carbon adsorption, followed by discharge of the treated water on site to surface water. The estimated present worth cost for this RA is $2,100,000. This figure represents the O&M costs for 30 years since the system is already in place as an interim measure and no additional capital costs are required.

Performance Standards or Goals

Ground-water clean-up standards are based on the more stringent of federal or state MCLs for drinking water. Chemical-specific goals for ground water include PCE 5 *ug*/l (MCL), and TCE 5 *ug*/l (MCL).

Institutional Controls

Deed restrictions will be implemented to limit access to site ground water until clean-up standards have been met.

ATLAS ASBESTOS MINE, CA

February 14, 1991

The 450-acre Atlas Mine Area is part of the Atlas Asbestos Mine site in Fresno County, California. The site consists of four geographically distinct areas (the Atlas Mine Area, the Clear Creek Management Area (CCMA), the Ponding Basin of the California Aqueduct, and the city of Coalinga). The Atlas Mine Area is on rural land owned by the federal government and private parties, and surrounding land is used for mining, ranching, farming, and recreation. The mine area includes three open pit asbestos mine surfaces, stockpiles of asbestos waste material, an abandoned mill building, a settling pond, and debris. Construction of an asbestos mill at the Atlas Mine began in 1962, and on-site asbestos mining and milling activities occurred from 1967 to 1979. Approximately three million cubic yards of asbestos ore and asbestos mill tailings from on-site operations were bulldozed into piles adjacent to the mill building. In 1976 and 1980, the Atlas Mine was cited for violating asbestos emissions standards. In early 1980, after detecting elevated levels of asbestos in water samples from the California Aqueduct, the state concluded that additional corrective measures were necessary to prevent mine- and mill-generated asbestos from entering the drainage basins. Further state investigations identified high concentrations of asbestos in the mine area soil, surface water, and air. A 1989 ROD for the city of Coalinga OU addressed cleanup of asbestos-contaminated soil in Coalinga, California by burying the contaminated material in a waste management unit with an impermeable cap. This ROD is designed to control the release of asbestos from the mine area. No actions are proposed at this time for the CCMA or the Ponding Basin of the California Aqueduct. In 1992, EPA will evaluate the DOI BLM's revised land use plan for CCMA to determine if the plan is adequate to minimize airborne asbestos emissions, and the U.S. Bureau of Reclamation and California Department of Waste Resources actions to minimize airborne emissions from the Ponding Basin to determine if further action is necessary. The primary contaminant of concern affecting the soil, sediment, debris, surface water, and air is asbestos, an inorganic.

Selected Remedial Action

The selected RA for this site includes paving the road through the Mine Area or implementing an appropriate road maintenance alternative; constructing stream diversions, sediment trapping dams, and other slope stabilization elements; instituting a verification sampling plan involving surface water modeling and surface water and stream bed sampling, as necessary; conducting a revegetation pilot project, and implementing revegetation if found to be technically feasible and cost-effective; dismantling the mill building with off-site disposal along with other debris from the mine area; and implementing institutional controls including deed and land use restrictions, and site access restrictions such as fencing. The estimated present worth cost for this RA is $4,286,000, which includes an annual O&M cost of $19,000.

Performance Standards or Goals

All diversion and drainage facilities will be designed and constructed to accommodate the anticipated volume of precipitation and peak flows from surface run-off in a 25-year, 24-hour storm. All tailings will be protected from 100-year peak stream flows. Quantification of risk reduction is difficult because asbestos from natural and disturbed areas will continue to enter

the surface water; however, a verification sampling plan will be implemented to confirm that an appropriate reduction in asbestos transport is achieved.

Institutional Controls

Deed restrictions will limit use of the privately-held land and prevent disturbance of the contaminated material left at the mine area.

CASTLE AIR FORCE BASE, CA

Federal Facility
August 12, 1991

The 2,777-acre Castle Air Force Base is a Strategic Air Command training base six miles northwest of the city of Merced in Merced County, California. Land use in the area is predominantly agricultural. Several irrigation canals and laterals are located within one mile of the base including Canal Creek, which borders the base on its southwest boundary and receives run-off from the base and irrigated land downstream. At least 20 agricultural wells are located within three to four miles of the site, and a number of residential and municipal wells are located within two miles of the site. Since 1941, the site has been used as a military air training base. Fire training activities, as well as aircraft and jet engine maintenance activities including metal plating and processing, have occurred on site. Both processes involve the use of fuels, solvents, and chemicals and have generated municipal and chemical wastes. During routine well sampling, the state identified elevated TCE concentrations in ground water in the shallow aquifer beneath and south of the site. In 1984, the base was required not only to implement remedial measures to correct this identified contamination but also to prevent future ground-water degradation from waste discharges. The site has been divided into OUs for remediation. This ROD provides an interim remedy for the main TCE plume, as OU1. Future RODs will address remaining soil and ground-water contamination. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, and TCE.

Selected Remedial Action

The selected RA for this interim remedy includes on-site pumping and treatment of ground water using air stripping, followed by natural biological enhancement to accelerate the release and degradation of hazardous constituents in the saturated zone; reinjecting the treated ground water on site to maintain hydraulic control and avoid depletion of the aquifer; treating emissions from the air stripping process using granular activated carbon; and treating the emissions abatement unit by on-site steam regeneration, and disposing of the liquid condensate off site. The estimated present worth cost for this RA is $28,445,000, which includes an annual O&M cost of $2,744,000.

Performance Standards or Goals

Ground-water clean-up goals based on MCLs and risk levels will be established in a subsequent ROD.

Institutional Controls

Institutional controls will be implemented on site to reduce site risks.

CTS PRINTEX, CA
June 28, 1991

The CTS Printex site is an inactive printed circuit board manufacturing facility in Mountain View, Santa Clara County, California. Land surrounding the site is used for industrial, commercial, residential, and agricultural purposes. The site overlies two major water-yielding zones, a shallow and deep aquifer, which are suspected to be hydraulically continuous. Historical ground-water use in the area surrounding the site includes private water-supply wells for homes and agriculture prior to the construction of public water and sewer connections in 1984. Site features include a flammable materials storage shed area, an industrial wastewater sump used to neutralize and discharge waste to POTW, a "wet floor" building used for both wet and dry manufacturing processes, a materials and waste storage warehouse, and various office buildings. From 1981 to 1985, the CTS Printex site manufactured printed circuit boards at its on-site facilities. Site investigations by CTS Printex in 1985 established that the "wet floor" building and the waste-water sump areas were the sources of on-site soil and ground-water contamination, and that the release of contaminants was attributed to deterioration of the concrete bases. In 1986, the state certified closure of the former CTS facility. In 1987, the state required CTS to implement the following interim RA for soil and ground water: destroying and removing contaminated on-site structures, removing residual metals sludge and process debris from the site, hydroblasting interior areas of structures exposed to contaminants, excavating the sump and contaminated soil, and installing and operating a ground-water extraction system. This ROD addresses contaminated on-site ground water. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCE, and toluene.

Selected Remedial Action

The selected RA for this site includes continuing the current ground-water extraction system, including discharging the untreated water to the sanitary sewer for off-site treatment at the POTW; and ground-water monitoring. Passive air stripping is created by passing water through the sewer collection system and through the sewage treatment plant. The estimated present worth cost for this RA is $786,000, which includes an estimated O&M cost of $104,700 for 15 years.

Performance Standards or Goals

Ground-water clean-up goals are based on the more stringent of federal MCLs or non-zero MCLGs, or state MCLs. Chemical-specific goals include benzene 1 *ug*/l (state), PCE 5 *ug*/l (MCL), TCE 5 *ug*/l (MCL), and toluene 100 *ug*/l (state). Action-specific goals include compliance with the city of Mountain View's discharge requirement for the sanitary sewer, which is total organics equal to 1 *ug*/l at the point of discharge.

Institutional Controls

Not provided.

FMC (FRESNO PLANT), CA
June 28, 1991

The 17-acre FMC (Fresno Plant) site is an active pesticide manufacturing facility in Fresno, California. Surrounding land use is primarily industrial, but several residential areas are within one kilometer of the site. The site overlies two unconsolidated sand zones that are a potential source of ground water, and have been contaminated by site operations. Since 1931, various agricultural product operations have been conducted on site including sulfur processing, and fertilizer and pesticide manufacturing. Wastewater from liquid pesticide formulation was discharged to a 4.92-acre area of the site via a trench during the 1960s and 1970s. From 1963 until 1974, wastewater from oil drum cleaning operations was stored in an above-ground tank and was sprayed on a concrete evaporation slab in an oil drum yard. A former disposal pond area was used for the disposal of fertilizer process waste from 1967 to 1972. From 1972 until 1983, a wastewater evaporation pond was used for the discharge of wastewater, including oil drum washing rinsate. From 1976 until 1988, a rainwater percolation pond was used to collect surface run-off from non-production areas of the site. These waste disposal practices have led to contamination of on-site soil and ground water. In 1980, FMC excavated a portion of the contaminated soil in the oil drum yard. In 1983, discharge to the wastewater evaporation pond was discontinued. In 1985, 1,500 cubic yards of contaminated soil were excavated from the waste pond. In 1989, this pond was lined with a synthetic liner. Investigations by FMC under EPA oversight from 1989 to 1991 characterized and quantified site contamination, affected media, and probable source areas. This ROD provides for remediation of on site source areas and restoration of ground water as a final remedy. The primary contaminants of concern affecting the soil and ground water are organochlorine and organophosphorous pesticides although VOCs including PCE, TCE, toluene, and xylenes; other organics including dioxin, PAHs, and phenols; and metals including arsenic, chromium, and lead are also present.

Selected Remedial Action

The selected RA for this site includes excavating approximately 25,000 cubic yards of contaminated soil from on-site source areas, and treating the soil using soil washing and stabilization technologies; backfilling the excavated areas with treated soil; treating soil wash water using carbon adsorption; capping unpaved and excavated areas including the 4.92-acre wastewater evaporation pond, oil drum yard, and percolation pond; on-site pumping and treatment of ground water using filtration, air stripping, and carbon adsorption; reinjecting or reusing the treated ground water on site; providing an alternate water supply to on-site or off-site well users, if necessary, to eliminate adverse affects to ground-water treatment; monitoring ground water; and implementing institutional controls including deed, land, and ground-water use restrictions. The estimated present worth cost for this RA is $17,310,681, which includes an annual O&M cost of $445,163 for 30 years.

Performance Standards or Goals

Clean-up standards for soil are based on a carcinogenic risk level of 10^{-4} and an HI=1. However, when combined with capping and institutional controls, the selected soil remedy attains a 10^{-6} carcinogenic risk level.

Ground-water clean-up standards are based on the more stringent of federal or state MCLs or non-zero MCLGs. If these standards do not exist, state action levels, site-specific health-based levels, or quantification limits will be used.

Institutional Controls

Deed restrictions will be implemented to restrict ground-water use and future land use on site.

INDIAN BEND WASH AREA (OUs 1, 4, 5, 6), AZ

September 12, 1991

The Indian Bend Wash Area site is an active electronics manufacturing and metal plating facility located in the cities of Scottsdale and Tempe, Maricopa County, Arizona. The site consists of two study areas, the North Indian Bend Wash (NIBW) and South Indian Bend Wash (SIBW), both of which contain portions that lie in the 100-year floodplain of the IBW. The NIBW area is the focus of this ROD and consists of four operable units; 1, 4, 5, and 6. Land use within the 10-square mile NIBW study area is mainly residential, commercial/industrial, and developed open space (parks and golf courses). In addition, the Salt River Pima-Maricopa Indian Community maintains a portion of NIBW as Cropland. The Indian Bend Wash provides the major surface water drainage for the NIBW area. Since 1950, various electronics manufacturing and metal plating facilities, as well as other industries, have been active at NIBW. On-site operations have included the use and disposal of organic solvents. During operations, waste solvents and wastewater containing solvents were released from solvent storage tanks and pipes directly to dry wells, surface pits, ponds, lagoons, and the ground surface. In 1981, the state conducted well sampling and identified VOC contamination in several municipal supply wells. EPA investigations have concluded that the methods used for solvent disposal led to soil contamination, which in turn acted as a source of contamination for underlying alluvial units. A 1988 ROD provided for remediation of the middle and deep alluvial units at NIBW. This ROD addresses contamination in the vadose zone and in the upper alluvial unit within the NIBW area. However, because the vadose zone overlies the upper alluvial unit, which overlies the middle and deep alluvial units, RAs documented in this ROD are dependent upon successful completion of the 1988 ROD. The primary contaminants of concern affecting the soil and shallow ground water are VOCs including benzene, PCE, TCE, and toluene; other organics; and metals including arsenic, chromium, and lead. EPA has designated 13 areas at NIBW for potential contamination in the vadose zone. Twelve of these areas are designated by number. The 13th area is in the vicinity of several city of Scottsdale ground-water supply wells.

Selected Remedial Action

The selected RA for this site includes installing a soil vapor extraction system for areas 7 and 8 consisting of soil vapor extraction wells, a manifold collection system, a vacuum pump, and a vapor-phase carbon adsorption system; installing additional soil vapor monitoring wells to continue investigations in areas 3, 5, 6, 9, 11, and 12 with either soil vapor extraction or no further action remedies as needed; conducting no further action for areas 1, 2, 4, 10, and the city of Scottsdale wells; and ground-water monitoring in the upper alluvial unit. The estimated present worth cost for this RA is a minimum of $21,576,000, depending upon the need for soil vapor extraction in areas 3, 5, 6, 9, 11, and 12, which includes an annual O&M cost of at least $935,000 for 30 years.

Performance Standards or Goals

Chemical-specific soil and ground-water criteria are based on the more stringent of state water quality standards, federal MCLs, or non-zero MCLGs. These criteria include PCE 5 *ug*/l (MCL), TCE 5 *ug*/l (MCL), toluene 1000 *ug*/l (MCL), arsenic 50 *ug*/l (MCL), chromium 50 *ug*/l (state), and lead 50 *ug*/l (MCL).

Institutional Controls

Not provided.

MESA AREA GROUND WATER CONTAMINATION, AZ

September 27, 1991

The 80-acre Mesa Area Ground Water Contamination site is a semiconductor manufacturing facility in Mesa, Maricopa County, Arizona. Land use in the area is predominantly industrial and residential. The site overlies two aquifers: an LAA, which is used by the residents of Mesa as a drinking water source, and a UAA. Since 1966, Motorola, Inc. has used the site for the production of semiconductors and the storage of chemicals in an underground storage system. On-site manufacturing processes involve the use of solvents, acids, and bases. In 1983, Motorola identified VOCs, including TCE, in ground water originating from the LAA. Subsequent investigations by Motorola revealed high levels of VOC-contaminated soil in the main chemical handling area, and VOC and chromium contamination in the UAA. From 1983 to 1987, Motorola performed a partial closure of the underground waste solvent storage system under RCRA authority. In 1984, Motorola installed ground-water monitoring wells, later converted these into extraction wells, and pumped contaminated ground water from the UAA. Since 1987, as a result of Motorola's actions, contamination levels have been consistently below MCLs. However, by 1991, the contaminated ground-water plume had migrated to over one mile southeast of the site. In 1991, EPA dropped the Mesa Ground Water Contamination site from the NPL and referred the site to the RCRA program because the site is a RCRA facility, the ground water contamination is solely from the Motorola facility, and no public drinking water supply wells have been contaminated. This action will be implemented by the PRP under state supervision, and incorporated as a component of the corrective action plan under RCRA. This ROD documents final remediation of contaminated soil and ground water. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE and TCE.

Selected Remedial Action

The selected RA for this site includes treating shallow on-site soil using soil vapor extraction, controlling VOC emissions using carbon adsorption, followed by off-site disposal of carbon residuals; on-site and off-site pumping of contaminated ground water; treating the ground-water on site using vacuum degasification, followed by carbon adsorption to remove VOCs; discharging the treated water from the degasifier to the deionized water treatment plant for reuse in manufacturing and other facility processes; disposing of remaining wastewater at a POTW; and rehabilitating two deep industrial ground-water supply wells to prevent them from acting as conduits for contaminant plume migration from the upper to the lower aquifer. The estimated present worth cost for this RA is $7,144,000, which includes an annual O&M cost of $581,000 for 13 years.

Performance Standards or Goals

Chemical-specific soil clean-up goals are based on state standards, and include PCE 14 mg/kg. Chemical-specific ground-water clean-up goals are based on SDWA MCLs, and include PCE 5 *ug*/l and TCE 5 *ug*/l.

Institutional Controls

Not applicable.

MICRO STORAGE/INTEL MAGNETICS, CA
August 26, 1991

The 3-acre Micro Storage/Intel Magnetics site consists of a former microcomputer disk drive manufacturing facility and a magnetic bubble production and testing facility in Santa Clara, Santa Clara County, California. Land use in the area is predominantly industrial, although approximately 300,000 people reside within a three-mile radius of the site. In addition, the site overlies two shallow aquifers zones, which in turn, overlie the Santa Clara Valley ground-water basin, the primary drinking water source for the 1.4 million residents of the Santa Clara Valley. From 1985 to 1986, Micro Storage Corporation (MSC) researched, developed, and manufactured microcomputer disk drives. Chemicals used on site were stored in an external shaded storage area in 55-gallon drums. From 1978 to 1987, Intel Magnetics (IM), a magnetic bubble production and testing facility, operated both an underground solvent tank used to store waste solvents, and an inorganic acid neutralization system. As a result of possible improper storage procedures at both facilities, a number of state and EPA investigations identified VOCs including benzene, TCE, and TCA, and other organics in the ground-water aquifer beneath the site. Interim remedial measures have included: extracting contaminated ground water at both sites; removing all chemicals stored on the combined MSC/IM site; and replacing the UST and excavating contaminated soil at the IM site. Treated ground water is discharged to a storm sewage system tributary of nearby Calabazas Creek. This ROD addresses ground water contaminated by past facility operations. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCE, and toluene; and other organics.

Selected Remedial Action

The selected RA for this site includes continuing ground-water extraction and treatment with carbon adsorption until clean-up standards are achieved in all combined MSC/IM site monitoring wells; installing and sampling a minimum of two new monitoring wells; hydraulically contain the entire 93,000 cubic yards ground-water plume above clean-up standards; maintaining hydraulic control to prohibit the further vertical and horizontal migration of the ground-water pollution; quarterly ground-water monitoring at the combined MSC/IM site during the clean-up period; treating the extracted ground water with an existing carbon absorption system; discharging the treated ground water on site to Calabazas Creek; and implementing deed restrictions on site. The estimated present worth O&M cost for this RA ranges from $630,000 to $1,100,000 for 10 years.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on the more stringent of federal and state MCLs standards, and include benzene 1 *ug*/l, PCE 5 *ug*/l, TCE 5 *ug*/l, and toluene 100 *ug*/l.

Institutional Controls

Deed restrictions will be implemented to prohibit the use of on-site shallow ground water and control other subsurface activities.

MONOLITHIC MEMORIES (ADVANCED MICRO DEVICES - ARQUES) (NATIONAL SEMICONDUCTOR), CA

September 11, 1991

The Monolithic Memories (MM) site is a former semiconductor manufacturing facility located in Sunnyvale and Santa Clara, California. Land surrounding the site is used for commercial and light industrial purposes. The site lies within the confined area of the Santa Clara Valley ground- water basin, which consists of various upper and lower aquifer zones. Ground water from this basin provides up to 50 percent of the municipal drinking water for Santa Clara Valley residents. Remediation of the MM site has been combined with another NPL site, National Semiconductor (NSC), because both sites contribute to the same ground-water contamination problem. The combined remediation has been divided into two OUs. This ROD addresses OU1, which consists of three subunits. Subunit 1 includes the 60-acre NSC facility, which contains more than 20 buildings used for administrative offices, laboratories, and semiconductor manufacturing; and the 10-acre United Technology Corporation facility, which was used to develop and test rocket propellants. Subunit 2 includes the MM facility, currently owned by Advanced Micro Devices, and consists of buildings used for office space and semiconductor production facilities. Subunit 3 consists of the areas downgradient from subunits 1 and 2 and extends to the leading edge of the contaminant plume. Semiconductor manufacturing activities took place on site at NSC beginning in 1967, and at MM in 1970, and continued until 1989. Virgin solvents and acids used in semiconductor manufacturing processes were stored in aboveground tanks and storage drums. Waste solvents were stored in underground and aboveground tanks, and acid waste was treated in underground and aboveground tanks or underground neutralization sumps. In 1982, NSC and MM conducted PAs of soil and ground water near USTs and underground storage sumps, in response to a state-initiated storage tank leak detection program. As a result, both NSC and MM removed tanks, sumps, and soil from areas containing elevated concentrations of solvents. In addition, in 1984 and 1986, NSC installed off-site and on-site ground-water extraction systems, and MM installed on-site extraction systems in 1986 and 1988. This ROD addresses remediation of contaminated soil on the facility property and ground water in the upper aquifer zone as OU1. OU2 will address remaining soil and ground-water problems associated with the western portion of the ground-water contaminant plume. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, PCE, TCE, toluene, and xylenes; and other organics including PAHs and phenols.

Selected Remedial Action

The selected RA for this site includes treating contaminated soil in Subunits 1 and 2 on site using soil vapor extraction, with carbon adsorption to control emissions, if required; excavating and surface aeration of contaminated soil, if necessary; pumping and on-site treatment of contaminated ground water by expanding the existing extraction system and adding an ozone oxidation treatment system to the current air stripper treatment systems; controlling air emissions from the air strippers using carbon treatment, if necessary; discharging the treated ground- water on site to storm sewers; monitoring ground water; and implementing institutional controls including deed restrictions. The estimated present worth cost for this RA is $8,400,000, which includes a 30-year operation period. O&M costs were not provided.

Performance Standards or Goals

Chemical-specific clean-up goals for soil and ground water are based on the more stringent of state MCLs, federal MCLs, non-zero MCLGs, and site-specific standards based on an HI < 1 and a calculated cancer risk of 10^{-6} to 10^{-4}. Chemical-specific goals for soil include total VOCs 1 mg/kg (site-specific) and PAHs 10 mg/kg (site-specific). Chemical-specific goals for ground water include benzene 1 *u*g/l (state), phenol 5 *u*g/l (state), PCE 5 *u*g/l (state), TCE 5 *u*g/l (state), and xylenes 175 *u*g/l (site-specific).

Institutional Controls

Deed restrictions will be implemented on site for soil and ground water.

NATIONAL SEMICONDUCTOR (MONOLITHIC MEMORIES), CA

September 11, 1991

The 70-acre National Semiconductor (NSC) site is a former semiconductor manufacturing facility located in Sunnyvale and Santa Clara, California. Land surrounding the site is used for commercial and light industrial purposes. The site lies within the confined area of the Santa Clara Valley ground-water basin, which consists of various upper and lower aquifer zones. Ground water from this basin provides up to 50 percent of the municipal drinking water for Santa Clara Valley residents. Remediation of the NSC site has been combined with another NPL site, Monolithic Memories (MM), because both sites contribute to the same ground-water contamination problem. The combined remediation has been divided into two OUs. This ROD addresses OU1, which consists of three subunits. Subunit 1 includes the 60-acre NSC facility, which contains more than 20 buildings used for administrative offices, laboratories, and semiconductor manufacturing, and the 10-acre United Technology Corporation facility, which was used to develop and test rocket propellants. Subunit 2 includes the MM facility, currently owned by Advanced Micro Devices, and consists of buildings used for office space and semiconductor production facilities. Subunit 3 consists of the areas downgradient from subunits 1 and 2 and extends to the leading edge of the contaminant plume. Semiconductor manufacturing activities took place on site at NSC beginning in 1967 and at MM in 1970, and continued until 1989. Virgin solvents and acids used in semiconductor manufacturing processes were stored in above-ground tanks and storage drums. Waste solvents were stored in underground and aboveground tanks, and acid waste was treated in underground and aboveground tanks or underground neutralization sumps. In 1982, NSC and MM conducted PAs of soil and ground water near USTs and sumps, in response to a state-initiated storage tank leak detection program. As a result, both NSC and MM removed tanks, sumps, and soil containing areas with elevated concentrations of solvents. In addition, in 1984 and 1986 NSC installed off-site and on-site ground-water extraction systems, and MM installed on-site extraction systems in 1986 and 1988. This ROD addresses remediation of contaminated soil on the facility property and ground water in the upper aquifer zone as OU1. OU2 will address remaining soil and ground-water problems associated with the western portion of the ground-water contaminant plume. The primary contaminants of concern affecting the soil and ground water are VOCs including benzene, PCE, TCE, toluene, and xylenes; and other organics including PAHs and phenols.

Selected Remedial Action

The selected RA for this site includes treating contaminated soil in Subunits 1 and 2 using soil vapor extraction, with carbon adsorption to control emissions, if required; excavating and surface aeration of contaminated soil, if necessary; pumping and treatment of contaminated ground water by expanding the existing extraction system and adding an ozone oxidation treatment system to the current air stripper treatment systems; controlling air emissions from the air strippers using carbon treatment, if necessary; discharging the treated ground-water on site to storm sewers; ground-water monitoring; and implementing institutional controls including deed restrictions. The estimated present worth cost for this RA is $8,400,000, which includes a 30-year operation period. O&M costs were not provided.

Performance Standards or Goals

Chemical-specific clean-up goals for soil and ground water are based on the more stringent of

state MCLs, federal MCLs, non-zero MCLGs, and site-specific standards based on an HI < 1 and a calculated cancer risk of 10^{-6} to 10^{-4}. Chemical-specific goals for soil include total VOCs 1 mg/kg (site-specific) and PAHs 10 mg/kg (site-specific). Chemical-specific goals for ground water include benzene 1 *u*g/l (state), phenol 5 *u*g/l (state), PCE 5 *u*g/l (state), TCE 5 *u*g/l (state), and xylenes 175 *u*g/l (site-specific).

Institutional Controls

Deed restrictions will be implemented on site for soil and ground water.

SIGNETICS (ADVANCED MICRO DEVICES 901/902) (TRW MICROWAVE), CA

September 11, 1991

The Signetics site is an active semiconductor manufacturing facility in Sunnyvale, Santa Clara County, California. The site is part of a larger study area that includes four OUs: the Signetics site, the three-acre Advanced Micro Devices (AMD) 901/902 site, the single acre TRW Microwave site, and a 100-acre off-site contaminated ground-water plume. Land use in the area is predominantly commercial and industrial. Residential property lies to the north and west of the main facilities and overlies portions of the off-site ground-water OU. Six aquifers are associated with the study area including a deeper aquifer confirmed only at the TRW and Signetics sites. Currently, the contaminated ground water is not used as a drinking water supply, but the state considers several of the aquifers to be potential drinking water sources. From 1964 to the present, Signetics used its portion of the study area for manufacturing semiconductors with organic solvents, acids, and metals. These substances also were used in semiconductor manufacturing at the AMD and TRW sites from 1969 to the present and from 1974 to 1986, respectively. As a result of a leakage from an underground waste solvent storage tank at the Signetics site, a number of investigations were conducted that revealed extensive contamination of on-site soil and ground water. Leakage from the acid neutralization system at AMD and responses to an information questionnaire regarding an underground tanks investigation at TRW resulted in a number of investigations that also revealed extensive contamination of on-site soil and ground water at both of these sites. Several initial remedial measures were conducted at the Signetics OU. From 1982 to present, ground water has been pumped from various site locations and treated using air stripping and carbon adsorption, followed by air stripping to control off-gases and reuse of the treated water in industrial processes. Contaminated soil has been removed from three separate locations, including 4,720 cubic yards of soil from a waste solvent storage tank area in 1983. In 1989, three vapor extraction wells were installed to treat contaminated soil. Several initial remedial measures also have been conducted at the AMD OU. In 1983 and 1984, acid neutralization sumps and about 217 cubic yards of contaminated soil were removed. From 1984 to 1988, remediation of ground water was implemented using extraction wells and dewatering sumps. Several initial remedial measures also have been conducted at the TRW OU. From 1983 to 1984, an underground waste solvent storage tank and 120 cubic yards of on-site contaminated soil were removed. From 1984 to present, ground water has been pumped and treated using air stripping, followed by on-site discharge to surface water. In addition, two ground-water extraction systems pump contaminated ground water from the 100-acre off-site plume. The extracted water is treated at a neighboring AMD facility using air stripping, followed by liquid phase granular activated carbon polisher, with on-site discharge to surface water or reuse by the facility. This ROD collectively addresses final remediation of soil and ground water in the four separate OUs within the study area. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE and TCE.

Selected Remedial Action

The selected RA for this site includes separate remedies for the four different OUs. The remedy for the Signetics OU includes expanding the on-site soil vapor extraction system; and continuing on-site pumping and

treatment of ground water using air stripping, followed by aqueous-phase carbon polishing, reuse of the treated water, and vapor-phase carbon treatment of the effluent air stream. The remedy for the AMD OU includes excavating 37 cubic yards of on-site contaminated soil, followed by off-site incineration and/or disposal, and backfilling the excavation with clean soil; continuing on-site pumping and treatment of ground water using air stripping and carbon adsorption of off-gases, followed by reuse of the treated water. The remedy for the TRW OU includes continuing on-site pumping and treatment of ground water using air stripping, followed by on-site discharge of treated water to surface water. The remedy for the off-site ground-water OU includes continuing and expanding the pumping and treatment system for contaminated ground water using air stripping and aqueous-phase carbon adsorption, followed by reuse of the treated water or on-site discharge to surface water, and off-site regeneration of spent carbon. Each OU also will involve continuing ground-water monitoring, and implementing institutional controls including deed and ground-water use restrictions. The estimated present worth cost for the RA for all OUs is $11,900,000, which includes an estimated annual O&M cost of $236,000 for the Signetics OU; $225,000 for the AMD OU; and $255,000 for the off-site ground-water OU. No annual O&M cost was provided for the TRW OU.

Performance Standards or Goals

Chemical-specific soil clean-up goals have been set at background or total VOCs 1 mg/kg based on state policy. Chemical-specific ground-water clean-up goals are based on state and federal MCLs, and include PCE 5 *ug*/l (state) and TCE 5 *ug*/l (state).

Institutional Controls

Deed and ground-water use restrictions will be implemented to prevent human exposure to contaminated ground water during the clean-up period.

SOLA OPTICAL USA, CA
September 27, 1991

The 35-acre Sola Optical site is an active ophthalmic lens manufacturing facility in southern Sonoma County, California. Land use in the surrounding area is mixed residential, manufacturing, commercial, and undeveloped. Adobe Creek is located 1,500 feet west of an on-site building. The City of Petaluma utilizes an unconfined aquifer, which underlies the site, as a drinking water source. In 1982, Sola identified low levels of solvents in on-site ground water near six underground solvent storage tanks used to store TCA, acetone, and methanol. In 1983, the San Francisco Regional Water Quality Control Board (SFRWQCB) directed Sola to investigate ground- water contamination at the site. In 1985, Sola independently excavated and removed the underground tanks along with the gravel backfill and three to five feet of native soil from the sides and bottom of the excavation. In 1987, the SFRWQCB ordered Sola to construct a ground water extraction and treatment system and, in 1988, the treatment system began pumping and treating ground water using granulated activated carbon to remove VOC contamination, followed by discharging the treated ground water under permit to Adobe Creek. This ROD provides a final remedy to restore ground water to its beneficial use. The primary contaminants of concern affecting the ground water are VOCs.

Selected Remedial Action

The selected RA for this site includes installing additional extraction wells on site; continuing pumping and treatment of ground water using the existing granulated activated carbon adsorption system, followed by discharging the treated water on site to surface water, or discharging the extracted ground water off site with or without treatment to a POTW; disposing of any spent carbon off site; and ground-water monitoring. The estimated present worth cost for this RA ranges from $2,100,000 to $2,200,000 depending on the treatment selected, which includes an annual estimated O&M cost of $169,000 for 15 to 20 years.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on SDWA MCLs and state standards.

Institutional Controls

Not provided.

SOUTH BAY ASBESTOS AREA, CA

Amendment
June 26, 1991

The 550-acre South Bay Asbestos Area site consists of a ring levee in Alviso, San Jose, California. Land use in the area is mixed residential, commercial, light industrial, and agricultural. A 300-acre wetlands area is located adjacent to the site and is partially covered by the levee. The ring levee was constructed by the City of San Jose as an emergency measure during a flood in March 1983, but a number of subsequent EPA investigations determined that the levee soil was comprised of 40 percent asbestos. In 1986 and 1987, EPA conducted several emergency response actions to reduce asbestos exposure around the site including the removal of an asbestos pile, paving and covering local roads and lots, and spraying the levee with a dust-suppressing polymer. A 1988 ROD provided for installation of a vegetated soil cover over the levee. A subsequent 1989 ROD addressed the remediation of portions of the site not previously addressed and provided for paving of contaminated truck yards, monthly wet sweeping of streets, removal of asbestos waste debris, cover requirements, inspections, deed restrictions on landfills, and site maintenancee and monitoring. This ROD amends the 1988 ROD for the asbestos-contaminated soil in the ring levee and surrounding area. The primary contaminant of concern affecting the soil is asbestos, an inorganic.

Selected Remedial Action

The selected RA for this site includes excavating and disposing off site 25,000 cubic yards of asbestos-contaminated levee soil; restoring any wetlands areas located under the levee, or which were disturbed by the excavation; and conducting soil sampling. The estimated present worth cost for this RA is $2,100,000. There are no O&M costs associated with this RA.

Performance Standards or Goals

The chemical-specific soil cleanup goal for asbestos is based on health-based criteria, and is 1 area percent.

Institutional Controls

Not applicable.

SPECTRA-PHYSICS (TELEDYNE SEMICONDUCTOR), CA
March 22, 1991

The Spectra-Physics site is composed of two Superfund sites: the Spectra-Physics site, a laser and related components manufacturing facility, and the Teledyne Semiconductor site, a semiconductor manufacturing facility, as well as off-site areas associated with a contaminated ground water plume in Mountain View, California. Land use in the area is predominantly commercial and industrial. The site is bordered by Permanente Creek to the west and a landfill dewatering trench to the north. Prior to the construction of public water and sewer connections in 1984, ground-water use in the area included private water supply wells for homes and agriculture. Many of these wells have been abandoned, and only a few currently are in use. Since 1963, Spectra-Physics has manufactured lasers and associated components on site, and has used VOCs including TCE as part of the manufacturing processes. Wastewater and rinse water were discharged through five below-grade sumps into the sanitary water system. Since 1962, Teledyne Semiconductor, Inc. has operated a semiconductor manufacturing facility on site. Below-grade sumps were used for acid neutralization and waste TCE collection. Furthermore, an UST (tank A) was used for storing waste solvents. In 1980, all underground solvent handling activities were discontinued and all chemicals are currently stored aboveground. From 1982 to 1984, state investigations identified the release of VOCs from solvent tanks into on-site soil at both areas. Spectra-Physics and Teledyne have together and separately implemented interim actions on site. In 1987, Spectra-Physics excavated and removed all but one of the sumps and 6 feet of contaminated soil from the facility area, and installed a soil vapor extraction system as an interim removal action to reduce VOCs in soil. Teledyne excavated and removed tank A and the surrounding contaminated soil, and installed ground-water extraction systems on and around the site to remove VOCs present in concentrations above specified levels followed by discharge of the extracted water to the sanitary sewer system. This ROD addresses contamination of the ground-water aquifers and on-site soil. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE, TCE, and toluene.

Selected Remedial Action

The selected RA for this site includes expanding the existing soil vapor extraction system at the Spectra-Physics area including treatment of off-gases using granular activated carbon; ground-water pumping and treatment at both the Teledyne and Spectra-Physics areas using air stripping followed by vapor phase carbon to control air emissions, if the air levels exceed permitted standards, followed by discharging the treated water into an on-site storm drain; continuing operation of the existing ground water extraction systems at the off-site Mountain View Area, with a contingency for adding additional air stripping capacity prior to discharge into the city sewer system; and soil and ground-water monitoring. The estimated present worth cost for the Spectra-Physics area is $2,729,595, which includes an annual O&M cost of $188,600. The estimated present worth cost for the Teledyne area is $2,000,000, which includes an annual O&M cost of $86,000 for 30 years. The estimated present worth cost for monitoring the off-site Mountain View Area is $10,496,757, which includes an annual O&M cost of $720,739 for 30 years. The estimated total present work cost for this RA is $18,226,352, which includes an annual O&M cost of $909,425 for 30 years.

Performance Standards or Goals

Soil will be remediated to meet state standards and reduce the risk of additional ground-water contamination. Chemical-specific clean-up goals for soil include PCE 5 *u*g/kg, TCE 5 *u*g/kg, and toluene 100 *u*g/kg. Ground-water will be remediated to meet state and federal MCLs or MCLGs including PCE 5 *u*g/l (MCL), TCE 5 *u*g/l (MCL), and toluene 100 *u*g/l (state).

Institutional Controls

Not provided.

SYNERTEK (BUILDING #1), CA

June 28, 1991

The 1.5-acre Synertek (Building #1) site is a former semiconductor products manufacturing facility in Santa Clara, Santa Clara County, California. The major site feature is a 24,000 square foot building (building #1). The site is comprised of both on-site and off-site components. The on-site component includes the area within the Synertek property boundaries surrounding Building #1, and the off-site component includes the area contaminated by a ground-water plume that has migrated north past the property boundaries and into the adjacent industrial park. The surrounding area is zoned for light industrial manufacturing. The site overlies three shallow aquifer zones, and a deep aquifer zone that provides up to 50 percent of the municipal drinking water for the Santa Clara Valley residences. It is suspected that hydraulic separation among shallow aquifers is imperfect owing to the discontinuous nature of sediment types. Municipal water supply wells perforate the aquifer zones nearby. Historical ground water use in the area includes private water-supply wells for homes and agriculture prior to the construction of public water connections and municipal water supply wells. The location of one agricultural well still remains unknown and is still under investigation. The Synertek site manufactured semiconductor products from 1978 to 1985. During this period Synertek constructed and utilized two underground tank systems to store chemicals and solvents used in semiconductor manufacturing processes, and an underground concrete vault was constructed for process water neutralization. In 1982, after Synertek submitted a facility questionnaire to the state describing their underground neutralization systems, sumps, and tanks, the state initiated further site studies to characterize subsurface pollution. The state determined that accidental release of chemicals leaking from the two underground tank systems was a source of on-site ground-water and soil contamination. In 1985, the state required the excavation and off-site removal of the solvent and neutralization tanks. In addition, on-site ground-water pumping and treatment using an air stripping tower began in 1987. A well search for abandoned potentially contaminated agricultural wells was conducted in 1986 and one well is still unaccounted for. This ROD addresses only contaminated ground water since the contaminated soil and structures were removed previously. The primary contaminants of concern affecting the ground water are VOCs including TCE, vinyl chloride, 1,1-DCE, cis-1,2-DCE, TCA, and 1,1-DCA.

Selected Remedial Action

The selected RA for this site includes continuing operation of the existing ground-water extraction and air stripping treatment system; discharging the treated effluent to an on-site storm drain; controlling air emissions by carbon adsorption, if emissions exceed levels currently permitted by the Bay Area Air Quality Management District; conducting a pilot injection study to evaluate if the reinjection of treated water would enhance the removal of pollutants, speed ground-water cleanup, and reduce ground-water discharge to the surface; conducting potential conduit investigations to locate and seal the remaining abandoned agricultural well that is believed to exist close to the plume; monitoring ground water; and implementing institutional controls including deed and well use restrictions. The estimated present worth cost for this RA is $895,000, which includes an annual O&M cost of $61,000.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on the more stringent of federal MCLs, state MCLs, non-zero MCLG, or a hazard risk index, and include TCE 5 *u*g/l (state).

Institutional Controls

Deed and well permit restrictions will be implemented on site to protect humans from exposure to contaminated ground water.

TELEDYNE SEMICONDUCTOR (SPECTRA-PHYSICS), CA

March 22, 1991

The Teledyne Semiconductor site is composed of two Superfund sites: the Teledyne Semiconductor site, a semiconductor manufacturing facility, and the Spectra-Physics site, a laser and related components manufacturing facility, as well as off-site areas associated with a contaminated ground- water plume in Mountain View, California. Land use in the area is predominantly commercial and industrial. The site is bordered by Permanente Creek to the west and the city of Mountain View landfill dewatering trench to the north. Since the construction of public water and sewer connections in 1984, most private wells have been abandoned; however, eight private wells are currently operational for residential and agricultural uses. Since 1962, Teledyne Semiconductor, Inc. has operated a semi-conductor manufacturing facility on site. From 1962 to 1980, the facility used two 1,400-gallon underground sumps for acid neutralization and waste TCE collection, and a 2,000-gallon waste solvent tank (tank A) for collection and disposal of liquid chemical waste on site. In 1980, all underground solvent handling activities were discontinued and waste holding and disposal facilities were moved aboveground. Spectra-Physics, Inc. has manufactured lasers and associated components on site since 1963, and has used VOCs including TCE as part of the manufacturing processes. Wastewater and rinse water were discharged through five below-grade sumps into the sanitary water system. From 1982 to 1984, state investigations identified the release of VOCs from solvent tanks into on-site soil at both areas. Teledyne and Spectra-Physics have together and separately implemented interim actions on site. Teledyne excavated and removed tank A and the surrounding contaminated soil, and in 1986, installed ground-water extraction systems on and around the site to remove VOCs present in concentrations above specified levels and discharge extracted water to the sanitary sewer system. In 1987, Spectra-Physics excavated and removed all but one of the sumps and 6 feet of contaminated soil from the facility area, and installed a soil vapor extraction system as an interim removal action to reduce VOCs in soil. This ROD addresses contamination of the ground-water aquifers and on-site soil. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE, TCE, toluene, and xylenes.

Selected Remedial Action

The selected RA for this site includes expanding the existing soil vapor extraction system at the Spectra-Physics area including treatment of off-gasses using granular activated carbon to control air emissions; ground-water pumping and treatment at both the Teledyne and Spectra-Physics areas using air stripping, followed by vapor phase carbon to control air emissions, followed by discharging the treated water into an on-site storm drain; continuing operation of the existing ground-water extraction systems at the off-site Mountain View area, with a contingency for adding additional extraction wells and treating the extracted water using air stripping prior to discharge into the city POTW; and conducting soil and ground-water monitoring. The estimated present worth cost for this RA at only the Teledyne area is $2,000,000, which includes an annual O&M cost of $86,000 for 30 years. The estimated present worth cost for the Spectra-Physics area is $2,729,595, which includes an annual O&M cost of $188,600. The estimated present worth cost for monitoring the off-site Mountain View area is $10,496,757, which includes an annual O&M cost of $720,739 for 30 years. The estimated total present cost for this RA is $18,226,352, which includes an annual O&M cost of $909,425 for 30 years.

Performance Standards or Goals

Soil will be remediated to meet state standards and reduce the risk of additional ground- water contamination. Chemical-specific clean-up goals for soil include PCE 5 *ug*/kg (state), TCE 5 *ug*/kg (state), and toluene 100 *ug*/kg (state). Ground water will be remediated to meet state and federal MCLs or MCLGs including PCE 5 *ug*/l (MCL), TCE 5 *ug*/l (MCL), and toluene 100 *ug*/l (state).

Institutional Controls

Not provided.

TRW MICROWAVE (ADVANCED MICRO DEVICES 901/902) (SIGNETICS), CA

September 11, 1991

The 1-acre TRW Microwave site is an active semiconductor manufacturing facility in Sunnyvale, Santa Clara County, California. The site is part of a larger study area that includes four OUs: the three-acre Advanced Micro Devices (AMD) 901/902 site, the Signetics site, the single-acre TRW Microwave site, and a 100-acre off-site contaminated ground-water plume. Land use in the area is predominantly commercial and industrial. Residential property lies to the north and west of the main facilities and overlies portions of the off-site ground-water OU. Six aquifers are associated with the study area including a deeper aquifer confirmed only at the TRW and Signetics sites. Currently, the contaminated ground water is not used as a drinking water supply, but the state considers several of the aquifers to be potential drinking water sources. The single acre TRW portion of the site has changed hands several times from 1968 to present; however, from 1974 to 1986, TRW used its portion of the study area for manufacturing semiconductors using solvents, metals, and acids. These substances also were used in semiconductor manufacturing at the AMD and TRW sites from 1969 to the present and from 1964 to the present, respectively. As a result of responses to an information questionnaire regarding an underground tanks investigation at the TRW site, a number of investigations were conducted that revealed extensive contamination of on-site soil and ground water. Leakage from the acid neutralization system at the AMD and leakage from an underground waste solvent storage tank at the Signetics site resulted in a number of investigations that also revealed extensive contamination of on-site soil and ground water at both of these sites. Several initial remedial measures have been conducted at the TRW OU. From 1983 to 1984, an underground waste solvent storage tank and 120 cubic yards of on-site contaminated soil were removed. From 1984 to present, ground water was pumped and treated using air stripping, followed by on-site discharge to surface water. Several IRMs also have been conducted at the AMD OU. In 1983 and 1984, acid neutralization sumps and about 217 cubic yards of contaminated soil were removed. From 1984 to 1988, remediation of ground water was implemented using extraction wells and dewatering sumps. Several IRMs also were conducted at the Signetics OU. From 1982 to present, ground water has been pumped from various site locations and treated using air stripping and carbon adsorption, followed by air stripping to control off-gases and reuse of the treated water in industrial processes. Contaminated soil has been removed from three separate locations, including 4,720 cubic yards of soil from a waste solvent storage tank area in 1983. In 1989, three vapor extraction wells were installed to treat contaminated soil. In addition, two ground-water extraction systems pump contaminated ground water from the 100-acre off-site plume. The extracted water is treated at a neighboring AMD facility using air stripping, followed by liquid phase granular activated carbon polisher and on-site discharge to surface water or reuse by the facility. This ROD collectively addresses final remediation of soil and ground water in the four separate OUs within the study area. The primary contaminants of concern affecting the soil and ground water are VOCs including PCE and TCE; and other organics.

Selected Remedial Action

The selected RA for this site includes separate remedies for the four different OUs of the study area. The remedy for the TRW OU includes continuing on-site pumping and

treatment of ground water using air stripping, followed by on-site discharge of treated water to surface water. The remedy for the AMD OU includes excavating 37 cubic yards of on-site contaminated soil, followed by off-site incineration and/or disposal, and backfilling the excavation with clean soil; and continuing on-site pumping and treatment of ground water using air stripping and carbon adsorption of off-gases, followed by reuse of the treated water. The remedy for the Signetics OU includes expanding the on-site soil vapor extraction system; and continuing on-site pumping and treatment of ground water using air stripping, followed by aqueous-phase carbon polishing, reuse of the treated water, and vapor-phase carbon treatment of the effluent air stream. The remedy for the off-site ground-water OU includes continuing and expanding the pumping and treatment system for contaminated ground water using air stripping and aqueous-phase carbon adsorption, followed by reuse of the treated water or on-site discharge to surface water, and off-site regeneration of spent carbon. Each OU also will involve continuing ground-water monitoring, and implementing institutional controls including deed and ground-water use restrictions. The estimated present worth cost for the RA for all OUs is $11,900,000, which includes an estimated O&M cost of $225,000 for the AMD OU; $236,000 for the Signetics OU; and $255,000 for the off-site ground-water OU. No annual O&M cost was provided for the TRW OU.

Performance Standards or Goals

Chemical-specific soil clean-up goals have been set at background or total VOCs 1 mg/kg based on state policy. Chemical-specific ground-water clean-up goals are based on state and federal MCLs, and include PCE 5 *ug*/l (state) and TCE 5 *ug*/l (state).

Institutional Controls

Deed and ground-water use restrictions will be implemented to prevent human exposure to contaminated ground water during the clean-up period.

VALLEY WOOD PRESERVING, CA

September 27, 1991

The 14.4-acre Valley Wood Preserving (VWP) site is a former wood preserving facility in Turlock, Stanilaus County, California. Land use in the area is predominantly agricultural, and one residence is located on site. There are subsurface irrigation drains at the site, which eventually discharge to the San Joaquin River about 12 miles west of the site. From 1973 to 1979, VWP used a solution of chromated-copper arsenate (CCA) to preserve lumber on site. Wood preserving chemicals were mixed and stored on site in three above-ground storage tanks. After treatment, the wood was allowed to drip dry on paved and unpaved areas. Chemical spills, leaking tanks, improper on-site disposal practices, and chemical drippings from the treated lumber are known sources of contamination. In 1979, state investigations identified metals including arsenic and chromium in an on-site storage pond, holding tanks, on-site and off-site soil, and the on-site underlying shallow aquifer. In 1989, EPA investigations identified low levels of chromium contamination in several domestic wells, and required VWP to install an interim ground-water extraction and electrochemical treatment system to help contain the migration of contamination. EPA also required VWP to design a plan for the development of an alternative water supply for any affected residences. VWP also installed three deep ground-water wells to serve as domestic water supplies. This ROD provides a final remedy for contaminated soil and ground water. The primary contaminants of concern affecting the soil and ground water are metals including arsenic and chromium.

Selected Remedial Action

The selected RA for this site includes excavating approximately 15,000 cubic yards of contaminated surface and subsurface soil; treating the soil using cement-based fixation; backfilling excavated areas with treated soil that meets state criteria, maintaining stabilized soil mass on site to prevent future exposure; placing treated soil that exceeds state criteria in lined cells on site; collecting, handling, and disposing of leachate; pumping and treatment of contaminated ground water using electrochemical treatment to reduce hexavalent chromium to its trivalent form, followed by treating the residual using alumina adsorption to remove any residual arsenic; disposing of ground-water on site by infiltration and evaporation at one or more percolation ponds, or by underground injection through subsurface injection wells; disposing of sludge generated during the treatment process off site; conducting soil, ground- water, surface water, and air monitoring; and implementing institutional controls possibly including deed restrictions. The estimated present worth cost for this RA is $3,850,000, which includes an annual O&M cost of $224,000.

Performance Standards or Goals

Soil excavation clean-up standards are based on an excess cancer risk level of 10^{-6} for surface soil and levels protective of ground water from contaminated leachate for subsurface soil. Ground-water clean-up standards are based on State levels and potential health risks. Chemical-specific soil goals include arsenic 2 mg/kg (risk-based) and hexavalent chromium 4 mg/kg (risk-based) for surface soil; and arsenic 5 *u*g/kg and hexavalent chromium 5 *u*g/kg for subsurface soil. State criteria require a liner below soil containing arsenic and chromium concentrations greater than 500 mg/kg and below soil exhibiting leachable arsenic and chromium at 5 *u*g/l. Ground-water clean-up goals include arsenic 16 *u*g/l (health-based) and chromium 50 *u*g/l (state).

Institutional Controls

Institutional controls, such as deed restrictions, may be used to ensure that future land use practices are compatible with the fixed soil mass.

VAN WATERS & ROGERS, CA
September 11, 1991

The 13.7-acre Van Waters & Rogers site is a commercial chemical storage, handling, and distribution facility in San Jose, California. Land use in the area is predominantly commercial and industrial. Nearby surface drainage features include Coyote Creek, approximately 1,200 feet to the east, and the Guadalupe River, approximately 6,000 feet to the west, that discharge to San Francisco Bay nine miles to the north. Since 1976, Van Waters & Rogers has used the site for bulk chemical transfers; storage in drums and underground tanks; chemical blending, packaging, and distribution; and rinsing of containers. Surface features from which releases of organic chemicals have occurred are aboveground storage tanks, rail-mounted tank cars, drum fillers, UST fill pipe manifolds, and a hazardous waste storage area. Subsurface features include 37 USTs; subsurface product transfer piping; and the subsurface storm drain system, which eventually discharges to the Guadalupe River. Fourteen USTs are not in service and are currently empty. With the exception of one tank used to store diesel fuel, all USTs have been used to store various industrial chemicals including PCE, toluene, and xylenes. During a survey of Regional hazardous waste facilities in 1982, the state identified VOCs, selected aliphatic hydrocarbons, aromatic hydrocarbons, ketones, glycols, and alcohols in on-site soil and ground water. Potential sources of contamination include a 1977 accidental release of PCE from an aboveground 12,000-gallon tank at the loading dock and various leaks from USTs and associated piping. Van Waters & Rogers began an interim ground-water remediation program in 1986 that involves ground-water extraction and treatment using air stripping with on-site discharge to the storm drain. This ROD provides a final remedy for on-site contaminated soil, debris, and ground water. The primary contaminants of concern affecting the soil, debris, and ground water are VOCs including PCE and TCE.

Selected Remedial Action

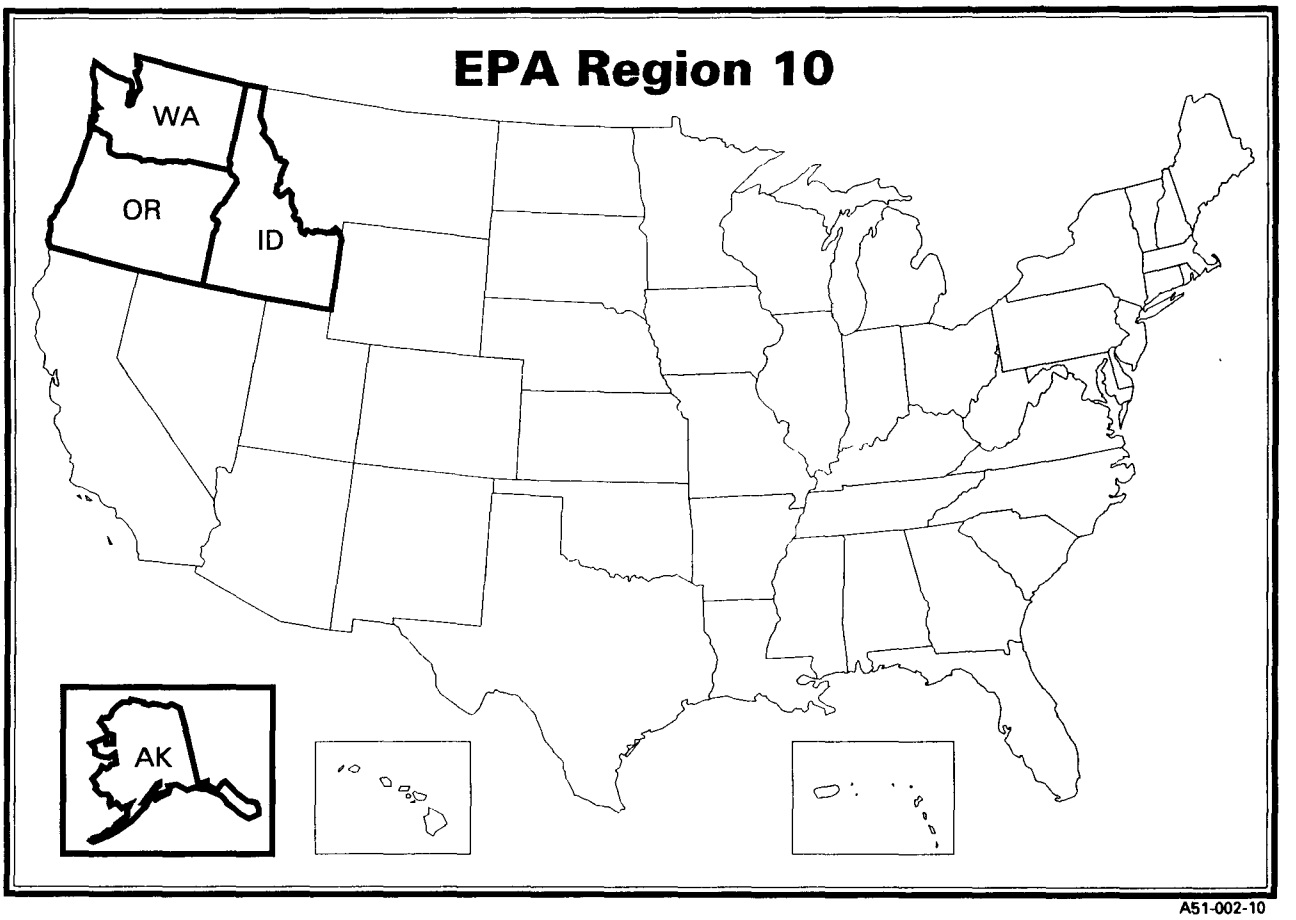
The selected RA for this site includes treating approximately 8,100 cubic yards of soil "hot spots" containing more than 10 mg/kg of one or more of PCE, TCA, and TCE using *in situ* vapor extraction; temporarily capping 46,000 cubic yards of soil containing greater than 1 mg/kg total VOCs, including areas containing USTs until tank removal can take place; removing USTs at a later date and investigating adjacent soil; expanding the existing upper aquifer ground-water pumping and treatment system by adding an air stripping unit and converting existing monitoring wells to extraction wells, wherever possible; treating the off-gases from the new air stripping unit; treating the lower aquifer by either granular activated carbon or air stripping; discharging the treated ground water on site to the storm drain system; monitoring soil and ground water; and implementing institutional controls including deed restrictions. The estimated present worth cost for this RA is $4,997,000, which includes a net present value O&M cost of $4,374,000.

Performance Standards or Goals

Clean-up goals for soil are intended to minimize contaminant migration to ground water. Chemical-specific initial soil goals for PCE and TCE are 10 mg/kg. Final soil goals will be 1 mg/kg for total VOCs. Chemical-specific ground-water clean-up goals are based on state and federal MCLs and risk levels, and include PCE 5 *ug*/l (MCL) and TCE 5 *ug*/l (MCL).

Institutional Controls

Deed and ground-water use restrictions will be implemented to prevent the use of on-site ground water for drinking water until final clean-up standards are met.



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REGION 10

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AMERICAN LAKE GARDENS (McCHORD AFB-AREA D), WA

Federal Facility
September 19, 1991

The American Lake Gardens (McChord AFB-area D) site is an active U.S. Air Force base located at McChord Air Force Base, Pierce County, Washington. The site consists of two areas, area D and American Lake Garden Tract (ALGT). Area D is located entirely on-base. Area D activities include Air Force Base administration, flight operations support functions, and housing and recreation facilities. Approximately 2,384 people reside in the area D housing facilities. ALGT is an off-base commercial and residential area with approximately 3,431 residents and various businesses. Hydrogeologic units exist on site including a series of confined and unconfined aquifers that appear to be hydraulically connected. Various surface water bodies exist near the site and are principally ground water-fed. From the mid-1940s to the present, no known industrial activities have occurred in the ALGT area; however, seven waste disposal sites have operated within the Area D portion of the site. In 1981, the Air Force initiated a multi-phase program to identify past disposal sites and contaminants and to eliminate public health risks. Concurrent with DOD investigations, EPA discovered TCE in ground-water monitoring wells installed at the ALGT, and in 1984, concluded that waste disposal sites in area D were the likely source of ground-water contamination. Modeling studies indicate that most of the soil contamination by VOCs has moved into the ground water, and that DNAPLs may continue to act as a secondary source of ground water contamination. In 1986, the Air Force provided an alternate water source to residents of ALGT, and subsequently connected 80 percent of the residences to a public water supply. This ROD addresses remediation of the contaminated on-site and off-site ground-water plume, as a final remedy. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCE, toluene, and xylenes; other organics; and metals including arsenic, chromium, and lead.

Selected Remedial Action

The selected RA for this site includes pumping and treating both the on-site and off-site ground-water contaminant plumes in the confined aquifer using an on-site multi-bed carbon adsorption treatment facility, followed by recharging or irrigating the treated ground water on site; regenerating the spent carbon off site; monitoring the ground-water contaminant plume; and implementing institutional controls such as deed, ground water, and land use restrictions. The estimated present worth cost for this RA ranges from $4,445,000 to $6,949,000, for interest rates of 10 percent and 4 percent respectively, which includes an annual O&M cost of $341,000 for years 0 through 2 and $318,000 for years 3 to 30.

Performance Standards or Goals

Ground water will be restored to levels consistent with state and federal MCLs. Chemical-specific goals for ground water include cis-1,2-DCE 70 *u*g/l (MCL), 1,1-DCE 0.7 *u*g/l (MTCA), TCE 5 mg/l (MCL), and vinyl chloride 0.04 *u*g/l (MTCA).

Institutional Controls

Deed, land, and ground-water use restrictions will be implemented on site.

BANGOR NAVAL SUBMARINE BASE, WA

Federal Facility
September 19, 1991

The Bangor Naval Submarine Base (SUBASE) is a former munitions handling, storage, and processing facility in Kitsap County, Washington. Land surrounding the SUBASE is generally undeveloped and supports limited residential use. The site overlies the surficial shallow aquifer and deeper aquifers, which are the principal water supplies for SUBASE Bangor and surrounding communities. Demilitarizing (demil) operations were conducted from 1940 until 1978, and included collecting condensate and solid explosive within a holding tank, followed by removal of the solid material from the wastewater before final discharge. Site F, a wastewater lagoon, was used between 1960 and 1971 for the disposal of final wastewater solution. Periodically, the lagoon was allowed to drain. Waste materials present in surficial sediment of the lagoon were burned off in place with waste oils, or transported to the on-site ordnance burning area for thermal destruction. Between 1972 and 1980, wastewater was collected into 55-gallon barrels and delivered to the SUBASE liquid-waste incinerator. Several on-site investigations of the distribution and transport of waste constituents at site F have occurred since 1971. Based on data collected, it was confirmed that soil in the lagoon area is contaminated by ordnance constituents. In 1972, 500 cubic feet of soil was excavated from the top several feet of the lagoon and transported to the on-site ordnance burning area for burning. In 1980, the lagoon was filled in and covered with a low permeability asphalt cover. Ground-water quality data collected at site F during prior studies indicated that only the shallow aquifer has been impacted by site F. This ROD is an interim RA addressing ground-water contamination at site F as OU2. The intent of this remedy is to contain the contaminated ground water plume. A future ROD will address final remediation of both soil and ground water. The primary contaminants of concern affecting the ground water are organics including RDX; 2,4,6-TNT; 2,4-DNT; 2,6-DNT; 1,3,5-TNB; 1,3-DNB; N-nitrate; and nitrobenzene.

Selected Remedial Action

The selected RA for this site includes pumping and treatment of ground water from the shallow aquifer using UV-oxidation; reinjecting the treated ground water on site into the shallow aquifer, or infiltrating it on site using a recharge basin; ground-water monitoring; and providing design information, as applicable, for the final remedy. If the UV-oxidation process cannot achieve the specified performance standards due to either technological or economic concerns, then carbon adsorption will be coupled with the UV-oxidation system to complete the treatment process prior to disposal. The estimated present worth cost for this RA is $2,515,000, which includes an O&M cost of $1,300,000 over 2 years.

Performance Standards or Goals

Chemical-specific ground-water clean-up goals are based on MTCA clean-up standards and include RDX 5 *ug*/l, 2,4,6-TNT 3 *ug*/l, 2,4-DNT 0.1 *ug*/l, 2,6-DNT 0.1 *ug*/l, 1,3,5-TNB 0.8 *ug*/l, 1,3-DNB 2 *ug*/l, N-nitrate 10,000 *ug*/l, and nitrobenzene 8 *ug*/l.

Institutional Controls

Not applicable.

BUNKER HILL MINING AND METALLURGICAL COMPLEX, ID

August 30, 1991

The Bunker Hill Mining and Metallurgical Complex site is a 21 square-mile area centered around an inactive industrial mining and smelting site, and includes the cities of Kellogg, Smelterville, Wardner, Pinehurst, and Page, in Shoshone County, Idaho. The inactive industrial complex includes the Bunker Hill mine and mill, a lead smelter, a zinc smelter and a phosphoric acid fertilizer plant, all totalling several hundred acres. Furthermore, the site includes the south fork of the Coeur d'Alene River, an alluvial floodplain bordered by mountains, numerous valleys and gulches, and vegetated residential areas. In 1886, the first mill for processing lead and silver ore was constructed at the site. Operations were expanded in later years with the addition of a lead smelter; a blast furnace; and electrolytic zinc, sulfuric acid, phosphoric acid, and fertilizer plants. On-site operational and disposal practices have caused the deposition of hazardous substances (e.g., metals) throughout the valley via airborne particulate deposition, alluvial deposition of tailings dumped in the river, and migration from on-site sources. Initially, most of the solid and liquid residue from the complex was discharged into the river. When the river flooded, these materials were deposited onto the valley floor, and have leached into on-site soil and ground water. Although some of the industrial waste has been removed and disposed of off site, thousands of tons of sludge, tailings, flue dust, and other waste still remains on site. Contamination at the site is a result of tailings deposition in the floodplain, and airborne deposition from smelter and mill complex emissions. A fire in 1973 severely reduced air pollution control capacity at the lead smelter. A 1974 public health study and concurrent epidemiologic and environmental investigations concluded that atmospheric emissions of particulate lead from the active smelter were the primary sources of elevated blood lead levels in local children. In 1977, two tall stacks were added to disperse contaminants from the complex. The complex ceased smelter operations in 1981, but continued limited mining and milling operations from 1988 to early 1991. In 1989, EPA began a removal program to excavate lead-contaminated soil from affected residential properties. Federal and state agencies have designated a 21-square-mile study area, which has been divided into populated areas and non-populated areas for remediation. This ROD addresses contaminated residential soil within the populated areas of the site, and includes four incorporated communities and three unincorporated residential areas as OU1. The nonpopulated areas of the site as well as all other contaminated media in the populated areas (e.g., house dust, and commercial properties) will be addressed in a future ROD. The primary contaminants of concern affecting residential area soil are metals including arsenic and lead.

Selected Remedial Action

The selected RA for this site includes soil sampling; excavating contaminated soil and sod exceeding 1,000 mg/kg lead on approximately 1,800 residential properties, and replacing it with clean soil and sod; disposing of the contaminated soil and sod at an on-site repository; capping the repository; placing a visual marker if lead levels in soil exceed 1,000 mg/kg below the depth of excavation; revegetating the area; conducting long-term environmental monitoring; and implementing institutional controls, including deed and land use restrictions. The estimated present worth cost for this RA is $40,600,000, which includes an annual O&M cost of $460,000 for 30 years.

Performance Standards or Goals

Residential soil with lead concentrations greater than 1,000 mg/kg will be excavated and replaced with clean material resulting in mean soil lead concentrations in residential areas of approximately 200 to 300 mg/kg.

Institutional Controls

Deed, land use, and other administrative restrictions will be implemented on site.

COMMENCEMENT BAY-NEARSHORE/TIDEFLATS, WA
December 31, 1990

The 10 to 12 square mile Commencement Bay-Nearshore/Tideflats site encompasses shallow water, shoreline, waterways, and adjacent land in Tacoma, Pierce County, Washington at the southern end of the main basin of Puget Sound. Surrounding land use is primarily residential and recreational. This site has been divided into eight different OUs. Part of this site is on the 67-acre Asarco Tacoma Smelter area, an inactive copper smelter facility adjacent to Puget Sound, which is the focus of this RA. This area consists of over 70 buildings and other structures including three piers, a 562-foot-high stack and a pond used for the discharge of plant cooling water. From 1890 until 1986, the primary use of the site was for copper smelting, as well as lead smelting, and sulfuric acid, sulfur dioxide, and arsenic production activities. Historically, molten slag was used as fill, and was poured onto the ground at the edge of the shoreline. Subsequently, many of the on-site structures were constructed over this contaminated material. In 1987, Asarco completed the initial stabilization of the area which included the demolition of buildings near the stack. A 1987 ROD addressed 0U3, Tacoma Tarpits, a historical coal gasification site. A 1989 ROD addressed OU1-CB/NT sediments and OU5-CB/NT sources, both associated with marine sediments. This ROD provides an interim remedy for OU7, the Asarco Demolition, and addresses further clearing of the site to prevent the threat of an uncontrolled collapse of the stack and to minimize contaminant migration to off-site surface water. The primary contaminants of concern affecting the debris, sludge, and surface water are metals including arsenic, chromium, and lead; and other inorganics including asbestos.

Selected Remedial Action

The selected interim RA for this site includes demolishing and dismantling on-site buildings using conventional techniques after cleaning and/or decontaminating these structures; removing and disposing asbestos materials off site; demolishing the stack by implosion using explosives, with dust suppression using fogging and misting and/or encapsulation of the stack internal lining; disposing of hazardous, dangerous, and solid demolition debris off site and/or temporarily storing debris on site; incinerating on-site uncontaminated wood and other combustible materials; cleaning and decontaminating buildings that will not be demolished; collecting dust suppression wastewater in the on-site pond, which has been converted to a wastewater evaporation system; removing a ship to shore oil line, and preventing spillage of any residential oil; disposing of evaporation pond sludge and dust off site in a metal recovery facility; diverting off-site surface water away from the site, and collecting on-site surface water in the wastewater evaporation system; and monitoring air and surface water. The estimated present worth cost for this RA ranges from $11,764,500 to $38,686,000. O&M costs were not provided.

Performance Standards or Goals

Air emissions and dust control must meet the substantive requirements of the CAA and state regulations. Final performance standards for ground water and surface water will be determined in the final ROD. Chemical-specific performance standards were not provided.

Institutional Controls

Not provided.

NORTHWEST TRANSFORMER - SALVAGE YARD, WA

Amendment
September 30, 1991

The 1.6-acre Northwest Transformer - Salvage Yard site is former transformer storage and salvage facility, is 2 miles south of Everson in Whatcom County, Washington. The site is bordered by low-density residential areas to the north and east, and farmland to the south. Storage and salvage operations were conducted in an on-site barn where PCB-contaminated dielectric fluid was drained from the transformers prior to dismantling. Transformer casings and associated parts were incinerated on-site, and some of the recovered oil was burned to heat the barn. Spills and leakages of PCB-laden oil onto the ground occurred frequently. Additionally, oil was dumped directly into a seepage pit on-site, and contaminated soil and possibly ground water. EPA studies from 1977 to 1985 identified PCB concentrations as high as 38,000 mg/kg in on-site media. In 1985, EPA removed 1,400 cubic yards of PCB-contaminated soil and debris, 6,660 gallons of PCB-contaminated liquids, and several contaminated transformer casings. In addition EPA initiated a ground-water monitoring program and imposed site access restrictions. In 1987, sufficient PCB contamination was identified in the soil to warrant further site remediation. A 1989 ROD addressed remediation through excavation, consolidation, and on-site treatment using *in situ* vitrification. This ROD amends the 1989 ROD and provides a change in the remedy for soil due to excessive cost. The primary contaminant of concern affecting the soil is PCB, an organic.

Selected Remedial Action

The selected amended RA for this ROD includes incinerating approximately 70 cubic yards of soil contaminated with PCBs at levels greater than or equal to 50 mg/kg at a TSCA-approved facility, landfilling approximately 1,500 cubic yards of soil contaminated with PCBs at levels greater than or equal to 1 mg/kg and less than 50 mg/kg off site at a TSCA-approved facility; demolishing the barn and disposing of the debris off site; testing the soil and concrete within the barn; placing a soil cover over the entire site; and implementing institutional controls, if necessary. The estimated capital cost for this amended RA ranges from $1,400,000 to $4,000,000 depending on the amount of soil removed. O&M costs were not provided.

Performance Standards or Goals

Chemical-specific soil clean-up goals are based on the Washington State Model Control Act and include PCBs 1 mg/kg.

Institutional Controls

If complete removal of soil with PCB levels ≥ 1 mg/kg cannot be demonstrated and hazardous materials remain on site, institutional controls will be implemented.

UNION PACIFIC RAILROAD YARD, ID

September 10, 1991

The Union Pacific Railroad (UPRR) Yard site is an active rail yard located in Pocatello, Bannock County, Idaho. Land use in the area is mixed commercial and light industrial, with some residential areas. Site features include sludge pits along the northwestern edge of the site, and Portneuf River, which is located 1,000 feet from the pit. Ground water in the vicinity of the sludge pit occurs in two distinct water-bearing deposits, the Upper and Lower Aquifers, which appear to be hydraulically connected. UPRR began operations around the turn of the 20th century. Site operations have included maintenance and repair work, train assembly, and refueling, which involved the use of various fuels, cleaning agents, detergents, and degreasers, including halogenated and non-halogenated hydrocarbon-based solvents. UPRR constructed a treatment plant in 1961 to receive industrial waste water and surface storm water run-off from the railyard. Until 1983, sludge from the treatment plant's oil/water separator and from a dissolved air flotation unit was disposed in the on-site sludge pit. Currently, the sludge pit contains approximately 2,500 cubic yards of sludge and 1,700 cubic yards of contaminated soil beneath the sludge. In 1983, EPA determined that seepage from UPRR's sludge pit, and from a nearby area where an oil tie treating facility was located were contributing to Upper Aquifer ground-water contamination. In 1985, UPRR, the only identified PRP, conducted an investigation of the railroad yard, and the sludge pit was determined to be the principal source of on-site contamination. This ROD addresses contamination of the Pocatello Sludge Pit located at the UPRR property. The primary contaminants of concern affecting the soil, sediment, sludge, and ground water are VOCs, other organics including PAHs and petroleum-based hydrocarbons (oils), and metals.

Selected Remedial Action

The selected RA for this site includes implementing a comprehensive soil, sediment, sludge, and ground-water sampling effort prior to remedial activities to determine background levels and to set final remediation goals; excavating to the maximum extent practicable up to 4,200 cubic yards of visibly-contaminated soil, sediment, and sludge; testing these media for compliance with land disposal restriction treatment standards, followed by disposal at an approved off-site landfill; treating soil remaining beneath the excavated area using *in situ* soil flushing as part of the Upper Aquifer ground water treatment system, backfilling, grading, and capping the entire pit boundary; extracting and treating NAPL contaminants from the upper aquifer ground water using an on-site oil/water separator and a dissolved air flotation unit; discharging effluent off site to a POTW; placing skimmed oil in an on-site holding tank for sale to a recycler; disposing of residual sludge from ground-water treatment off site; conducting quarterly sampling and analysis of ground water to ensure remediation goals are met; constructing a fence around the sludge pit; providing advanced funding for design and installation of an alternate water supply system to be implemented if monitoring indicates that ground-water contamination has not been adequately remediated; monitoring ground water, surface water, and air; and implementing administrative and institutional controls including deed, land, and ground-water use restrictions. The estimated present worth cost for this RA is $3,797,550, which includes a present worth O&M cost of $1,657,900 for 30 years.

Performance Standards or Goals

Chemical-specific remediation goals have not been finalized, with the exception of lead 500 mg/kg for soil and 0.015 mg/l (MCL) for ground water, as a result of incomplete data regarding background concentrations of contaminants in soil, sediment, sludge, and ground water. Final clean-up goals will be based on background concentrations, lowest practical quantitation limits, ground-water ARARs identified in the feasibility study, or target concentration values, whichever is highest. Health-based clean-up goals include a 10^{-6} cancer risk for carcinogens and an HI < 1 for non-carcinogens.

Institutional Controls

Deed, land, and ground-water use restrictions will be implemented on site.

YAKIMA PLATING, WA
September 30, 1991

The 0.94-acre Yakima Plating site is an inactive nickel-chrome automobile bumper replating facility in Yakima, Yakima County, Washington. The site lies within a mixed light commercial and residential area, and there are four schools within one mile of the site. Ground water from the shallow alluvium aquifer supplies much of the domestic and irrigation water in the Yakima Basin, and many residences adjacent to the site utilize private ground-water wells for their water supply. Yakima Plating began operations in 1965 utilizing 20 to 30 aboveground holding tanks, which were stored within the plating building. These tanks were used during the electroplating operation cleaning, plating, and rinsing processes. Rinse water and spent plating tank solutions were disposed into a floor drain within the plating room. The floor drain was connected to an underground sedimentation tank and drain field line that collected the sedimentation tank overflow and distributed the wastewater to subsurface soil. The wastewater system operated from 1965 until plating operations ceased in 1990. Site assessments and investigations conducted by EPA contractors in 1984 and 1990 determined that the sludge and effluent from the settling tank were a dangerous waste under state regulations and that the potential exists for public exposure to metals from contact with contaminated surface and subsurface soil. This ROD addresses remediation of contaminated on-site soil, debris, and sludge. The primary contaminants of concern affecting the soil, debris, and sludge are organics including pesticides; and metals including arsenic, chromium, copper, lead, and nickel.

Selected Remedial Action

The selected RA for this site includes removing 1,500 gallons of liquid and 6.5 cubic yards of sludge currently in tanks and containers, and treating and disposing of these materials at an off-site facility; excavating, treating, and disposing of contaminated soil at an off-site landfill; excavating and decontaminating underground tanks using a solvent or water-based solution; abandoning the tanks in place, and covering the tank areas with clean fill; treating and disposing of any liquids or sludges generated during the decontamination process at an off-site facility; and excavating and disposing of 540 cubic yards of soil and underground drain lines at an off-site facility; ground-water monitoring; and implementing institutional controls including land and ground-water use restrictions. The estimated present worth cost for this RA ranges from $310,000 to $377,000, depending on the type of solution used for debris decontamination. There are no O&M costs associated with this remedial action.

Performance Standards or Goals

Clean-up levels for soil and ground water are set at the more stringent of the NCP and state standards. Chemical-specific soil remediation goals include arsenic 20 mg/kg, chromium 400 mg/kg, lead 50 mg/kg, and DDT 2.9 mg/kg.

Institutional Controls

Land use and ground-water restrictions will be implemented at the site.

Appendix D
Progress Toward Meeting Superfund-Related Statutory Requirements

In response to a recommendation of the *Lautenberg-Durenberger Report on Superfund Implementation: Cleaning up the Nation's Cleanup Program*, EPA includes in this report the following matrix, which charts the progress of EPA and other government organizations in meeting statutory requirements imposed by SARA. The matrix lists all Superfund-related administrative and program implementation (rather than site-specific) requirements by statutory section, describes the mandated activity, indicates if the activity has been completed, and briefly describes what has been done to meet the requirement. If the activity has not been completed, its status is reported.

EPA and other government organizations have made significant progress towards meeting their statutory requirements. The matrix indicates that 35 of the 39 applicable one-time requirements with specific deadlines have been completed. Furthermore, 14 of the 15 requirements due annually or biannually have been completed for FY91, and one was not yet due. Also, 25 of the 26 requirements with no specific deadline have been completed.

Progress Toward Meeting CERCLA-Related Statutory Requirements, as Amended by SARA[1/]

CERCLA Section	Statutory Deadline	Requirement	Status
102(a)	12/31/86[2/]	EPA to promulgate final regulations establishing reportable quantities (RQs) for all hazardous substances for which proposed RQs were published prior to March 1, 1986.	**Completed 05/08/92** -- EPA promulgated final RQs for lead and methyl isocyanate in the *Federal Register* (*FR*) (56 FR 20014). **09/29/86, 08/14/89** -- EPA promulgated final RQs for all hazardous substances (except for lead metal and methyl isocyanate) (51 *FR* 34534, 54 *FR* 33418, 54 *FR* 33426).
102(a)	12/31/86[2/]	EPA to propose regulations establishing RQs for all hazardous substances for which proposed RQs were not published prior to March 1, 1986.	**Completed 03/16/87** -- EPA proposed RQs for all hazardous substances for which proposed RQs were not published prior to March 1, 1986 (52 *FR* 8140). EPA proposed RQs for radionuclides (52 *FR* 8172).

1/ In this matrix, requirements of CERCLA, as amended by SARA, precede requirements of SARA that do not amend CERCLA.

2/ Deadline specified in statute rather than correlated to date of enactment.

CERCLA Section	Statutory Deadline	Requirement	Status
102(a)	04/30/88[2/]	EPA to promulgate final regulations establishing RQs for all hazardous substances for which proposed RQs were not published prior to March 1, 1986.	**Completed 05/08/92** -- EPA promulgated final RQs for the 16 remaining hazardous substances (56 *FR* 20014). **08/14/89** -- EPA promulgated final RQs for all hazardous substances (except for 14 lead-containing wastes, lead acetate, and lead phosphate) (54 *FR* 33418, 54 *FR* 33426). **05/24/89** -- EPA promulgated final RQs for radionuclides (54 *FR* 22524).
104(c)(9)	10/17/89	States to provide assurances of availability of hazardous waste treatment or disposal facilities.	**Completed 03/19/90** -- All 50 states and the District of Columbia have submitted plans; 12/29/88 -- EPA issued guidance to state officials on providing assurances (53 *FR* 52783).
104(i)(2)(A)	04/17/87	Agency for Toxic Substances and Disease Registry (ATSDR) and EPA to produce list of 100 hazardous substances most commonly found at National Priority List (NPL) sites that pose significant human health risks.	**Completed 04/17/87** -- ATSDR and EPA published list of first set of 100 hazardous substances (52 *FR* 12866).
104(i)(2)(B)	10/17/88	ATSDR and EPA to produce list of a total of 200 hazardous substances including the first set of 100 substances most commonly found at NPL sites that pose significant human health risks.	**Completed 10/20/88** -- ATSDR and EPA published list of 200 hazardous substances which includes the first and second set of hazardous substances (53 *FR* 41280).

[2/] Deadline specified in statute rather than correlated to date of enactment.

CERCLA Section	Statutory Deadline	Requirement	Status
104(i)(2)(B)	10/17/89[3]	ATSDR and EPA to add no fewer than 25 hazardous substances to list of those most commonly found at NPL sites that pose significant human health risks.	**Completed 10/26/89, 10/17/90, 10/17/91** -- EPA published three lists of 25 hazardous substances each (54 *FR* 43619, 55 *FR* 42067, 56 *FR* 52166); 11/25/91--Correction to the 10/17/91 list published (56 *FR* 59331).
104(i)(2)(B)	10/17/92[4]	ATSDR and EPA to revise list of hazardous substances most commonly found at NPL sites that pose significant human health risks.	10/17/91 -- EPA expects to revise list annually (56 *FR* 52166). **Completed 10/28/92** -- Notice of availability of revised CERCLA Priority List of 275 Hazardous Substances (57 *FR* 48801).

[3] Due annually on this date through 1991.

[4] Due annually on this date beginning in 1992.

CERCLA Section	Statutory Deadline	Requirement	Status
104(i)(3)	10/17/87[5]	ATSDR to prepare toxicological profiles on each of the hazardous substances on the list of those most commonly found at NPL sites that pose significant human health risks.	**Completed 10/15/87** -- The first set of 25 profiles were announced for public comment (52 *FR* 38340); 04/06/89, 06/28/89, 12/01/89 -- Notices of availability of 15 final profiles published (54 *FR* 14037, 54 *FR* 26417, 54 *FR* 49816); 12/17/90 -- Notice of availability of all 25 final profiles published (55 *FR* 51775). **Completed 12/20/88** -- The second set of 25 profiles were announced for public comment (53 *FR* 51192); 08/14/90 -- Notice of availability of final profiles published (55 *FR* 33172). **Completed 10/17/89** -- The third set of 30 profiles were announced for public comment (54 *FR* 42568); 06/13/91 -- Notice of availability of final profiles published (56 *FR* 27261); 06/26/91 -- Notice of availability of correction to final profiles published (56 *FR* 29308). **Completed 10/16/90** -- The fourth set of 30 profiles were announced for public comment (55 *FR* 41881); 09/12/91 -- An additional three fluoride compound profiles were announced for public comment (56 *FR* 46436). 10/8/92 -- An additional 5 profiles were announced for public comment (57 *FR* 46393).

[5] Profiles for original 100 hazardous substances on list must be completed at a rate of no fewer than 25 per year by 10/17/90.

CERCLA Section	Statutory Deadline	Requirement	Status
104(i)(3)	6/	ATSDR to revise and republish toxicological profiles.	**Completed 10/17/91** -- The first set of 20 updated draft profiles published (56 *FR* 52086); 11/25/91 -- Correction to the 20 updated profiles published (56 *FR* 59330). 10/8/92 -- Notice of availability of 10 updated profiles (57 *FR* 46393).
104(i)(5)(A)	7/	ATSDR, in consultation with EPA and the Public Health Service, to assess whether adequate information is available on the health effects of those hazardous substances most commonly found at NPL sites that pose significant human health risks.	ATSDR includes assessments in the "Adequacy of the Database" section of the toxicological profiles required by CERCLA Section 104(i)(3). Subsequently, ATSDR refines these assessments.
104(i)(5)(A)	7/	ATSDR, in cooperation with the National Toxicology Program (NTP), to assure the initiation of a program of research designed to determine the health effects (and techniques for development of methods to determine such health effects) of substances for which adequate information is not available (or under development).	**Completed 09/11/89** -- ATSDR published *Decision Guide for Identifying Substance-Specific Data Needs Related to Toxicological Profiles* (54 *FR* 37618). **03/28/90** -- ATSDR published the results of a pilot exercise that identified priority data needs for specific substances (55 *FR* 11566). **10/17/91** -- Initiation of the Substance-Specific Research Program in which 38 substances were classified as priority leads (56 *FR* 52178).

6/ Profiles for hazardous substances must be revised within three years after addition to list.

7/ Specific deadline not stated in statute.

CERCLA Section	Statutory Deadline	Requirement	Status
104(i)(5)(D)	10/17/87	EPA to promulgate regulations for the payment and recovery of costs of health effects research programs established under CERCLA Section 104(i)(5).	**Completed 03/08/90** -- EPA believes that the revised National Oil and Hazardous Substances Pollution Contingency Plan (NCP) satisfies the statutory requirement (NCP Subpart B 300.160(d); (55 *FR* 8666)); see also preamble to proposed rule (53 *FR* 51402).
104(i)(6)(A)	12/10/88[2/]	ATSDR to complete health assessments for facilities proposed for the NPL prior to SARA's date of enactment.	**Completed 12/08/88** -- Health assessments performed for 951 facilities.
104(i)(6)(A)	[8/]	ATSDR to complete health assessments for facilities proposed for the NPL after SARA's date of enactment.	**Ongoing** -- During FY91, ATSDR completed 162 health assessments. The completed health assessments included 13 revisited and 2 petitioned assessments.
104(i)(10)	10/17/88[9/]	ATSDR to submit report to EPA and Congress on ATSDR activities.	**Completed August 1989, August 1990, February 1992** -- Volumes I and II of first biannual report and the second biannual report submitted to EPA and Congress.

[2/] Deadline specified in statute rather than correlated to date of enactment.

[8/] Health assessments to be completed within one year of date of proposal on NPL.

[9/] Due biannually from 10/17/88.

CERCLA Section	Statutory Deadline	Requirement	Status
104(i)(14)	[7]	ATSDR to assemble and develop as necessary, educational materials (including short courses) on the medical surveillance, screening, and methods of diagnosis and treatment of injury or disease related to exposure to hazardous substances. The material will be distributed to the states and upon request to medical colleges, physicians, and other health professionals.	**Completed 09/13/89** -- ATSDR created Division of Health Education to implement ongoing program. **FY90** -- ATSDR developed 40,000 case studies in environmental medicine, which were distributed through states, counties, and professional organizations; ATSDR negotiated and implemented 20 state cooperative agreements for physician education training in environmental medicine; and ATSDR developed state training course materials and provided support to conduct training (2,800 health professionals trained). **FY91** -- ATSDR funded the Association of State and Territorial Health Officials to implement state courses in risk communication (56 *FR* 41693); ATSDR funded state departments of health and departments of the environment to educate health professionals on hazardous substance exposure in the environment (56 *FR* 41694); ATSDR also funded the Association of Occupational and Environmental Clinics to improve the methodology for diagnosing injury related to hazardous substance exposure (56 *FR* 41691).
105(b)	04/17/88	EPA to revise the NCP.	**Completed 03/08/90** -- EPA published revised NCP (55 *FR* 8666).

[7] Specific deadline not stated in statute.

CERCLA Section	Statutory Deadline	Requirement	Status
105(c)(1)	04/17/88	EPA to promulgate amendments to the hazard ranking system (HRS).	**Completed 12/14/90** -- EPA published revised HRS (55 *FR* 51532); 12/23/88 -- EPA published proposed revisions (53 *FR* 51962).
105(c)(1)	10/17/88	EPA to establish effective date for the amended HRS.	**Completed 12/14/90** -- Revised HRS became effective 03/14/91, 90 days after publication in *Federal Register*.
107(f)(2)(A)	7/	EPA to designate in the NCP federal natural resource trustees.	**Completed 11/20/85** -- EPA designated in Section 300.72 of the NCP federal natural resource trustees (50 *FR* 47912); 03/08/90 -- Section 300.72 of the NCP was revised and renumbered as Section 300.600 (55 *FR* 8666).
107(f)(2)(B)	7/	States to designate state natural resource trustees and notify the Department of the Interior (DOI) of such designations.	44 states and four territories have officially designated natural resource trustees as of July 1993.
107(k)(6)	7/	Comptroller General to conduct a study of options for the management of the liabilities associated with hazardous waste treatment, storage, and disposal sites after their closure.	**Completed 06/01/90** -- General Accounting Office (GAO) published report entitled *Hazardous Waste -- Funding of Post-Closure Liabilities Remains Uncertain* (GAO/RCED-90-64).

7/ Specific deadline not stated in statute.

CERCLA Section	Statutory Deadline	Requirement	Status
109(d)	[7]	EPA to prescribe criteria (by regulation) for paying an award to any individual who provides information leading to the arrest and conviction of any person for a violation subject to criminal penalty under CERCLA.	**Completed 05/05/88** -- EPA issued an interim final rule (IFR) prescribing criteria for citizen awards for information on criminal violations under Superfund (53 *FR* 16086). **06/21/89** -- EPA published a final rule identical to the IFR (54 *FR* 26142).
111(k)	Annually	Inspector General (IG) of federal agencies, departments, or instrumentalities to conduct audits and submit audit reports to Congress of all uses of the Hazardous Substances Trust Fund in the prior fiscal year.	**Completed September 1988, September 1989, September 1990, September 1991, September 1992** -- EPA submitted FY87, FY88, FY89, FY90, and FY91 reports to Congress.
111(o)	01/17/87	EPA to develop and implement procedures to adequately notify concerned local and state officials of limitations on the payment of claims for response costs incurred for sites on NPL.	**Completed 02/05/87** -- EPA published notice of regulatory limitations on response claims (52 *FR* 3699). **09/13/89** -- EPA published proposed regulations to establish procedures to inform concerned persons of limitations on payment of response claims (54 *FR* 37892); **01/21/93** -- EPA published final rule (58 *FR* 5460).
112(b)(1)	[7]	EPA to prescribe appropriate forms and procedures for response claims filed under CERCLA.	**Completed 01/21/93** -- EPA published final rule (58 *FR* 5460). **09/13/89** -- EPA published proposed regulations to establish response claims procedures (54 *FR* 37892).

[7] Specific deadline not stated in statute.

CERCLA Section	Statutory Deadline	Requirement	Status
113(k)	[7]	EPA to promulgate regulations that will establish procedures for public participation in the development of the administrative record.	**Completed 03/08/90** -- Regulations included in revised NCP Subpart I (55 *FR* 8666).
116(a)(1)	01/01/88[2]	EPA to complete preliminary assessments (PAs) of all facilities contained on the CERCLA Information System (CERCLIS) as of SARA's date of enactment.	**Completed 01/01/88**.
116(a)(2)	01/01/89[2]	Following completion of PAs, EPA to complete site inspections (SIs) at facilities contained in CERCLIS as of SARA's date of enactment, as necessary.	Nine regions met statutory schedule; remaining region plans to meet goal in 1993.
116(b)	10/17/90	Following completion of PAs or SIs, EPA to complete evaluation of each facility listed in CERCLIS as of SARA's date of enactment, as warranted.	Following completion of PAs or SIs, EPA will take appropriate steps to mitigate the threat at facilities based on the policy of addressing worst sites first.
116(d)(1)	10/17/89	EPA to start 275 remedial investigations/feasibility studies (RI/FSs).	**Completed May 1989**.
116(d)(2)	10/17/90	EPA to start total of 450 RI/FSs only if 275 starts deadline not met.	**Not applicable** -- Prior deadline met.
116(d)(2)	10/17/91	EPA to start total of 650 RI/FSs only if 275 starts deadline not met.	**Not applicable** -- Prior deadline met.

[7] Specific deadline not stated in statute.

[2] Deadline specified in statute rather than correlated to date of enactment.

CERCLA Section	Statutory Deadline	Requirement	Status
116(e)(1)	10/17/89	EPA to start 175 remedial actions (RAs) at individual NPL sites.	**Completed 02/01/90**.
116(e)(2)	10/17/91	EPA to start an additional 200 RAs at individual NPL sites.	10/17/91 -- EPA has begun an additional 63 RAs and completed 22 remedial designs.
117(e)	[7]	EPA to promulgate regulations for issuing Technical Assistance Grants.	**Completed 10/1/92** -- EPA published final rule (*57 FR* 45311).
119(c)(7)	[7]	EPA to develop guidelines and promulgate regulations on the indemnification of response action contractors.	**Completed 01/25/93** -- EPA published final guidelines (58 *FR* 5972); 10/06/87 -- EPA issued interim guidance (OSWER Directive #9835.5); 10/31/89 -- EPA published proposed guidance and request for comments (54 *FR* 46012).
119(c)(8)	09/30/89[2]	Comptroller General to report to Congress on application of CERCLA's provisions for the indemnification of response action contractors.	**Completed 09/26/89** -- GAO published report entitled *Contractors Are Being Too Liberally Indemnified by the Government* (GAO/RCED-89-160).
120(c)	[7]	EPA to establish Federal Agency Hazardous Waste Compliance Docket and make available for public inspection.	**Completed 02/12/88** -- Notice of initial list of 1,095 federal facilities published (53 *FR* 4280). Public may review and copy specific documents in the Docket by contacting the Federal Facilities Docket Hotline.

[7] Specific deadline not stated in statute.

[2] Deadline specified in statute rather than correlated to date of enactment.

CERCLA Section	Statutory Deadline	Requirement	Status
120(c)	Semiannually	EPA to publish updates of Federal Agency Hazardous Waste Compliance Docket.	**Completed 11/16/88, 12/15/89, 08/22/90, 9/27/91, 12/12/91, 7/17/92, 02/05/93** -- EPA published first seven updates (53 *FR* 46364, 54 *FR* 51472, 55 *FR* 34492, 56 *FR* 49328, 56 *FR* 64898, 57 *FR* 31758, 58 *FR* 7292).
120(d)	04/17/88	EPA shall take steps to assure that a PA is conducted for each facility on the Federal Agency Hazardous Waste Compliance Docket.	**Completed 04/17/88** -- EPA took steps to assure that federal agencies complied with this process prior to statutory deadline. EPA informs federal agencies of the requirement to gather information on sites and assists agencies in collecting and analyzing such information. PAs have not yet been completed at all federal facilities.
120(d)	04/17/89	Following PAs, EPA to evaluate federal facilities with criteria established in accordance with Section 105 under the NCP for determining priorities among releases; those facilities meeting the criteria are to be included on the NPL.	EPA evaluates federal facilities where appropriate in light of resource constraints and other demands. During FY91, three federal facilities were proposed to the NPL and no facilities were listed. As of the end of FY91, 116 federal facilities had been added to the NPL (56 *FR* 35840); additional sites have been evaluated and determined not to be appropriate for the NPL.
120(e)(1)	[7]	EPA and states to publish timetable and deadlines for completion of RI/FSs at federal facilities listed on NPL.	Schedules for completion of RI/FSs at federal facilities are routinely developed pursuant to interagency agreements (IAGs), or are published by EPA and the state when IAG negotiations are unsuccessful. IAGs have been signed for 85 of the 116 federal facility sites as of FY91.

[7] Specific deadline not stated in statute.

CERCLA Section	Statutory Deadline	Requirement	Status
120(e)(1)	10/17/87	Federal departments, agencies, or instrumentalities to begin RI/FSs for federal facilities listed on NPL prior to SARA's date of enactment.	**Not applicable** -- No federal facilities were listed on NPL prior to SARA's date of enactment.
120(e)(1)	[10]	Federal departments, agencies, or instrumentalities to begin RI/FSs for federal facilities listed on NPL.	07/22/87 -- First federal facilities listed on NPL (52 *FR* 27620); CERCLIS reports that EPA had 115 RI/FS starts during FY91.
120(e)(2)	[11]	Federal departments, agencies, or instrumentalities to enter into IAGs with EPA for completion of RAs for federal facilities listed on NPL.	EPA policy is to enter into an IAG with federal facilities (listed on the NPL) during the RI/FS stage, prior to the RA stage. As a result, RA IAGs are completed well in advance of the statutory mandate. At the end of FY91, 85 IAGs had been signed with 24 IAGs signed during FY91.
120(e)(2)	[12]	Federal departments, agencies, or instrumentalities to begin RAs for federal facilities listed on NPL.	During FY91, 15 RAs for federal facilities on the NPL began.
120(e)(3)	Annually with budget	Federal agencies to review alternative agency funding to provide for costs of RAs. Agencies to submit statement of the hazard posed by facilities and identify consequences of failure to begin and complete RAs.	**Completed January 1987, January 1988, January 1989, January 1990, January 1991, January 1992** -- Included in annual budget submissions to Congress.

[10] Not later than six months after listing of federal facility on NPL.

[11] Within 180 days after EPA review of RI/FS.

[12] Not later than 15 months after completion of RI/FS.

CERCLA Section	Statutory Deadline	Requirement	Status
120(e)(5)	Annually	Federal agencies, departments, or instrumentalities to submit reports to Congress on progress in implementing CERCLA federal facility requirements.	**Completed May 1989, April 1990, September 1990, February 1992 and February 1994** -- EPA's reports included in FY87, FY88, FY89, FY90, and FY91 Reports to Congress, required under CERCLA Section 301(h)(1).
120(h)(2)	04/17/88	EPA, in consultation with the General Services Administration, to promulgate regulations on the form and manner of notice required whenever any federal department, agency, or instrumentality enters into a contract to sell or transfer property owned by the United States on which a hazardous substance was stored, disposed, or released.	**Completed 04/16/90** -- Final rule published (55 *FR* 14208).
121(c)	7/	EPA to report to Congress a list of facilities for which a five-year review is required, the results of all such reviews, and any actions taken.	**Completed May 1989, April 1990, September 1990, February 1992, and February 1994** -- EPA's reports included in FY87, FY88, FY89, FY90, and FY91 Reports to Congress, required under CERCLA Section 301(h)(1).
121(f)	7/	EPA to promulgate regulations providing for state involvement in initiation, development, and selection of remedial activities.	**Completed 03/08/90** -- Regulations included in revised NCP Subpart F (55 *FR* 8666).

7/ Specific deadline not stated in statute.

CERCLA Section	Statutory Deadline	Requirement	Status
122(e)(1)	[7]	EPA to issue procedures for special notice regarding negotiation with potentially responsible parties.	**Completed 10/19/87** -- EPA sent procedural guidelines to Regional Administrators from Assistant Administrator for OSWER (OSWER Directive #9834.10); **02/23/88** -- Guidelines published as *Interim Guidance on Notice Letters, Negotiations, and Information Exchange* (53 *FR* 5298); **02/07/89** -- EPA published Appendix C to the Interim Guidance (Model Notice Letters) (OSWER Directive #9834.10).
122(e)(3)(A)	[7]	EPA to develop guidelines for preparing nonbinding preliminary allocations of responsibility (NBAR).	**Completed 05/28/87** -- EPA published interim final guidelines (52 *FR* 19919). **May 1991** -- EPA published *Summary of "Interim Guidelines for Preparing NBARs"* (OSWER Directive #9839.1FS).
123(d)	10/17/87	EPA to promulgate regulations for reimbursement to local governments for costs incurred in responding to the release or threatened release of a hazardous substance, pollutant, or contaminant.	**Completed 01/15/93** -- EPA published final rule (58 *FR* 4816); **10/21/87** -- IFR published (52 *FR* 39386).
126(c)	FY88 budget request	EPA to submit report to Congress on hazardous waste sites on Indian lands.	**Completed 11/06/87** -- Report entitled *Hazardous Waste Sites on Indian Lands* submitted to Congress.

[7] Specific deadline not stated in statute.

CERCLA Section	Statutory Deadline	Requirement	Status
301(c)(1)	04/17/87	DOI to issue regulations for the assessment of damages for injury to, destruction of, or loss of natural resources resulting from a release of oil or a hazardous substance.	**Completed 02/22/88** -- Final regulations published (53 *FR* 5166).
301(g)	10/17/87	Comptroller General to submit report to Congress on the results of the insurability study.	**Completed 10/16/87** -- GAO published report entitled *Issues Surrounding Insurance Availability* (GAO/RCED-88-2).
301(h)(1)	Annually	EPA to submit report to Congress on CERCLA implementation.	**Completed May 1989, April 1990, September 1990, February 1992 and February 1994** -- EPA's reports included in FY87, FY88, FY89, FY90, and FY91 Reports to Congress, required under CERCLA Section 301(h)(1).
301(h)(2)	[7]	EPA IG to review EPA's Report to Congress required under CERCLA Section 301(h)(1).	**Completed May 1989, April 1990, September 1990, February 1992 and February 1994** -- EPA's reports included in FY87, FY88, FY89, FY90, and FY91 Reports to Congress, required under CERCLA Section 301(h)(1).

[7] Specific deadline not stated in statute.

CERCLA Section	Statutory Deadline	Requirement	Status
306(a)	13/	Department of Transportation (DOT) to list and regulate hazardous substances, listed or designated under CERCLA Section 101(14), as hazardous materials under the Hazardous Materials Transportation Act.	**Completed 08/21/89** -- DOT, through the Research and Special Programs Administration (RSPA), amended Hazardous Materials Regulations (HMR) by revising the *List of Hazardous Substances and Reportable Quantities* (54 *FR* 34666); **11/07/90** -- RSPA published additional revisions to the list in the HMR (55 *FR* 46794).
310(d)(1)	7/	EPA to issue regulations describing manner of notice of citizen suits.	**Completed 11/23/92** -- EPA published final rule (54 *FR* 55038); 12/28/92 -- Correction to final rule published (51 *FR* 61612).
311(a)(1)	7/	Department of Health and Human Services (HHS) to establish and support a basic hazardous substance research and training program.	**Completed 09/14/87** -- HHS published notice of availability of final National Institute of Environmental Health Sciences (NIEHS) Hazardous Substances Basic Research and Training Plan (52 *FR* 34721). HHS previously initiated steps to establish program, including: 11/28/86 -- HHS published draft program description (51 *FR* 43089); 12/15/86 -- HHS held first public meeting to solicit comments.

13/ Requirements to be completed by November 17, 1986, or at the time each substance is listed or designated as hazardous under CERCLA, whichever is later.

7/ Specific deadline not stated in statute.

CERCLA Section	Statutory Deadline	Requirement	Status
311(a)(5)	[7]	HHS to appoint an advisory council to assist in implementing and coordinating activities for the hazardous substance research and training program established under CERCLA Section 311(a)(1).	**Completed 03/13/87** -- HHS appointed NIEHS Advisory Council on Hazardous Substances Research and Training (52 *FR* 7934); 07/20/87 -- Advisory Council first convened.
311(a)(6)	07/17/87	HHS, through NIEHS, to issue a plan to implement the hazardous substance research and training program established under CERCLA Section 311(a)(1).	**Completed 09/14/87** -- Notice of availability of final version of the NIEHS Hazardous Substances Basic Research and Training Plan published (52 *FR* 34721).
311(b)(1)	[7]	EPA to carry out a program of research, evaluation, testing, development, and demonstration of alternative or innovative technologies.	**Completed December 1986** -- EPA published the Superfund Innovative Technology Evaluation (SITE) Strategy and Program Plan (EPA/540/G-86/001). Program is ongoing.
311(b)(5)(B)	01/17/87[14]	EPA to publish a solicitation for innovative or alternative technologies suitable for full-scale demonstration at Superfund sites.	**Completed January 1986, January 1987, January 1988, January 1989, January 1990, January 1991, January 1992, January 1993** -- Solicitations published.

[7] Specific deadline not stated in statute.

[14] First solicitation due January 17, 1987; subsequent solicitations to be published no less often than annually.

CERCLA Section	Statutory Deadline	Requirement	Status
311(b)(6)	[15]	EPA to initiate or cause to be initiated at least 10 field demonstration projects of alternative or innovative treatment technologies.	FY87 -- 1 site demonstration completed; FY88 -- 6 site demonstrations completed; FY89 -- 7 site demonstrations completed; FY90 -- 4 site demonstrations completed. FY91 -- 7 site demonstrations completed.
311(b)(8)	[7]	In carrying out the SITE program established under CERCLA Section 311(b)(1), EPA to conduct a technology transfer program and establish and maintain a central reference library on relevant information.	**Completed December 1986** -- EPA announced the publication of program reports and documents (e.g., demonstration reports, bulletins) through the Center for Environmental Research Information. **09/01/87** -- EPA established the electronic Bulletin Board System (BBS), including a "SITE Conference." **05/08/89** -- EPA established the Alternative Treatment Technology Information Center (ATTIC). EPA eliminated the SITE Conference from the BBS; important program information is available through ATTIC. **08/07/91** -- SITE announced an update of the ATTIC system which will include bioremediation technologies (56 *FR* 37543).
311(d)	[7]	EPA to make grants to universities to establish and operate not fewer than five hazardous substance research centers.	**Completed FY89, FY90, FY91** -- EPA made $1 million grants to each of five Hazardous Substance Research Centers.

[15] Due in fiscal years 1987, 1988, 1989, and 1990.

[7] Specific deadline not stated in statute.

CERCLA Section	Statutory Deadline	Requirement	Status
311(e)	Annually with budget	EPA to submit report to Congress on progress of the SITE program established under CERCLA Section 311(b)(1).	**Completed February 1988, March 1989, March 1990, September 1991, October 1992** -- FY87, FY88, FY89, FY90, and FY91 SITE program reports submitted to Congress.
312(e)	7/	EPA to conduct habitability and land use study of the Love Canal Emergency Declaration Area, and to work with New York State (NYS) to develop recommendations based upon the study results.	**Completed 07/28/88** -- Study submitted to NYS Commissioner of Health. September 1988 -- Commissioner issued follow-up report. **07/10/89** -- Love Canal Land Use Advisory Committee issued recommendations. **May 1990** -- Love Canal Area Revitalization Agency published final generic environmental impact statement. **June 1990** -- Agency published the Love Canal Area Master Plan.

7/ Specific deadline not stated in statute.

Progress Toward Meeting SARA-Related Statutory Requirements[1/]

SARA Section	Statutory Deadline	Requirement	Status
118(b)	01/17/87	EPA to grant $7.5 million to New Jersey for removal and temporary storage of radon contaminated soil.	**Completed 01/15/87** -- Grant made to New Jersey.
118(d)	07/01/87[2/]	Comptroller General to submit report to Congress on study of shortages of skilled personnel in EPA.	**Completed 10/26/87** -- GAO published report entitled *Improvements Needed in Work Force Management* (GAO/RCED-88-1).
118(f)	03/01/87[2/]	ATSDR to submit report to Congress on the nature and extent of lead poisoning in children from environmental sources.	**Completed 07/12/88** -- Report entitled *Nature and Extent of Lead Poisoning in Children in the United States* submitted to Congress.
118(j)	04/17/87	EPA to submit report to Congress on joint use of vehicles for transportation of hazardous and non-hazardous substances.	**Completed 04/20/87** -- Report entitled *A Study of Joint Use of Vehicles of Hazardous and Non-Hazardous Materials submitted to Congress* (OSWER Directive #9360.6-01).
118(k)(1)	10/17/87	EPA to submit report to Congress on radon site identification and assessment.	**Completed 02/23/90** -- Report submitted to Congress.

[1/] In this matrix, requirements of CERCLA, as amended by SARA, precede requirements of SARA that do not amend CERCLA.

[2/] Deadline specified in statute rather than correlated to date of enactment.

SARA Section	Statutory Deadline	Requirement	Status
118(k)(2)(A)	[7]	EPA to conduct a demonstration program to test methods and technologies of reducing or eliminating radon gas and radon daughters where it poses a threat to human health.	**Completed September 1985** -- EPA established Radon Action Program. Since the enactment of SARA, EPA has focused its program efforts to meet the statutory mandate.
118(k)(2)(B)	02/01/87[2,16]	EPA to submit report on radon mitigation demonstration program.	**Completed 06/12/87, 01/18/89, 02/26/90, 01/15/91** -- Four reports have been submitted to Congress.
118(n)(1)	04/17/87	Department of Energy (DOE) to carry out program at the Liquified Gaseous Spills Test Facility. Program to test and evaluate technologies utilized in responding to liquified gaseous and other hazardous substance spills that threaten human health or the environment.	**Completed 06/30/87** -- Memorandum of understanding developed among DOE, EPA, and DOT. **1990** -- Collaborative research effort between DOE and the Silicone Health Council to study hazardous material foams. **1990** -- Collaborative effort among DOE and other organizations (under an IAG) to conduct a study on materials for chemical protective suits. **1990** -- Collaborative effort between DOE and Center for Chemical Process Safety to conduct field test of gas dispersion model. **1991** -- Testing of totally encapsulated suits and their resistance to released chemicals.

[7] Specific deadline not stated in statute.

[2] Deadline specified in statute rather than correlated to date of enactment.

[16] Due annually on this date beginning in 1987.

SARA Section	Statutory Deadline	Requirement	Status
118(n)(3)	7/	EPA to enter into contracts and grants with a nonprofit organization in Albany County, Wyoming, to carry out program established under CERCLA Section 118(n)(1).	**Completed 1988** -- EPA entered into contract with the Western Research Institute (WRI) to carry out technology transfer program requirements under CERCLA Sections 118(n)(2)(A), (B), and (D). **September 1990** -- DOE entered into a second contract with WRI that is scheduled to run until 1995, which continues to address requirements under CERCLA Section 118(n)(2).
121(b)(2)	11/17/86	EPA Administrator to certify in writing that RODs or consent decrees covering RAs, signed within 30 days of enactment of SARA, comply to the maximum extent practicable with Section 121 of CERCLA.	**Completed 11/17/86** -- All three RODs signed comply; no consent decrees lodged during this period.
126(a)	10/17/87	Department of Labor (DOL) to promulgate standards for the health and safety protection of employees engaged in hazardous waste operations.	**Completed 03/06/89** -- DOL published standards (54 *FR* 9294).
126(f)	17/	EPA to promulgate worker protection standards identical to those contained in the Occupational Safety and Health Act regulations established by DOL under CERCLA Section 126(a).	**Completed 06/23/89** -- EPA published final standards (54 *FR* 26654).

7/ Specific deadline not stated in statute.

17/ Not later than 90 days after promulgation of DOL final regulations.

SARA Section	Statutory Deadline	Requirement	Status
205(b)	07/17/87	States to develop and submit to EPA inventories of all underground storage tanks containing regulated substances.	**Completed 07/17/87** -- All 50 states submitted inventories to EPA.
205(h)	01/17/88	Comptroller General to submit report to Congress on study of the availability of pollution liability insurance, leak insurance, and contamination insurance for owners and operators of petroleum storage and distribution facilities.	**Completed 01/15/88** -- GAO published report entitled *Insuring Underground Petroleum Tanks* (GAO-RCED-88-39).
211(a)	Annually	Secretary of Defense to submit report to Congress on progress in implementing Department of Defense Environmental Restoration Program.	**Completed March 1988, March 1989, February 1990, March 1991, February 1992** -- FY87, FY88, FY89, FY90, and FY91 reports submitted to Congress.

Appendix E

EPA Annual Report to Congress: Progress toward Implementing CERCLA at EPA Facilities as Required by CERCLA Section 120(e)(5)

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1.0 Introduction

Section 120(e)(5) of CERCLA, as amended by SARA, requires each department, agency, or instrumentality responsible for compliance with Section 120 of CERCLA to furnish an annual report to Congress concerning its progress in implementing the requirements of that section.

Requirements of CERCLA Section 120(e)(5)

The annual reports to Congress required by Section 120(e)(5) of CERCLA are to include, but need not be limited to, each of the following items:

(A) A report on the progress in reaching interagency agreements (IAGs) under CERCLA Section 120(e)(2);

(B) The specific cost estimates and budgetary proposals involved in each IAG;

(C) A brief summary of the public comments regarding each proposed IAG;

(D) A description of the instances in which no agreement was reached;

(E) A report on progress in conducting remedial investigations and feasibility studies (RI/FSs) required by CERCLA Section 120(e)(1) at National Priority List (NPL) sites;

(F) A report on conducting remedial actions (RAs) at NPL sites; and

(G) A report on progress in conducting RAs at facilities that are not listed on the NPL.

The annual report is also required to contain a detailed description, on a state-by-state basis, of the status of each facility subject to this section, including a description of the hazards presented by each facility, plans and schedules for initiating and completing response actions, enforcement status (where applicable), and an explanation of any postponement or failure to complete response actions.

EPA Compliance Program

EPA has given high priority to maintaining compliance with CERCLA requirements at its own facilities. To ensure compliance, EPA uses its environmental compliance program to heighten regulatory awareness, identify potential compliance violations, and coordinate appropriate corrective action schedules at its laboratories and other research facilities.

As part of EPA's commitment to environmental compliance, the environmental compliance program has instituted an environmental auditing program to accomplish many of its compliance objectives. Audits are conducted at EPA facilities to identify potential regulatory violations of federal (including CERCLA), state, and local statutes. By performing these detailed facility analyses, EPA is better able to assist facilities in complying with environmental regulations.

2.0 EPA Progress in Meeting Requirements of CERCLA Section 120 during FY91

EPA is required to report on progress in meeting the requirements of CERCLA Section 120 in terms of IAGs, RI/FSs at NPL sites, and RAs at NPL and non-NPL sites.

- EPA did not have any facilities placed on the NPL during FY91. As a result, EPA has not entered into any IAGs for remediation requiring reporting under CERCLA Sections 120(e)(5)(A), (B), (C), or (D).
- EPA has not been involved with RI/FSs or RAs that would require reporting under CERCLA Sections 120(e)(5)(E) and (F).

For purposes of CERCLA Section 120(e)(5), only the following facilities with past releases or documented contamination will be included in this discussion.

Environmental Research Laboratory, Florida

Following completion of the preliminary assessment (PA) in April of 1988, additional testing and reviews of environmental data led to the determination that hazardous substances are not being released into the environment. The Agency

considers Superfund site evaluation to be accomplished.

EPA Central Regional Laboratory, Maryland

EPA operates an analytical testing laboratory in Annapolis, Maryland. The laboratory discharged waste-water into an on-site septic tank disposal system, and then to the public sewer system. EPA, in conjunction with the State of Maryland, conducted an on-site investigation for ground-water contamination. The study indicated that hazardous substances had not been released into the environment, and further remedial action was not required.

Motor Vehicle Emission Laboratory, Michigan

The Agency has conducted a PA of the facility, which is located in Ann Arbor, and considers Superfund evaluation to be accomplished.

EPA Raritan Depot, New Jersey

Originally, the site was owned by the Department of Defense (DOD) and used for munitions testing and storage. In 1961, the General Services Administration (GSA) took possession of the property, and transferred 165 acres to EPA in 1988. Although residual contamination from past DOD and GSA activities persists at the facility, EPA has not stored, released, or disposed of any hazardous waste substances on the property. Some pre-Superfund waste was temporarily stored at the site, but was later properly disposed off site.

Additional site investigation work occurred in FY91, following the discovery of a contaminated surface water impoundment. The investigation is currently underway, although near-term remediation is under consideration.

EPA Tech Center, North Carolina

EPA's laboratory at Research Triangle Park was permitted for incineration research involving hazardous waste. A PA of the site has been conducted, accomplishing Superfund site evaluation.

EPA Laboratory, Oregon

The EPA laboratory in Corvallis is a conditionally exempt small quantity generator,
and is not subject to the requirements of CERCLA Section 120(h).

EPA Laboratory, Texas

The EPA laboratory in Houston is a conditionally exempt small quantity generator, and is not subject to the requirements of CERCLA Section 120(h).

Region 10 Environmental Services Division Laboratory, Washington

EPA acquired the property from the Department of the Navy, and used the land to construct an environmental testing laboratory. The land adjacent to the laboratory contains a rubble landfill that was minimally covered by the Navy. The landfill's soil cover has begun to deteriorate, exposing rubble material. Additional sampling has been performed at the site, revealing the presence of hazardous substances in the surface water run-off. Further investigative work is in progress.

3.0 State-by-State Status of EPA Facilities Subject to Section 120 of CERCLA

Federally-owned facilities are listed on the Federal Agency Hazardous Waste Compliance Docket, which documents those federal facilities added to, corrected on, or removed from the docket. At the end of FY91, the docket listed 18 EPA-owned facilities. During the fiscal year, the docket listed one deletion of an EPA-owned facility, the Narragansett Environmental Research Laboratory in Rhode Island.

The names of these 18 EPA facilities, along with an indication of the types of problems and progress of activities required by CERCLA, are presented, by state, in Exhibit E-1.

Exhibit E-1. Status of EPA Facilities on the Federal Agency Hazardous Waste Compliance Docket

State	EPA Facility	Known or Supected Problems	Project Status
AR	Combustion Research Facility	No contamination	PA completed 4/89; currently under review by regional offices.
CO	National Enforcement Investigation Center	No contamination	PA completed 4/88; currently under review by regional offices.
FL	Environmental Research Laboratory	No significant contamination	PA completed 4/88; site evaluation accomplished.
IL	Region 5 Environmental Services Division Laboratory	No contamination	PA complete 4/88; currently under review by regional offices.
KS	EPA Mobile Incinerator	No contamination from mobile incinerator	Site evaluation accomplished; mobile incinerator removed from site.
KS	Region 7 Environmental Services Division Laboratory	No contamination	PA completed 4/88; currently under review by regional offices.
MD	EPA Central Regional Laboratory	No contamination	PA completed 4/88; site evaluation accomplished.
MI	Motor Vehicle Emmission Laboratory	No contamination	PA conducted 3/90; site evaluation accomplished.
NC	EPA Tech Center	No contamination	PA conducted 8/91; site evaluation accomplished.
NJ	EPA Raritan Depot	No contamination that poses a threat to the environment	PA/SI prompted additional investigative work currently underway.
OH	AWBERC Facility	No contamination	PA completed 4/88; currently under review by regional offices.
OH	Center Hill Hazardous Waste Engineering Research Laboratory	No contamination	PA completed 4/88; currently under review by regional offices.
OH	Testing and Evaluation Facility	No contamination	PA completed 4/88; currently under review by regional offices.
OR	EPA Laboratory	Small quantity generator	Conditionally exempt from PA requirements.
TX	EPA Laboratory	Small quantity generator	Conditionally exempt from PA requirements.
VA	Environmental Photographic Interpretation Center	Minor contamination due to EPA activities	PA/SI conducted; currently under review by regional offices.
VI	Anguilla Landfill	Extent of contamination under investigation	Site assessment in progress.
WA	Region 10 Environmental Services Division Laboratory	Minor contamination due to EPA activities	PA/SI prompted additional investigative work currently underway.

Source: Federal Agency Hazardous Waste Compliance Docket

Appendix F
Report of the EPA Inspector General

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE INSPECTOR GENERAL

MEMORANDUM

SUBJECT: Audit Report E1SFF2-11-0019-3100404
Review of the Superfund Annual Report To Congress
For Fiscal Year 1991

FROM: John C. Martin
Inspector General (A-109)

TO: Carol M. Browner
Administrator (A-100)

Summary of Results

We have completed a review of the Environmental Protection Agency's Annual Report to Congress (Annual Report) on Progress Toward Implementing Superfund: Fiscal Year 1991. We found that the Annual Report included the information required by the applicable statute as interpreted by the Agency. We believe the fiscal 1991 data in the Agency's fiscal 1991 Annual Report is generally accurate and reasonable. We found that the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) data we reviewed, from which the Annual Report was created, contained some errors for the fiscal 1991 accomplishments we sampled, but no greater than a ten percent error rate.

However, we must disclaim an opinion on the pre-fiscal 1991 data and cumulative totals of accomplishments in the Agency's Annual Report because the Agency changed its procedures for reporting historical data. The new reporting procedures resulted in some material changes in the historical data compared to historical data reported by the Agency in prior years' Annual Reports. In essence, the Agency is now saying that the accomplishment levels reported in prior years are now being reinterpreted.

Additionally, the scope of our audit originally included the review of Preliminary Assessments (PA) and Site Inspections (SI) completed during fiscal 1991. However, due to an Office of Inspector General (OIG) investigation that began during our original field work, the Agency removed PA and SI information from the Annual Report. We, therefore, express no opinion regarding the fiscal 1991 PA and SI completions information noting that it has been removed from the report.

Scope and Objectives:

The objective of our review was to determine whether the Agency's Annual Report, Progress Toward Implementing Superfund: Fiscal Year 1991, is reasonable and accurate, as required by Section 301(h)(2) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986. We began our review on October 28, 1991, and we completed virtually all of our work by June 22, 1992, approximately one month before EPA submitted the Annual Report to the Office of Management and Budget (OMB).

On July 31, 1992, the OIG auditors were notified that allegations had been made regarding possible irregularities related to the fiscal 1991 Preliminary Assessment and Site Inspection completions in Region 9. Because of the ongoing OIG investigation, on February 1, 1993, we issued a disclaimer of opinion on the Agency's fiscal 1991 Annual Report until the Office of Audit and the Office of Investigations could perform work to determine the extent of the irregularities. As a result of the disclaimer, the Agency revised its Annual Report to exclude Preliminary Assessment and Site Inspection information. Since the Preliminary Assessment and Site Inspection information has been deleted from the Agency's Annual Report for fiscal 1991, and we have completed adequate follow-up work on other issues resulting from the allegations, we can now express an opinion on the Agency's revised Annual Report.

As part of our original field work, we performed detailed audit work in Headquarters and in Regions 2, 3, and 9 to verify the accuracy of selected key information presented in the following Annual Report chapters and appendices:

-- "Executive Summary;"

-- 1.0: "Major Program Accomplishments;"

-- 2.0: "Response Initiatives;"

-- 4.0: "Federal Facilities Program;"

-- 5.0: "Other Statutory Requirements for the Report;"

-- Appendix A: "Status of Remedial Investigations, Feasibility Studies, and Remedial Actions at Sites on the National Priorities List in Progress on September 30, 1991;"

-- Appendix B: "Remedial Designs in Progress on September 30, 1991;" and

-- Appendix C: "Record of Decision Abstracts."

We did not perform in-depth audit work on Chapter 3.0, "Estimate of Resources Required to Implement Superfund." This was because the General Accounting Office had just completed an audit of the Outyear Liability Model, the method by which the Agency calculates much of the information in Chapter 3.0.

We began our original field work by using a January 1992 draft of the Agency's Annual Report, and we reviewed updated drafts as we received them. We focused our field work on those items the Comprehensive Environmental, Response, Compensation and Liability Act specifically required to be included in the Annual Report. We also reviewed the final changes made to the Agency's fiscal 1991 Annual Report in September 1993.

We performed detailed audit work in Regions 2, 3, and 9 as part of the original field work because of the volume of activity or because we had not performed this review in the region in prior years. Recognizing regional differences, we hoped, in this manner, to obtain a balanced, nationwide perspective for our review.

For the information in the Executive Summary, Chapter 1.0, and Appendices A and B, we obtained printouts from the CERCLIS for October 1991, and we selected sample cases for review in the site assessment, removal, and remedial programs. We obtained the October 1991 printout from the Office of Solid Waste and Emergency Response (OSWER) to define our universe of cases. In Region 2, we randomly selected 84 accomplishments from a universe of 204. In Region 3, we randomly selected 68 accomplishments from a universe of 162. In Region 9, we randomly selected 78 accomplishments from a universe of 145. (All of the samples and universes exclude Preliminary Assessments and Site Inspections on which we are not opining.) With the exception of the accomplishments we sampled and interviews we conducted in Regions 2, 3, and 9, no audit tests were performed to evaluate the adequacy of manual or automated controls for CERCLIS.

For our sample cases, we reviewed the source documentation in Regions 2, 3, and 9 to determine whether the activities claimed met the definitions for valid fiscal 1991 accomplishments. The specific source documentation reviewed varied from activity to activity. For example, for Remedial Investigation/Feasibility Study (RI/FS) completions, the official Agency definition states that the completion date is the date "the Record of Decision [ROD] is signed by the Regional Administrator/Deputy Regional Administrator or the AA SWER." In accordance with this definition, we reviewed source documents showing the signature of the appropriate official on the ROD. We performed this same type of review for each of the site assessment, removal, and remedial actions selected for review. Although a majority of our sample items was selected at random, we did not select statistically valid samples.

Our subsequent field work included interviews with Region 2 and Region 3 officials. We also used some of the preliminary results of the work we completed related to the Agency's fiscal 1992 Annual Report to arrive at our opinion of the fiscal 1991 Annual Report.

When we have conducted this review in prior years, we have generally stated our opinion on the reasonableness and accuracy of the entire Annual Report, including historical data. This is because we have reviewed past years' Annual Reports and the data have not changed; or, if the data have changed, the changes are minor and easily explainable compared to prior fiscal years' data we have reviewed. However, for this year's Annual Report, the Agency modified the computerized program which selects historical data from CERCLIS for presentation in the Annual Report. Accomplishment levels of historical data claimed for prior years in this year's Annual Report are different from the levels claimed in prior years' Annual Reports. Thus, we are not able to express an opinion on the historical data in the fiscal 1991 Annual Report because the data are changed from the data we sampled and reviewed during our review of prior Agency Annual Reports.

Our scope originally included the review of Preliminary Assessments (PA) and Site Inspections (SI) completed during fiscal 1991. Due to the OIG investigation that began during our original field work and then continued throughout our subsequent field work, the Agency removed PA and SI information from the Annual Report. We, therefore, express no opinion regarding now absent fiscal 1991 PA and SI completions information at this time.

On August 3, 1993, we provided the Agency with a draft report qualifying our opinion of the Agency's Annual Report to Congress for fiscal 1991. The Agency provided a response to our draft report on September 10, 1993. The Agency agreed to address our concerns by revising the Annual Report. Because all of the issues in our draft report were resolved, and the Agency revised its report appropriately, we agreed with the Agency not to include its response to our draft report in this final report.

Our work was performed in accordance with the Government Auditing Standards (1988 revision) issued by the Comptroller General of the United States. However, we did not perform a full scope audit to determine if the Superfund program is achieving the results required by CERCLA, nor did we perform extensive tests to determine if internal controls are adequate. We performed limited audit work necessary to determine if key information included in the Annual Report is reasonable and accurate. As noted above, our audit was performed in accordance with Government Auditing Standards, but this does not guarantee the discovery of irregularities resulting from noncompliance.

Results of Review

MOST FISCAL 1991 ACCOMPLISHMENTS WERE PROPERLY SUPPORTED

Most of the fiscal 1991 Superfund accomplishments we randomly selected were supported. We grouped the Superfund accomplishments into three categories: (1) site assessment accomplishments, (2) removal accomplishments, and (3) remedial accomplishments. We disclaimed an opinion on the site assessment accomplishments because they were under investigation. However, we found no errors in the reporting of removal action accomplishments for the accomplishments we sampled. Lastly, we found that the error rate of our sampled remedial accomplishments listed in CERCLIS did not exceed 10 percent, and we notified the appropriate Agency officials regarding the errors we found. Accordingly, we concluded that fiscal 1991 Annual Report accomplishments are accurate and reasonable within these parameters.

Below is a chart detailing the errors we found for remedial accomplishments only. Remedial accomplishments include remedial investigation/feasibility studies (RI/FS) starts, RI/FS completions, remedial design starts, remedial action (RA) starts, and RA completions. We did not include removal accomplishments (removal starts and removal completions) in this chart because we questioned none of the removal accomplishments we sampled. Also, we did not include site assessment accomplishments (preliminary assessments and site inspections) in this table because we disclaimed an opinion on these accomplishments.

Sample Error Rate of Remedial Accomplishments

Region	Sample	Validated	Questioned	Percent Questioned
2	53	51	2	4%
3	62	61	1	2%
9	60	54	6	10%

Appendix G
List of Sources

The following is a list of reference sources and a bibliography of materials that were used in the preparation of this report. Reference sources are those materials that were used directly in the formulation of the text. Documents cited in the bibliography were used for background information only. Sources for data used in exhibits within this document are cited in the exhibits and also listed below.

Sources

Statutes

Comprehensive Environmental Response, Compensation, and Liability Act, P.L. 96-510 (11 December 1980), 42 U.S.C. Section 9601 *et. seq.*

Resource Conservation and Recovery Act, P.L. 94-580 (21 October 1976), 42 U.S.C. Section 6901 *et. seq.*

Superfund Amendments and Reauthorization Act, P.L. 99-499 (17 October 1986), 42 U.S.C. Section 11001 *et. seq.*

Rulemakings

EPA. December 24, 1991. National Oil and Hazardous Substances Pollution Contingency Plan; Deletion of Sites from the National Priorities List; Five-Year Reviews. 56 *FR* 66601.

EPA. December 12, 1991. Notice of Fifth Update of the Federal Agency Waste Compliance Docket Pursuant to CERCLA Section 102(c). 56 *FR* 64898.

EPA. December 4, 1991. Notice to Change Policy Regarding Five-Year Reviews. 56 *FR* 66601.

EPA. September 27, 1991. Notice of Fourth Update of the Federal Agency Hazardous Waste Compliance Docket Pursuant to CERCLA Section 102(c). 56 *FR* 49328.

EPA. September 10, 1991. Notice of Intent to Delete: National Priorities List; John's Sludge Pond, Wichita. 56 *FR* 46142.

EPA. July 26, 1991. Proposed Rule: Hazardous Waste Management Systems: Identification and Listing of Hazardous Waste; CERCLA Hazardous Substance Designation; Reportable Quantity Adjustment, Coke By-Products Waste Listings. 56 *FR* 35758.

EPA. March 27, 1991. Reportable Quantity Adjustments for Petroleum Refinery Primary Treatment. 56 *FR* 12826.

EPA. February 11, 1991. Notice of Recategorization of 14 Sites on the National Priorities List. 56 *FR* 5634.

EPA. December 14, 1990. Final Rule: Revised Hazard Ranking System. 55 *FR* 51532.

EPA. August 22, 1990. Notice of Third Update of the Federal Agency Hazardous Waste Compliance Docket Pursuant to CERCLA Section 102(c). 55 *FR* 34492.

EPA. March 8, 1990. Final Rule: National Oil and Hazardous Substances Pollution Contingency Plan. 55 *FR* 8666.

EPA. December 15, 1989. Notice of Second Update of the Federal Agency Hazardous Waste Compliance Docket Pursuant to CERCLA Section 102(c). 54 *FR* 51472.

EPA. December 1, 1989. Technical Assistance Grants to Groups at National Priorities List Sites; Amendments to Interim Final Rule. 54 *FR* 49848.

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