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DEFENSE ENVIRONMENTAL RESTORATION PROGRAM

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ANNUAL REPORT TO CONGRESS

FOR

FISCAL YEAR 1987

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DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
ANNUAL REPORT TO CONGRESS
FISCAL YEAR 1987



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EXECUTIVE SUMMARY

In Fiscal Year 1987, the Department of Defense made significant progress in cleaning up hazardous waste sites and correcting other environmental damage under its Environmental Restoration Program. The \$377.2 million appropriated by the Congress was used for Installation Restoration (IR) Program activities at military installations and formerly used DoD properties, hazardous waste minimization initiatives, and limited building demolition/debris removal projects at formerly used properties.

As of September 30, 1987, 5,165 sites at 739 installations had been included in the program. Preliminary Assessments/Site Inspections (PA/SI) had been completed at 3,735 sites; Remedial Investigations/Feasibility Studies (RI/FS) had been completed at 1,096 sites and Remedial Design/Remedial Actions (RD/RA) had been completed at 126 sites. Work is underway at over 3,600 sites.

Highlights of Fiscal Year 1987 include:

- Completion of RD/RA at 27 sites (including removals and long term monitoring), and the identification of 786 new sites for future RD/RA. In addition, PS/SI were completed at over 200 sites and started at 1,473 sites.*
- Negotiation of Federal Facility Cleanup Agreements with the Environmental Protection Agency (EPA) and states underway at nine installations. One agreement, for the Twin Cities Army Ammunition Plant, MN, was completed.*
- Addition of 200 installations, primarily National Guard facilities and reserve centers to the IR Program. All have PA/SI work underway or completed.*
- Development of a new DoD relative risk model, the Defense Site Remediation Priority Model, to assist in setting priorities for remedial action. DoD formally proposed its use in the Federal Register on November 18, 1987, and is working with EPA and state organizations to refine the model for use in the Fiscal Year 1989 program.*

In July 1987, EPA listed 29 DoD facilities on the National Priorities List (NPL). Another 15 DoD facilities were proposed for listing. Legislative schedules for completion of PA/SI and initiation of RI/FS have been met for all NPL listed facilities except one. Interim RD/RA or removal actions have been taken at 11 of the 29 final-listed facilities.

DoD expects to continue its strong progress in the IR Program in Fiscal Year 1988 with emphasis on the successful negotiation of Federal Facility Cleanup Agreements.

INTRODUCTION

This is the second Annual Report to the Congress on the Department of Defense Environmental Restoration Program. This report provides the DoD with the opportunity to demonstrate its commitment to cleaning up hazardous and toxic waste sites and the progress made in carrying out the program in Fiscal Year (FY) 1987.

The report includes an overview of the Defense Environmental Restoration Program and detailed responses to specific information requested by the Superfund Amendments and Reauthorization Act of 1986, PL 99-499 (SARA) in Section 120, Federal Facilities, and in Section 211, Department of Defense Environmental Restoration Program (codified as Title 10, United States Code (USC), Sections 2701-2707, and 10 USC 2810).

This document is divided into two major parts. Part I, is an overview of the Defense Environmental Restoration Program and a summary of significant accomplishments; Part II addresses items specified in the SARA, Sections 120 and 211.

PART I

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM

The Defense Environmental Restoration Program was established in 1984 to provide increased emphasis and visibility for an expanded effort to cleanup contamination from hazardous waste sites.

The Department of Defense, like private industry, conducts a number of industrial processing and manufacturing operations which utilize large amounts of industrial chemicals. Although in the past, wastes from these operations were disposed of by the commonly accepted practices of the times, we have found that such practices may have resulted in significant risks to public health and the environment. In response to that knowledge, programs were developed in the late 1970's by the Military Services and Defense Agencies to identify and assess the problems on military installations.

With the passage of the Defense Appropriations Act of 1984 the Department's program was expanded to include properties formerly owned or used by the DoD and to include removal of structures or debris which are unsafe or constitute a hazard. Additionally, the overall management of the program was centralized in the Environmental Policy Office of the Secretary of Defense to ensure a consistent approach to environmental restoration efforts and the adequate allocation of resources.

The Superfund Amendments and Reauthorization Act of 1986 (SARA) provided continuing authority for the Secretary of Defense to carry out its Environmental Restoration Program in consultation with the Administrator of the Environmental Protection Agency (EPA). Executive Order 12580 on Superfund Implementation, signed by President Reagan on January 23, 1987, delegated authority to the Secretary of Defense for carrying out the Department's Environmental Restoration Program within the overall framework of the SARA and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Funding for the Defense Environmental Restoration Program is provided by the Defense Appropriations Act.

The Defense Environmental Restoration Program consists of three major sub-elements:

- **Installation Restoration Program**—to identify, investigate, and cleanup contamination from hazardous substances and wastes on installations and at formerly used properties. This program is focused on cleanup of contamination from past activities. Included are research, development and demonstration of innovative and cost-effective site cleanup technologies.
- **Other Hazardous Waste Operations**—to fund studies and the purchase of equipment to minimize the generation of hazardous wastes. This element also includes research, development and demonstrations related to hazardous waste.
- **Building Demolition and Debris Removal**—to demolish and remove unsafe buildings, structures and debris at installations and at formerly owned or used properties.

INSTALLATION RESTORATION PROGRAM

The Installation Restoration Program (IRP) is managed centrally in the Office of the Secretary of Defense and is carried out by the Military Services and Defense Agencies.

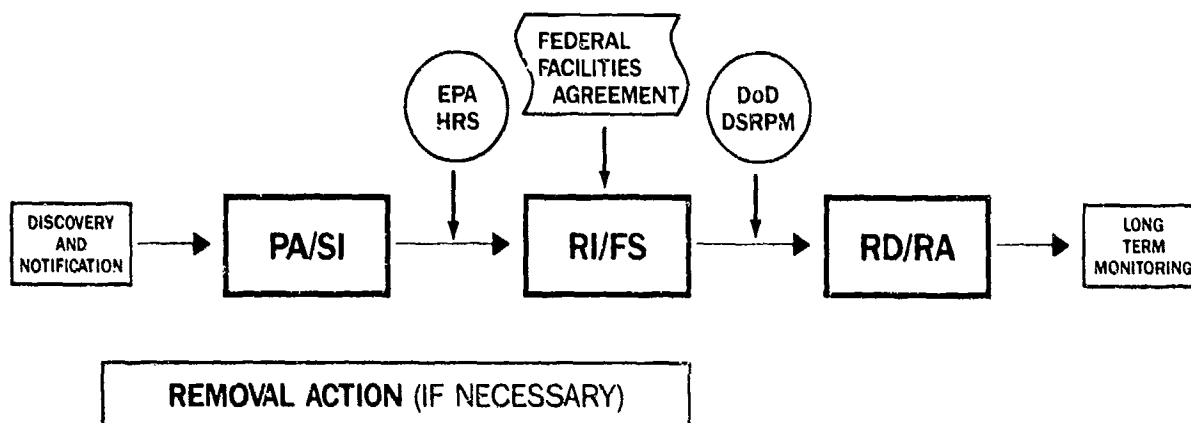
- The Deputy Assistant Secretary of Defense for Environment (DASD(E)) provides overall policy direction and oversight for the program.
- Each service retains the lead for installation restoration activities at its own installations. Any installation requiring support requests it from its major command, which in turn reviews the requests and provides management oversight.
- The Military Services have each established their own in-house management and technical expertise responsible for implementing the program. This includes responsibility for carrying out different phases of the program by contracting for preliminary assessments, site inspections, remedial investigations, feasibility studies, and remedial designs and actions.

Like the EPA's Superfund program, the DoD Installation Restoration Program follows the National Contingency Plan (NCP)*. Figure 1 depicts the NCP investigation and remediation procedures for cleaning up hazardous waste sites. These cleanup procedures are followed when a site is placed on the National Priorities List (NPL). If a site is not placed on the NPL, the DoD cleanup procedures will comply with state laws concerning removal and remedial actions. The cleanup of sites not on the NPL also follows the same type of investigative and remediation procedures depicted in Figure 1.

*Reference 40 CFR 300.

FIGURE 1

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM NPL SITE CLEANUP PROCEDURE



NPL = National Priorities List
 HRS = Hazard Ranking System
 DSRPM = Defense Site Remediation Priority Model
 PA/SI = Preliminary Assessment/Site Inspection
 RI/FS = Remedial Investigation/Feasibility Studies
 RD/RA = Remedial Design/Remedial Action

All sites go through the steps of Discovery and Notification, Preliminary Assessment/Site Inspection and, when deemed necessary by the EPA, scoring by the Hazard Ranking System (HRS). If the HRS score is high enough (28.5 or above) to qualify the site for placement on the NPL, then SARA/CERCLA, NCP, and EPA guidelines are applied in carrying out the investigatory and remediation phases of the program. The NCP procedures for cleaning up hazardous waste sites are as follows:

- **Discovery and Notification**—If a release of a hazardous substance(s) is found, appropriate Federal, State and local officials are notified.
- **Preliminary Assessment/Site Inspection (PA/SI)**—A PA/SI is an installation-wide study to determine whether there are sites on the installation that may pose hazards to the public health or environment. Available information is collected on the source, nature, extent and magnitude of a hazardous substance release or threat of release at sites on the installation. These site data, plus samples collected by DoD are assembled into a package of information describing which facilities (or sites) have the potential to endanger human health and/or the environment.
- **Hazard Ranking**—Following the PA/SI, the EPA evaluates the facility and applies the Hazard Ranking System (HRS), to establish the potential effect on human health and the environment. If the HRS score exceeds 28.5, the site is eligible for inclusion on the NPL.

- **Imminent Threats**—In cases where an existing danger to the public is discovered at an installation, immediate action is taken to remove the threat. The Service then proceeds to study how best to address the risk expected to occur in the future. This will often mean, for example, removal of poorly stored, or leaking drums, but it can entail other actions, such as placement of people on alternative water supplies if their drinking water is now contaminated. The DoD takes all necessary measures to minimize the exposure of people on or around installations to contaminants while studies are done to determine how best to accomplish long term solutions.
- **Remedial Investigation/Feasibility Study (RI/FS)**—An RI/FS is a comprehensive investigation of individual sites identified in the PA/SI as potential threats. All contaminants and their migration pathways are defined, potential risks to public health and the environment are assessed, and a comprehensive, quantitative risk assessment is carried out. Remedial action alternatives are evaluated in terms of their cost and effectiveness; and in coordination with regulatory agencies and the public, the DoD identifies the remedial action plan chosen for implementation at the site in the form of a Record of Decision.
- **Federal Facility Agreement**—If a site qualifies for placement on the NPL, SARA mandates DoD and EPA enter into an agreement as to the execution and timing of remedial action(s) at that site. An agreement may be entered into during the Remedial Investigation phase of the Program to fulfill the statutory mandate and to establish a sound working relationship with the EPA and the state.
- **Remedial Design/Remedial Action (RD/RA)**—The RD/RA includes design and implementation of the chosen alternatives to address problems at the site. Contaminant treatment processes are constructed, operated, maintained and monitored to observe the effects of the remedial action to be sure the hazardous waste site is no longer a threat.

IRP Priorities

The early study phases (PA/SI, RI/FS) of the IRP are less costly than the later cleanup phase (RD/RA). Consequently, as the program progresses, there is increased competition for available funds. The DoD must set cleanup priorities to assure sites are addressed on a "worst-first" basis, nationwide.

To target resources to those sites posing the greatest risk, DoD currently uses a priority system which considers the degree of hazard a site poses, and its impact upon surrounding communities. Using this system, sites are assigned a priority corresponding to:

- **Priority A**—Sites that have been recommended for or included in the EPA's National Priorities List, and other sites which pose an imminent or substantial danger to the public or the environment.
- **Priority B**—Sites not posing as high a potential risk as Priority A; and sites not listed or proposed for listing on the NPL but undergoing investigative or remedial activity.
- **Priority C**—All sites not classified as Priority A or B and non-site specific activities that directly support the IRP.

DoD is also developing a relative risk model to assist in setting priorities for cleanups using quantitative data gathered during the investigative stages of the IRP. The new Defense Site Remediation Priority Model (DSRPM) will serve as a management tool to improve the process of setting priorities for the remedial actions.

The DSRPM model will use an algorithm that is applied by the Military Services and Defense Agencies near the end of the RI/FS (or equivalent phase of non-NPL sites) to generate a score (0 to 100, with 100 representing the greatest risk). The score is used to determine relative priorities for remedial action. It is based on three factors:

- 1) Pathway—potential for contaminant transport;
- 2) Hazard—characteristic and concentration of contaminant; and
- 3) Receptor—presence of potential receptors.

The DoD has completed development and in-service field testing of the model and issued a notice for public comment in the Federal Register on November 18, 1987.* The DoD has briefed the EPA and state organizations on the model and other outreach efforts are planned. Pending incorporation of comments, DoD plans to apply the model during the FY 1989 program.

Federal Facility Cleanup Agreements

Overlapping statutory requirements under the SARA and the Resource Conservation and Recovery Act (RCRA) have caused DoD installations to be subject to many complex and at times duplicative regulatory requirements. The DoD is working with EPA, and state regulatory agencies to establish a close working relationship during the IRP process to simplify the approach for complying with these laws and to increase efficiency. This effort is focused on signing agreements that will contain mutually acceptable cleanup plans for sites on military installations. The DoD is required to sign cleanup agreements with EPA for NPL sites and believes it will also often be appropriate to have similar agreements with regulatory agencies for non-NPL sites as well.

The first agreement has been signed for cleaning up the Twin Cities Army Ammunition Plant (TCAAP) in Minnesota. TCAAP is part of a larger non-Federal NPL site—New Brighton, Arden Hills. The Army, which is responsible for the TCAAP portion of the site, has entered into a Federal Facilities Agreement with the State of Minnesota and EPA on how to proceed with cleanup activities for the TCAAP portion. This agreement allows the Army to conduct the cleanup under CERCLA while satisfying the requirements of RCRA.

DoD has increased public participation in the IRP by systematically informing local citizens of IRP activities, and decision making in regard to IRP actions. This public involvement is vital to the successful accomplishment of a cleanup, because it leads to a firm understanding and support of the chosen remedial measures.

IRP Progress

The Department has continued to make substantial progress during FY 1987 in investigating and cleaning up hazardous and toxic waste sites on its installations. Table I-1 provides a cumulative summary—a "snapshot"—of the status of the IRP on September 30, 1987. These data are for active installations only; formerly used properties are identified and discussed separately below.

TABLE I-1
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
Installation Restoration Program Status Summary by Military Service
(as of 30 September, 1987)

DoD Component	Total Number of		PA/SL		Number of Sites (by Phase)			RD/RA†		
	Instal- lations	Sites	C	U	C	U	F	C	U	F
Army	328	1229	608	2	245	356	78	33	60	66
Navy	129	975	913	31	499	428	12	6	112	317
Air Force	259	2874	2203	45	342	1937	78	86	624	394
Defense Log. Agency	23	87	11	0	10	12	1	1	4	9
GRAND TOTAL	739	5165	3735	78	1096	2733	169	126	800	786

†Includes removals and long term monitoring.

C = Cumulative total of sites completed by end of FY87.

U = Number of sites underway at end of FY87.

F = Number of sites scheduled for future study/action.

As of September 30, 1987, 739 installations have completed PA/SI studies. This includes all major military installations in the United States. This is an increase from 529 at the end of FY 1986 as a result of a continuing effort to identify and include many smaller activities, such as National Guard sites and Reserve Centers. DoD facilities identified for inclusion on the Federal Agency Hazardous Waste Compliance Docket required by Section 120 of the SARA have completed PA/SI's. Any requirements for additional information to allow HRS scoring by the EPA are also being met.

The total number of identified sites included in the program has also grown to 5,165. Of these 5,165 sites, PA/SIs have been completed at 3,735 as of the end of FY 1987. More significant changes have occurred in the RI/FS phase with total studies completed or underway now at 3,829 sites, an increase of nearly 800 sites above last year.

The RD/RA work completed has increased from 99 to 126, and the number underway has grown from 407 to 800. These 800 include both site cleanups and associated monitoring. Further, an additional 786 new RD/RA sites have already been identified for future cleanup work. The Department expects this strong momentum in site cleanups to continue as the more than 3,600 sites with RI/FS or RD/RA work underway approach completion.

DoD Installations on the National Priorities List

In July of 1987, the EPA added 32 federal facilities to the revised National Priorities List, 29 of which are DoD installations. At the same time, EPA proposed an additional 16 federal facilities—of which 15 are DoD—for placement on the NPL at a later date.

Tables I-2a and I-2b summarize basic background information for each installation on the NPL, including the location of the installation, its HRS score, and start/complete dates for IRP actions at each installation. Table I-2a catalogues all the final listed installations with NPL sites and Table I-2b catalogues the installations with sites proposed for listing on the NPL. Note there are four installations with more than one area listed on/proposed for the NPL: Aberdeen Proving Ground, MD; Joliet AAP, IL; Letterkenny AD, PA; NAS Whidbey Island, WA. All final listed or proposed sites are priority ranked "A" using the current Defense Priority System. Detailed background and status information on each installation at which a site is located, can be found in Appendix A in Part II of this report.

TABLE I-2a
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM

**DoD INSTALLATIONS HAVING SITES
FINAL LISTED ON NPL—JULY 1987**

Facility	City/County, State	HRS	PA/SI Comp.	RI/FS Start	Removal/Interim Remedial Action	
					Start	Comp.
Alabama AAP	Childersburg, AL	36.83	090178	060179	070186	—
Cornhusker AAP	Hall Co., NE	51.13	080180	090181	061584	—
Fort Dix	Pemberton Twp., NJ	37.40	050177	110186	—	—
Fort Lewis	Tacoma, WA	42.76	110183	040188*	—	—
Joliet AAP	Joliet, IL	32.08	021879	080180	090183	030185
Lake City AAP	Independence, MO	33.68	090180	080187	—	—
Letterkenry AD	Chambersburg, PA	34.21	021880	092481	070187	—
Lone Star AAP	Texarkana, TX	31.85	073078	013182	—	—
Milan AAP	Milan, TN	53.15	110178	080179	100183	120184
Rocky Mtn. Ars.	Adams Co., CO	58.15	010178	090184	100186	—
Sacramento AD	Sacramento, CA	44.46	020180	093080	040187	—
Sharpe AD	Lathrop, CA	42.24	050180	090181	060186	053189
Umatilla ADA	Hermiston, OR	31.36	030180	090180	—	—
NAEC Lakehurst	Lakehurst, NJ	50.53	050183	020185	—	—
NAS Brunswick	Brunswick, ME	43.38	063083	090184	—	—
NAS Moffett Fld.	Sunnyvale, CA	32.90	043084	111984	—	—
NSB Bangor	Bremerton, WA	30.42	060183	110184	—	—
Castle AFB	Merced, CA	37.93	100083	080084	090087	—
Griffiss AFB	Rome, NY	34.20	070081	050085	090087	—
Hill AFB	Ogden, UT	49.90	110081	080082	—	—
Mather AFB	Sacramento, CA	28.90	060182	020184	021587	—
McChord AFB	Tacoma, WA	43.24	080182	080082	113086	—
McClellan AFB	Sacramento, CA	57.93	080082	080186	010186	—
Minneapolis-St. Paul IAP	Minneapolis, MN	35.00	030083	020587	030189	—
Norton AFB	San Bernardino, CA	39.65	100182	050183	111086	—
Robins AFB	Houston Co., GA	51.66	040082	040082	—	—
Tinker AFB	Oklahoma City, OK	42.24	040082	051584	093086	081587
DDOU Ogden	Ogden, UT	45.10	030180	030182	—	—
DGSC Richmond	Richmond, VA	33.85	010181	090182	—	—

*Delayed start due to contract award problems.

—Information not available.

NOTE: Twin Cities Army Ammunition Plant not included as it is listed as part of a larger non-Federal NPL site—
New Brighton, Arden Hills.

TABLE I-2b
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM

**DoD INSTALLATIONS HAVING SITES PROPOSED
FOR LISTING ON NPL—JULY 1987**

Facility	City/County, State	HRS	PA/SI Comp.	RI/FS Start	Removal/Interim Remedial Action	
					Start	Comp.
Aberdeen Prv. Gr. Edgewood	Edgewood, MD	53.57	010177	080185	080088	050090
Aberdeen Prv. Gr. Michaeville	Aberdeen, MD	31.45	040183	090181	—	—
Anniston AD	Anniston, AL	51.91	070178	090181	070182	080189
Joliet AAP	Joliet, IL	32.08	020179	030188	090183	—
Letterkenny AD	Chambersburg, PA	34.21	021880	092481	070187	093089
Louisiana AAP	Doyline, LA	30.26	010179	070181	100186	100192
Savanna ADA	Savanna, GA	42.20	050179	090180	—	070189
Tooele AD	Tooele, UT	38.32	060180	090182	—	—
NADC Warminister	Warminister, PA	57.93	123081	040188	—	063090
NAS Whidbey Is. (Ault Field)	Whidbey Is., WA	48.48	093084	113085	—	—
(Seaplane Basin)	Whidbey Is., WA	39.64	093084	113085	—	—
NUWES Keyport	Keyport, WA	33.60	093084	113085	—	083089
NWS Earle Colts Neck	Colts Neck, NJ	37.21	033083	010185	—	073089
AFP #4 Ft. Worth	Ft. Worth, TX	39.92	080084	030085	—	—
Dover AFB	Dover, DE	35.89	100083	050184	073088	063090

—Information not available.

FORMERLY USED PROPERTIES

The U.S. Army Corps of Engineers is the DoD Executive Agent for the implementation of Environmental Restoration Program operations at formerly used properties. As Executive Agent, the COE is responsible for all projects involving hazardous substance contamination cleanup activities, building demolition and debris removal, and unexploded ordnance removals on lands formerly owned or used by any of the DoD components.

The investigation and cleanup procedures at formerly used properties are similar to those at currently owned installations, except more coordination is required since DoD is not the land owner. Determinations must be made as to the origin of the contamination, land transfer, and current ownership before a site is considered eligible for restoration by the DoD.

As shown in Table I-3, there are 7,177 formerly used properties with potential for inclusion in the IRP that have been identified through an inventory phase. Screening surveys at 2,254 of those properties have been initiated, 1,579 are underway, and 645 have been completed. Of these, 168 properties were determined to be eligible for DoD building demolition and debris removal or cleanup of hazardous or toxic contaminants. Investigative or cleanup work has either been completed or is ongoing at these locations.

This work includes 134 building demolition/debris removals for unsafe buildings or structures on formerly owned or used properties, and 34 projects to clean up hazardous or toxic contamination such as formerly used underground storage tanks for fuels or solvents, or contamination from leaking PCB transformers. Included in the 34 are two projects for detection and removal of unexploded ordnance from former target ranges or impact areas.

TABLE I-3
DEFENSE ENVIRONMENTAL RESTORATION PROGRAM

Summary of DoD Environmental Restoration Program at Formerly Used Properties (as of September 30, 1987)

Properties Identified (cumulative total)	7,177
Inventory Investigations (cumulative total)	2,254
Ongoing	1,579
Completed	645
Results of Inventory Investigations	
Total completed	645
Total eligible for or recommended for further action	168
Total ineligible for or not recommended for further action	477
Projects Completed or Ongoing (total)	168
BD/DR	134
IRP: Haz/Tox and UXO* Removals	34

*Unexploded Ordnance Removals at two locations—Tierrasanta, CA; Burma Rd., Kodiak, AK

OTHER HAZARDOUS WASTE (OHW) PROGRAM

The OHW Program provides seed money for hazardous waste reduction and other hazardous waste minimization initiatives; for Research, Development and Demonstration of hazardous waste technology, including UXO detection and range clearance; and for other one-time environmental restoration expenses. In Fiscal Year 1987 approximately \$24.7 million of the Environmental Restoration Account was provided to the military services for OHW activities. For FY 1988 the OHW allocation is \$26.1 million from the account.

In the area of hazardous waste reduction, the operating principle is that prevention is better than cure. Minimization projects funded through the OHW subelement are a catalyst for additional effort by the services. Unique or new efforts referred to as "seed" projects are either basic to establishing a viable program, have immediate benefit or help decide long term strategy.

For example, the Army is developing two critical data bases: one for tracking waste disposal and the other to account for hazardous material issue and use—to prevent excess requiring disposal. These management information systems are able to show where action is needed and are a major tool that allow the newly created Army Hazardous Waste Minimization Board to focus hazardous waste reduction efforts where they will do the most good.

The Navy has produced a technical memorandum giving waste reduction options for every major Navy industrial operation which has shown that changes in chrome plating, and paint stripping are a good investment. For example, a \$180K project to strip torpedo bodies using plastic media blasting (PMB) has eliminated 3,500 gallons of hazardous waste per week and saved \$227K in disposal costs in the first year.

The Air Force has undertaken a comprehensive investigation of the feasibility of incineration as a treatment alternative to reduce volume and to reduce the need to depend on off-site disposal which is out of immediate control of DoD and carries the potential for later problems. On the other end of the spectrum, investment in distillation equipment for used solvent recovery at one Air Force installation has already resulted in annual savings averaging \$500K per year.

At the Defense Logistics Agency, OHW funding contributes to the comprehensive effort to review what hazardous materials are procured, why, and then go back through the DoD specifications and standards community to see if alternatives to these specifications are possible.

Subsidiary effects of the OHW program are especially encouraging. Cross fertilization of ideas through formal information exchanges such as one spearheaded by the Joint Depot Maintenance Analysis Group means that past "seed" projects are made known to more people which increases the potential for even more future waste reductions through the OHW program and independent Military Service programs.

Examples of minimization accomplishments that are occurring throughout DoD are:

- Ft. Benning, GA: All chlorinated solvent use has been replaced with nonchlorinated solvent which can be recycled as boiler fuel supplement.
- McClellan AFB, CA: Use of electrostatic paint spraying system reduces solvent cleanup by a factor of four. PMB facility just completed (no results but see Hill AFB next page).

- Mare Island NSY, CA: 6,500 gallons per day (gpd) chrome wastewater eliminated by plating process change. 3,100 gallons per year (gpy) of Freon redistilled and reused.
- Long Beach NSY, CA: Abrasive blast residue is used as feedstock (raw material) for civilian cement manufacturer saving 8,000 tons per year and \$1M in disposal.
- Hill AFB, UT: Has used PMB on F-4s for several years. Has just begun use on F-16s. Saves 2-300 gallons methylene chloride and 15-20,000 gallons wastewater per aircraft for a cost savings of \$2.6M per year.
- The Defense Reutilization and Marketing Service hazardous material Reutilization, Transfer, Donation and Sales Program in 1986 cost avoidance was \$42M. Hazardous material sales proceeds of \$1.5M were returned to the treasury.

These examples are only a broad overview of the extent of the OHW contribution and DoD's overall hazardous waste reduction efforts which will be further elaborated in a separate Report to the Congress due in March as requested by the FY 1988 Appropriations Act Committee Report.

RESEARCH DEVELOPMENT AND DEMONSTRATION

The DoD had identified a need for increased emphasis in DoD research on innovative hazardous waste cleanup technologies. The DoD committed \$25.6 million to hazardous waste clean-up and waste minimization research and development projects in Fiscal Year 1987. DERA provided \$13.8 million (54%) of the money for these projects. The individual service research and development programs provided the remaining \$11.8 million. In fiscal year 1988, the Services have programmed \$27.6 million for Environmental Restoration Research Programs. DERA will provide approximately \$16 million (58%) for these efforts.

The various research and development programs can be divided into several categories. These include the following:

- In-situ treatment
- On-site clean-up
- Containment
- Site assessment
- Alternative technologies to land disposal
- Waste minimization
- Underground storage tanks

Projects in these categories include low temperature thermal soil treatment, soil venting, air stripping, and biodegradation. One program which is underway as the result of this initiative is a tri-service project to investigate the elimination of off-island disposal of hazardous waste generated by military installations in Hawaii. The Navy is acting as the lead agency and is overseeing the initial study. The project has real potential for developing waste minimization techniques, and identifying alternative technologies and procedures for the cleanup of hazardous wastes.

A DoD/EPA/DOE working group was established in 1985 as an important element of the DoD Environmental Restoration Research Program. The group seeks to increase not only inter-service cooperation but interagency cooperation. The group was established to address the issues of the high cost of hazardous waste cleanups; the need for innovative technology development to achieve the necessary clean-up goals in a more cost-effective manner; and to provide a coordinated approach to these efforts among the agencies. The results of this group's efforts are compiled in a report called the Blue Book. In order for a project to be included in the compilation, at least two federal agencies must agree to work jointly on the study. Last year DoD provided a copy of the updated DoD/EPA/DOE Blue Book in its annual report to Congress. Projects shown in the Blue Book for fiscal years 1987 and 1988 are currently in progress. Representatives from DoD, EPA, and DOE are currently working to improve the process and encourage even greater cooperation, participation, and information exchange among the federal agencies. A revised Blue Book will be developed as a result of these efforts.

PROGRAM FUNDING

In FY 1984 the Congress consolidated and expanded DoD programs for cleanup of hazardous waste into a separate appropriation entitled the Defense Environmental Restoration Account (DERA) under the Defense Appropriations Act. This allowed the DoD to accelerate work and also to add research and other components to the Environmental Restoration Program.

Funds appropriated by the Congress to the Defense Environmental Restoration Account are summarized in Table I-4. More than 76% of these funds has been allocated to the IRP in total. However, in FY 1987 nearly 90% was expended in the IRP and in FY 1988 over 93% is earmarked for IRP activities because of the growth in these high priority requirements.

**TABLE I-4
DERA FUNDING (\$ MILLIONS)**

	IRP	OHW	BD/DR	HWD	TOTAL
FY 1984	85.9	5.1	36.1	22.9	150
FY 1985	180.8	39.4	54.5	39.3	314
FY 1986	245.7	27.3	27.0	60.6	360.6
FY 1987	336.2	24.7	16.3	— ¹	377.2 ²
FY 1988	377.9	26.1	—	— ¹	404.0 ¹
TOTAL	1,226.5	122.6	133.9	122.8	1,605.8

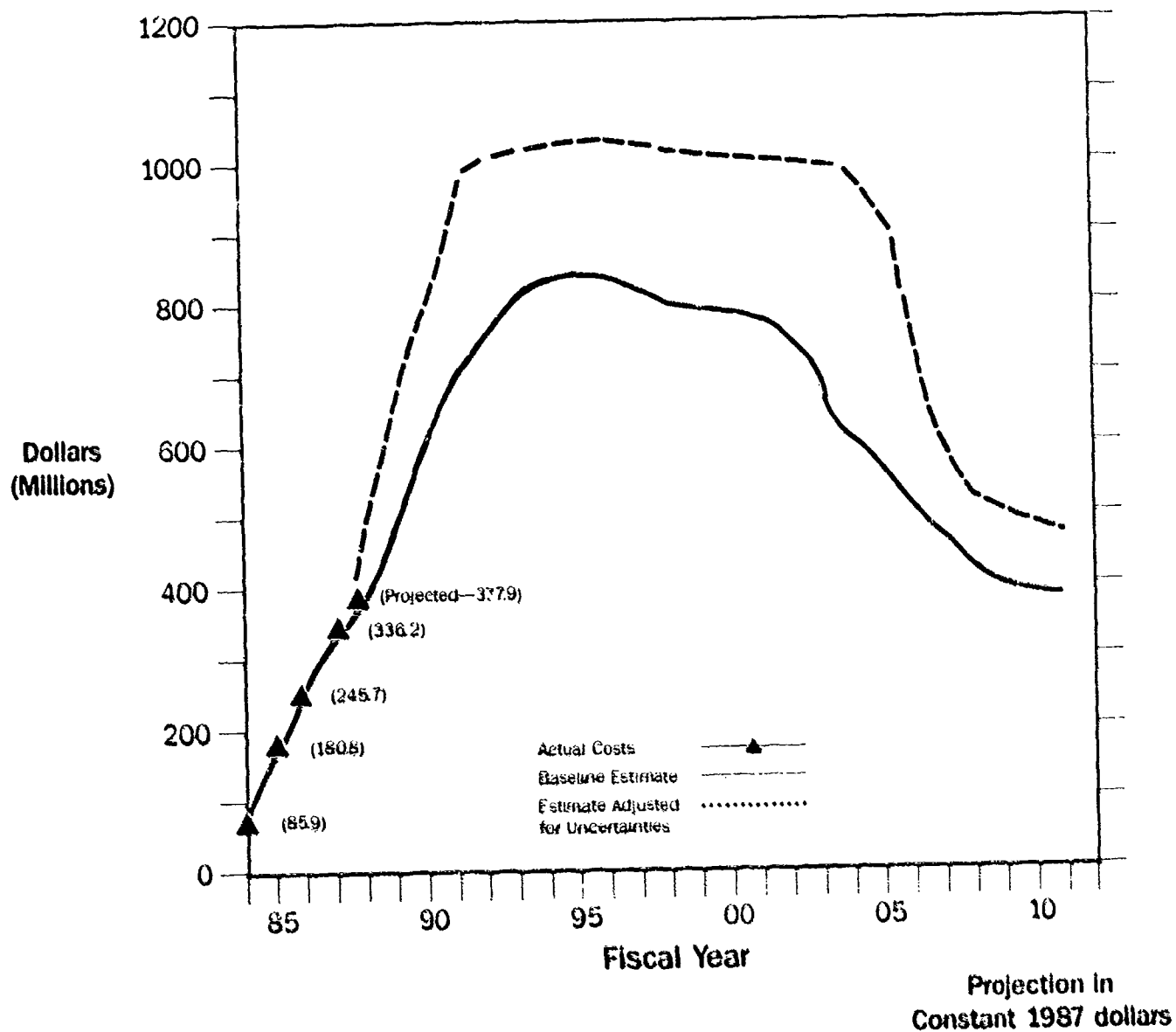
¹ Costs for hazardous waste disposal included in military services O&M budgets.

² Includes \$1.3M carryover from FY 1986.

³ Includes \$1.1M carryover from FY 1987.

Projections for future IRP funding needs are shown in Figure 2. The bulk of this funding is for the more costly RD/RA cleanup phase of the program. The Department has estimated the total cost of DoD installation restoration work at between \$11 and \$14 billion (FY 1987 dollars). The uncertainty of the total funding requirement is because there are still many remedial investigations to complete, cleanup levels are uncertain, and agreements have not been reached with EPA and state agencies.

Figure 2
INSTALLATION RESTORATION PROGRAM
HAZARDOUS WASTE SITE CLEANUP EXPENDITURES



PART II

This part of the Annual Report responds to the specific information requested in Section 120(C)(5) of the SARA, which applies to all federal facilities, and Section 211 of SARA Chapter 160 (codified at Section 2706), which pertains to the Defense Environmental Restoration Program.

FEDERAL FACILITIES REPORTING REQUIREMENTS

Section 120(e)(5) of the SARA legislation specifies that each Federal department or agency shall annually report on the following items:

- “(A) A report on the progress in reaching interagency agreements under this section.
- “(B) The specific cost estimates and budgetary proposals involved in each interagency agreement.
- “(C) A brief summary of the public comments regarding each proposed interagency agreement.
- “(D) A description of the instances in which no agreement was reached.
- “(E) A report on progress in conducting investigations and studies under Paragraph (1)... (Paragraph (1) discusses the timing of RI/FS work at NPL sites)...
- “(F) A report on progress in conducting remedial actions.
- “(G) A report on progress in conducting remedial action at facilities which are not listed on the National Priorities List.

“With respect to instances in which no agreement was reached within the required time period, the department, agency, or instrumentality filing the report under this paragraph shall include in such report an explanation of the reasons why no agreement was reached. The annual report required by this paragraph shall also 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 hazard presented by each facility, plans and schedules for initiating and completing response action, enforcement status (where appropriate), and an explanation of any postponements or failure to complete response action. Such reports shall also be submitted to the affected States.”

Appendix A comprises a detailed description of each installation which has a site final listed or proposed for listing on the NPL. Each description includes a summary of background information on the installation, and the types of environmental hazards present; the status of IRP response actions at that installation, and schedules for initiating and completing those response actions; and the status of installation cleanup agreements under negotiation. The information in Appendix A answers requirements of the preceding paragraph. Table A-1 in Appendix A is a state-by-state inventory of installations having NPL sites. Tables I-2a and I-2b in Part I of this report also catalog DoD facilities that are final listed and proposed for listing on the NPL.

A. Progress in reaching Interagency Agreements

As of September 30, 1987, negotiations on Federal Facility Cleanup Agreements (Interagency Agreements) for eight DoD NPL facilities were under way. These were for sites at: Lake City AAP, MO; Letterkenny AD, PA; Sharpe AD, CA; NAS Moffett Field, CA; NSB Bangor, WA; McChord AFB, WA; Norton AFB, CA; and McClellan AFB, CA. The Army, the EPA and the State of Minnesota had recently signed a Federal Facilities Agreement specifying the cleanup procedure the Army will implement for the Twin Cities Army Ammunition Plant (TCAAP). TCAAP is part of a larger, non-Federal NPL site: New Brighton, Arden Hills. Agreement negotiations should expand to all the DoD NPL listed facilities in 1988 as the Department has made this a high priority item for the IR Program.

B. Interagency Agreement cost estimates and budgetary proposals

Defense Environmental Restoration Program funding is discussed in Part I of this report. The estimate for total program funding is based on existing budget documentation including program cost data from the individual Service component Installation Restoration Programs, and from existing Superfund cost data. This new estimate includes anticipated budgetary requirements for implementing the cleanup actions agreed to in Federal Facility Cleanup Agreements.

Funding estimates for the cleanup at Twin Cities AAP are shown in Table II-1. In this table, dollars already spent, and estimates of future expenditures for each element of the IRP are tabulated. The total cost to cleanup TCAAP is estimated at \$29.5 million. As shown in Table II-1, the cleanup effort funding should peak in 1990.

TABLE II-1
TWIN CITIES ARMY AMMUNITION PLANT
COST ESTIMATE ($\times 10^3$ DOLLARS)

	Fiscal Year						Total Costs
	78-85	86	87	88	89*	90*	
Preliminary Assessment	98.0	209.0	136.0	—	—	—	443.0
Remedial Investigation	2478.0	404.0	1404.7	450.0	—	—	4736.7
Feasibility Study	637.0	289.0	—	305.0	—	—	1231.0
Remedial Action Design	85.0	212.0	162.0	210.0	500.0	500.0	1669.0
Remedial Action	415.0	3696.0	1490.9	2500.9	4000.0	8000.0	20101.9
Monitoring	275.0	111.0	190.4	250.0	250.0	250.0	1308.4
GRAND TOTAL	3970.0	4921.0	3384.0	3715.0	4750.0*	8750.0*	29490.0

*Planned.

C. Public comments regarding proposed Interagency Agreements

As Federal Facility Cleanup Agreements are finalized, public comments regarding each agreement will be reported to the Congress. The principal comments received from the public regarding the agreement for Twin Cities AAP were from the City of St. Anthony, Minnesota; Mr. Bruce Liesch; and Honeywell Corporation. Some comments questioned the timing of project milestones and report reviews. Other comments were related to the definition of the contaminated zone limits and the decision making process for site remediation or related criteria. Technical comments centered on ground and storm water monitoring, monitoring well design and contaminant analyses. These comments, and EPA's response to them are provided in Table A-2 of Appendix A. The DoD believes, after the receipt of public comments, that it is responsibly handling its obligations to cleanup the site. The EPA's responses to these public comments affirm the careful consideration that the DoD, EPA and State have given to the conditions at TCAAP. The DoD will continually factor into its plans the public concerns and comments as they arise.

D. Instances where no agreement reached

There are no instances, as yet, where DoD has failed to reach an agreement under negotiation.

E. RI/FS Progress

The SARA Section 120(c), para. 1, specifies that RI/FS work must be initiated at sites listed on the NPL, within six months of their listing. Remedial Investigation/Feasibility Study work has been started at 28 of the 29 DoD installations final listed on the NPL. There has been a delay in beginning the RI/FS at Fort Lewis because of contract award problems; the anticipated award date is April, 1988. Also, RI/FS work has been initiated at 14 of the 15 DoD installations proposed for listing on the NPL.

F. Remedial Action Progress

Response actions—removal and/or interim remedial actions—have been undertaken at 11 of the 29 DoD installations with sites final listed on the NPL. This work comprises actions such as removals of hazardous wastes or provision of new water supplies. Complete RD/RA activities based on RI/FS recommendations, and under the terms of a Federal Facility Cleanup Agreement, have not yet been initiated at any DoD NPL installation, because none of the RI/FS's are complete. Table I-2a (in Part I of this report) indicates, where available, estimated RI/FS completion dates. SARA (Section 120(e), paragraph 2) requires that within 15 months of completion of an RI/FS at an NPL facility, RD/RA work must be initiated. The DoD anticipates these schedules will be met.

The DoD includes removal actions and interim remedial actions, as well as post RI/FS remedial activities under the term RD/RA. For example, at Tinker Air Force Base, in Oklahoma, two landfills were found to be releasing organic chemicals (primarily Trichloroethene and Chloromethane) to the environment. Although the RI/FS concluded that this contamination was not found to be migrating off base, it was recommended that these landfills be capped. During the past year, a clay cap was installed at each landfill. Monitoring wells were also installed at one landfill to insure no further release of chemicals occurred. Additional sampling at the installation discovered fuel floating on top of the groundwater at the fuel farm site. This fuel was determined to have come from old underground storage tanks and piping at the fuel farm. Approximately 40,000 gallons of contaminated water and 1,000 gallons of fuel have already been pumped from the aquifer. French drains are also being installed to divert the groundwater around the fuel farm. Tinker AFB will institute a long-term monitoring program for the site to insure the cleanup measures have been adequate.

Additional information on RD/RA initiatives at DoD NPL installations are found in the narratives provided in Appendix A.

G. Remedial actions at non-NPL facilities

Remedial actions have been undertaken at 926 DoD sites (including sites at the DoD NPL installations). These include removal actions, interim remedial actions and long term monitoring. Of these, 126 had been completed by the end of FY 1987. Long term monitoring is ongoing at 234 DoD sites.

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM REPORTING REQUIREMENTS

Section 211 of SARA Chapter 160 (codified at Section 2706) specifies that the Annual Report to Congress...shall include the following:

- "(1) A statement for each installation under the jurisdiction of the Secretary of the number of individual facilities at which a hazardous substance has been identified.
- "(2) The status of response actions contemplated or undertaken at each such facility.
- "(3) The specific cost estimates and budgetary proposals involving response actions contemplated or undertaken at each such facility.
- "(4) A report on progress on conducting response actions at facilities other than facilities on the National Priorities List.

Appendix B summarizes the information requested in items 1, 2, and 4 above. This Appendix denotes the number of sites undergoing each phase of the IRP at any one installation. The response to item "3" above is found in Part I of this report, Program Funding.

Table B-1 provides an overall summary of status of IRP work at installations, state-by-state, and is a summary of Table B-2, a detailed listing of IRP status for each installation in the program. For each IRP phase listed in Tables B-1 and B-2, there are three status categories: "C," "U," or "F." Category "C" represents the total number of sites for which that particular study or action has been completed. The "U" category denotes the number of sites having that particular study or action underway; and the "F" category shows the number of sites scheduled to have that study/action performed in the future. There is no "F" category for the PA/SI phase because virtually all PA/SI work has been started, and most studies are complete.

1. Facilities having identified hazardous waste

The universe of sites at DoD installations in the IR Program is summarized in Table I-1, Part I and further detailed in Appendix B. Referring to these tables, a PA/SI is a preliminary investigation of an installation to determine whether it potentially has a contamination problem, and at which locations. The RI/FS involves quantitative sampling and analysis to identify those sites that are contaminated, the types of contaminants present and their levels, and whether or not the contamination is causing or contributing to any ground or surface water pollution. RD/RA cleanup work is performed at those facilities where an RI/FS has identified a contamination problem.

The data in Table B-2 are the confirmed number of sites as of the end of FY 1987 (September 30, 1987). Because RI/FS's at many sites are still underway, the absolute number of sites having hazardous substances cannot yet be reported.

2. Status of current or contemplated/undertaken response actions

The number of response actions undertaken at any one installation is indicated by the sum of the numbers in the "C" and "U" categories of each response action type listed in the tables in Appendix B. Similarly, the "F" category under each type of response action indicates the number of contemplated (future) response actions for each installation. Table B-3 summarizes for each DoD service component the response action status as of September 30, 1987. This table also includes a category indicating the number of new starts ("S") during FY 1987.

The number of PA/Sl's completed by the end of FY 1987 has increased by 6%. This is the result of most of the PA/Sl work for all DoD installations nearing completion. The number of sites undergoing RI/FS work has shown an increase from 3,188 sites in FY 1986 to 3,829 this year. The number of completed cleanup projects (removals or remedial actions) has increased from 99 to 126; and there were 800 RD/RA projects underway at the end of FY 1987.

3. Response action cost estimates and budgetary proposals

In FY 1987, the Congress appropriated \$377.2 million for the Defense Environmental Restoration Program of which \$336.2 million were spent on the IRP. These funds were used primarily to expand and accelerate studies and remedial actions at more than 2,600 individual sites on 417 DoD installations. Part I of this report, Program Funding, provides additional information.

4. Response action progress at non-NPL facilities

The DoD has continued to make progress during FY 1987 in investigating all sites or facilities on DoD installations potentially contaminated with hazardous materials, and cleaning up those that pose a threat to human health and the environment, regardless of whether they are on the NPL. A total of 5,165 sites on 739 military installations are now included in the IR Program. In FY 1987, 1,085 sites at 232 installations were added to the IR Program. These additions represent, primarily, National Guard and Reserve installations.

Appendix A provides data regarding IRP response actions at DoD facilities on the NPL; the listing provided in Appendix B includes both NPL and non-NPL facilities.

The Navy and the Air Force have completed the design for several response action projects at non-NPL installations.

- At Naval Weapons Supply Center, Crane IN.: the design of a waste ash processing facility at the ammunition burning grounds has been completed. Construction of the facility for this equipment is underway. This equipment will prepare the waste ash pile for ultimate disposal at an EPA-approved off-site hazardous waste landfill.
- At Public Works Center, Guam, GQ: the design of two systems for decontaminating PCB contaminated soil was completed. Installation of this decontamination system has already begun, and will be complete in June of 1988.
- At Naval Air Station, Lemoore, CA.: the removal and proper disposal of sludge and approximately 2,000 cubic yards of contaminated soil was started. The project will be completed in June of 1988.

- At Naval Air Station, Whiting Field, Milton, FL.: installation of a carbon filtration treatment system to treat groundwater contamination has been started. This project will be completed in June of 1988.
- At Shemya Air Force Base, AK.: drums, contaminated soil and other hazardous materials were removed from a number of landfill sites; and the drums were disposed of. Also, 21 underground storage tanks were removed, and the contaminated soil surrounding them was disposed of.
- At Edwards Air Force Base, CA.: soil contaminated with oil and grease organic deposits was removed from the fire training facility. The RD/RA plan was approved in December, 1985. The removal involves grading the area, installing an impermeable clay cap, and periodic monitoring.
- At Hanscom Air Force Base, MA.: field investigations indicated the presence of organic compounds in the groundwater, surface water, and the soil at the fire training site. Plans for remedial action include construction of a groundwater collection trench, excavation of, and offsite disposal of contaminated soils (into a secure landfill), installation of an aquifer groundwater recovery system, and treatment of recovered groundwater.
- Also, at Hanscom AFB, buried drums and cans of waste solvents, paints and other wastes disposed of in the paint waste disposal area, and barrels of waste buried in trenches, will be excavated. The groundwater is contaminated with organic compounds from these drums and barrels and will be collected and treated using an infiltration bed system. In addition, a landfill used from 1964 to 1974, for solid waste disposal, is to be closed. Remediation plans include regrading of the site, additional drainage ditch stabilization, removal of exposed refuse from the landfill toe, infiltration controls (such as a clay cap) and gas venting from the closed landfill.

APPENDIX A

DoD INSTALLATIONS ON THE NPL OR PROPOSED FOR LISTING ON THE NPL

Includes:

- Table A-1: Installations Having Sites Final Listed and Proposed for Listing on the NPL
- Installation Descriptions
- Table A-2: Public Comments and EPA Response—
TCAAP Federal Facilities Agreement

**TABLE A-1
DEFENSE ENVIRONMENTAL RESTORATION PROGRAM**

**Installations Having Sites Final Listed and Proposed
for Listing On the NPL (As of July, 1987)**

State	Installation/Site	Location	Final Listed/ Proposed
AL	Alabama Army Ammunition Plant	Childersburg	F
AL	Anniston Army Depot	Anniston	P
CA	Castle Air Force Base	Merced	F
CA	Mather Air Force Base	Sacramento	F
CA	McClellan Air Force Base	Sacramento	F
CA	Naval Air Station, Moffett Field	Sunnyvale	F
CA	Norton Air Force Base	San Bernardino	F
CA	Sacramento Army Depot	Sacramento	F
CA	Sharpe Army Depot	Lathrop	F
CO	Rocky Mountain Arsenal	Adams County	F
DE	Dover Air Force Base	Dover	P
GA	Robins Air Force Base	Houston County	F
IL	Joliet Army Ammunition Plant/ LAP Area	Joliet	P
	Manufacturing Area		F
IL	Savanna Army Depot	Savanna	P
LA	Louisiana Army Ammunition Plant	Doyline	P
MD	Aberdeen Proving Ground—Michaelsville (Landfill)	Aberdeen	P
MD	Aberdeen Proving Ground—Edgewood Area	Edgewood	P
ME	Naval Air Station Brunswick	Brunswick	F
MN	Twin Cities Air Force Reserve Base	Minneapolis	F
MO	Lake City Army Ammunition Plant	Independence	F
NE	Cornhusker Army Ammunition Plant	Hall County	F
NJ	Fort Dix		F
NJ	Naval Air Eng. Center, Lakehurst	Lakehurst	F
NJ	Naval Weapons Station, Earle	Colts Neck	P
NY	Griffiss Air Force Base	Rome	F
OK	Tinker Air Force Base	Oklahoma City	F
OR	Umatilla Army Depot	Hermiston	F
PA	Letterkenny Army Depot/PDO Area	Chambersburg	P
	SE Industrial Area		F
PA	Naval Air Dev. Center, Warminster	Warminster Township	P
TN	Milan Army Ammunition Plant	Milan	F
TX	Air Force Plant No. 4	Fort Worth	P
TX	Lone Star Army Ammunition Plant	Texarkana	F

TABLE A-1 (Continued)
DEFENSE ENVIRONMENTAL RESTORATION PROGRAM

**Installations Having Sites Final Listed and Proposed
for Listing On the NPL (As of July, 1987)**

State	Installation/Site	Location	Final Listed/ Proposed
UT	Hill Air Force Base	Ogden	F
UT	Ogden Defense Depot (DDOU)	Ogden	F
UT	Tooele Army Depot	Tooele County	P
VA	Defense General Sup. Ctr. (DGSC)	Richmond	F
WA	Fort Lewis/Landfill No. 5	Tacoma	F
WA	McChord AFB	Tacoma	F
WA	Naval Air Station, Whidbey Island	Whidbey Island	
	Ault Field		P
	Seaplane Base		P
WA	Naval Sub. Base, Bangor/Site A	Bremerton	F
WA	Naval Undersea Warfare Engineering Station, Keyport	Keyport	P

ALABAMA ARMY AMMUNITION PLANT— INSTALLATION DESCRIPTION

Background Information

Alabama Army Ammunition Plant occupies 5,067 acres, 4 miles north of Childersburg, Alabama; 30 miles east of Birmingham. The mission of this installation during WWII was the production of high explosives, nitrocellulose, and single based propellants. After the war, it remained on standby status until the early 1970's, when it was excessed.

Environmental Issues

Mission support operations generated varying quantities of hazardous wastes including acids, nitrocellulose, nitroaromatic compounds, tetryl, anilines, paint and paint thinners, heavy metals, rubble, insecticides, polynuclear aromatic compounds, coal-pile runoff and asbestos. Standard practices for disposal of hazardous wastes in the past included recycling of spent acids; on-site burial in landfills; discharge of manufacturing wastewater into drainage ditches, abandoned well shafts, local creeks, unlined ponds, and lagoons; deposition of pond and lagoon sludge in spoil banks; on-site burning and demolition of waste explosives, propellants, and other reactive wastes.

STATUS UPDATE

PA/SI

The Army completed an Installation Assessment and an Exploratory Survey in June, 1983. These studies identified 10 sites as potential contaminant migration sources, 7 of which were targeted for RI/FS. The studies predicted there could be a high rate of vertical contaminant migration within the aquifer, potentially threatening groundwater quality. Additionally, a potential surface water contamination problem was identified. A Confirmation Study delineated parameters and migration patterns of one of the groundwater aquifers. This study also identified nitroaromatic compounds (NACs) in on-site soils and in an aquifer beneath and down gradient of the manufacturing areas; and identified contaminant migration off-site in groundwater and surface water, but not in concentrations above standard criteria. Sites on this installation were final listed on the NPL in July, 1987; HRS: 36.83.

RI/FS

The Army initiated RI/FS work at Alabama AAP in 1979. All work is scheduled for completion in 1987. Investigations to date have found that the groundwater is contaminated with nitroaromatic compounds in concentrations above applicable standards. It has also been determined that on-site surface water is similarly contaminated with nitroaromatic compounds as well as lead. The cause of surface water contamination has been determined to be from the runoff of on-site contaminants and from groundwater influx. Surface water concentrations are below applicable standards. In addition, it has been determined that off-site surface water is threatened by groundwater migration, but contamination is not predicted to be at levels exceeding standard criteria.

RD/RA

Decontamination of soils has been completed in some areas. Decontamination of soils in other areas and demolition/decontamination of excessed buildings is underway. The Army's goal is to clean up the facility well enough to certify its release for general use.

ANNISTON ARMY DEPOT—INSTALLATION DESCRIPTION

Background Information

Anniston Army Depot occupies 18,000 acres approximately 10 miles west of the city of Anniston, Alabama. Its mission, when it first began in 1941, was to serve as an ammunition storage area. Over the years this mission has been expanded to include the overhauling and repairing of combat vehicles and artillery equipment. It is currently the largest tank rebuild facility in the free world. Efforts in support of these missions include the repair, maintenance, modification and rebuilding of combat vehicles and artillery equipment.

Environmental Issues

Industrial and other mission-support operations generated varying quantities of hazardous wastes including oils and greases, cyanide, metal plating sludge (heavy metals), paints and paint residues, acids, solvents, degreasers, phenols, boiler blowdown (fly ash), TNT and other ammunition waste, and unexploded ordnance. Standard procedures for disposal of these wastes included dumping in leaching beds and in unlined liquid waste disposal pits and lagoons, burial in landfills and trenches, storage and/or demolition and burning during fire protection training.

STATUS UPDATE

PA/SI

The Army (USATHAMA) completed all PA/SI work at Anniston in July, 1978. This study identified a number of industrial operations areas and 15 past disposal or spill sites potentially contaminated with hazardous wastes. In addition, the PA/SI found that hazardous wastes from some sites had contaminated the surface water and were probably contaminating the groundwater as well. Sites at this installation were proposed for placement on the National Priorities List in July, 1987; HRS: 36.83.

RI/FS

All RI/FS work at Anniston was completed in 1983. This investigation confirmed that the local groundwater was contaminated, principally with metals, phenols, VOC's and chlorinated solvents (TCE, PCB's, etc.). It also determined the shape and migration pattern of the contaminant plume, and the location and configuration of the contaminant source areas. In addition, the bedrock depth and configuration, and the potential for contaminant migration to bed rock was assessed.

RD/RA

RD/RA work, begun in 1982, included the excavation, and removal to an RCRA permitted facility, of contaminated materials in disposal trenches and lagoons, and the installation of an air stripper and three other systems for eliminating volatiles and phenolics. Three groundwater treatment systems are scheduled to be constructed beginning in 1987.

CASTLE AIR FORCE BASE—INSTALLATION DESCRIPTION

Background Information

Castle Air Force Base occupies 2,777 acres adjacent to the city of Atwater, California; five miles to the west of the city of Merced; in the upper northwest half of Merced County—the geographic center of the state. The installation began as an Army air base in late 1941, and served primarily as an aircrew training facility until the Strategic Air Command (SAC) assumed responsibility for it in 1946. Since 1957, it has also housed the KC-135 stratotanker and the training programs for tanker crews. Operations in support of these missions include, primarily, the maintenance and repair of aircraft, vehicles and other equipment and machinery.

Environmental Issues

Mission-support operations have generated varying quantities of potentially hazardous wastes, including spent solvents (e.g., trichloroethylene and trichloroethane) cyanide, cadmium, fuels, waste oils, and pesticides. Standard practices for disposal of hazardous wastes, in the past, included deposition in on-site chemical disposal pits and landfills, discharge of wastewater on the ground on-base, and burning during fire protection training exercises.

A water quality analysis of drinking water in wells drawing from a shallow groundwater aquifer beneath and adjacent to the base indicated the presence of trichloroethylene (TCE) in levels exceeding state and federal drinking water standards.

STATUS UPDATE

PA/SI

The Air Force completed all PA/SI work at Castle AFB in October, 1983. This study identified 26 past disposal or spill sites potentially containing hazardous contaminants which might migrate from them. Based on their HARM scores, five of these sites were chosen as having a high potential for environmental contamination and were targeted for RI/FS characterization. Sites at this installation were placed on the National Priorities List in July, 1987; HRS: 37.93.

RI/FS

The first stage of an RI/FS has been completed, and stage 2 is underway. The results of stage 2 indicate the shallow groundwater aquifer beneath and adjacent to the base is contaminated with nitrate (concentrations up to 74 mg/l), trichloroethylene (TCE) (concentrations over .250 mg/l), and trace amounts of pesticides. Stages 2 and 3 will characterize the contamination on the base in more detail, and will determine which sites on the installation require further RD/RA action.

RD/RA

Removal action has been taken to replace the TCE-contaminated on-base drinking water supply with a new, potable water well drawing from deeper, uncontaminated aquifers.

MATHER AIR FORCE BASE—INSTALLATION DESCRIPTION

Background Information

Mather Air Force Base occupies 5,934 acres, 12 miles east of Sacramento, California. Its mission is to train pilots and navigators. Since 1958 it has also provided support for Strategic Air Command. Industrial operations in support of this mission include maintenance and repair of aircraft, vehicles, and other equipment.

Environmental Issues

Mission-support operations have generated hazardous wastes such as solvents, cleaners, plating, residues, fuels, and waste oils. In the past, industrial wastes were disposed of through deposition in landfills and disposal sites; contracted salvage and disposal; and burning during fire protection training exercises. Currently all wastes are disposed of through the base Defense Redistribution and Marketing Office or by contractor salvage/disposal. Water quality analyses of drinking water in wells on and near-by the base have indicated the presence of trichloroethylene (TCE) in the groundwater system beneath and adjacent to the base.

STATUS UPDATE

PA/SI

The Air Force completed PA/SI work in January, 1982. Twenty-three past disposal or spill sites were identified, 20 of which were suspected of having a potential to be contaminant migration sources and were targeted for an RI/FS. Because of the significant levels of TCE contamination, the Air Command and Warning (AC&W) area was placed on the National Priorities List in July, 1987; HRS: 28.9.

RI/FS

RI/FS work commenced in August, 1983. Stages 1 and 2 have been completed; stage 3 is underway. The TCE groundwater contamination was confirmed and low concentrations of chloro- and dichloro-benzenes were detected. The groundwater investigation is continuing with additional monitoring wells and further groundwater sampling.

McClellan Air Force Base—Installation Description

Background Information

McClellan Air Force Base occupies 3,690 acres, 8 miles northeast of Sacramento, California. Its current mission is to operate as an Air Force Logistics Center. The base is a System Manager for assigned aircraft, missile, and space programs, electronics systems, and communications-electronics programs; depot maintenance, repair, and storage center for communication and electronic equipment; and jet fighter maintenance depot.

Environmental Issues

Mission-support operations have produced hazardous wastes including dewatered industrial sludge (containing trichloroethane, DCE and TCE, and organic solvents), metal plating and wastewater treatment sludges and wastewater, caustic cleaners/degreasers, and painting residues, jet fuel, waste oils and lubricants; photochemicals, phenols, chloroform, spent acids and bases, and PCBs. Disposal procedures in the past included licensed contractor disposal or resale; storage in bowlers or storage tanks before burning on-site or going to oil skimmer at industrial wastewater treatment plant; drainage to industrial sewers; solvent recovery; discharge on the ground, into unlined pits, holding ponds, drying beds, or local creeks; landfarming and incineration. A 1979 Air Force study detected groundwater contamination. Two on- and 3 off-base wells were closed. Approximately 23,000 people in the area depend on the groundwater for domestic and agricultural use.

STATUS UPDATE

PA/SI

A records search was completed in 1981. Forty-six potential contaminant migration sites were identified, 36 of which were grouped as one site. DCE, TCE, and other solvents were discovered in on-site monitoring and in public and private wells off-base. Sites at this installation were placed on the National Priorities List in July, 1987. HRS: 5793

RI/FS

Stage 1 was completed in 1983; Stage 2 was completed in 1985; and a Follow-On Monitoring Presurvey was also completed. Sixty-eight areas were investigated, including 46 that were previously identified in the PA/SI. Further action is expected to be required at 27 of these areas. Eighty-eight additional areas were identified for RI/FS work. Groundwater contamination, primarily at the shallow aquifer, was detected (heavy metals, organic compounds, cyanide, cresylic acid, grease, oil, pesticides, and herbicides). Deeper aquifer contamination was below the limit of detection with the exception of pesticides and herbicides. Groundwater contamination was found off-base in a 1,000 ft. radius.

RD/RA

One area was capped with a synthetic membrane and a pump-and-treatment system was built for contaminated groundwater. Also, PCB contaminated soils were removed, and 500 homes were hooked up to the municipal water supply. The Air Force is providing alternative water sources to residents with water supply contamination above California action levels.

NAVAL AIR STATION MOFFETT FIELD—INSTALLATION DESCRIPTION

Background Information

Naval Air Station Moffett Field occupies 3,919 acres (including 1,539 acres at NALF Crows Landing), adjacent to Sunnyvale, California, 35 miles south of San Francisco. In the past, it served to support west coast dirigibles of the Lighter Than Air Program. It operated briefly as an Army training facility; served as an overhaul and repair facility for choppers and airships; and was used as a test flight facility for jet fighters. Currently, it supports antisubmarine warfare training and patrol squadrons; houses one major air training squadron and seven Orion patrol squadrons; and is the Headquarters for the commander patrol wings of the Pacific Fleet. Operations in support of these missions have included maintenance, repair and overhaul of buildings, vehicles and equipment, jet aircraft, and ordnance vehicles.

Environmental Issues

These operations have generated a variety of hazardous wastes including waste oil and fuels, painting residues, solvents, caustic solutions, cleaning components, boiler blowdown, transformer oil (contaminated with PCBs) and filters, battery electrolytes, coolant, pesticides, freon, asbestos, dyes, metal plating wastes, photographic chemicals, and ordnance. Disposal techniques in the past included the following: burial of drummed and undrummed wastes at on- and off-site landfills; storage in holding tanks; discharge into sanitary sewers, unlined flux ponds, storm sewers, drainage ditches, and deck drains; pouring and spraying on the ground; and use in fire protection training exercises. Approximately 272,000 people depend on wells (located within three miles of the base) as a source of drinking water. The estuarine wetlands of San Francisco Bay are located adjacent to the base.

STATUS UPDATE

PA/SI

The Navy completed an Installation Assessment in April 1984. Nine sites (which probably received hazardous wastes in the past) were identified as potential contaminant migration sources. Eight of these were targeted for RI/FS characterization. The potential effect of contaminant migration on the regional aquifer system was documented, as was the chlorinated hydrocarbon contamination of a shallow on-site aquifer. A confirmation study was recommended to evaluate the relative severity of problems on- and off-site. In addition, NAS Moffett Field is working with state regulatory agencies in an effort to develop an area-wide approach to clean up efforts in the San Francisco Bay region. Sites at this installation were placed on the National Priorities List in July, 1987; HRS: 32.90.

RI/FS

Step one of a confirmation/verification study was completed in 1986. Step two is scheduled to begin in late 1988.

NORTON AIR FORCE BASE—INSTALLATION DESCRIPTION

Background Information

Norton Air Force Base occupies approximately 2,036 acres adjacent to the city of San Bernardino, California; 58 miles east of Los Angeles and 60 miles west of Palm Springs. Its primary mission has been to overhaul jet engines, and repair aircraft. Since 1962 the base has served as a military airlift command base. In addition, Norton AFB formerly had the responsibility for providing maintenance and logistics for all liquid fueled ICBMs.

Environmental Issues

Industrial and other operations generated varying quantities of fuels, waste oils, solvents, paint strippers and residues, refrigerants, acidic plating solutions, metal plating residue, and sludge dredged from industrial waste lagoons. Standard practices for disposal of hazardous wastes included burial in landfills, deposition in unlined disposal pits, ponds and drying beds, storage in leaking underground tanks, and burning during fire protection training.

STATUS UPDATE

PA/SI

The Air Force completed all PA/SI work at Norton AFB in October, 1982. This study identified 20 past disposal or spill sites potentially containing hazardous contaminants which might migrate from them. Eighteen were targeted for RI/FS characterization. Sites at this installation were placed on the National Priorities List in July, 1987; HRS: 39.65.

RI/FS

As of April 1987, the first two stages of an RI/FS have been completed. These studies characterized the contamination at the high potential sites. Soils at several sites were found to be contaminated, principally with fuel derivative VOC's and volatile chlorinated hydrocarbons. Groundwater was found to be contaminated, principally with VOC's (such as chlorinated hydrocarbons), fuel derivatives and metals (silver, lead, arsenic). Seven sites were identified as having contamination levels significantly high to require further study during stage 3 of the RI/FS, scheduled to begin in the fall of 1987.

RD/RA

A removal action was taken in late 1986 to clean up the on-base Industrial Waste Water Treatment Plant sludge drying beds. Monitoring of a TCE-contaminated well used by 11,000 people who live and/or work at the base is ongoing to assure that it is below the California state action level.

SACRAMENTO ARMY DEPOT--INSTALLATION DESCRIPTION

Background Information

Sacramento Army Depot (SAAD) occupies 485 acres within the city of Sacramento, California. Its mission is the receipt, storage, issue, maintenance and disposal of various electronics materials used by the U.S. Army, and the manufacture of parts unavailable in the supply system.

Environmental Issues

These operations have generated hazardous wastes including waste oil and grease, solvents, metal plating sludge and wastewaters (containing caustics, cyanides, heavy metals, and some acids). Standard procedures for disposal of these wastes in the past included disposal in unlined lagoons, discharge into sanitary sewers, deposition in off-site landfills, and burning and/or burial on the facility. Some waste solutions were transferred to McClellan AFB, nearby, for treatment and disposal.

STATUS UPDATE

PA/SI

USATHAMA completed all PA/SI work at SAAD in December, 1979. This investigation identified a number of industrial areas, and spill and disposal sites contaminated with hazardous wastes that pose a potential threat for contaminant migration. In addition, they concluded that surface runoff from the installation is the most likely source of contamination of Morrison Creek, and that groundwater is not threatened by migration of contaminants from contaminated sites on the installation. Finally, the PA/SI indicated that surface runoff from backflushing, and/or vertical migration through permeable soil zones may potentially contribute to groundwater contamination. Sites on this installation were listed on the NPL in July, 1987; HRS: 44.46.

RI/FS

An RI/FS was begun in 1984 to determine the type and extent of contamination at the base, and to identify alternatives for remedial action. Groundwater sampling during the first stage indicated contamination both on- and off-site, primarily with trichloroethylene and heavy metals. In addition, heavy metals were also found in the sediment of Morrison Creek immediately downstream of SAAD. Detection of these substances off-post prompted the inclusion of SAAD on the National Priorities List. During the second stage of the RI/FS, completed in 1987, a schedule for further investigation of groundwater and soil to define contaminated areas was prepared, and plans were developed to remove leaking storage tanks.

RD/RA

RD/RA work to be implemented in 1987 includes construction of both a groundwater treatment system, and a groundwater monitoring system. The installation will also close out the old oxidation lagoons and oil burn pits.

SHARPE ARMY DEPOT—INSTALLATION DESCRIPTION

Background Information

Sharpe Army Depot occupies 724 acres, 60 miles east of San Francisco, in San Joaquin County, California. Its primary mission is to serve as a center for storage, shipping, packaging and maintenance of general supplies.

Environmental Issues

These operations produced varying quantities of hazardous wastes including dichloroethane, trichloroethene, tetrachloroethylene, chlorinated solvents and hydrocarbons, chromium compounds, arsenic, volatile organic compound (VOCs), industrial waste treatment plant sludge (containing phenols, di- and trichloroethylene and carbon tetrachloride), and used paints. Standard practices of disposal in the past included burial in trenches (industrial chemicals), discharge of waste into three retention ponds and one oxidation lagoon, and disposal in burning pits.

STATUS UPDATE

PA/SI

The Army completed an Installation Assessment in January, 1980. As a result, eight potentially contaminated sites were identified, and all of them were targeted for RI/FS work. Di- and trichloroethylene (TCE) were found present in the soil, and evidence of off-base contaminant migration and local well contamination was discovered. It was also determined that aquifer contamination had occurred (TCE and arsenic). Sites at this installation were placed on the National Priorities List in July, 1987; HRS:42.24.

RI/FS

The Army has completed several studies at Sharpe Army Depot including the following: an Environmental Survey (exploratory phase) in May 1982; a confirmation phase to the Survey in 1983; a Geophysical Investigation in 1984; a Groundwater Contamination Assessment in July 1985; a Community Relations Program in April 1986; and an RI/FS Operations Plan in February 1987. An estimated 14,000 pounds of VOC waste was discovered in the groundwater and soil. High concentrations of arsenic and VOCs were detected in the groundwater at the base boundary. The levels of concentration for these two contaminants exceeds the drinking water standard (As concentration as high as 720 ug/l and trichloroethene concentration as high as 240 ug/l--the standards for these two contaminants are 50 ug/l and 5 ug/l, respectively). The source of the VOC contamination was identified as the South Balloon Area disposal trenches, but the source of the As contamination is unknown. The VOC contaminant plume is migrating northwest from the South Balloon Area.

RD/RA

Bottled water has been supplied and the well has been closed. A groundwater air-stripping treatment plant has been in operation since 1986, and a cleanup and abatement Order was issued in January of the same year. An NPDES permit was issued in January 1987 for the discharge of treated effluent to surface water. Currently, operation, maintenance, and monitoring of the treatment plant and groundwater sampling for contamination is ongoing. The Army is also working to negotiate an Interagency Agreement.

ROCKY MOUNTAIN ARSENAL--INSTALLATION DESCRIPTION

Background Information

Rocky Mountain Arsenal occupies 17,228 acres northeast of Denver, in Adams County, Colorado. The installation has served, primarily, for the manufacture, assembly, demilitarization, and disposal of chemicals and incendiary munitions; and the decontamination and cleanup of real estate, facilities, and equipment.

Environmental Issues

Operations in support of this mission include manufacturing chemicals; manufacturing, assembling, and demilitarizing munitions; disposing of chemicals, munitions, and other incendiary materials; and producing biological anti-crop agents and nerve agents. Areas of the arsenal were leased to Shell Chemical Company for the manufacture of pesticides.

These and other mission support operations generated varying quantities of potentially hazardous wastes including pesticides; mustard gas and nerve agents (such as GB, VX, TX); mercury, lead and arsenic; chlorides of aluminum, arsenic, sulfur, thionyl, and cyanogen; hydroxides and fluorides; diisopropyl methylphosphonate (DIMP), dicyclopentadiene (DCPD), and dibromochloropropane (DBCP); sulfates; solvents; dimethyl disulfide; acids; methyl isobutyl ketone; dithiane oxathiane; and chlorophenyl methyl-sulfide, sulfoxide, and sulfone.

Standard practices for disposal of hazardous wastes, in the past included discharge to deep wells, lime pits, disposal basins, and the sanitary sewer system; and on-base landfilling, incineration, neutralization, detonation or burning.

Potential environmental impacts include on-base contamination leaching into groundwater that may become available for off-base use; and surface runoff from intermittent storms causing contamination to migrate beyond the installation boundary. Airborne particulates and odors may pose a hazard to on-base workers. Contaminated waterfowl may move on- and off-base, posing a potential threat to humans and other carnivorous animals.

STATUS UPDATE

PA/SI

The Army completed a Material Contamination Survey in August, 1973, and an Installation Assessment in March, 1977. These studies identified 19 sectors potentially contaminated with heavy metals, chemical agents, incendiaries, and industrial wastes. Sites on this installation were first listed on the NPL in July, 1987; HRS: 58.15.

RI/FS

The first stage of an RI/FS was begun in 1976 and is ongoing. The results of these investigations identified, as primary contamination sources, the South Plants, Basins A and F, and sewer lines; detected chloride, DIMP, DCPD, and DBCP plumes migrating across the northern and/or northwestern boundaries; and identified vertical migration of contaminated groundwater into the South Plants and Basin A areas. A Memo of Understanding was established in December, 1982, between the State of Colorado, EPA, the Army, and Shell.

Future RI/FS work is scheduled to determine the type and extent of contamination, and identify alternatives for remedial actions. These investigations will be completed by the Army in 1989. EPA plans to conduct an RI/FS for off-base areas. A Record of Decision is to be completed in 1989.

RD/RA

Three groundwater intercept/treatment systems have been constructed and are operational as follows: on the installation's northern boundary, the pilot system was completed in August, 1978, and an extension to it in November, 1981; on the Irondale area, in December, 1981; on the Northwest Boundary, in October, 1984. A contaminated sewer system was removed in 1982. A deep well was closed in 1986.

Current RD/RA projects underway include the decontamination and disposal of hydrazine wastewaters and facilities; treatment and removal of building 1727 sump liquid; and the operation of an evaporation system to remove liquid at Basin F prior to its closure. Future projects include the removal or upgrade of the sewer system; control of Basin A dust; removal of sediment in the lower lakes; excavation and storage of contaminated railroad yard materials; establishment of water management activities at the Southern Plants area; disposal of waste salts; and the development of a comprehensive remedial action plan. Settlement negotiations between the Army, Shell Chemical Company, and the State of Colorado to determine the extent of liability are currently underway.

DOVER AIR FORCE BASE—INSTALLATION DESCRIPTION

Background Information

Dover Air Force Base occupies 3,740 acres, 3.5 miles southeast of Dover, in Kent County, Delaware. Activated in 1942 as a coastal patrol base, its mission changed in 1943 to operational training for P-47 fighter pilots. In 1951, it initiated air and land defense operations and in 1952 it became part of Military Air Transport Service. Its current mission is to provide immediate airlift of troops, cargo, and equipment (particularly in airland or airdrop operations). Operations in support of this mission include aircraft and vehicle maintenance and repair; logistic support; operational training, air/land defense; and cargo/troop transport.

Environmental Issues

Hazardous wastes generated include solvents, paints, waste fuel and oils, VOCs, hydraulic fluid, paint and corrosion removers, muriatic and nitric acids, caustic soda, cyanide, phenols, cadmium, copper, chromium, nickel, lead, and zinc. In the past, chemicals were discharged to treatment plants, storm drainage system, and surface waters; some oils, paints, and solvents were landfilled; and combustible chemicals were disposed of at fire training pits. On-base groundwater is contaminated with arsenic and other metals; and the base well system, serving approximately 10,000 people as drinking water source, is currently free of contamination found in the groundwater.

STATUS UPDATE

PA/SI

The Air Force completed all PA/SI work in October, 1983. Eleven areas were identified as potential sources of contamination, and seven of these were targeted for RI/FS work. Groundwater contamination with low levels of volatile organics and Industrial Waste Basin sludge contamination (heavy metals) were discovered. Sites at this installation were proposed for inclusion on the NPL in July, 1987; HRS: 35.89

RI/FS

Stage 1 (presurvey) was completed in 1986. Twelve sites were investigated. The presurvey identified two additional sites and eliminated one previously documented in the PA/SI. It was confirmed that concentration of VOCs and metals exceed public health criteria or Delaware drinking water standard maximums in soils, sediments, surface waters, and groundwater at several sites. Concentration of arsenic and other metals at 5 sites exceeds background values reported for Maryland and Delaware coastal plain soils. Identification of contaminant sources and extent of migration from sites has not been fully pinpointed. Future work includes the initiation of Stage 2.

RD/RA

In cooperation with the state, efforts are being made to close the Industrial Waste Basin—the major source of groundwater contamination on-base. A Remedial Action Plan has been proposed for the North Drainage Ditch and the Liquid Waste Site.

ROBINS AIR FORCE BASE—INSTALLATION DESCRIPTION

Background Information

Robins Air Force Base occupies 8,810 acres, 90 miles southeast of Atlanta and 18 miles south of Macon, in Houston County, Georgia. The installation was used primarily for training purposes during World War II and since that time, has served as a worldwide parts and equipment logistics manager for assigned aircraft and commodities. In addition, it is also a technical repair center for airborne electronics as well as a storage center for aircraft spare parts and systems. Operations in support of these missions include the maintenance and repair of vehicles and aircraft component systems, and the receipt, storage, issuance, and transportation of aircraft parts.

Environmental Issues

Efforts associated with these mission-support activities generated varying quantities of potentially hazardous wastes, including paint strippers and thinners, paints, solvents, phosphoric and chromic acids, oils, hydraulic fluid, acetone, methylene chloride, methyl ethyl ketone, trichloroethylene, trichloroethane, carbon remover, cyanide, perchloroethylene, and toluene. Standard practices for disposal of hazardous wastes in the past, included deposition in landfills and lagoons, and discharge to sanitary sewers.

The water supply for the base and the city of Warner Robins could potentially be affected by any contamination in ground and surface water.

STATUS UPDATE

PA/SI

The Air Force completed all PA/SI work at Robins AFB in April, 1982. This study identified 13 sites as contamination sources and targeted nine of these for RI/FS work. Three sites were determined to have a high potential for contaminant migration. Groundwater contamination was also detected. Sites at this installation were placed on the National Priorities List in July, 1987; HRS: 51.66.

RI/FS

As of March, 1985, the first stage of an RI/FS has been completed. Nine sites were investigated and then redefined as six zones. In zone 1, contamination of ground and surface water and sediments by organic solvents and cyanide, was confirmed. Ground and surface water contamination was detected in zone 2. High levels of petroleum products, TOX, and lead were found in the groundwater in zone 3. Groundwater contamination by TOX, phenols, and cyanides was detected in zone 4 and by solvents in zone 5. No significant contamination was detected in zone 6.

RD/RA

The DDT spill site located in zone 2 has been covered with asphalt.

JOLIET ARMY AMMUNITION PLANT—INSTALLATION DESCRIPTION

Background Information

Joliet Army Ammunition Plant occupies 23,543 acres, 17 miles south of Joliet, in Will County, Illinois. It is a GOCO installation designed for the manufacture of explosives and ammunition. It was reactivated for the Korean and Vietnam Wars, but since 1977, it has assumed a nonproducing standby status. Operations in support of this mission include loading, assembling, and packing of explosives and ammunition; testing, renovation, and demolition of ordnance; and operating sulfuric and ammonium nitrate plants. Also, Joliet was the only Army Ammunition Plant to manufacture tetryl.

Environmental Issues

Hazardous wastes generated included TNT, DNT, RDX, nitric and sulfuric acids, oleum, sellite, toluene, sodium sulfite, tetryl, and lead azide. Methods of disposal in the past included open combustion of explosive materials; incineration, landfilling, and discharging of contaminated process water; burning of demolition debris; and landfilling of refuse. Several areas could potentially contaminate ground- and surface waters on- and off-base. Humans (using water for recreational purposes), vegetation, and wildlife could all be impacted by contaminated surface water.

STATUS UPDATE

PA/SI

An Installation Assessment was completed in September, 1978. Five areas were identified as major sources of contamination, of which three were targeted for RI/FS. The IA cited the potential for off-base contaminant migration of nitrobenzenes and other industrial wastes and also noted the following: aquifer potentially contaminated; aquatic life eliminated in creeks that received wastewater discharge in the past; and inorganic contamination found in soils near the ashpiles. The manufacturing area was placed on the NPL in July, 1987. The LAP area was proposed for inclusion on the NPL in July, 1987. HRS:32.08

RI/FS

Field Investigation and Technical Reports were completed in 1983. Confirmation Survey Assessment was completed in November, 1987. Contamination was detected in ground- and surface water, sediments, and soils. Contaminant migration is not presently occurring, but ground- and surface water routes have been identified as potential migration pathways. A feasibility study was scheduled to begin sometime in 1987.

RD/RA

"Red Water Lagoon Sampling and Analysis Remedial Action Report" completed in 1985. Also in 1985, sludge and water in Red Water Lagoon removed, liner constructed, and area capped with clay. Ashpiles were recapped in 1985. In addition, a compliance agreement is currently being redrafted by EPA Region V.

SAVANNA ARMY DEPOT—INSTALLATION DESCRIPTION

Background Information

Savanna Army Depot occupies 460 acres, north of Savanna, in Carroll County, Illinois. It is situated on the east bank of the Mississippi River. Its mission is the handling, processing, testing, and storage of munitions and explosives; manufacture and storage of chemicals; and quality assurance for ammunition and components, missiles, and rockets. Operations in support of this mission include renovation and loading of artillery shells and bombs for transport; demolition and burning of obsolete ordnance; housing of artillery weapons; assembly, disassembly, and storage of munitions; and inspections of equipment.

Environmental Issues

Mission-support operations generated hazardous wastes such as TNT, DNT, nitrobenzene, di- and trinitrobenzene, ammonium nitrate, lead azide, UXO, and mustard gas. In the past, these wastes were disposed of through burial and burning (munitions); TNT reclamation operations and disposal in landfills, leaching ponds, and lagoons. Potential impacts include the possible contamination of 3 potable water sources that exist in the vicinity of the depot and the shallow aquifer located in the upper 5 meters of soil covering the site. Lagoons adjacent to the Mississippi River could contaminate this drinking water source, and surface contamination could affect the large wintering population of bald eagles.

STATUS UPDATE

PA/SI

All PA/SI work was completed in May, 1979. Fifty-nine potential contamination sites were identified, and munitions-related contamination (primarily TNT) was detected in the surface soils (47% at the surface and a few ppm at a depth of 31 inches) and groundwater on-base. Sites at this installation were proposed for inclusion on the National Priorities List in July, 1987; HRS: 42.20

RI/FS

RI/FS work was completed in January, 1980. Among the findings: soil contamination distribution was determined; groundwater contamination (TNT, TNB, DNB, nitrates) was confirmed and verified; extent of contamination and waste concentrations (primarily TNT) in the lagoon sediment were identified; the lagoon leached TNT and other chemicals to the groundwater; contaminant migration was not significant and has not reached the Mississippi River; pollutants in the river (TNT, DNT, TNB, and RDX) present no serious human health risk for drinking water or eating fish. Additional hydrogeological work, including additional aquifer testing and monitoring, is necessary to predict contaminant plume extent and boundaries. Additional soil testing is ongoing.

RD/RA

Incineration of TNT-contaminated soils is scheduled for 1988. Future monitoring to determine the effectiveness of the RA is planned.

LOUISIANA ARMY AMMUNITION PLANT—INSTALLATION DESCRIPTION

Background Information

Louisiana Army Ammunition Plant occupies 14,974 acres, 22 miles east of Shreveport, Louisiana; seven miles west of Minden, in the northwest portion of the state. The plant is a government owned industrial installation under contractual agreement with the Thiokol Corporation to manufacture shell metal parts, and the Load-Assemble-Pack (LAP) operations of ammunition items.

Environmental Issues

Industrial plant maintenance and other operations in support of this mission generated varying quantities of hazardous wastes, including oils, grease, degreasers, phosphates, solvents, metal plating sludges, acids, fly ash from boiler blowdown, and TNT and RDX explosives. Standard procedures for disposal of these wastes, in the past, included discharge into unlined lagoons, pits or ponds in order to remove fabrication and metal plating wastes and explosive materials from the treatment water.

Until 1971, water quality analysis of on-base wells indicated that no significant contamination problem existed, and that the site posed no public health problem. In 1976 organic pollution was discovered in on-site wells.

STATUS UPDATE

PA/SI

USATHAMA completed all PA/SI work at Louisiana AAP in 1978. This investigation concluded that, although the plant is heavily contaminated with explosives, metal plating, and lubrication wastes in both the industrial and waste disposal areas, surface and groundwater monitoring did not indicate migration of contaminants into those systems or beyond installation boundaries. However, the study did indicate that because of the high level of on-site contamination, the potential for contaminant migration, especially from disposal areas was great. Sites at this installation were proposed for placement on the National Priorities List in July, 1987; HRS: 30.26.

RI/FS

The first stage of RI/FS work was begun in 1981. The investigation indicated that no off-post groundwater contamination had occurred, but that on-post wells were contaminated with di- and trinitrotoluene, phenols, cadmium and tetryl, as are on-site soils, and surface water. A follow-on study was begun in January, 1987, to investigate further the contamination problem.

RD/RD

Remedial action for an explosives contaminated lagoon is to be performed in 1988.

ABERDEEN PROVING GROUND—INSTALLATION DESCRIPTION

Background Information

Aberdeen Proving Ground (APG) occupies 72,518 acres, 21 miles northeast of Baltimore, in Harford and Baltimore Counties, Maryland. APG is a Test and Evaluation Command installation for the testing and development of munitions, weapons, vehicles, and materials, and the operation of training schools. The Edgewood area of APG (as a commodity management and R&D center, and depot) is a Class II activity under the U.S. Army Munitions Command for chemical agent production. Mission operations include manufacture, development, and demilitarization of chemical agents; and research and testing of lethal and incapacitating agents.

Environmental Issues

In the past, mission-support operations have generated hazardous wastes in varying quantities. These include arsenic, volatile organics, phosphates, napalm, UXO, nitrates, white phosphorus, mustard gas, chloroacetophenone, hydrogen cyanide, cyanogen chloride, adamrite, leucrite, VX, tabun, sarin, and soman. Disposal practices in the past included discharge of wastes to unlined holding ponds, sanitary and storm sewers, and surface waters. Ordnance was disposed of by means of subsurface detonation at the demolition area. Water range areas of APG that are contaminated with large quantities of live UXO are accessible to local boating during non-testing periods, and could present a potential safety problem. Off-base contaminant migration could affect 4 proposed state critical areas and a national wildlife refuge.

STATUS UPDATE

PA/SI

An Installation Assessment was completed in September, 1976. Eight areas of contamination were identified. Three were recommended for preliminary survey and two for further monitoring. Large areas contaminated or potentially contaminated with UXO, chemical munition, and manufacturing wastes, were determined; and contamination of surface and groundwaters was detected. Four wells were removed from service due to detection of VOCs, and it was learned that potential contaminant migration via surface waters was indicated at five sites. Sites at this installation were proposed for inclusion on the NPL in July, 1987; HRS: Edgewood Area—53.57; Michaelsville—31.45.

RI/FS

"Disposal of Hazardous Materials at O Field" report was completed in August, 1978; An Environmental Survey was completed in 1979; Environmental Survey of Edgewood Area was finished in January, 1983; resampling was completed in October, 1984; and a feasibility study is to be finalized in 1988. Findings noted low levels of hydrocarbons in the groundwater at three areas; detected white phosphorus in the sediment and surface waters at one area; determined that O Field was contaminated with large quantities of chemical and explosive materials, and that it is a source of contaminant migration; detected arsenic, trichloroaniline, and DDT in surface waters; detected groundwater contamination by VOCs; and reported no significant off-base migration. In addition, resampling confirmed original survey findings, and four alternative evaluations were included in the feasibility study. Currently, the O Field Groundwater Investigation is scheduled for completion in 1989.

RD/RA

Cleanup of the Edgewood area is being addressed in the RCRA Part B permit application.

NAVAL AIR STATION BRUNSWICK—INSTALLATION DESCRIPTION

Background Information

Naval Air Station Brunswick occupies 7,259 acres (including the main station and four non-contiguous properties) adjacent to the City of Brunswick, Maine, 31 miles south of Augusta, and 27 miles northeast of Portland. Its principle mission is as a NATO facility, providing facilities, services and materials in direct support for COMPATWINGFIVE with its six anti-submarine warfare squadrons and OPCON center, and for COMPATWINGSLANT. NAS Brunswick also provides aircraft support facilities for these commands. Efforts in support of these missions include the maintenance of aircraft, vehicles and buildings, pest control, and ordnance operations.

Environmental Issues

Industrial, ordnance, and other operations related to these efforts generated varying quantities of hazardous wastes, including waste oils and gases, contaminated fuels, solvents (including trichloroethane and trichloroethylene), acids, paint residues, photographic chemicals, pesticides and herbicides, and asbestos. Standard procedures for disposal of these wastes in the past, included deposition in on- and off-base landfills, burial of drummed wastes, spraying on installation roads, storage in waste oil tanks, and burning during fire protection training exercises. Currently, wastes are separated and controlled by the base Public Works Department. Groundwater, which serves as drinking water for 18,000 people, surface-water, and nearby wetlands are threatened off-base by migration of these contaminants.

STATUS UPDATE

PA/SI

The Navy completed all PA/SI work at NAS Brunswick in 1983. This study identified ten past disposal or spill sites potentially containing hazardous contaminants. Of these, seven were designated as having a high potential for environmental contamination, thus warranting further investigation during an RI/FS. Sites on this installation were placed on the National Priorities List in July, 1987; HRS: 4338.

RI/FS

An RI/FS, begun in September 1984, is in the first stage of completion. This initial study will assess the contaminants present at the site in more detail and determine their migration paths. All RI/FS work is scheduled to be completed in 1988.

MINN ST. PAUL IAP—INSTALLATION DESCRIPTION

Background Information

Minn St. Paul IAP occupies 301 acres (encompassing 5 separate areas), at the Minneapolis-St. Paul IAP in Minnesota. It was established in 1943 as an Air Force Flight Training Base. Since 1970, it has been under the command of the 934th Tactical Airlift Group. Mission support operations include maintenance, repair, and rehabilitation of C-130 aircraft, aerospace and ground equipment, and vehicles.

Environmental Issues

These operations have generated hazardous wastes including waste oil/petroleum/lubricants, spent solvents and cleaners, battery acid, strippers, methyl ethyl ketone, cellulose nitrate, painting wastes (containing metals), PCBs, pesticides, chromium-containing paint filters, and chlorinated hydrocarbons. Disposal practices in the past have included the following: storage in drums or in underground tanks; road oiling; burning in pits, in heating plant, and during fire training exercises; neutralized battery acid in storm sewer; oil/water separator liquids to sanitary sewer; washing into ground and storm sewers; and burial in pits and on- and off-site landfills. Approximately 64,700 people in the Twin Cities metropolitan area use public and private wells located within 3 miles of the site.

STATUS UPDATE

PA/SI

PA/SI work was completed in March, 1983. It was concluded that ground and surface water contamination is possible. Groundwater contamination is potentially higher in areas where low permeability confining strata occur in the unsaturated zone above the water table aquifer (low permeability strata is not always present). Nine past disposal and spill sites were identified, six of which were considered to be potential contaminant migration sources and targeted for RI/FS. One site was targeted for removal action. Sites at this installation were placed on the National Priorities List in July, 1987; HRS:35.00

RI/FS

Stage one was completed in April, 1986 and Stage two was completed in January, 1987. It was determined that no heavy contamination of soil or groundwater had occurred, but that contamination levels warranted further investigation. It was also determined that leachate from the small arms landfill poses the greatest threat of off-base contaminant migration. Evidence indicated that the groundwater is contaminated with mercury, DCE, oil and grease, and trichloroethane. Stage two showed a free floating hydrocarbon plume in the water table aquifer, migrating to the southwest and possibly to the northwest. It was learned that groundwater was contaminated with benzene, ethyl benzene, toluene, and xylene. The soil is also contaminated.

RD/RA

RD/RA work is scheduled to commence in 1989.

TWIN CITIES ARMY AMMUNITION PLANT (TCAAP)— INSTALLATION DESCRIPTION

Background Information

Twin Cities Army Ammunition Plant occupies 2,560 acres, approximately 13 miles north of Minneapolis-St. Paul, in new Brighton, Minnesota. Its mission, since 1942, involves the manufacture of small arms and projectile casings. Major industrial operations in support of this mission include various maintenance shops (aircraft, aerospace ground equipment and vehicles) and corrosion control shops.

Environmental Issues

These operations have generated hazardous wastes in varying quantities including solvents, acids, caustics, heavy metals, VOCs, fuels, cleaners, paint wastes, paint sludge, TNT, and 1,2-transdichloroethylene. In the past, TCAAP wastes were deposited into a landfill, dumped in nearby Round Lake, or released into Rice Creek. Production, storage, demolition, and/or disposal activities of lessees contributed to the release of hazardous substances. Round Lake and Rice Creek have been contaminated by wastes from sewer line effluent. The drinking water supply for some 64,700 area residents has been contaminated. It is suspected that contamination could affect the Minnesota Valley National Wildlife Refuge located 500 feet from the landfill. In addition, periodic metal contamination of the Minnesota River occurs when the landfill floods.

STATUS UPDATE

PA/SI

PA/SI work began in May, 1981. Four potential source areas for the release of VOCs that could have contaminated the groundwater were identified. It is probable that the wells are contaminated with VOCs. It was determined that operations at Buildings 103 and 502 were a source of VOC-contaminated groundwater that is migrating toward Rice Creek and toward the west and southwest, respectively. Fourteen disposal areas were identified as sources of hazardous substance release (mainly VOCs). Further identification of VOCs and metals was made in sewer sediments. Two VOC contaminated groundwater plumes were detected leaving TCAAP, and site A was found to be the origin of a plume of VOCs in the groundwater north of TCAAP. Sites at this installation were placed on the National Priorities List in 1982; HRS: 35.00

RI/FS

RI/FS work was initiated in August, 1987 and is ongoing.

RD/RA

Residents with VOC-contaminated wells have been given bottled water and a groundwater treatment system was scheduled to begin in FY87. A groundwater collection system was constructed at Building 103 and a water quality monitoring program was implemented. A decontamination pilot system is in effect to remove trichloroethylene from the soil. Full scale ISV systems, caps, and in situ air stripping are in operation at sites D and G to remove VOCs. In addition, the following have been completed: sewer line and sump restoration; PCB contaminated soils removed and stored; site A remedial investigation underway; site F closure investigation in progress; and an agreement between EPA, the State of Minnesota, and the Army was negotiated.

LAKE CITY ARMY AMMUNITION PLANT—INSTALLATION DESCRIPTION

Background Information

Lake City Army Ammunition Plant occupies 3,909 acres, ten miles east of Independence, in Jackson County, Missouri. The plant serves as a GOCO facility and is operated by Remington Arms, Inc. Its primary mission is for the manufacture and loading of small arms ammunition and the production of lead styphnate. Operations in support of this mission, past and present, include manufacturing and loading of small arms ammunition, including cartridge case drawing, annealing, purling, and forming; core priming and zinc plating; and cartridge loading and assembly.

Environmental Issues

Mission-support operations have generated hazardous wastes such as TNT, oils, spent halogenated and nonhalogenated solvents, tetracene, asbestos, trinitite, VOCs, trichloroethylene, sodium orthosilicate, heavy metals (barium, cadmium, chromium, lead, mercury, silver, beryllium), sulfuric acid, styphnic acid, and initiator materials. Standard procedures for disposal of these wastes in the past included the discharge of industrial wastes to leaching beds, evaporation and detonation basins, lagoons, landfills, demolition pits, and demilitarization furnaces. It is estimated that groundwater contamination could affect approximately 2,800 people who rely upon on-base wells as a source of drinking water.

STATUS UPDATE

PA/SI

The Army completed an Installation Assessment in May, 1980, and a Geohydrologic Study in 1986. As a result, 50 past and present disposal areas were identified, 19 of which were recommended for RI/FS characterization. Among the other findings, the sand pits were found to contain various heavy metals; solvents and explosives were detected in the groundwater (leachate from the closed landfill is probably the source); silver was detected in the well downgradient from the chemical laboratory lagoon; and contaminated groundwater (VOCs, explosives, trichloroethylene, chromium, beryllium, and HMX) was discovered at seven sampled sites. In addition, the geology of the site seems to indicate the potential for contaminant migration. Sites at this installation were placed on the National Priorities List in July, 1987; HRS: 3368.

RI/FS

RI/FS work was scheduled to begin in 1987.

RD/RA

The lagoon has been treated, covered, graded, and reseeded. The presence of heavy metals in the on-site monitoring well indicate, however, that the closure of the lagoon is not adequate.

CORNHUSKER ARMY AMMUNITION PLANT— INSTALLATION DESCRIPTION

Background Information

Cornhusker Army Ammunition Plant occupies 11,936 acres, three miles west of Grand Island, in Hall County, Nebraska. The plant was constructed in 1942 for the production of conventional munitions used in World War II. The plant was rehabilitated in 1950 to produce artillery shells and rockets for the Korean Conflict. Operations resumed once again during the Vietnam Conflict. The plant is currently in standby status. Previous activities at Cornhusker Army Ammunition Plant include loading, assembly, and packing of bombs, boosters and mines.

Environmental Issues

Mission-support activities have generated hazardous wastes including TNT, DNT, RDX, and TNB. Standard procedures for disposal of these wastes in the past included deposition of TNT, RDX, experimental explosives and solid industrial wastes at landfills or at demolition and burning grounds. Wastewaters were discharged into cesspools or leaching pits. Contaminated water is used for crop irrigation and for livestock purposes. The present levels of contamination are not considered hazardous to humans through consumption of beef.

STATUS UPDATE

PA/SI

The Army completed the installation assessment in March, 1980. This study identified 56 sources of contamination, determined the existence of groundwater contamination (explosive components), and noted a potential for off-base contamination and migration. Sites at this installation were placed on the National Priorities List in July, 1987; HRS: 51.13.

RI/FS

A preliminary survey was completed in 1982, followed by a confirmation survey in 1985, and a final in 1987. The sole source of drinking water for some 200 residences was found to be extensively contaminated by TNT, DNT, and RDX. Over 500 private wells in Grand Island have been affected. In addition, on- and off-base contaminant migration was found to exist, especially to the east of the plant where it extends 3.5 miles beyond the base boundary. Also, peak concentrations of RDX were found in the groundwater west of Grand Island; high concentrations of TNT were detected in the soil at the bottom of the leach pits. The contaminant plume is moving approximately 0.7 feet/day.

RD/RA

In 1984, work was begun on the extension of the municipal water system for 800 residents living in the northwest section of Grand Island. This work was completed in 1986. A groundwater dewatering system was installed and its discharge is monitored weekly during operations. A rotary kiln incineration system was initiated in 1985, for removal and destruction of explosives contaminating the soil. This project was scheduled for completion in 1987. In addition, excavation and open burning/flashing of contaminated construction materials was initiated in 1987.

FORT DIX—INSTALLATION DESCRIPTION

Background Information

Fort Dix occupies 31,110 acres, 16 miles southeast of Trenton, in Burlington County, New Jersey. Its mission, under the jurisdiction of the Training and Doctrine Command (TRADOC), is to conduct basic combat and advanced individual training, provide combat support, and support the Reserve and National Guard units. Operations in support of these missions include training; vehicle and building maintenance and repair; furniture stripping and repair; termite and insect control; and photographic and lithographic processing.

Environmental Issues

Hazardous wastes generated by these operations include methylene chloride, trichloroethylene, chloroform, trichloroethane, toluene, VOCs, petroleum hydrocarbons, heavy metals, photographic chemicals, LIXO, battery acid, antifreeze, pesticides, herbicides, Freon, and PCBs. In the past, these wastes were disposed of in the following ways: deposition in a landfill (chemical wastes) or grease disposal pits; disposal at an EOD range (ordnance); and discharge to ground surface or unlined pits. Approximately 7300 residents are served by domestic wells located within 3 miles of a landfill that is a potential source of contamination.

STATUS UPDATE

PA/SI

The Army completed an Installation Assessment in March, 1977. A reassessment was completed in July, 1987. Over 40 sites were identified in the Reassessment, 22 of which were investigated in this study. On-base radioactive contaminant migration via surface water was detected. Soil or groundwater contamination was discovered at 10 sites; heavy metal contamination was detected at 4 sites; evidence of petroleum hydrocarbon contamination was uncovered at 4 sites; chloroform contamination was found at 2 sites; trichloroethylene and trichloroethane were located at 1 site each; and potential contamination from underground fuel tanks was present at 2 sites. Sites at this installation were placed on the NPL in July, 1987; HRS: 374.

RI/FS

A Remedial Investigation was completed in September, 1986 and a Feasibility Study was finished in January, 1987. Among the findings, it was learned that the grease trap was no longer a source of contamination; a contaminant plume may be emanating from a landfill; potential for contaminant migration between aquifers is low; and no private potable wells appear to be threatened by contamination. In addition, VOCs and trichloroethylene were detected in wells south and southwest of the landfill, and an appropriate source control RA was determined for remediation at the landfill. Five response alternatives were identified for further evaluation. Currently, a soil gas analysis is in the works, as well as an RI/FS modification to include 8 additional sites.

RD/RA

The BOMARC site was decontaminated in June, 1960. Cracks in the concrete pad in front of the missile launches were sealed in October, 1982. Consideration is currently being given to closing the landfill.

NAVAL AIR ENGINEERING CENTER LAKEHURST— INSTALLATION DESCRIPTION

Background Information

Naval Air Engineering Center Lakehurst occupies 7,382 acres within the environmentally sensitive Pinelands Preservation (Pine Barrens) in New Jersey; 65 miles south of New York City and 50 miles east of Philadelphia. The primary mission of NAEC Lakehurst is the testing and development of weapons systems and their components.

Environmental Issues

Operations related to mission-support activities generated varying quantities of hazardous wastes, including fresh and contaminated fuels, waste oils, degreasers, solvents, paints and paint residues, photographic chemicals, acids, refrigerants, boiler blowdown from coal and oil power plants, PCB's, pesticides and herbicides, and unexploded ordnance. Standard procedures for disposal of these hazardous wastes in the past, included deposition or discharge on the ground, into landfills, unlined lagoons or open pits, or into drainage ditches; and burning during fire protection training. The installation and its surrounding area, include Fort Dix, agricultural lands, landfills, and the New Jersey Pine Barrens, one of the most extensive wildlife tracts in the Mid-Atlantic Seaboard region. This surface water serves recreation, wildlife and agriculture. A shallow aquifer adjacent to the basin is utilized by surrounding communities for drinking water.

STATUS UPDATE

PA/SI

The Navy completed all PA/SI work at NAEC Lakehurst in May, 1983. This study identified 44 past spill and disposal sites potentially containing hazardous contaminants, none of which, the Navy concluded, pose an immediate threat to human health or the environment. Sixteen of these sites, however, warrant further investigation during an RI/FS. Sites at this installation were placed on the National Priorities List in July, 1987; HRS: 4338.

RI/FS

The first stage of the RI/FS, begun in February 1985, concluded that although most areas on the installation appear free of contaminants or contain only trace amounts of them, groundwater at three sites was contaminated, primarily with hydrocarbons (exceeding EPA criteria by as much as five orders of magnitude). Minor sediment (soil) contamination with heavy metals and petroleum hydrocarbons was also identified. Available data give no evidence that contaminated groundwater is migrating beyond the installation boundaries or that drinking water wells on-base are contaminated. The second step is currently underway to confirm the extent of contamination.

NAVAL WEAPONS STATION EARLE COLTS NECK— INSTALLATION DESCRIPTION

Background Information

Naval Weapons Station Earle Colts Neck occupies 706 acres of waterfront in the Chapel Hill, New Jersey area, and 10,428 acres inland, 47 miles southeast of New York City. The installation began as an explosives stripping facility during World War II. Currently, it has a number of missions including the receipt, renovation, maintenance, storage, and issue of ammunition, explosives, and expendable ordnance material, and provision of logistics and administrative support to home ported ships. Efforts in support of these missions include testing and proving of different types of ordnance, maintenance and repair of vehicles and buildings, fuel storage, and radiological operations.

Environmental Issues

Industrial, ordnance and other operations related to these efforts generated varying quantities of hazardous wastes, including, waste oils and lubricants, degreasers, solvents, paint residues, corrosives/acids, metals, ammunition/ordnance (including unexploded ordnance), and fungicides and pesticides. Standard procedures for disposal of these wastes, in the past, included on- and off-site burial in landfills, discharge on the ground, contracted removal, and burning during fire protection training.

This base is in the recharge area for the regional groundwater system. Extensive public and private use of both surface and groundwater, makes runoff from any on-base contamination a substantial threat to both the public health and the environment.

STATUS UPDATE

PA/SI

The Navy completed all PA/SI work at NWS Earle Colts Neck in March, 1983. This study identified 29 past disposal or spill sites potentially containing hazardous contaminants, none of which, the Navy concluded, pose an immediate threat to human health or the environment. Four of these sites, however, warrant further investigation during an RI/FS, and sites at this installation were proposed for placement on the National Priorities List in July, 1987; HRS: 37.21

RI/FS

The first stage of the RI/FS was begun in 1985, and the last stage is scheduled to be completed by late 1990.

GRIFFISS AIR FORCE BASE—INSTALLATION DESCRIPTION

Background Information

Griffiss Air Force Base occupies 5,836 acres, two miles northeast of Rome, in Oneida County, New York. The installation was activated in 1942 and serves to maintain and implement effective air refueling operations, and provide long-range bombardment capability on a global scale. The current host unit of the base is the 416th Bombardment Wing.

Environmental Issues

Mission-support operations have generated varying quantities of potentially hazardous wastes, including methanol, acetone, trichloroethane, trichloroethylene, dye penetrants, soaps, greases, degreasers, isopropyl alcohol, solvents, cleaners, methyl ethyl ketone, toluene, and lead. Standard practices for disposal of hazardous wastes in the past, included the disposal of wastes in landfills and dry wells; the discharge of chemicals to industrial, sanitary, and storm sewers and septic tanks; and the storage of plating and stripping rinses in a holding tank. There is a threat of contamination of on-base wells from leachate emanating from landfills.

STATUS UPDATE

PA/SI

The Air Force completed all PA/SI work in 1981. This study identified 19 sites containing hazardous materials from past disposal activities, one of which was targeted and three recommended for RI/FS characterization. The study also detected surface contamination at the Tank Farm; potential contamination of groundwater by dry wells and a lindane spill; and potential contamination due to a source associated with construction technology. Sites at this installation were placed on the National Priorities List in July, 1987; HRS: 34.20.

RI/FS

Phase II, Stage 2 was completed in November, 1985. Three sites have been investigated thus far, revealing the presence of phenols, ethyl benzene, and benzene in the groundwater; toluene in the on-base surface water; and high levels of lead, copper, antimony, and zinc in the soil and sludge at the Battery Acid Disposal Pits. In addition, there was evidence of soil and groundwater contamination by fuel products at the tank farm, and groundwater contamination (oils, grease, TOC, and tetrachloroethylene) below the landfill.

RD/RA

Some remedial actions are currently underway at the Tank Farm and the Battery Acid Disposal Pits. The Air Force is presently negotiating an agreement with the EPA, and the State of New York.

TINKER AIR FORCE BASE—INSTALLATION DESCRIPTION

Background Information

Tinker Air Force Base occupies 4,277 acres, adjacent to Oklahoma City, in Oklahoma County, Oklahoma. Its mission is to serve as a worldwide repair depot for aircraft, weapons, and engines. Industrial operations in support of this mission include aircraft maintenance, degreasing, jet engine rebuilding and overhauling, plating, heat treating, metal part testing, and servicing aircraft (reconditioning, modifying, modernizing).

Environmental Issues

Mission-support operations such as these have generated hazardous wastes in varying quantities. These include organic solvents (tri- and tetrachloroethylene, dichloroethane, acetone, perchloroethylene, methyl ethyl ketone), waste oils, paint strippers and sludges, plating solutions and wastes, heavy metals (Cr, Th, Ni, Mg, Cd), alkaline cleaners, acids, freon, jet fuels, and radium paint. In the past, industrial wastes were discharged to landfills, waste pits, water wells, streams, ordnance disposal sites, storm and sanitary sewers, and the fuel farm; burned in fire training exercises; treated in wastewater treatment plants; and removed by contract. Contamination of the aquifer underlying the base could affect base and municipal water supply systems serving approximately 55,400 people. In addition, surface water contamination could affect threatened and endangered species that use the base as a stopover during migration.

STATUS UPDATE

PA/SI

The Air Force completed all PA/SI work in April, 1982. Fourteen contaminated areas were identified and three sites were determined to present the greatest hazard. The disposal sites contain petroleum/oil/lubricants, VOCs (trichloroethylene), sludge, solvents, and heavy metals; and two creeks on or near the base are contaminated with high concentrations of oil, grease, nickel, and chromium. Sites at this installation were placed on the National Priorities List in July, 1987; HRS: 42.24

RI/FS

RI/FS work commenced in September, 1983 and has been completed for several sites. Other are nearing completion. Confirmation and verification of contamination at all sites was given. It was learned that one site has contaminated the base water supply wells in relatively shallow zones of the aquifer (organics—primarily trichloroethylene). It was also determined that the landfill is releasing organic chemicals (trichloroethylene and chloromethane) into the environment. Only limited contaminant migration from the waste sites investigated was recorded, and there appears to be no contaminant migration off-base.

RD/RA

Tinker AFB is in the process of removing contaminated sediments from a lagoon; draining the pond to lower the risk of contaminant migration; plugging the water supply wells that serve as contaminant conduits; capping a landfill; and taking additional samples at selected sites to assess potential environmental impacts and aquifer contamination.

UMATILLA ARMY DEPOT—INSTALLATION DESCRIPTION

Background Information

Umatilla Army Depot occupies 19,729 acres, 3.5 miles west of Hermiston, in Umatilla County, Oregon. Since its construction in 1941, it has served as an ammunition storage facility. Operations in support of this mission include storage of ammunition, minor maintenance of vehicles (spray painting, soldering, welding, lubrication, battery repair, steam-cleaning), woodworking, ammunition renovation and disassembly, and modification, reassembly, and repair of munitions.

Environmental Issues

Mission-support activities such as these have produced hazardous wastes in varying quantities. In the past, wastes have been disposed of at burning, leaching, demolition, and burial storage pits. Wastewater from the TNT Washout Plant was discharged to leaching beds; and bulk metals and ores were stored at open storage areas. It has been determined that groundwater contamination may affect the public water supplies that serve approximately 24 people.

STATUS UPDATE

PA/SI

The Army completed all PA/SI work in March, 1980. Two major areas were identified as contaminant sources and both were targeted for RI/FS work. Areas contaminated with explosive wastes and UXOs were discovered, while groundwater under the lagoon was found to be contaminated with RDX, nitrates, TNT, DDT, lindane, and tri- and tetrachloroethylene. Geologic maps indicate that the area possesses a high potential for contaminant migration via subsurface water, even though no such evidence has been uncovered. Sites at this installation were placed on the National Priorities List in July, 1987; HRS: 31.36.

RI/FS

A Contamination Survey was completed in April 1982. The washout lagoon was identified as having contaminated an aquifer with TNT, RDX, and minor amounts of DNT. Contaminant plumes were delineated and determined to be moving slowly (10 cm/day). It is likely that once the contaminant plume reaches the base boundary (in approximately 100 years), it will have been significantly diluted. Additional studies were to be initiated in 1987.

RD/RA

One of eight locations is being considered as a site for the construction of an incinerator complex for the destruction of obsolete chemical agents.

LETTERKENNY ARMY DEPOT—INSTALLATION DESCRIPTION

Background Information

Letterkenny Army Depot occupies 19,511 acres, 2 miles north of Chambersburg, in south-central Pennsylvania. Its mission, originally ammo storage, is now concerned with the maintenance, overhaul, rebuilding and testing of tracked vehicles and missiles; the issuance and shipment of Class III chemicals and petroleum; and the storage, maintenance, demilitarization and modification of ammunition. Operations in support of this mission include ammunition demolition, washout and deactivation, and chemical and petroleum transfer and storage.

Environmental Issues

Industrial and other operations related to these missions have generated varying quantities of hazardous wastes, including heavy metals, pesticides, explosives, petroleum/oil/lubricant (POL) wastes, phenolics, phosphorus, trichloroethylene, painting residues and thinners, solvents, cleaning agents, and metal plating wastewater and sludge. Typical disposal procedures in the past have included deposition in landfills and unlined pits, and spreading on the ground.

STATUS UPDATE

PA/SI

An Installation Assessment was completed by USATHAMA in December, 1983. The Assessment identified 14 sites as having a potential for contaminant migration and all are targeted for RI/FS characterization. Significant contamination of groundwater by aromatic hydrocarbons and volatile chlorinated hydrocarbons was identified. These appear to have migrated off base at levels of environmental concern. Toxic metal contaminant sources were also identified, as were nitrate concentrations in the groundwater at levels above the national standard. The surface water drainage pattern and the regional groundwater flow pattern were also delineated. The Property Disposal Office area, a major disposal area on post, was repropose for inclusion on the National Priorities List in July, 1987, and the Southeast Industrial Area was placed on the National Priorities List in July, 1987; HRS 34.21.

RI/FS

A confirmatory RI/FS (including an endangerment assessment) is currently underway. Contamination has been confirmed at 11 of the sites identified in the PA/SI. There is also confirmation that the ground and surface water has been contaminated with chlorinated hydrocarbons (di- and trichloroethylene, di- and trichloroethane and benzenes), chlorinated organic solvents (toluene), chloroform, heavy metals, and freon. Soils have also been contaminated by xylene, heavy metals, chloroform, aromatic and chlorinated hydrocarbons (including di- and trichloroethylene and benzenes), and chlorinated organic solvents.

RD/RA

RD/RA work completed thus far includes the activation of a water system in September, 1987; a low temperature solvent stripping pilot study; and studies of approaches for providing a permanent supply of uncontaminated water to affected off-post residents. The installation of a water distribution system was begun in late 1986 and an in-situ volatilization system is currently being installed.

NAVAL AIR DEVELOPMENT CENTER WARMINSTER— INSTALLATION DESCRIPTION

Background Information

Naval Air Development Center Warminster occupies 921 acres, and is located in the Warminster Township of southeast Pennsylvania. Commissioned in 1941, its mission is the research, development, testing and evaluation of naval aircraft systems, as well as software development and antisubmarine warfare systems studies. Operations in support of these missions include the maintenance and repair of aircraft, buildings, vehicles and equipment; pest control; and weapon and materials research and testing.

Environmental Issues

These mission-support operations have generated the following hazardous wastes in varying quantities: metal plating and other industrial waste solids; sludges and liquids; domestic sewage and sludges; painting residues, waste oils (including PCBs), and fuel; solvents, asphalt and coolant. Disposal practices in the past included burial of drummed and undrummed wastes in trenches, on-site burning, and deposition in unlined ponds. Numerous private and public wells are located within three miles of the installation. They tap a single aquifer to provide drinking water for over 100,000 people in the area. Local surface water is used for recreational and industrial purposes.

STATUS UPDATE

PA/SI

The Navy completed an Installation Assessment in December, 1981. Six sites were identified as having received hazardous materials and possessing a potential for contaminant migration. All were recommended for RI/FS characterization. No conclusive evidence was found of environmental contamination from any disposal sites. Chromium and lead were found in surface water streams, but well samples did not indicate that any contamination by toxic metals or pollutants had occurred. A confirmation study was recommended. Sites at this installation have been proposed for placement on the National Priorities List; HRS: 57.93.

RI/FS

Step one of the confirmation study was begun in June, 1982. As a result, groundwater flow patterns were determined; chromium (100 ppb) and di- and trichloroethane (16-66 ppb) were discovered in on-site wells at levels above EPA water quality standards; and VOCs and metals were identified in low concentrations at on-site wells. Groundwater and surface water were found to be free of acids, base/neutrals, and pesticides. It was also found that disposal sites were not leaching organic or inorganic compounds into the drinking water sources. Conclusions of the investigation were that groundwater contaminants did not come from on-base disposal sites.

RD/RA

Groundwater monitoring is ongoing.

MILAN ARMY AMMUNITION PLANT—INSTALLATION DESCRIPTION

Background Information

Milan Army Ammunition Plant occupies 22,544 acres, 5 miles west of Milan, in Gibson County, Tennessee. Its mission is the manufacture, storage, loading, shipment, and demilitarization of explosive ordnance, including large and small caliber ammunition. Operations in support of this mission include production of ammunition; pelletizing of explosives; rework and renovation of various items; operation of 7 active lines for loading ammunition; and previous operation of an ammonium nitrate plant.

Environmental Issues

Mission-support operations have generated hazardous wastes in various quantities including nitrates, TNT, RDX, paint, thinners, lead, mercury, acids, toluene, organic solvents, carbon tetrachloride, and cadmium. The following are examples of past disposal procedures: production wastewater discharged from treatment sumps to 11 combined settling ponds and open ditches that flow to streams; sediments dredged from ponds and stored on ground; two burning grounds and two demolition areas used for disposal of ammunition and contaminated combustible items. Over 13,000 people in this area depend on groundwater as a source of drinking water. Ten base and three city water supply wells are located less than 3 miles from an area of known groundwater contamination.

STATUS UPDATE

PA/SI

All PA/SI work was completed in 1978. Six past industrial and disposal areas contaminated with explosive wastes were identified. All six were targeted for RI/FS work. It was determined that surface drainage ditches and streams were contaminated with RDX, TNT, ZN, Cr, Fe, sulfates, phosphates, tetryl, and nitrobenzides (with potential for off-base migration). Sites at this installation were placed on the National Priorities List in July, 1987; HRS: 58.15.

RI/FS

Three surveys have been completed: a preliminary (1981), a contamination (1982), and an environmental (1983). Groundwater contaminant plumes migrating toward the base boundary were identified. Widespread low level contamination of ground and surface water and stream sediments was verified (TNT, RDX, DNT, Pb, Cr, Hg). It has been determined that groundwater concentrations slightly exceed EPA water standards. Regular sampling and analysis of existing wells is an ongoing task.

RD/RA

O-line settling ponds were closed in December, 1984. O-line ponds were capped and seeded with grass. Areas of suspected residual explosive contamination of surface soils were excavated to approximately 6 inches. A plan to install an additional well to monitor leaching of contaminants into groundwater, has been formulated. Ongoing post-closure maintenance of ground and structures (fences) continues.

AIR FORCE PLANT #4, FT. WORTH--INSTALLATION DESCRIPTION

Background Information

Air Force Plant #4 occupies 602 acres, in Fort Worth, Tarrant Co., TX. It is a General Dynamics GOCO plant that manufactures aircraft and associated equipment. Industrial operations include plating, painting, and degreasing; machine and tool servicing and coolant replacement; maintenance and testing of engines; fueling and defueling.

Environmental Issues

Industrial operations have resulted in the generation of hazardous wastes including solvents, paint residues, spent process chemicals, PCBs, waste oils and fuels. In the past, wastes were disposed of in waste and burn pits, landfills, wastewater collection basins; and discharged to sanitary, storm and industrial waste sewers. Some were removed by contract. Currently, wastes are placed in an EPA approved disposal facility and treated. There are approximately 13,000 people in the city of White Settlement who rely on the Paluxy aquifer, that underlies the base, for drinking water.

STATUS UPDATE

PA/SI

The Air Force completed PA/SI work in August, 1984. Twenty sites were studied and 10 were identified as potentially contaminated. Ground and surface water contamination involving di-, tri-, and tetra chloroethylene; ethylbenzene; toluene; methylene chloride; heavy metals; cyanide; and petroleum products was found. Sites at this plant were proposed for placement on the National Priorities List in July, 1987; HRS: 39.92.

RI/FS

RI/FS work commenced in April, 1987 and is presently ongoing.

RD/RA

Four contaminated sites have been cleaned up; the soil has been excavated. White Settlement monitoring wells are sampled on a quarterly basis by EPA. Future monitoring is planned.

LONE STAR ARMY AMMUNITION PLANT—INSTALLATION DESCRIPTION

Background Information

Lone Star Army Ammunition Plant occupies 15,546 acres, 12 miles west of Texarkana, in Bowie County, Texas. It operates as a GOCO plant run by Day and Zimmerman, Inc., for the production, loading, and demilitarization of explosives and munitions. Operations in support of this mission include loading, assembling, packing, demilitarization and renovation of ammunition and explosives.

Environmental Issues

Mission-support operations generated hazardous wastes in varying quantities. These included TNT, DNT, RDX, tetrazine, lead styphnate, lead azide, tetryl, octal, hexavalent chromium, copper, cadmium, lead, mercury, arsenic, nitrobenzenes, sulfates, and chlorides. Past disposal practices included burial of drummed and undrummed wastes in landfills, wells, and cisterns; disposal of explosives in demolition area black powder dump, and burning ground; and the discharge of wastes to chemical sludge ponds, settling pits, unlined pinkwater lagoons, and neutralization ponds. The possibility exists that potential groundwater contaminant migration off-base could affect approximately 1200 people that use private wells located within three miles of the base as a source of drinking water.

STATUS UPDATE

PA/SI

The Army completed an Installation Assessment in July, 1978. Twenty-eight areas of potential contamination were identified of which 24 were targeted for RI/FS characterization. Manufacturing, disposal, demolition, and lagoon areas were found to be contaminated with nitrobenzenes and heavy metals, and it was determined that the potential exists for contaminant migration beyond the base boundaries via surface and subsurface waters. It is also suspected that unexploded ordnance could be found in the testing and demolition areas. Sites at this installation have been placed on the National Priorities List; HRS 3185.

RI/FS

A Geotechnology Report was completed in May, 1982; a Quality Control Report was completed in August, 1982; a Contamination Analysis Report was also completed in 1982; and a Contamination Survey was completed in June, 1983. RI/FS work was initiated in 1987. The Contamination Survey investigated 14 areas of potential contamination. Heavy metal contamination was discovered in the groundwater at 8 areas, in the surface water at 2 areas, in the sediments at 1 area, and in the surface soils at 4 areas. In addition, small concentrations of sulfates, chlorides, DNT, and dieldrin were detected in the groundwater at 1 area; contaminant migration via groundwater was detected at 2 areas; and 5 areas were identified as having the potential for contaminant migration via groundwater and/or surface water.

RD/RA

The Chromic Acid (No. G) and O-line (So. O) ponds have been closed and are currently being monitored.

HILL AIR FORCE BASE—INSTALLATION DESCRIPTION

Background Information

Hill Air Force Base occupies 5,915 acres, 5 miles south of Ogden, in Davis and Weber County, Utah. Hill AFB was activated in the late 1940's as an aircraft rehabilitation center and prime storage depot for aircraft parts. In 1959, it served as the logistics command for the Minuteman missile and in 1968, managed the Maverick missile and AFLC Test Range. In 1979, the base assumed worldwide management of the F-16 aircraft. Its current mission as Ogden Logistics Center, ensures that Air Force weapon systems are kept at maximum operational capability (while maintaining cost efficiency), and that the Air Force constantly assumes a combat-ready posture. Operations in support of these missions include maintenance and repair of vehicles and aircraft; hazardous waste storage and paint stripping; and pesticide and herbicide utilization.

Environmental Issues

Mission-support operations have generated a variety of hazardous wastes such as sulfuric and chromic acids, methyl ethyl ketone, trichloroethylene, industrial sludge, solvent cleaning bottoms, solvents, and liquid petroleum wastes. In the past, disposal procedures included the following: burial of drummed and undrummed waste in landfills; evaporation of wastewaters from electroplating and industrial operations in an unlined pond; and discharge of chemicals to industrial, storm, and sanitary sewers and disposal pits.

STATUS UPDATE

PA/SI

The Air Force completed all PA/SI work in 1981. As a result, thirteen sites were identified as contaminant sources and four of these were selected for RI/FS characterization. Sites at this installation were placed on the National Priorities List in July, 1987; HRS: 49.94.

RI/FS

Stage two was completed in September, 1984. Groundwater and soil contamination was detected at the chemical disposal sites where high levels of COD, BOD, phenols, and solvents were discovered. A contaminant plume from the chemical disposal pits was identified but not completely defined at Landfill 3. In addition, groundwater contamination was detected below the Berman Pond. Additional studies were begun in 1985.

RD/RA

Hill AFB is currently installing a slurry wall and capping its landfills and chemical disposal pits to reduce leachate generation. Remedial actions have also begun at the pond site. On February 14, 1986, the Air Force signed an agreement with the EPA and the State, covering all site activities.

DEFENSE DEPOT OGDEN—INSTALLATION DESCRIPTION

Background Information

Defense Depot Ogden occupies 1,326 acres, near Ogden, Utah, in the Great Salt Lake Valley. Its mission, as a distribution depot, is the receipt, storage, maintenance, inventory, and issue of electronic, industrial and construction equipment, textiles, package petroleum and industrial/commercial chemicals, and other DLA (Defense Logistics Agency) assigned, centrally managed, non-ordnance items for support of all American military services and Federal civil agencies. Operations in support of this mission include maintenance, repair, and refurbishing of buildings, equipment, and vehicles; testing of food and other materials and field and electronic equipment; packaging and shipping; photographic and chemical laboratory work; electronics calibration; and recontainerizing of chemicals for storage on-site and/or shipment off-site.

Environmental Issues

Hazardous wastes generated by these operations include the following: paints and paint residues, solvents, thinners, acids, bases, waste oil and fuel, boiler blowdown, insecticides and pesticides, chemical warfare agents (mustard and phosgene gas, methyl bromide), metal plating wastewater and sludge, and PCBs. In the past, these wastes have been disposed of by means of burning in on-site pits; dumping in off-site landfills, burial of drummed and undrummed wastes in on-site trenches; discharge into sanitary sewers, storm sewers, septic tanks, and ditches; and pouring or spraying on the ground.

STATUS UPDATE

PA/SI

An Installation Assessment (IA) was completed by USATHAMA in March, 1980. Three areas were identified as potential contaminant migration sources and targeted for RI/FS work. It was concluded that past management practices were incompatible with current regulations and requirements. Post IA monitoring wells (installed by USAEHA) confirmed the existence of contaminants in the groundwater. A post IA geohydrologic study, designed to characterize geology and hydrology on-site, concluded that the aquifer is low yield and has low flow rates. The contaminants found in the aquifer (6 sites studied) included arsenic, chromium, vinyl chloride, benzenes, lead, nickel, aldrin, alpha- and beta-BHC, chlordane, endosulfan I, heptachlor, enoxide, mercury, and 111TCA; all of which were found at levels above the maximum allowable for human health. Sites at this installation were placed on the National Priorities List in July, 1987. The listing was prompted by the potential that exists for migration of contaminants to surface water from POL (petroleum/oil/lubricant) storage materials, from past usage of pesticides and herbicides, and from chemical burial sites. HRS: 45.10

RI/FS

RI/FS work was scheduled to begin in 1987.

TOOELE ARMY DEPOT—INSTALLATION DESCRIPTION

Background Information

Tooele Army Depot occupies 44,087 acres in Tooele County, Utah, in the west-central portion of the state. Its mission is to provide for the receipt, storage, issue, maintenance and disposal of assigned commodities (i.e., ammunition, combat vehicles, missiles, tires, test and topographic equipment, troop support items, construction equipment and power generators, chemicals and chemical weapons); to provide installation support to attached organizations; to store and maintain chemical munitions, and to maintain surveillance of ammunition. Other operations include the building and repair of locomotives, railcars and transport cars.

Environmental Issues

Operations in support of these missions generated the following hazardous wastes: heavy metals (Cr, Cd), detergents, grease and oils, acids, alkali, white phosphorus, mustard gas, plating wastes, PCBs, paint primer (Zn), photo chemicals and explosives. Disposal practices in the past consisted of discharging wastes to evaporation or percolation ponds; neutralization and thermal destruction of chemical agents and munitions; detonation and burning; and burial at the demilitarization range. As a result, groundwater may be threatened by possible contaminant migration from the waste sites. Plant and animal life in the area could also be affected.

STATUS UPDATE

PA/SI

The Army completed an Installation Assessment in June 1980. A reassessment was completed in June 1987. Contamination by heavy metals (Cr, As, Ni, Pb), petroleum and lubricants, PCB's, paint primer, and cleaning, plating and explosive wastes were all detected. In addition, the presence of x-ray developers, white phosphorus, pyromaterial, industrial chemicals, and radioactive materials was revealed. A potential for contaminant migration via groundwater does exist. Five sites were considered in the Reassessment and all appear to present a significant threat to the environment and to public health. In addition, explosives were discovered in the groundwater beneath the TNT washout pond, and there is a risk of diesel fuel contaminated groundwater seeping into below-ground structures. Sites at this installation were proposed for inclusion on the National Priorities List in July, 1987; HRS: 3832.

RI/FS

An Environmental Survey was completed in October, 1982. It indicated that trichloroethylene contaminant migration was moving from the industrial wastewater lagoon to the northern boundary on-base. It also noted the possibility of off-base contaminant migration.

DEFENSE GENERAL SUPPLY CENTER RICHMOND— INSTALLATION DESCRIPTION

Background Information

The Defense General Supply Center (DGSC) Richmond occupies 640 acres, 11 miles south of the City of Richmond, Virginia; 16 miles north of the city of Petersburg. Its mission, as part of Defense Logistics Agency (DLA), is to coordinate, organize, direct, and accomplish the management of general supplies to the Armed Forces, and to provide general Federal civilian supply support to more than 300,000 general supply items at a facility valued at \$100 million.

Environmental Issues

Industrial and other operations related to mission-support activities generated varying quantities of hazardous wastes, including oils, gases, solvents, paints and paint residues, corrosives, oxidizers, photographic chemicals, pesticides and herbicides, and refrigerants and anti-freeze. Standard procedures for disposal of these wastes, in the past, included on-site dumping or burial in landfills, storage, and burning during fire protection training. Numerous spills and leaks occurred at storage areas in the past. Currently hazardous wastes and unsalvageable chemicals are removed by an approved waste disposal contractor.

STATUS UPDATE

PA/SI

All PA/SI work at DGSC Richmond was completed in 1983. The study concluded that several potential contamination sources exist, and the water supply both on- and off-base has been contaminated with phenols, chloroform, methylene chloride, dichlorobenzene, di- tri- and tetrachloroethylene, and chromium. Six past spill and/or disposal sites were identified as having a high potential for contaminant migration, thus warranting further investigation during an RI/FS. Sites on this installation were listed on the National Priorities List in July, 1987; HRS: 3385.

RI/FS

Stages 1 and 2 of the RI/FS have been completed. These studies detected over 50 different toxic compounds in the soil and groundwater. Virginia drinking water standards were exceeded for phenols, lead, cadmium, chromium, trichloroethylene (concentrations as high as 5.2 ppm) of soils are contaminated with volatile and semi-volatile organic compounds, acidic compounds, base-neutral compounds, and hydrocarbons and phenols.

RD/RA

Phase 3 of the RI/FS is currently underway. It includes the installation of monitoring wells to define in more detail, both the sources of and the extent of groundwater contamination, and the collection of soil samples to confirm the existence and locations of known or suspected contaminant sources. This investigation will include both on- and off-site contamination. Limited remedial action to date, has been to drain the fire training pit, and infill it with the surrounding dike.

FORT LEWIS—INSTALLATION DESCRIPTION

Background Information

Fort Lewis occupies 86,541 acres, 20 miles northeast of Tacoma, in Pierce County, Washington. Its mission is to serve as the U.S. Army Forces Command Center for troop induction, training, embarkation, and debarkation; to administer and conduct basic and advanced level training; to plan and prepare for the commitment of assigned and attached units in response to Pacific, NATO, or other contingencies; and to supervise execution of the High Technology Test Bed Program. Operations include maintenance and repair of aircraft and vehicles; weapons repair and refinishing; neutralization of caustic paint stripping wastes and battery acids; and furniture refinishing.

Environmental Issues

Mission support operations have generated varying quantities of spent solvents, plating wastes, pesticides, PCBs, coal liquification wastes, polycyclic aromatic hydrocarbons, waste oils and fuels, battery electrolyte, trichloroethylene (TCE), asbestos, sodium hydroxide paint stripper, chromic and phosphoric acids, paints, paint strippers and thinners, neutralized caustic paint-stripping and battery electrolyte wastes. Standard practices for disposal of hazardous wastes have included disposal in landfills and pits; discharge of wastewaters into lagoons, the on-base storm drainage system, and surface waters; and on-site burning of wastes in fire training pits and at burning grounds.

STATUS UPDATE

PA/SI

The Army completed an Installation Assessment in September, 1983. A Concept Plan for Contamination Assessment was completed in August, 1984. These studies identified 26 sites potentially contaminated with hazardous wastes, of which 15 were recommended for further sampling during an RI/FS. No indication was found that off-base contaminant migration via surface or groundwater was, or had been occurring, although there was evidence of groundwater degradation from liquified coal production spillage. The lagoon sediment and underlying groundwater were found to be contaminated with polycyclic aromatic hydrocarbons (trichloroethylene), and hazardous chemicals were detected at landfill 5. Sites at this installation were final listed on the NPL in July, 1987; HRS: 52.78.

RI/FS

An investigation was completed in May, 1986. An RI/FS on the Logistics Center is approximately 60% complete, and an RI/FS on landfill 5 has been started. These investigations detected di- and trichloroethylene in groundwater beneath the Logistics Center, and found that contamination is flowing from the Center towards the American Lane Garden housing area. The contamination zone identified is approximately 10,000 feet long, 2,500 feet wide, and extends 80 feet below the land surface. RI/FS work has also identified three potential sources of TCE contamination.

RD/RA

An acid disposal pit was covered with earth in 1982. Future RD/RA projects at Fort Lewis include the testing and disposal of battery acid disposal pit sludge and then the closure of the pit; and the installation of a liner and leachate collection system at landfill 5.

McCHORD AIR FORCE BASE—INSTALLATION DESCRIPTION

Background Information

McChord Air Force Base occupies 7,199 acres, 1 mile south of Tacoma and 5 miles east-southeast of Puget Sound, in Pierce County, Washington. Formerly a bomber base, its current mission is to provide airlift of troops, cargo, equipment, passengers, and mail. The 62nd Military Airlift Wing serves as the host unit. Operations in support of this mission include maintenance and repair of aircraft, and airlift of troops and equipment.

Environmental Issues

Hazardous wastes generated by these operations include methylene chloride, chloroform, benzene, VOCs, arsenic, chromium, mercury, solvents, detergents, paints, hydraulic fluid, corrosion-removing compounds, di- and trichloroethylene, perchloroethylene, sodium cyanide, acids, trichloroethene, thinners, strippers, toluene, naphtha, pesticides, developer, fixer, arsenic, cadmium, copper, lead, and methyl chloride. Past disposal procedures included discharging industrial wastes to storm and sanitary sewer systems, surface waters, dry wells, and leaching/soakage pits; burning in trenches and fire training areas; burial in landfills; and ordnance demolition. Over 10,000 people located within 3 miles of the base depend on the aquifer partially underlying the base for safe drinking water.

STATUS UPDATE

PA/SI

The Air Force completed all PA/SI work in August, 1982. Thirty-four of the 62 disposal sites identified were targeted for RI/FS characterization. The 34 sites were then grouped into 10 areas. Di- and trichloroethylene were detected in the surface and groundwater, and it was determined that there was a potential for on- and off-base contaminant migration. Sites at this installation were placed on the National Priorities List in July, 1987. HRS: 43.24.

RI/FS

Investigations completed thus far include Stage 1 Presurvey (October, 1982), Reconnaissance Survey (June, 1983), Stage 2 (1985) for base; and a Feasibility Study (May, 1985), an Environmental Assessment (July, 1985), and Stage 1 (December, 1985), and Stage 2 (April, 1986) for American Lake Gardens Tract (ALGT). Low level contamination of groundwater on-base and surface drainage leaving base was detected. Contaminant migration in ALGT north and west of the base was confirmed. The plume was established to be 250 feet wide and present in the water column 40-70 feet below the ground surface. Quantities of di- and trichloroethylene were discovered at ALGT in excess of health department action levels. In addition, public water supply wells adjacent to the base were shut down due to low level concentrations of organic solvents and other priority pollutants.

RD/RA

A remedial action plan has been developed for 3 sites in Area D. Extending the Lakewood Water Supply District into ALGT as a new potable water system has been proposed.

NAVAL AIR STATION WHIDBEY ISLAND—INSTALLATION DESCRIPTION

Background Information

Naval Air Station Whidbey Island occupies 2,534 acres, just northeast of Seattle, on Whidbey Island, in Puget Sound, Washington. It was commissioned in 1942 to maintain and operate facilities and to provide services and material in support of operations of aviation activities and units of the operation forces of the Navy. Currently it is the home of the Electronic Warfare squadron (flying the EA-6B Pro- wler) and serves as the westcoast training and operations center for the A-6 "Intruder" attack bomber squads. It is also the center for US Navy and US Marine Corps reserve training in the Pacific Northwest. Operations in support of these missions include the repair and maintenance of seaplanes, propeller and jet aircraft, and base vehicles; and the maintenance of on-site buildings.

Environmental Issues

These mission-support operations have generated the following hazardous wastes: waste oils and fuels (JP-5, AVGAS), fuel sludges, solvents, painting residues, resins, laquers, thinners, cleaning compounds, glues, alodyne liquid, zyglow, caustic solvents, Freon, acid (battery electrolyte), boiler blowdown, coal pile leachate, phosphates, asphalt, PCBs, printing solutions and ordnance. In the past, these wastes have been disposed of by means of discharge on the ground, discharge into Puget Sound, or discharge into storm sewers, ditches, and oil pits; storage in underground tanks, road oiling, dumping in landfills, and burning in fire training exercises.

The groundwater is used extensively for water supply throughout much of Whidbey Island, and there is a possibility that contaminant migration could occur via ground- and surface water.

STATUS UPDATE

PA/SI

The Navy completed an Installation Assessment in September, 1984. Fifty-one past spill and/or disposal sites suspected of being contaminant migration sources were identified. Thirty-five of these were targeted for RI/FS characterization in 11 separate confirmation studies. It was concluded that several past disposal practices may have contributed to groundwater contamination. It was further noted that surface water runoff may have contaminated sediment and biota in nearshore areas around the island. Mitigation actions have been recommended at seven sites. Ault Field (HRS score of 48.48) and Seaplane Base (HRS score of 39.64) were repropoed for inclusion on the National Priorities List in July, 1987.

RI/FS

RI/FS work was begun in 1985.

NAVAL SUBMARINE BASE BANGOR—INSTALLATION DESCRIPTION

Background Information

Naval Submarine Base Bangor occupies 6,692 acres (including SUBASE Bangor and outlying areas), on the Kitsap Peninsula, 13 miles north of Bremerton, Washington. NSB Bangor was originally established in 1944 as a deep water transshipment port for ammunition and explosives. Its mission was to receive, renovate, maintain, store, and issue ammunition, explosives, expendable ordnance items and/or weapons, and technical ordnance material. It currently serves as a support base for Trident submarines. Operations in support of this mission include maintenance, storage, transfer and disposal of ordnance; maintenance and repair of on-base buildings, vehicles and equipment; refitting of Trident submarines; periodic decontamination and demilitarization; and fuel storage.

Environmental Issues

Mission-support operations have produced hazardous wastes such as PCBs, waste oil and grease, spent solvents, waste battery acid, pesticides, paints and painting residues, photographic chemicals, metal plating wastewater and sludge, and dyes. In the past, hazardous wastes have been disposed of by means of spreading and spraying on the ground; off-site removal by a licensed contractor; discharge into unlined pits, drainage ditches, sanitary sewers and storm sewers; storage of drummed waste for off-site removal; liquid wastes incineration; and deposition in an on-site landfill.

In 1971, a limited groundwater study was performed by NSB Bangor. Results indicated that TNT and RDX were contaminating the shallowest of three groundwater aquifers. The source of the contamination was determined to be a pit used for holding wastewater discharged from a projectile demilitarization process. One possible direction of the groundwater flow is to the north, where a small residential community is located approximately 0.5 miles away.

STATUS UPDATE

PA/SI

The Navy completed an Installation Assessment in June, 1983. Forty-two past industrial, disposal or spill sites were identified as being potentially contaminated and 12 were targeted for RI/FS work. Three groundwater aquifers were characterized and their potential contaminant pathways determined. The study also evaluated the potential for contamination in all three aquifers below the base from migration of on-site contaminants. TNT and RDX contamination was confirmed at the shallowest aquifer. The study also identified the following contaminants involved in on-base soil and surface water runoff: TNT, RDX, OTTO fuel, and ammonium picrate. In addition, an evaluation was made of the potential for contamination of nearby shoreline sediment from on-base surface water drainage (ditches and creeks). Site A (site used by the explosives team) was placed on the National Priorities List in July, 1987; HRS: 30.42.

RI/FS

RI/FS work commenced in 1984.

NAVAL UNDERSEA WARFARE ENGINEERING STATION KEYPORT— INSTALLATION DESCRIPTION

Background Information

Naval Undersea Warfare Engineering Station Keyport occupies 4,959 acres, 15 miles west of Seattle, Washington, on the Kitsap Peninsula. Originally, it was a still water range for testing of torpedoes. Its mission was expanded during World War II to include the proving, overhaul, and issue of torpedoes. The mission was scaled down in 1977. Operations in support of this mission have included the maintenance and repair of buildings and vehicles; the maintenance, assembly and testing of torpedoes; the refurbishing of torpedo containers; and the operation and maintenance of vessels and associated testing equipment.

Environmental Issues

These and other mission support operations generated varying quantities of hazardous wastes including the following: painting residues, thinners, and strippers; solvents, cleaners, and degreasers; deflocculant, contaminated fuel solids and rinsewaters; sewage and metal plating waste water and sludge; neutralized concentrated plating baths; waste oils and fuels; acids, caustics lag, and pesticide rinseate; dyes; ordnance and explosives wastes; and batteries. Standard practices for disposal of hazardous wastes in the past included disposal in landfills; discharge on the ground and into filtration beds, storm sewers, creeks and marine bays; on-site burning or demolition of ordnance; and storage in drums and underground tanks. Potential pollution receptors in and around the base include backup water wells, fish, shellfish and wildlife habitats along the shoreline.

STATUS UPDATE

PA/SI

The Navy completed an Installation Assessment in September, 1984. This study identified 23 past disposal or spill sites as potential contaminant migration sources; six were recommended for RI/FS and one recommended for mitigation action. The study concluded that past disposal practices have probably contaminated portions of a shallow aquifer and adjacent marsh, but confirmation of this is limited. Contamination of the deep or shallow aquifers off-site has probably not occurred. The IAS also concluded that potential off-site contamination of bay and marsh sediment may have an impact on oysters, fish, and shellfish living in them. Sites on this installation were repropose for listing on the National Priorities List in July, 1987; HRS: 33.60 (Score based on four sites, although facility scored as a single site).

RI/FS

The Navy began the first stage of an RI/FS in 1985.

TABLE A-2
PUBLIC COMMENTS AND EPA RESPONSE—
TCAAP FEDERAL FACILITIES AGREEMENT

Public Comments

Early Timetables and Deadlines: The City of St. Anthony criticized the Agreement for not having more deadlines. They suggested a set of deadlines implementing a final remedial action plan on September 1, 1988 and completing the Plan on January 1, 1989.

Health Assessment: The City of St. Anthony asks that a health assessment or health effects study be performed and completed by March 1, 1988. The comment expressed doubts that the Agency for Toxic Substances and Disease Registry (ATSDR) has sufficient resources to perform a study in a timely manner. Consequently the comment asks that the Agreement require a health assessment be conducted by an independent contractor.

EPA Response

U.S. EPA and MPCA are aware of the need for timelines. A sense that the TCAAP cleanup needed to be expedited was one of the driving forces behind the Inter-agency Agreement on TCAAP. In view of the fact that modifications to the schedules submitted by the U.S. Army are subject to U.S. EPA review and acceptance (Determination of Consistency), the U.S. EPA feels that incorporating deadlines in a signed document is less important than assuring rapid implementation of acceptable plans and deadlines submitted to the Agency. Schedules will be available to the public in published fact sheets and available to the public through the community relations staff of all three parties. Further information will be available through the Technical Review Committee established by the U.S. Army.

ATSDR is performing a health assessment using existing environmental data. ATSDR expects to complete this assessment in January 1988. The results will determine if additional health studies are necessary.

TABLE A-2 (Continued)
PUBLIC COMMENTS AND EPA RESPONSE—
TCAAP FEDERAL FACILITIES AGREEMENT

Public Comments

EPA Response

Investigation of all Hazardous Substances: The City of St. Anthony expressed concern that the list in the Agreement of substances to be analyzed (Table 3.7) does not include all substances in soil, groundwater, or surface water that have been detected at TCAAP. A list of the substances detected at TCAAP accompanies the comment.

All "sites" of contamination at the TCAAP will be analyzed initially for all substances on the hazardous substance list of the U.S. EPA. The substances specifically named in the Agreement are those that either help identify sources of contamination, are known indicator compounds or are otherwise specifically chosen as potential contaminants of concern.

The substances specifically reviewed may vary depending on the results of the initial screening for substances on the Hazardous Substances List. However, the U.S. EPA and MPCA do not find it necessary to do repeated routine analysis for all possible substances.

Reimbursement of St. Anthony and Private Party Costs: The Agreement covers all known costs incurred in connection with TCAAP by the U.S. EPA, MPCA and MDH. The City of St. Anthony commented that the City and various others have also incurred costs and should be reimbursed.

At the time of negotiations, there were no data definitively linking TCAAP to the contamination at St. Anthony or a number of other places. As a result the U.S. EPA and MPCA were unable to make definitive claims about past costs incurred by St. Anthony and others during negotiation of the Agreement. However, the Agreement does not require nor prohibit claims by others due to TCAAP contamination. These claims are simply outside the Scope of the Agreement.

Enforcement of Environmental Permits: The City of St. Anthony commented that actions under the Agreement are deemed to satisfy certain permit requirements. The City feels it has no assurances that actions under the Agreement will ameliorate its contamination problem and objects that the RCRA permit requirements are satisfied by the Agreement.

It is the intent of all parties that TCAAP be cleaned up successfully now, eliminating the necessity for a second cleanup under RCRA.

The City of St. Anthony is correct that any action at TCAAP may not ameliorate its problem. As mentioned in the response to the prior comment, there has not been a determination by the U.S. EPA or MPCA of the source of contamination at St. Anthony. TCAAP may not be the source and no impact on contamination at St. Anthony may occur due to activities at TCAAP. Appropriate action at non-TCAAP sources under RCRA or CERCLA are not restricted by the Agreement, however.

TABLE A-2 (Continued)
PUBLIC COMMENTS AND EPA RESPONSE—
TCAAP FEDERAL FACILITIES AGREEMENT

Public Comments

EPA Response

Judicial Review and Diligent Prosecution : The City of St. Anthony contends that Section XXXVII of the Agreement, by restricting the jurisdiction of the federal courts and narrowly defining "diligent prosecution," limits the ability of private parties to challenge the adequacy of removal or remedial actions.

The Agreement neither augments nor diminishes the right of private parties to bring suit. CERCLA itself defines the conditions under which private parties may challenge removal or remedial actions in the federal courts. The Agreement merely states what would be true in any case, i.e., that the Agreement can create no greater right to bring suit than that provided in CERCLA. With respect to "diligent prosecution," the definition given in the Agreement states U.S. EPA's, MPCA's, and the Army's view of the matter; but this definition would not necessarily bind a federal court. Hence, U.S. EPA maintains that Section XXXVII does not alter the standing of private parties who seek to challenge the adequacy of removal or remedial actions.

Area of Study: Bruce Loisch commented that some areas of contamination such as the Gross Golf Course well are not indicated on a map of the general area of study (Attachment 1 of the Agreement).

The Agreement clearly makes the U.S. Army responsible for its contamination, wherever that may be. The map (Attachment 1) is only a general indicator of the area and was drawn by MPCA to represent the area of study for the U.S. EPA funded Phase 1A conducted by the MPCA. As such, it does not necessarily indicate every area of contamination that will be addressed in the cleanup.

Comments on Attachment 2

Need for greater number of data points: Liesch maintains that more data points (e.g. additional wells are required in the 96-10-8 triangle.

U.S. EPA does not agree that more data will significantly improve the study.

Pumping Criteria: Liesch commented that the criteria of 1000 ug/l seemed high for source pumping controls and it may be better to continue pumping below 1000 ug/l in hopes of lowering the total volume of water to be treated.

U.S. EPA agrees that source pumping may continue at levels below 1000 ug/l based on the effectiveness (including environmental, and cost) of the pumping regime. The 1000 ug/l figure was a value selected for on site removal actions in general. It does not take into account the effects of the specific combination of remedial activities at a particular site.

TABLE A-2 (Continued)
PUBLIC COMMENTS AND EPA RESPONSE—
TCAAP FEDERAL FACILITIES AGREEMENT

Public Comments

EPA Response

Water Level Recorders: Liesch commented that continuous water level recorders should be installed on selected wells.

U.S. EPA believes that the frequency of measurement specified in the Agreement is adequate for the intended use of the data. Continuous recorders would produce greater volumes of data but would not produce a significantly better study.

South Plume: Liesch noted that the "South Plume," thought to emanate from building 502, is not specifically mentioned as an area to be addressed by the Prairie du Chien/Jordan gradient control system.

Section 2.2.1.2 of Attachment 2 requires contaminants in excess of criteria levels migrating in the southwest boundary of TCAAP to be captured without regard for the source. Thus the "South Plume" should be captured.

Minnesota Water Well Code: Liesch noted that the Section 2.3.2 did not mention the Minnesota prohibition to injection of treated groundwater.

If applicable to a specific remedy, such a prohibition would be a State ARAR (applicable or relevant and appropriate requirement) used in determining if the proposed remedy is acceptable. At this time no injection by wells is anticipated other than treated water from the Boundary Groundwater Recovery System reinjected via the gravel pit.

Comments on Attachment 3

Multi-part wells: Liesch suggests that multiport or multilevel wells be installed in the Hillside Sand and in the bedrock units.

Sampling of the bedrock levels is primarily to determine "break through" between the Hillside Sand and Prairie du Chien Aquifer. It is not necessary to sample the vertical distribution in the Prairie du Chien/Jordan Aquifer.

Vinyl Chloride: Liesch noted that the vinyl chloride criteria level was 2.015 and in error on Table 3.7A.

In copies of Table 3.7A presented for public comment there is no such error.

TABLE A-2 (Continued)
PUBLIC COMMENTS AND EPA RESPONSE—
TCAAP FEDERAL FACILITIES AGREEMENT

Public Comments	EPA Response
Surface Water Measurements of TCE: Liesch noted the absence of TCE in the parameters for surface water investigation.	TCE (trichlorethene) is not generally found in surface water because of its volatility. Hence, it was not included on the initial list of substances to be analyzed. However, for the sake of consistency all parties agree to include TCE in the substances to be measured.
RCRA Closure for Sites other than Source Areas D, F and G: Liesch commented that the Agreement should call for RCRA closure requirements for all new areas identified pursuant to the RI as well as the selected areas already known.	All source areas will be addressed under CERCLA. Under Section 122 of CERCLA RCRA rules are applicable, or relevant and appropriate requirements (ARARs), and as such, will be considered when U.S. EPA and MPCA determine a remedy for the site. As a result, all remediation under CERCLA will meet RCRA closure requirements.
Public Review of Workplans: Liesch expressed concern with the lack of input available regarding the specifics of workplans.	U.S. EPA maintains that the Technical Review Committee will allow public participation in the process at developing progress reports and work plans development. Moreover, the three parties will issue face sheets periodically.

TABLE A-2 (Continued)
PUBLIC COMMENTS AND EPA RESPONSE—
TCAAP FEDERAL FACILITIES AGREEMENT

Honeywell Comments

The following are comments from the Honeywell letter of September 9, 1987. This letter was received after the deadline, but is addressed because U.S. EPA could do so without delaying implementation of the Agreement.

Comments on Attachment 2

Honeywell Comment

Honeywell noted that Section 2.1.1.1 of Attachment 2 specified an approximate capture zone and comments that such a description is restrictive.

Honeywell commented that no allowances were made for testing and modification of the BGRS to meet capture criteria.

Honeywell commented that Section 2.1.1.2 of the Agreement requires that the wells for the Hillside Sand Gradient Control system be screened throughout the saturated thickness. Honeywell noted an existing well does not meet this requirement.

Sections 2.1.1.3, 2.1.2.3 and 2.2.1.3 provide for elimination of well pumping when monitoring results are below criteria for three consecutive quarters. This does not allow "scaling up" if objectives are not met.

EPA Response

The size of the capture zone will depend upon the concentration of contaminants in the "uncaptured" ground water. An approximate extent was given. But the actual capture zone may be smaller or larger.

Sections 2.1.1.3 and 2.2.1.3 provide for modification of the BGRS should adequate capture not be achieved, as determined by the effectiveness monitoring program (Sections 2.1.1.4 and 2.2.1.4).

U.S. EPA believes that if the one well in question meets capture criteria even though it is not screened throughout the saturated thickness, it is both logical and cost effective to use this well, rather than drill a new one.

Modifications to achieve criteria or objectives are specifically addressed in Part IV of the Agreement. Section 2.1.1.3, 2.1.2.3 and 2.2.1.3 all contain statements that operation of the system shall be adjusted to capture groundwater where contamination exists in excess of criteria levels.

TABLE A-2 (Continued)
PUBLIC COMMENTS AND EPA RESPONSE—
TCAAP FEDERAL FACILITIES AGREEMENT

Honeywell Comment	EPA Response
Section 2.1.2.1 provides for capture zones based on area (i.e., 500 feet either side of well S2a) or concentration. Source remediation should be based on the most effective and efficient remediation.	U.S. EPA, MPCA and the U.S. Army have determined that it is effective to clean up "hot spots" to at least some degree, rather than relying on a boundary control system. The area given for source control system barrier is approximate. Section 2.1.2.3 clearly states that concentrations of contaminants in groundwater are what define a "hot spot." Modifications of the criteria level concentrations may be requested by the U.S. Army for good reason including efficiency of remediation.
Section 2.2.1.1 develops criteria for the boundary gradient control system. The Prairie du Chien/Jordan Aquifer criteria for the system are based on both concentration and area. This could be contradictory.	The areal extent of capture is approximate. Section 2.2.1.3 clearly indicates that contaminant concentration is the measure of sufficient capture.
Section 2.5.4 requires submission of a report on the water balance study prior to discharge and should be changed to a submission thirty days after operation initiation of the Hillside Sand Gradient Control System (Boundary Groundwater Recovery System).	U.S. EPA has issued a Record of Decision in which it concurred with a workplan submitted by the U.S. Army with some modifications to the system. This plan contains the timetable mentioned in the comment and is due thirty days after operation of the BGRS.
Section 2.6 requires operation of the Prairie du Chien/Jordan system within 150 days of passing the Consistency Test. Honeywell noted this may not be possible.	The plans and schedule submitted by U.S. Army will be reviewed. U.S. EPA may alter the schedule if an adequate justification is presented. U.S. EPA is aware that construction during winter months proceeds slower than during summer.
Sections 3.1, 3.3 and 3.5 specifies a monitoring program that does not reflect wells that Honeywell installed for the purpose of its own monitoring	U.S. EPA will (and has) accepted any reasonable monitoring program. Equivalent wells as determined by the U.S. EPA and MPCA would pass the Consistency Test.

TABLE A-2 (Continued)
PUBLIC COMMENTS AND EPA RESPONSE—
TCAAP FEDERAL FACILITIES AGREEMENT

Honeywell Comment

EPA Response

Section 3.2 requires a Quality Assurance Project Plan (QAPP) submitted after a planning program. The commentator asks why there is not a set period of time for U.S. EPA review.

A well written QAPP is reviewable within the standard forty day period of Part XIV of the Agreement. However, Part XIV also notes that certain complex documents (such as QAPPs) may require longer periods. U.S. EPA's experience is that QAPPs are often poorly written and require several drafts and multiple conferences before an acceptable QAPP is submitted. Therefore, U.S. EPA maintains that complex documents such as QAPPs should not be subject to preset timetables.

Stormwater monitoring requirement on Table 2.1 is excessive since no surface water discharge is planned.

Any workplan that demonstrates to U.S. EPA and MPCA an adequate monitoring program will be considered.

Table 2.6 in the Agreement lists discharge conditions. Limitations should be based on a site-specific risk assessment and should not be "tacked into the document" before such a risk assessment is complete.

Table 2.6 establishes monitoring requirements for the Hillside Sand Gradient Control System/Boundary Groundwater Recovery System discharges to the gravel pit. We do not agree that new studies have to be performed to establish protective levels for discharge water. The Superfund program has a long history of using protective levels determined on risk-based values. In this case we have used 10^{-6} cancer risk and similar values for the protection of the public.

Tables 3.7A and 3.7B in attachment 3 have values for some parameters, such as vinyl chloride, that require special analytical techniques.

U.S. EPA feels that in order to protect public health, the monitoring should be able to detect substances at the criteria level. Anything less sensitive would not offer adequate protection. If a substance is lethal at 5 ppm but the technique only measures as low as 20 ppm, the monitoring program would be inadequate for protection of public health. If protection of human health requires special analytical techniques, special analytical techniques must be used.

APPENDIX B

INSTALLATION RESTORATION PROGRAM STATUS

Includes:

- Table B-1: Installation Restoration Program Status Summary
- Table B-2: State-by-State Installation Status
- Table B-3: Cumulative IR Response Actions Status

Table B-1
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
Installation Restoration Program Status Summary
(As of 30 September, 1987)

State	Number of		Number of								
	Instal-	Sites	PA/SI		RI/ES			RD/RA			
	lations		C	U	C	U	F	C	U	F	
ALASKA	60	379	264	1	11	287	10	5	60	82	
ALABAMA	11	69	37	1	10	47	4	3	9	4	
ARKANSAS	5	73	34	0	14	14	6	0	0	0	
ARIZONA	13	74	56	1	15	42	3	3	21	4	
CALIFORNIA	75	816	661	17	154	546	16	24	260	166	
COLORADO	9	224	216	0	9	208	3	0	22	10	
CONNECTICUT	3	6	4	0	0	4	0	0	0	4	
DISTRICT OF COLUMBIA	5	7	3	0	3	1	0	0	1	0	
DELAWARE	5	29	27	0	2	24	0	0	3	11	
FLORIDA	23	270	231	0	88	151	2	5	40	23	
GEORGIA	13	85	41	4	12	42	1	3	5	19	
GUAM	9	57	55	0	9	37	8	0	7	11	
HAWAII	30	98	76	5	38	39	4	6	11	15	
IOWA	4	31	8	0	0	8	0	0	1	2	
IDAHO	15	33	24	0	14	10	0	0	1	2	
ILLINOIS	15	114	41	2	19	26	3	0	1	8	
INDIANA	10	67	37	0	15	18	5	0	2	9	
KANSAS	8	43	33	0	14	14	8	2	0	8	
KENTUCKY	7	16	14	0	4	4	7	0	1	1	
LOUISIANA	7	81	44	2	6	35	6	1	2	4	
MASSACHUSETTS	13	123	96	0	17	70	13	10	50	13	
MARYLAND	21	90	73	9	34	36	7	0	8	22	
MAINE	8	33	7	1	10	13	7	0	0	5	
MICHIGAN	16	77	39	0	4	46	0	0	13	22	
MINNESOTA	4	40	39	0	7	31	1	3	5	5	
MISSOURI	12	99	28	6	16	18	3	14	3	8	
MISSISSIPPI	11	61	53	0	27	25	1	0	4	9	
MONTANA	4	23	22	0	2	20	0	0	0	0	
NORTH CAROLINA	10	81	59	0	56	17	0	12	6	2	
NORTH DAKOTA	6	16	14	0	3	10	0	0	0	5	
NEBRASKA	9	31	29	0	18	11	0	0	1	9	
NEW HAMPSHIRE	5	28	23	0	18	3	3	0	0	4	
NEW JERSEY	11	158	115	1	26	84	9	4	24	51	
NEW MEXICO	13	119	60	1	23	35	12	8	4	1	
NEVADA	7	55	31	15	5	42	1	2	0	17	
NEW YORK	25	129	87	3	27	60	8	4	12	10	
OHIO	16	117	91	0	13	81	1	0	47	25	
OKLAHOMA	23	88	82	0	34	49	0	1	3	10	
OREGON	6	39	19	0	2	11	0	0	1	17	
PENNSYLVANIA	22	121	64	2	34	26	3	2	15	11	
PUERTO RICO	8	26	23	0	9	14	0	0	14	0	
RHODE ISLAND	7	25	21	0	18	2	0	1	3	1	
SOUTH CAROLINA	14	122	91	4	15	79	0	3	22	50	
SOUTH DAKOTA	2	19	15	0	1	14	0	0	1	2	
TENNESSEE	16	82	39	0	14	26	3	0	3	9	
TRUST TERRITORIES	1	16	16	0	0	16	0	0	0	0	
TEXAS	40	332	241	1	42	204	3	2	52	47	
UTAH	12	66	53	0	5	46	4	2	17	2	
VIRGINIA	35	159	110	1	74	43	0	2	16	24	
VERMONT	2	4	3	0	1	2	0	0	0	2	
WASHINGTON	13	136	102	0	82	17	0	3	24	8	
WISCONSIN	9	42	28	1	15	14	0	1	2	7	
WEST VIRGINIA	5	13	12	0	3	9	0	0	2	2	
WYOMING	6	23	22	0	4	15	4	0	1	3	
Grand Total	739	5165	3735	78	1096	2733	169	126	800	786	

Table B-2
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
State by State Installation Status Listing
(As of 30 September, 1987)
Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
ALASKA								
ARMY								
CAMP CARROLL	1		1					
FORT GREELY				1				1
FORT RICHARDSON	1				1			
FORT WAINWRIGHT	4			4				
NAVY								
NARL POINT BARROW	2		1	1				
NAS ADAK	22			22				22
AIR FORCE								
ALASKAN DEWLINE	23			23		7		
CAMPION AFS	7			7		2		5
CANYON CREEK RRS				1		1		
CAPE LISBURNE AFS	6			6				
CAPE NEWENHAM AFS	6			6		1		
CAPE ROMANZOF AFS		1		2		1		
CLEAR AFB	5		1	11		12		
COLD BAY AFS	4			4		1		3
DUNCAN CANAL RRS				1		1		
EIELSON AFB	46		1	36	9	4		
ELMENDORF AFB	33		2	33		6		
FIRE ISLAND				1		1		
FORT YUKON AFS	6			6				6
GALENA AIRPORT	6			6				6
GOLD KING CREEK RADIO RELAY SITE				1		1		
GRANITE MOUNTAIN RRS				1		1		
INDIAN MOUNTAIN RESEARCH SITE	11			11		2		7
KING SALMON AFS	16		1	16		1		
KOTZEBUE	1		1	1		1		
MURPHY DOME AFS	8			8				6
NIKOLSKI RADIO RELAY SITE	1			1				1
OCEAN CAPE RADIO RELAY SITE				1		1		
PILLAR MOUNTAIN RRS	1			1				
PORT HEIDEN RADIO RELAY SITE				1		1		
SHEMYA AFB	21		1	40		1	14	18
SMUGGLERS COVE RADIO RELAY			1			1		
SOLDOTNA RRS			1			1		
SPARREVOHN AFS	8			8		1		7
TATALINA AFS	12			13		2		
TIN CITY AFS	12			12				
UNALAKALEET RRS	1			1				
ALASKA TOTALS	264	1	11	287	10	5	60	82

Table B-2
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
State by State Installation Status Listing
(As of 30 September, 1987)
Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
ALABAMA								
ARMY								
ALABAMA AAP	7		1	7		1	1	1
ANNISTON AD	2		2	5		1	6	
FORT MCCLELLAN	10		2	9				
FORT RUCKER	2		1		1			
HUNTSVILLE COE	1			1				
PHOSPHATE DEV WORKS				1			1	
REDSTONE ARSENAL	3		1		2			1
AIR FORCE								
DANNELLY FIELD ANG	6			6				
MAXWELL AFB	6	1	3	5	1	1	1	2
ALABAMA TOTALS	37	1	10	34	4	3	9	4
ARKANSAS								
ARMY								
PINE BLUFF ARSENAL	1				1			
AIR FORCE								
BLYTHEVILLE AFB	9			9				
LITTLE ROCK AFB	24		14	5	5			
ARKANSAS TOTALS	34	0	14	14	6	0	0	0
ARIZONA								
ARMY								
BUCKEYE	1		1					
FLORENCE	1		1					
FORT HUACHUCA	2		2		1	2		
NAVAJO ADA				1			1	
PAPAGO MILITARY RESERVATION	1							1
YUMA PROVING GROUND				2			1	1
NAVY								
MCAS YUMA	2		2					
AIR FORCE								
AFP NO.44, TUCSON	12		2	10			12	
DAVIS MONTHAN AFB	20		1	17	2		2	
LUKE AFB	7		5	3		1	5	
TUCSON IAP (ARIZONA ANG)		1						
WILLIAMS AFB	10		1	9				2
ARIZONA TOTALS	56	1	15	42	3	3	21	4

Table B-2
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
State by State Installation Status Listing
(As of 30 September, 1987)
Number of Sites

CALIFORNIA

ARMY

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
AFRC		1		1				
CAMP ELLIOTT		1		1				
CHINESE CAMP		1		1				
FORT CRONKITE		1		1				
FORT HUNTER LIGGETT	10		10			2	3	
FORT IRWIN	4		1	3		1	3	
FORT ORD	10		7	3		3		
HAMILTON ARMY AIR FIELD	3	1		1	2		1	
OAKLAND ARMY BASE				1			1	
PRESIDIO OF MONTEREY	3		2	1			1	1
PRESIDIO OF SAN FRANCISCO				1				1
RIVERBANK AAP	3			3			3	
SACRAMENTO AD	2		1	5			4	1
SHARPE AD	3			4			3	1
SIERRA AD	5		3	1	1			2
SLOUGHOUSE	1		1					

NAVY

CBC PORT HUENEME	9			9				9
MCAGCC 29 PALMS	9			9			3	6
MCAS EL TORO	15		1	14				12
MCAS TUSTIN	11		4	7		2		7
MCB CAMP PENDLETON	5		5					
MCLB BARSTOW	11		11					
MCMWTC BRIDGEPORT	1				1			
NAB CORONADO	4			4				4
NALF CROWS LANDING	1			1				
NAS ALAMEDA	7			7				7
NAS LEMOORE	12		1	11		1	1	10
NAS MIRAMAR	5			5				5
NAS MOFFETT FIELD	11			11	1		10	1
NAS NORTH ISLAND	5		5					
NCEL					1			
NCS STOCKTON	1	4		5			3	
NIROP SUNNYVALE		3		2				2
NS SAN DIEGO	3			3				3
NS TREASURE ISLAND		7		6				6
NSB SAN DIEGO	7			7				7
NSC STOCKTON				1				
NSY HUNTER'S POINT	14		1	13			2	9
NSY LONG BEACH	3		3			1		
NSY MARE ISLAND	7		6	1				1
NTC SAN DIEGO	5			5			1	4
NWC CHINA LAKE	17		16	1			1	
NWS CONCORD	14		3	11			1	9
NWS SEAL BEACH	9		9					
PMTC POINT MUGU	9			9				9

Table B-2
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
State by State Installation Status Listing
(As of 30 September, 1987)
Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
AIR FORCE								
AFP NO.19, SAN DIEGO					6		6	
AFP NO.42, PALMDALE	25		24	1				
AFP NO.70, FOLSOM	1							
BEALE AFB	21		1	19	1		1	
CASTLE AFB	28	1	1	28			5	2
EDWARDS AFB	27		16	11	1	6	9	
GEORGE AFB	23		6	18		6	7	2
LOS ANGELES AFS	6		3	4		2	1	
MARCH AFB	32		1	31				3
MATHER AFB	26	1		18			3	22
MCCLELLAN AFB	159			162	3		161	1
NORTON AFB	25		4	42			22	
ONIZUKA AFS	1				1			
TRAVIS AFB	24			20	4		2	16
VANDENBERG AFB	17			17				

DEFENSE LOGISTICS AGENCY

DDTC TRACY	2			3				2
DFSP NORWALK			1					1
DFSP OZOL	1		1	1				
DFSP SAN PEDRO			2				2	

CALIFORNIA TOTALS

661 17 154 546 16 24 260 166

COLORADO

ARMY

FORT CARSON	2		4	1				1
PUEBLO DEPOT ACTIVITY	2			2				1
ROCKY MOUNTAIN ARSENAL	152			152			1	

AIR FORCE

AFP PJKS	16			16			16	
BUCKLEY ANG	11		1	9			1	7
LOWRY AFB	15		4	10	3		4	1
PETERSON	8			8				
USAF ACADEMY	10			10				

COLORADO TOTALS

216 0 9 208 3 0 22 10

CONNECTICUT

NAVY

NSB NEW LONDON	4			4				4
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CONNECTICUT TOTALS

4 0 0 4 0 0 0 4

Table B-2
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
State by State Installation Status Listing
(As of 30 September, 1987)
Number of Sites

	PA/SI		RI/FS				RD/RA		
	C	U	C	U	F		C	U	F
DISTRICT OF COLUMBIA									
NAVY									
NDW WASHINGTON				1				1	
AIR FORCE									
BOLLING AFB	3		3						
DISTRICT OF COLUMBIA TOTALS	3	0	3	1	0		0	1	0
DELAWARE									
ARMY									
NEW CASTLE	1		1						
NIKE SITE, REHOBOTH	1		1						
AIR FORCE									
DOVER AFB	20		20				3		8
GREATER WILMINGTON APT (DE ANG)	5		4						3
DELAWARE TOTALS	27	0	2	24	0		0	3	11
FLORIDA									
ARMY									
CAMP BLANDING	1		1						
WEST PALM BEACH	1			1					
NAVY									
NAS CECIL FIELD	10		9	1			1		
NAS JACKSONVILLE	29		21	7	1		1	7	
NAS KEY WEST	9		5	4					4
NAS PENSACOLA	19		19				3		2
NAS WHITING FIELD	15		10	5			5		
NCSC PANAMA CITY	7			7					7
NS MAYPORT	9		5	4					3
NTC ORLANDO	5		5						
PWC PENSACOLA	1			1					
AIR FORCE									
CAPE CANAVERAL	12			12					
EGLIN AFB	32		4	27	1		1	8	1
HOMESTEAD AFB	9		2	9				2	
HURLBURT AFB	11			18				7	
JACKSONVILLE ANG	6			6					5
MACDILL AFB	19		3	17			2	2	
PATRICK AFB	17		1	16				2	1
TYNDALL AFB	18		3	15			1	2	

Table B-2
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
State by State Installation Status Listing
(As of 30 September, 1987)
Number of Sites

	PA/SI		RI/FS				RD/RA		
	C	U	C	U	F		C	U	F
DEFENSE LOGISTICS AGENCY									
DRMS	1			1				1	
FLORIDA TOTALS	231	0	88	151	2		5	40	23
GEORGIA									
ARMY									
FORT BENNING	1			5					5
FORT GILLEM				1					1
FORT GORDON			2						
FORT MCPHERSON			1						
FORT STEWART	1				1				
NAVY									
MCLB ALBANY	9			9				1	7
NSB KINGS BAY	1		1						
AIR FORCE									
AFP NO.6 MARIETTA		1		1					
DOBBINS AFB	5	2	2	5					5
MOODY AFB	7		2	6			1	3	
ROBINS AFB	17	1	4	15			2	1	1
GEORGIA TOTALS	41	4	12	42	1		3	5	19
GUAM									
NAVY									
NAS AGANA	14		1	10	2				10
NAVAL DENTAL CLINIC GUAM	1				1				
NAVMAG GUAM	1				1				
NS GUAM	1				1				
NSD GUAM	1				1				
NSRF GUAM	1				1				
PWC GUAM	14		7	7				6	1
AIR FORCE									
ANDERSEN AFB	22		1	20	1			1	
GUAM TOTALS	55	0	9	37	8		0	7	11
HAWAII									
ARMY									
DIAMOND HEAD CRATER	1		1						
NIKE SITE 3 AND 4	1		1						
WAIAWA GULCH	1		1						

Table B-2
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
State by State Installation Status Listing
(As of 30 September, 1987)
Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
NAVY								
COMNAVBASE PEARL HARBOR (NAVSTA)	2		1	1				1
COMNAVBASE PEARL HARBOR (NSC)	8		6	2				2
COMNAVBASE PEARL HARBOR (NSY)	6		5	1				
COMNAVBASE PEARL HARBOR (PWC)	3		2	1				1
COMNAVBASE PEARL HARBOR (SUPSHIP)	1		1					
MCAS KANEOHE BAY	5			5		1		4
NAS BARBERS POINT	3			3				3
NAVCAMS EASTPAC	4			4				4
NAVMAG LUALUALEI	3		3					
AIR FORCE								
BELLOWS AFS	1	1		1	1			
HICKAM AFB	17		10	7		6	4	
HICKAM POL	13			13				
KAALA AFS	3				3			
KAENA PT STATION		1		1				
WHEELER AFB	4	3	7				6	
HAWAII TOTALS	76	5	38	39	4	6	11	15
IOWA								
ARMY								
FORT DES MOINES	1							1
IOWA AAP	3			4			1	1
AIR FORCE								
DES MOINES ANG	4			4				
IOWA TOTALS	8	0	0	8	0	0	1	2
IDAHO								
ARMY								
ARCO AEC SITE	1		1					
BONNEVILLE	1		1					
BROKEN KETTLE TRAINING AREA	1		1					
BUHL	1		1					
GOODING	1		1					
GOWEN FIELD	1		1					
HAILEY	1		1					
IDAHO FALLS	1		1					
KELLY CANYON	1		1					
KIMANA	1		1					
ORCHARD RANGE	1		1					
SAINT ANTHONY	1		1					
TWIN FALLS CITY	1		1					

Table D-2
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
State by State Installation Status Listing
(As of 30 September, 1987)
Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
AIR FORCE								
GOWEN FIELD, BOISE ANG	6			6				2
MOUNTAIN HOME AFB	5		1	4			1	
IDAHO TOTALS	24	0	14	10	0	0	1	2
ILLINOIS								
ARMY								
FORT SHERIDAN				1				1
JOLIET AAP	2			2				1
MAINTENANCE CENTER, N.RIVERSIDE	1		1					
O'HARE IAP	1		1					
SAVANNA ADA	1			6				6
USA TRAINING AREA JOLIET		1						
NAVY								
NAS GLENVIEW	1			1				
NTC GREAT LAKES	7		7					
AIR FORCE								
CHANUTE AFB	15		1	14			1	
GREATER PEORIA ANG	1				1			
O'HARE AIR RESERVE	4	1	2	1	2			
SCOTT AFB	8		7	1				
ILLINOIS TOTALS	41	2	19	26	3	0	1	8
INDIANA								
ARMY								
AFRTA	1		1					
FORT BENJAMIN HARRISON	1				1			
INDIANA AAP				1				1
JEFFERSON PROVING GROUND	1				1			
NEWPORT AAP	5			2	3		1	1
NAVY								
NWSC CRANE	15		14	2			1	1
AIR FORCE								
FORT WAYNE ANG	1			1				
GRISCOM AFB	8			8				2
HULMAN ANG	5			4				4
INDIANA TOTALS	37	0	15	18	5	0	2	9

Table B-2
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
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(As of 30 September, 1987)
Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
KANSAS								
ARMY								
FORT LEAVENWORTH	1		1					
FORT RILEY	1		3			2		1
KANSAS AAP	1			1				
SMOKEY HILL	1		1					
SUNFLOWER AAP	10		1	1	8			1
AIR FORCE								
FORBES FIELD	6			6				3
MCCONNELL AFB	13		8	5				2
DEFENSE LOGISTICS AGENCY								
DIPEF ATCHISON				1				1
KANSAS TOTALS	33	0	14	14	8	2	0	8
KENTUCKY								
ARMY								
FORT CAMPBELL	2		1	2				1
FORT KNOX	1			1			1	
GREENVILLE	1		1					
LEXINGTON-BLUE GRASS ADA	8			1	7			
SOMERSET	1		1					
NAVY								
NOS LOUISVILLE	1		1					
KENTUCKY TOTALS	14	0	4	4	7	0	1	1
LOUISIANA								
ARMY								
FORMER NAAS-NEW IBERIA	1		1					
FORT POLK	7			2	5			
LOUISIANA AAP	4		1	4		1		4
NAVY								
NSA NEW ORLEANS	3		3					
AIR FORCE								
BARKSDALE AFB	22			21	1			
ENGLAND AFB	7	2	1	8			2	
LOUISIANA TOTALS	44	2	6	35	6	1	2	4

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Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
MASSACHUSETTS								
ARMY								
AUBURN	1		1					
CAMP EDWARDS	1			1				1
FORT DEVENS	5		1		4			
MATERIALS TECHNOLOGY LABORATORY	9			1	8			
NATICK R&D CENTER				1			1	
NAVY								
NWIRP BEDFORD	2			2				2
AIR FORCE								
HANSCOM AFB	14		5	9			5	
OTIS ANG	54			54	1		43	9
WESTOVER AFB	10		10	2		10	1	1
MASSACHUSETTS TOTALS	96	0	17	70	13	10	50	13

MARYLAND

ARMY								
ABERDEEN PRVG GRND, EDGEWOOD	9			9	1			5
ABERDEEN PRVG GRND, MICHAELSVILLE	1			1				
BLOSSOM POINT FIELD TEST ACTIVITY	7		1		6			
FORT MEADE	1		1					
JACHMAN RESERVE CENTER	1		1					
LAUDERICK CREEK TRAINING AREA	1		1					
NIKE SITE 3	1		1					
NIKE SITE 79	1		1					
NIKE SITE, PHOENIX				1			1	
NIKE SITE, WAYLAND	1		1					
PHOENIX MILITARY RES				1				1
NAVY								
NAS PATUXENT RIVER	15	2	11	4			3	1
NIROP CUMBERLAND	7		6	1				1
NOS INDIAN HEAD	3		3				2	
NSWC WHITE OAK	7		6	1				1
NYC BAINBRIDGE	3			3				
AIR FORCE								
ANDREWS AFB	14			15			2	13
MARTIN AIRPORT ANG	1	7	1					
MARYLAND TOTALS	73	9	34	36	7	0	8	22

Table B-2
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Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
MAINE								
ARMY								
BANGOR IAP	1		1					
CASWELL	1		1					
RILEY-BOG BROOK	1		1					
NAVY								
NAS BRUNSWICK	7		7					
AIR FORCE								
LORING AFB	19	1		13	7			5
MAINE TOTALS	29	1	10	13	7	0	0	5
MICHIGAN								
ARMY								
CAMP GRAYLING AIRFIELD	1							1
CUSTER RFTA	1		1					
DETROIT ARSENAL	1							1
FORT CUSTER RECREATION AREA	1		1					
NIKE SITE 58	1		1					
AIR FORCE								
K.I.SAWYER	12			13				4
PHELPS COLLINS ANG	8			8				8
SELFIDGE ANG	9		1	7				8
W.K. KELLOGG REGIONAL AIRPORT	5			5				
WURTSMITH AFB				13			13	
MICHIGAN TOTALS	39	0	4	46	0	0	13	22
MINNESOTA								
ARMY								
TWIN CITIES AAP	16		1	15			4	
NAVY								
NIROP MINNEAPOLIS	3		1	2				2
AIR FORCE								
DULUTH IAP	13		1	11	1			
MINN ST. PAUL IAP	7		4	3		3	1	3
MINNESOTA TOTALS	39	0	7	31	1	3	5	5

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(As of 30 September, 1987)
Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
MISSOURI								
ARMY								
CAMP CLARK	1		1					
FORT LEONARD WOOD	2		1	1		1		
LAKE CITY AAP	1			3			2	1
NIKE SITE 30	1		1					
ST. LOUIS AAP	1				1			
WELDON SPRING TRAINING AREA	1			1				
WELDON SPRINGS CHEMICAL PLANT				1			1	
AIR FORCE								
RICHARDS GEBAUR	7	6	13			13		
WHITEMAN AFB	14			12	2			7
MISSOURI TOTALS	28	6	16	16	3	14	3	8
MISSISSIPPI								
ARMY								
CAMP MCCAIN	1		1					
NAVY								
CBC GULFPORT	10		10					
NAS MERIDIAN	1			1				
AIR FORCE								
COLUMBUS AFB	25		16	8				1
GULFPORT NOBC				1			1	
KEESLER AFB	16			15	1		3	8
MISSISSIPPI TOTALS	53	0	27	25	1	0	4	9
MONTANA								
ARMY								
FORT MISSOULA	1		1					
LIMESTONE HILLS	1		1					
AIR FORCE								
MAJNSTRAM	20			20				
MONTANA TOTALS	22	0	2	20	0	0	0	0

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Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
NORTH CAROLINA								
ARMY								
FORT BRAGG	1		1					
OMS 17	1		1					
NAVY								
MCAS CHERRY POINT	14		13	1				1
MCB CAMP LEJEUNE	24		23	1				1
AIR FORCE								
POPE AFB	6		17	3		12	3	
SEYMOUR-JOHNSON AFB	13		1	12			3	
NORTH CAROLINA TOTALS	59	0	56	17	0	12	6	2
NORTH DAKOTA								
ARMY								
GARRISON	1		1					
WILLISTON	1		1					
AIR FORCE								
GRAND FORKS AFB	3			3				1
HECTOR ANG (ND ANG)	6		1	4				4
MINOT AFB	3			3				
NORTH DAKOTA TOTALS	14	0	3	10	0	0	0	5
NEBRASKA								
ARMY								
CAMP ASHLAND	1		1					
CORNHUSKER AAP	1		1				1	
HASTING	1		1					
LINCOLN	1		1					
MEAD	1		1					
STANTON	1		1					
STAPLETON	1		1					
AIR FORCE								
LINCOLN ANG	6			6				6
OFFUTT AFB	16		11	5				3
NEBRASKA TOTALS	29	0	18	11	0	0	1	9

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Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
NEW HAMPSHIRE								
ARMY								
HOPINGTON WEST	1		1					
NAVY								
NSY PORTSMOUTH	2		2					
AIR FORCE								
NEW BOSTON AFS	3				3			
PEASE AFB	17		15	2				4
DEFENSE LOGISTICS AGENCY								
DFSP NEWINGTON				1				
NEW HAMPSHIRE TOTALS	23	0	18	3	3	0	0	4
NEW JERSEY								
ARMY								
FORT DIX	17		1	16				1
FORT MONMOUTH	1		1					
MILITARY OCEAN TERMINAL, BAYONNE	2		1	1				1
PICATINNY ARSENAL	11		3	3	8	3	1	1
NAVY								
NAEC LAKEHURST	43		11	38		1	2	36
NAPC TRENTON	8		8					
NWS EARLE COLTS NECK	11			5				12
AIR FORCE								
MCGUIRE AFB	22	1	1	21	1		21	
NEW JERSEY TOTALS	115	1	26	84	9	4	24	51
NEW MEXICO								
ARMY								
CARLSBAD	1		1					
DEMING	1		1					
DONA ANA RANGE	1		1					
FORT WINGATE ADA	5				5			
SANTE FE	1		1					
TAOS	1		1					
YUCOUNMOARI	1		1					
WALKER ANNEX	1		1					
WHITE SANDS MISSILE RANGE	3			2	1			

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Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
AIR FORCE								
AFP NO.83, ALBURQUERQUE	11			11				
CANNON AFB	17		5	11	1			
HOLLOMAN AFB	11	1		10	3		2	
KIRTLAND AFB	6		11	1	2	8	2	1
NEW MEXICO TOTALS	60	1	23	35	12	8	4	1
NEVADA								
ARMY								
HAWTHORNE AAP	4		3	3		2		2
INDIAN SPRINGS RANGE	1		1					
RENO	1		1					
NAVY								
NAS FALLON		15		15				15
AIR FORCE								
NELLIS	25			24	1			
NEVADA TOTALS	31	15	5	42	1	2	0	17
NEW YORK								
ARMY								
FORT DRUM	4		3		1	2		
FORT HAMILTON				1				
MALONE	1		1					
NIAGARA FALLS AFRC	1		1					
NIKE SITE 24	1		1					
OLEAN	1		1					
ROCHESTER	1		1					
SENECA AD			1			1		
TICONDEROGA	1		1					
WATERLOO ARSENAL	1			1				1
YOUNGSTOWN TRAINING	1		1					
NAVY								
NWIRP CALVERTON/BETHPAGE	7		7					
AIR FORCE								
AFP NO.38, LEWISTON	10			10				
AFP NO.59, JOHNSON CITY	4		1	3			1	1
GRIFFISS AFB	11	1	3	7	5	1	4	1
HANCOCK FIELD	9		2	7			2	
NIAGARA FALLS IAP	13	1	1	13				
PLATTSBURGH AFB	9	1	1	11			2	1

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(As of 30 September, 1987)
Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
STEWART ANG	3			3			2	
SUFFOLK ANG	9		1	4	2		1	6
NEW YORK TOTALS	87	3	27	60	8	4	12	10
OHIO								
ARMY								
BLUE ROCK	1		1					
CAMP SHERMAN	1		1					
NIKE SITE 78	1		1					
RAVENNA AAP	3		1	2				
AIR FORCE								
AFP NO.36, EVANDALE	3			3			2	
AFP NO.85, COLUMBUS	7		5	2				1
NEWARK AFS	7			7				
RICKENBACKER ANG	22			22				22
WRIGHT-PATTERSON AFB	42			44	1		41	1
YOUNGSTOWN	4		4				4	
DEFENSE LOGISTICS AGENCY								
DCSC COLUMBUS				1				1
OHIO TOTALS	91	0	13	81	1	0	47	25
OKLAHOMA								
ARMY								
ARMY AVIATION SUPPORT FACILITY	1		1					
CAMP GRUBER	1		1					
COMBINED SUPPORT MAINTENANCE SHOP	1		1					
FORT SILL	1		1					
HUGO	1		1					
KEGLEMAN AUX FIELD	1		1					
MCALESTER AAP								
OMS 1				1				
OMS 10	1		1					
OMS 11	1		1					
OMS 14	1		1					
OMS 15	1		1					
OMS 2	1		1					
OMS 5	1		1					
OMS 6	1		1					
OMS 8	1		1					
PERRY	1		1					

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Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
AIR FORCE								
AFP NO.3, TULSA	8		7	1				
ALTUS AFB	10			10			1	8
TINKER AFB	26		4	22		1	2	2
VANCE AFB	22		7	15				
OKLAHOMA TOTALS	82	0	34	49	0	1	3	10
OREGON								
ARMY								
CAMP ADAIR	1		1					
REDMOND	1		1					
UMATILLA ADA	1			2				2
AIR FORCE								
KINGSLEY FIELD	8							8
MOUNT HEBD AFS				1			1	
PORTLAND ANG	8			8				7
OREGON TOTALS	19	0	2	11	0	0	1	17
PENNSYLVANIA								
ARMY								
EAST JADWIN DAM	1		1					
FORT INDIANTOWN GAP	1				1			
FORT MIFFLAN	1		1					
LETTERKENNY ARMY DEPOT	4		1	3			2	1
LOCK HAVEN	1		1					
NEW CUMBERLAND AD	3		2	1		1	1	
NIKE SITE 93	1		1					
NIKE SITE, FINLEYVILLE	1		1					
NIKE SITE, GASTONVILLE	1		1					
TOBYHANNA AD	4		1	2	2	1	1	1
NAVY								
NADC WARMINSTER	9							9
NAS WILLOW GROVE	10		10					
NSY PHILADELPHIA	8		6	2			1	
SPCC MECHANICSBURG	4		4					
AIR FORCE								
GREATER PITTSBURGH IAP	8			8				
OLMSTED FIELD		2	1	6			7	
WILLOW GROVE ARF	7		3	4			3	
PENNSYLVANIA TOTALS	64	2	34	26	3	2	15	11

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Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
PUERTO RICO								
ARMY								
CAMP SANTIAGO	1		1					
FORT ALLEN	1		1					
NAVY								
NS ROOSEVELT ROADS	16		2	14			14	
NSGA SEBANA SECA	2		2					
SUPSHIP SAN JUAN	3		3					
PUERTO RICO TOTALS	23	0	9	14	0	0	14	0
RHODE ISLAND								
ARMY								
CAMP FOGARTY	1		1					
NIKE SITE 99	1		1					
U.S. ARMY RESERVE CENTER			1			1		
NAVY								
CBC DAVISVILLE	13		10	2		2	1	
NETC NEWPORT	6		5			1		
RHODE ISLAND TOTALS	21	0	16	2	0	1	3	1
SOUTH CAROLINA								
ARMY								
CLARKS HILL RESERVATION	1		1					
NAVY								
MCAS BEAUFORT	13			13				12
MCRD PARRIS ISLAND	6			6				6
NS CHARLESTON				1		1		
NSY CHARLESTON	14		9	5				
NWS CHARLESTON	8			9		7	2	
AIR FORCE								
CHARLESTON AFB	22	2	2	17		1	2	22
MCENTIRE ANG	9			9				8
MYRTLE BEACH AFB	11	1	1	11		1	11	
SHAW AFB	7	1		8				
DEFENSE LOGISTICS AGENCY								
DFSP CHARLESTON			1				1	
ORMO CHARLESTON			1			1		
SOUTH CAROLINA TOTALS	91	4	15	79	0	3	22	50

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Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
SOUTH DAKOTA								
AIR FORCE								
ELLSWORTH AFB	13		1	12			1	
JOE FOSS	2			2				2
SOUTH DAKOTA TOTALS	15	0	1	14	0	0	1	2
TENNESSEE								
ARMY								
AEDC TULLAHOMA	1		1					
CATOOSA RANGE	1		1					
HOLSTON AAP	1			1	1			
JOHN SEVIER	1		1					
MILAN AAP	2		2					
SMYRNA AIRPORT	1		1					
VOLUNTEER AAP	2		1	1	1		1	1
NAVY								
NAS MEMPHIS	7		5	2				1
NWIRP BRISTOL	5			5				5
AIR FORCE								
ARNOLD AFB	17		1	16			2	
DEFENSE LOGISTICS AGENCY								
DDMT MEMPHIS	1		1	1	1			2
TENNESSEE TOTALS	39	0	14	28	3	0	3	9
TRUST TERRITORIES								
AIR FORCE								
WAKE ISLAND AIRFIELD	16			16				
TRUST TERRITORIES TOTALS	16	0	0	16	0	0	0	0
TEXAS								
ARMY								
ADDICKS RESERVOIR	1		1					
BARKER DAM DZ	1		1					
CAMP BARKELEY	1		1					
CAMP BULLIS	1		1					
CAMP SWIFT	1		1					
CORPUS CHRISTI AD			1				1	
DECATUR	1		1					

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Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
FORT BLISS	1			2			1	
FORT WOLTERS	1		1					
LONE STAR AAP	6		4	3		1	1	1
LONGHORN AAP	1		1	2			1	
NIKE SITE 80	1		1					
PANHANDLE TRAINING AREA	1		1					
RED RIVER ARMY DEPOT				3			2	1
RESERVOIR TEXARCANA	1		1					
WEST CLEVELAND	1		1					
NAVY								
NAS CHASE FIELD	4		4					
NAS CORPUS CHRISTI	6		4	1	1		4	
NAS DALLAS	5			5			5	
NAS KINGSVILLE	8		7	1				
NWIRP DALLAS	9			9			9	
NWIRP MCGREGOR	7		7					
AIR FORCE								
AFP NO.4, FT. WORTH	22			22			22	
BERGSTROM AFB	12		1	11				4
BROOKS AFB	10			10			1	
CARSWELL AFB	11	1		12				3
DYESS AFB	6			7			1	
ELLINGTON ANG	3			2				2
GOODFELLOW AFB	5		1	3	1		1	1
KELLY AFB	35			35			3	2
LACKLAND	20			22	1			9
LAUGHLIN	13			9			1	0
RANDOLPH AFB	14			14				5
REESE AFB	16		1	15				2
SHEPPARD AFB	16			16				14
TEXAS TOTALS	241	1	42	204	3	2	52	47
UTAH								
ARMY								
CAMP WILLIAMS	1		1					
DUGWAY PROVING GROUND	2		1	1		1		
TOOELE AD	12		2	8	3	1	1	2
NAVY								
NIROP MAGNA	2		1	1				
AIR FORCE								
AFP NO.78, CORINNE	6			6			6	
HILL AFB	29			29	1		10	

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	PA/SI		RI/FS				RD/RA		
	C	U	C	U	F		C	U	F
DEFENSE LOGISTICS AGENCY									
DDOU OGDEN	1			1					
UTAH TOTALS	53	0	5	46	4		2	17	2
VIRGINIA									
ARMY									
BYRD FIELD	1		1						
CALLAGHAN	1		1						
FORT A.PHILL	4		4	2			1		
FORT BELVOIR	1		1						1
FORT EUSTIS	2		1	1					
FORT STORY	1			1					
NG VA BEACH	1		1						
RADFORD AAP	2			2				1	
RICHLANDS	1		1						
WOODBIDGE RESEARCH FACILITY	1		1				1		
NAVY									
FCTC DAM NECK	4		4						
MCDEC QUANTICO	7		1	6				6	
NADEP NORFOLK				1				1	
NAS NORFOLK				1				1	
NAS OCEANA	6		6	1				1	
NAVPHIBASE LITTLE CREEK	6		6						
NRS DRIVER VA	3		3	1					1
NSC CHEATHAM ANX WILLIAMSBURG	20		20						
NSC NORFOLK	5		5						
NSWC DAHLGREN	6		6					3	
NSY (NORFOLK) PORTSMOUTH	10		4	6					5
NWS YORKTOWN	15			15					15
PWC NORFOLK	5		4	1				1	
AIR FORCE									
BYRD ANG (RICHMOND IAP)	1			1					
LANGLEY AFB	2	1	1	2				2	
DEFENSE LOGISTICS AGENCY									
DGSC RICHMOND	5		3	2					2
VIRGINIA TOTALS	110	1	74	43	0		2	16	24
VERMONT									
ARMY									
ETHAN ALLEN FIRING RANGE	1		1						

Table B-2
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
State by State Installation Status Listing
(As of 30 September, 1987)
Number of Sites

	PA/SI		RI/FS			RD/RA		
	C	U	C	U	F	C	U	F
AIR FORCE								
BURLINGTON IAP (VERMONT ANG)	2			2				2
VERMONT TOTALS	3	0	1	2	0	0	0	2
WASHINGTON								
ARMY								
CAMP MURRAY	1		1					
CAMP SEVEN MILE	1		1					
FORT LEWIS	4		3	1		1		2
NIKE SITE 13-14	1		1					
NIKE SITE 43	1		1					
YAKIMA FIRING CENTER	1		1					
NAVY								
NAS WHIDBEY ISLAND	37		37					
NSB BANGOR	16		16					
NSY PUGET SOUND	1		1					
NUWES KEYPORT	6		5	1				1
AIR FORCE								
FAIRCHILD AFB	14		5	9			11	
MCCHORD AFB	19		10	6		2	13	5
WASHINGTON TOTALS	102	0	82	17	0	3	24	8
WISCONSIN								
ARMY								
BADGER AAP	5		2	4		1	2	
CAMP WILLAMS	1		1					
CAMP WISMER	2		2					
INO RANGE	1		1					
RACINE	1		1					
TRUAX FIELD	1		1					
AIR FORCE								
GEN. MITCHELL FIELD	4		4					
TRUAX FIELD		1						
VOLK FIELD ANG	13		3	10				7
WISCONSIN TOTALS	28	1	15	14	0	1	2	7

Table B-2
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
State by State Installation Status Listing
(As of 30 September, 1987)
Number of Sites

	PA/SI			RI/FS				RD/RA		
	C	U		C	U	F		C	U	F
WEST VIRGINIA										
ARMY										
HINTON		1			1					
VOLCANO RANGE		1			1					
WEST VIRGINIA ORDNANCE WORKS		7			1	6			2	
AIR FORCE										
EWVRA SHEPHERD FIELD		3				3				2
WEST VIRGINIA TOTALS	12	0		3	9	0		0	2	2
WYOMING										
ARMY										
AASF, CHEYENE		1			1					
LANDEL		1			1					
LOVELL		1			1					
SHERIDAN		1			1					
AIR FORCE										
CHEYENNE ANG (WYOMING ANG)						1				1
F.E. WARREN AFB		18			14	4			1	2
WYOMING TOTALS	22	0		4	15	4		0	1	3

Table B-3
DEPARTMENT OF DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
Cumulative IR Response Actions Status
(as of September 1987)

PA/SI

SERVICE	Number of Sites			
	C	S	U	F
ARMY	608	158	2	0
NAVY	913	27	31	0
AIR FORCE	2203	13	45	0
DLA	11	0	0	0
GRAND TOTAL	3735	198	78	0

RI/FS

SERVICE	Number of Sites			
	C	S	U	F
ARMY	245	259	356	78
NAVY	499	324	428	12
AIR FORCE	342	878	1937	78
DLA	10	12	12	1
GRAND TOTAL	1096	1473	2733	169

RD/RA

SERVICE	Number of Sites			
	C	S	U	F
ARMY	33	72	60	66
NAVY	6	164	112	317
AIR FORCE	86	374	624	394
DLA	1	5	4	9
GRAND TOTAL	126	615	800	786

C = Total number of sites completed by end of FY87
S = Number of new starts in FY87
U = Number of sites underway at end of FY87
F = Number of sites scheduled for new study/action (FY88 or beyond)