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# DEFENSE ENVIRONMENTAL RESTORATION PROGRAM



## ANNUAL REPORT TO CONGRESS

for  
Fiscal Year 1989

February 1990

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*"Federal facilities should lead the way in environmental compliance."*

**- President George Bush**  
1988 presidential campaign



*"This Administration wants the United States to be the world leader in addressing environmental problems and I want the Department of Defense to be the Federal leader in agency environmental compliance and protection."*

**- Secretary of Defense Cheney**  
October 10, 1989

# DoD Environmental Commitment

**C**onsistent with the direction of President Bush and Secretary Cheney, DoD is working to incorporate an environmental ethic into all defense activities.

Two primary objectives underlie this effort: the protection of long-term access to the air, land and water needed to sustain mission capability; and the enhancement of the quality of life and the environment. To accomplish those objectives, the Department of Defense has established six specific goals:

- *Performing environmental impact analyses and conducting environmental planning early in the acquisition process;*
- *Identifying resources to meet environmental requirements using established programming and budgeting procedures;*
- *Maintaining internal communication programs so that DoD leaders and managers are aware of environmental requirements as well as external communication programs that provide interested communities with information about DoD's environmental activities and compliance efforts;*
- *Minimizing pollutants from DoD installations and operations worldwide;*
- *Maintaining feedback systems so that each organizational level has sufficient information to comply with DoD environmental requirements; and*
- *Implementing management procedures that ensure the Department has the right people at the right place with the right training.*

# Foreword

I am pleased to provide the Congress with this report on the accomplishments of the Department of Defense Environmental Restoration Program for Fiscal Year 1989. In keeping with the commitments made by President Bush and Secretary Cheney, the Department is leading the way among Federal agencies in the investigation and cleanup of its facilities. This year has seen significant progress on several fronts.

- *We are moving quickly towards the cleanup of the worst DoD sites and maintaining steady progress at lower-priority sites.*
- *The completion of a sophisticated system for establishing priority of cleanup resources among sites and improvements in program tracking across all DoD components has strengthened our management of the Installation Restoration Program.*
- *Research and development of better methods for site investigation and clean-up is improving the speed and cost-effectiveness of many of these activities.*
- *Efforts to prevent future pollution have received increased emphasis with the establishment of new policies, procedures and responsibilities for reducing the use of hazardous materials at DoD installations.*

In 1989, we increased our emphasis on including the U.S. Environmental Protection Agency and the states as full partners in our efforts. As a result, the number of completed Interagency Agreements for National Priorities List site cleanups rose from 1 to 19. This dramatic increase in signed Agreements in 1989 is a clear indication of the benefits of such cooperation.

The primary commitment of the Defense Environmental Restoration Program remains the evaluation and remediation of DoD installations. To this end, 93 percent of the Program's Fiscal Year 1989 funding was devoted to Installation Restoration Program activities. The number of sites under this Program grew by 77 percent in 1989 to approximately 14,400. In addition, EPA has added an additional 38 DoD installations to the facilities proposed and listed on the National Priorities List, a 78 percent increase in the number of DoD installations.

By the end of Fiscal Year 1989, Preliminary Assessments/Site Inspections had been completed at almost 14,000 of DoD's Installation Restoration Program sites. Likewise, Remedial Investigations/Feasibility Studies were completed at over 1,000 of the sites requiring such studies and are underway at over 3,200 additional sites. By the end of 1989, cleanups had been initiated or completed at almost 1,200 sites. Although this progress represents significant effort and achievement, much remains to be done.

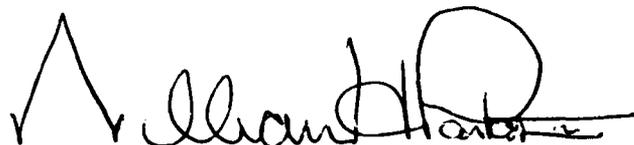
Our mission is clear. We must remain committed to completing actions at sites as quickly and cost-effectively as possible, starting with those presenting the highest risk to public health and the environment. We also must continue to expand our technical capabilities for site remediation and further improve our management procedures. Most importantly, we must build on the momentum established thus far. These goals represent significant challenges to the Department. But they can and will be accomplished.

We have established environmental leadership as a top priority in DoD, not just in the evaluation and cleanup of our facilities, but throughout our operations. Attention is being focused on the following key elements to assure that we meet the goals of the Defense Environmental Leadership Program.

- *We must work to effect Cultural Change — to create an environmental ethic in the Department of Defense.*
- *We must ensure Compliance with environmental law, and accountability for complying must be made clear.*
- *We must ensure correct numbers of well trained and motivated People are working environmental issues, and that they are working in a management structure — grades, organizational level and reporting systems — that are commensurate with the importance of their duties.*
- *We must Budget appropriate resources for the environment and take care to spend our money where it will do the most good.*
- *We must support excellent Training on the environment throughout all Defense activities — every soldier, sailor, airman, marine and civilian employee must be aware of their environmental responsibilities.*
- *We must possess excellent Communications and Public Affairs programs to foster environmental awareness and improve problem solving capability.*
- *We must improve Regulatory Relations between the Department and environmental agencies at all levels of government.*

The outstanding work and continuing commitment to these measures by DoD personnel, both military and civilian, from the installation level up to this Headquarters, have resulted in a year of solid progress in the Defense Environmental Restoration Program. The Department is moving out smartly in the waste site remediation area driven by the desire to be “good neighbors” to the communities surrounding our installations.

This report describes our progress to date and outlines our plans for the future. It will provide Congress and the public with a comprehensive understanding of the scope and complexity of our undertaking and the numerous accomplishments that have taken place over the past Fiscal Year.



William H. Parker, III, P.E.  
Deputy Assistant Secretary of Defense  
(Environment)

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# The Defense Environmental Restoration Program

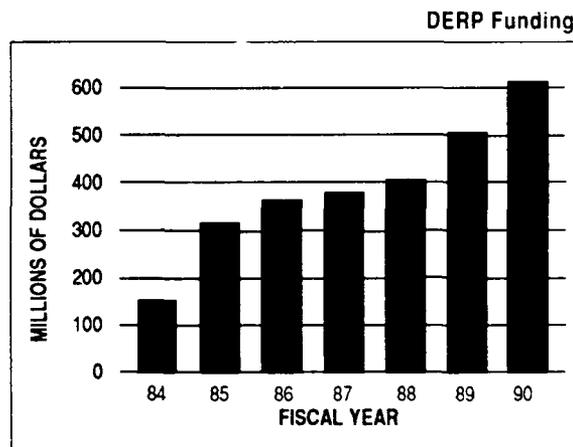
**T**he Defense Environmental Restoration Program (DERP) was established in 1984 to promote and coordinate efforts for the evaluation and cleanup of contamination at DoD installations. The Program currently consists of two major elements:

- The Installation Restoration Program (IRP) where potential contamination at DoD installations and formerly used properties is investigated and, as necessary, site cleanups are conducted; and
- Other Hazardous Waste (OHW) Operations, through which research, development and demonstration programs aimed at reducing DoD hazardous waste generation rates are conducted.

Previously, DERP activities included Building Demolition and Debris Removal (BDDR) and hazardous waste disposal. No BDDR activities have been conducted under the program since FY 1987 because higher priority IRP and OHW projects needed the funds. Similarly, hazardous waste disposal costs are now funded through each component's operation and maintenance budget and have not been a part of DERP since FY 1986.

DERP is managed centrally by the Office of the Secretary of Defense. Policy direction and oversight of DERP is the responsibility of the Deputy Assistant Secretary of Defense (Environment). Each military service and the Defense Logistics Agency are responsible for program implementation at their installations.

The Superfund Amendments and Reauthorization Act of 1986 (SARA) provide continuing authority for the Secretary of Defense to carry out this program in consultation with the U.S. Environmental Protection Agency (EPA). Executive Order 12580 on Superfund Implementation, signed by the President on January 23, 1987, assigned responsibility to the Secretary of Defense for carrying out the Department's Environmental Restoration Program within the overall framework of SARA and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The Defense Appropriations Act provides funding for DERP.



**DERP funding has grown steadily, from \$150 million in FY 1984 to over \$600 million in FY 1990.**

# The Installation Restoration Program

**T**he Installation Restoration Program (IRP) conforms to the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). EPA guidelines are applied in conducting investigation and remediation work in the program.

The initial stage, a **Preliminary Assessment** or **PA**, is an installation-wide study to determine if sites are present that may pose hazards to public health or the environment. Available information is collected on the source, nature, extent and magnitude of actual and potential hazardous substance releases at sites on the installation. The next step, a **Site Inspection** or **SI**, consists of limited sampling and analysis to determine the existence of actual site contamination. Uncontaminated sites do not proceed to later stages of the IRP process.

Contaminated sites are fully investigated in the **Remedial Investigation/Feasibility Study** or **RI/FS**. The RI may include a variety of site investigative, sampling and analytical activities to determine the nature, extent and significance of contamination. Concurrent with these investigations, the FS is conducted to evaluate remedial actions for the site.

After agreement is reached with appropriate EPA and/or state regulatory authorities on how the site will be cleaned up, **Remedial Design/Remedial Action** or **RD/RA** work begins. During this phase, detailed design plans for the cleanup are prepared and implemented.

The notable exception to this sequence involves Removal Actions and Interim Remedial Actions. These actions may be conducted at any time during the IRP to protect public health or control contaminant releases to the environment. Such measures may include providing alternate water supplies to local residents, removing concentrated sources of contaminants or constructing structures to prevent the spread of contamination.

## The National Priorities List (NPL)

EPA has established a Hazard Ranking System (HRS) for evaluating contaminated sites based on their potential hazard to public health and the environment. The application of the HRS, using PA/SI data, generates a score for each site evaluated. The score is computed based on such factors as the amount and toxicity of the contaminants present, their potential mobility in the environment, the availability of pathways for human exposure and the proximity of population centers to the site.

The National Priorities List (NPL) is a compilation of the sites scoring 28.5 or higher by the HRS. Such sites are first proposed for NPL listing. Following a public comment period, proposed NPL sites may be listed final on the NPL or may be deleted from consideration.

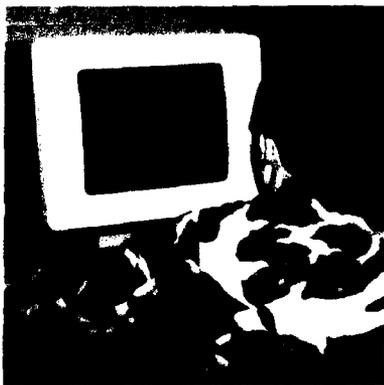
## IRP Priorities

The order in which DoD conducts IRP project activities is based on a policy assigning the highest priorities to sites that represent the greatest potential public health and environmental hazards. Top priority is assigned to:

- Removal of imminent threats from hazardous or toxic substances or unexploded ordnance (UXO);
- Interim and stabilization measures to prevent site deterioration and achieve life cycle cost savings; and
- RI/FSs at sites either listed or proposed for the NPL and RD/RAs necessary to comply with SARA.

Anticipating the need to refine priorities as the DERP matures and a large number of sites simultaneously reach the costly cleanup phase, DoD developed the Defense Priority Model (DPM). The DPM uses RI data to produce a score indicating the relative risk to human health and the environment presented by a site. The model considers the following site characteristics:

- Hazard - the characteristics and concentrations of contaminants;



- Pathway - the potential for contaminant transport; and
- Receptor - the presence of potential receptors.

This risk-based approach is logical, defensible and the best way to identify priority sites among those being addressed nationwide.

In FY 1989, DoD completed development of the DPM. The effort included both a public comment period announced in the Federal Register (52 FR 44204, November 17, 1987) and coordination with the Environmental Protection Agency and state agencies. Based on comments received, the model was refined with the addition of a new pathway for air/soil exposure. An automated version of the model to facilitate scoring the numerous sites covered by the IRP was designed in FY 1989.

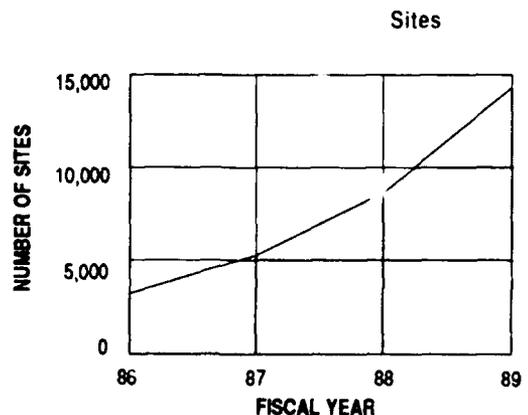
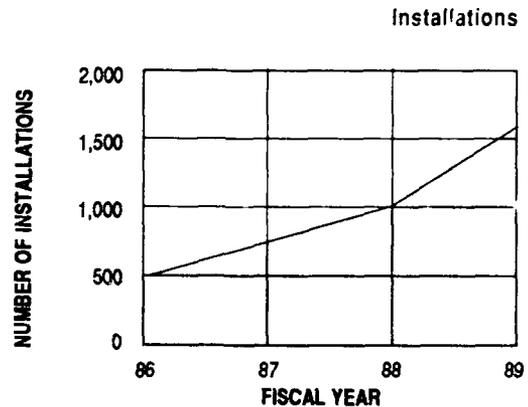
DoD publicly announced plans to implement the model (54 FR 43104, October 20, 1989), and DoD Component personnel were trained in scoring sites. These recently trained personnel have already scored over 250 sites where RD/RA activities are planned for FY 1990. These DPM scores will assist decisionmakers in allocating resources during FY 1990.

The Department has proposed the establishment of an inter-agency work group with representatives of DoD, EPA and the states to identify additional desirable improvements to the DPM. During FY 1990, DoD will continue making model refinements, based on experience gained during initial scoring and work group recommendations.

## IRP Activity Levels Have Increased Dramatically

The number of installations included in the IRP has increased steadily since the program's inception. Consistent with the Department's worst-first policy, emphasis was initially placed on large, industrial facilities with the highest probability for contamination. Efforts expanded yearly to include smaller installations with lower hazard potential. Also, installation re-assessments initiated to satisfy SARA requirements have identified, and will continue to identify, additional sites not previously included in the program.

By FY 1988, 8,139 sites at 897 installations had been identified. In FY 1989, these numbers increased to 14,401 sites at 1,579 installations. The installations

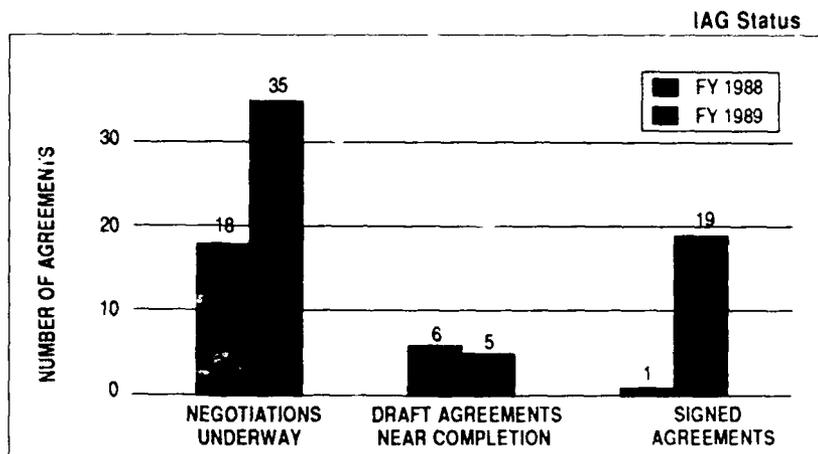


added in FY 1989 were small, non-industrial properties. In addition to sites associated with these newly added installations, new sites were defined at installations already in the IRP due to reclassification of contaminated areas into individual sites and inclusion of new sites at installations already in the program. DoD anticipates that the program growth trend will level off in the next few years. Many sites recently identified do not warrant RI/FS or follow-on RD/RA work.

The number of installations proposed for or listed on the NPL also increased dramatically in FY 1989. At the end of FY 1988, 30 DoD installations were listed on the NPL and another 19 were on the proposed list. By the end of FY 1989, these numbers had grown to 41 listed and 46 proposed installations.

### IAGs Are A Critical Step in the Cleanup of NPL Sites

SARA requires that an Inter-agency Agreement (IAG) be reached between EPA and DoD within 180 days after completion of the RI/FS for each NPL-listed facility. The completed IAG provides a detailed management plan for the effective cleanup of the facility. The involvement of EPA and state authorities in preparing



the IAG ensures their concurrence and, therefore, enhances the public credibility of the course of action taken by DoD. It also provides a strong management tool for resolving issues arising from overlapping or conflicting jurisdictions.

The IAG negotiation process involves the applicable DoD component and both the EPA regional office and state environmental authorities. The identification and resolution of issues typically takes several months. Once the parties conclude negotiations, the agreement is signed and made available for public comment. Comments received are considered and appropriate changes are made before the agreement goes into effect.

The Department recognizes the advantages of involving all parties well before the IAG is required. Accordingly, DoD has involved EPA and the states in the IRP process from early assessment and characterization through final cleanup of the site. The Department seeks a cooperative and collaborative ongoing effort with all parties to avoid discovering problems late in the process that could result in costly delays. The early establishment

of good working relationships also resolves potentially duplicative and possibly conflicting regulatory requirements for the cleanup, such as those that occur between CERCLA and the Resource Conservation and Recovery Act of 1976 (RCRA).

### FY 1989 Saw Significant Progress in Completing IAGs

The Department completed negotiation of IAG model language for NPL sites with EPA in June 1988. The Office of the Deputy Assistant Secretary of Defense (Environment) subsequently issued guidance to the Components about the state role in the IAG process. Nationwide, the negotiations simultaneously accelerated. Workshops were held with EPA and state agencies to refine site-specific language for the agreements. Training sessions for DoD personnel who will negotiate agreements were also held.



Negotiations with state agencies revealed concerns, especially about funding and jurisdictional matters of RCRA vs. CERCLA. These and other issues are being continually discussed to iron out such difficulties. The progress already made is evidenced by the number of IAGs signed and nearing completion. In FY 1988, one IAG had been signed for cleaning up Twin Cities Army Ammunition Plant, MN (TCAAP). By the end of FY 1989, 19 IAGs had been signed for DoD installations proposed and final-listed on the NPL. Only minor public comments were received on the IAGs completed in FY 1989.

IAG negotiations were underway at 40 listed and proposed NPL installations at the end of FY 1989. Of these, five were near completion. The Department is treating proposed NPL installations just like final-listed installations from the standpoint of consummating IAGs, even though there is no clear statutory requirement to do so.

## **DoD Now Supports State Participation Through DSMOAs**

As the states became involved in the IAG process, it became apparent that financial support was needed for them to effectively review and comment on draft technical documents and participate in the cleanup process.

To facilitate active state participation, a process to allow DoD to reimburse the states for up to one percent of the Defense Environmental Restoration Account (DERA) costs was developed. This procedure was developed through lengthy negotiations between DoD and the Association of State and Territorial Solid Waste Management officials, the National Governors' Association and the National Association of Attorneys General.

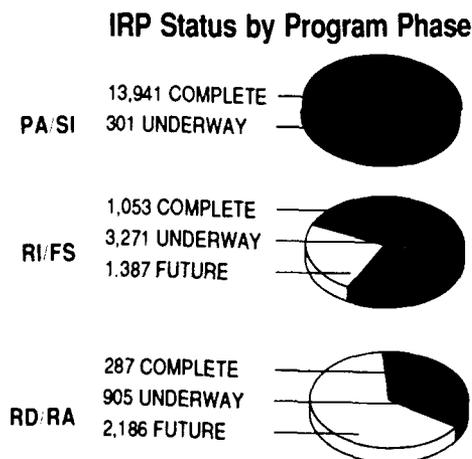
These negotiations resulted in the development of a model Defense and State Memorandum of Agreement (DSMOA) (54 FR 31358, July 28, 1989). The DSMOA not only addresses state agency support at NPL sites, but also outlines the process for work at non-NPL sites. Along with non-NPL reimbursement, the DSMOA provides a process for DoD and the states to resolve technical disputes before judicial remedies are sought. The dispute resolution process is necessary as most non-NPL work should not require any sort of formal agreement to accomplish cleanups. The DSMOA also includes provisions reflecting the state's willingness to accept the Defense Priority Model (DPM) as DoD's method of establishing priorities among sites.

All states and territories have been contacted and encouraged to participate in the DSMOA process. Favorable responses have been received from 25 states and/or territories. DoD anticipates signing at least 5 DSMOAs early in FY 1990. One DSMOA has already been signed by DoD and awaits the state's final signature (Mississippi).

The progress made in FY 1989 in preparing IAGs and developing the DSMOA process represents significant achievements that will enhance cooperation among DoD, EPA and state authorities. The establishment of IAG and DSMOA models and the training of Department personnel in their development will help provide a nationally consistent process for effective site cleanup.

# Installation Restoration Program Status

The Installation Restoration Program gained significant momentum in FY 1989. By the end of the fiscal year, projects were actively underway at 4,477 sites throughout the nation. In keeping with the Department's "worst-first" policy, considerable effort has been focused on the 87 DoD installations proposed for or included on the NPL. Of the 189 remedial activities implemented in FY 1989 (removal actions, Interim Remedial Actions and final Remedial Actions), 118 were at NPL sites.



In spite of significant progress in all phases of the IRP in FY 1989, the number of completed RI/FS and RD/RA activities reported is lower than in FY 1988. This is not indicative of lost ground, but is indicative of improved tracking of actual site progress and the resulting reclassification of several sites.

1989. The accompanying reevaluation of project status used more stringent criteria for determining when a program phase is complete. This resulted in several sites being removed from "complete" status and recategorized as underway or awaiting further action.

A centralized IRP status tracking system was adopted by all Department components in FY

1989. By the end of FY 1989, PAs had been completed at 13,941 of the 14,401 identified IRP sites.

## Installation Restoration Program Status Summary by Military Service

	Total Number		Number of Sites (by Phase)								
			PA/SI		RI/FS			RD/RA			
	Installations	Sites	C	U	C	U	F	C	U	F	
Army	1,125	8,642	8,554	39	570	536	530	135	447	128	
Navy	184	2,031	1,980	36	10	820	305	28	87	725	
Air Force	243	3,481	3,160	226	466	1,782	534	117	368	1,272	
DLA	27	247	247	0	7	133	18	7	3	61	
<b>Totals</b>	<b>1,579</b>	<b>14,401</b>	<b>13,941</b>	<b>301</b>	<b>1,053</b>	<b>3,271</b>	<b>1,387</b>	<b>287</b>	<b>905</b>	<b>2,186</b>	

Status as of September 30, 1989 ♦ C = Completed Activity ♦ U = Underway Activity ♦ F = Future Activity Planned

SIs had been completed at 8,298 of these sites. Based on PA/SI work completed to date, almost 70 percent of the Department's sites have been found to require further investigation in the RI/FS phase.

RI/FS efforts had been completed at 1,053 of the sites requiring such investigations by the end of FY 1989. RI/FS activities are either complete or underway at three-quarters of the sites where they are needed. A significant increase in completions is expected during FY 1990.

A total of 3,378 sites requiring some RD/RA activity had been identified as of the end of FY 1989. Work has been completed at 287 of the sites and is underway at another 905. DoD expects its remedial activities to increase steadily over the next few years and peak in the mid-1990s.

A total of 189 remedial activities were undertaken at 135 installations in FY 1989. The number of actions is greater than the number of installations as more than one type of action was taken at some installations.

## Summary of FY 1989 Remedial Activities

### Summary for All IRP Sites

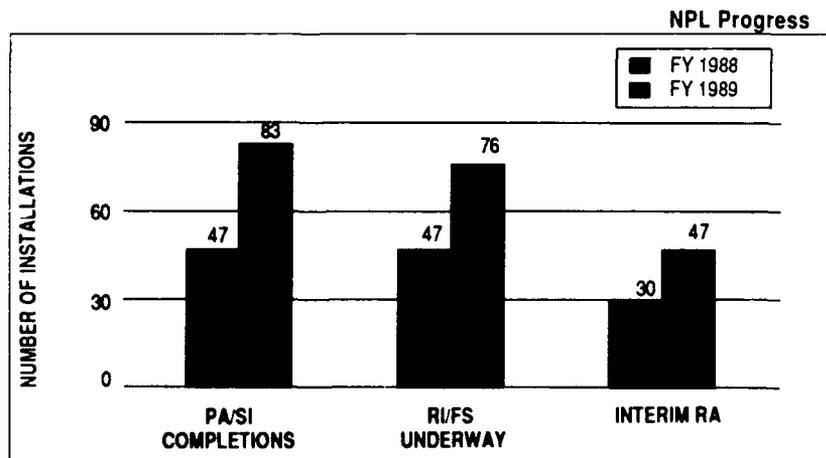
Type of Activity	Number of Activities
Alternate Water Supply/Treatment	19
Incineration	4
Site Treatment/Remediation	100
Decontamination	3
Waste Removal	33
Ground Water Treatment	30
<b>TOTAL</b>	<b>189</b>

Status as of September 30, 1989

## Solid Progress is Evident at NPL Sites

The Department made steady gains in the evaluation and cleanup of NPL sites in FY 1989. Completed PA/SI activities at proposed and listed NPL installations rose from 47 to 83 while the number of RI/FSs underway rose from 47 to 76. Further, the number of installations at which Interim Remedial Actions were taken rose from 30 to 47 in FY 1989.

FY 1989 also saw completion of the first Record of Decision at an NPL site, the Naval Weapons Station in Concord, California. This progress reflects the emphasis placed on high priority IRP sites by DoD.



# Formerly Used Properties

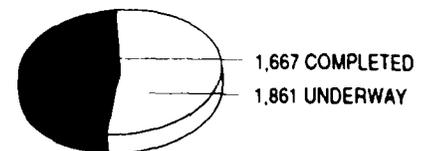
**T**he U.S. Army Corps of Engineers (USACE) is the DoD Executive Agent for the implementation of the Environmental Restoration Program at formerly used properties. As Executive Agent, the USACE is responsible for environmental restoration activities under DERP on lands formerly owned or used by any DoD Components. The investigation and cleanup procedures at formerly used sites are similar to those at currently owned installations. Determination about the origin of the contamination, land transfer information and current ownership must be made before a site is considered eligible for restoration by DoD.

A total of 7,118 formerly used properties with potential for inclusion in the program have been identified through inventory efforts. Preliminary Assessments/Site Inspections (PA/SIs) at 3,528 of those properties have been initiated, 1,861 are underway, and 1,667 have been completed (818 in FY 89). The DoD has already funded 203 properties for further investigation and/or remedial action based on completed PA/SI work. Further investigative or cleanup work has either been completed or is ongoing at these locations.

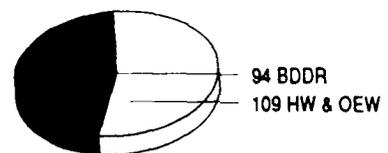
This work includes 109 projects to clean up hazardous or toxic (HTW) contamination from formerly used underground storage fuel tanks or from leaking polychlorinated biphenyl (PCB) transformers. Included also are projects for detection and removal of ordnance and explosive waste (OEW) from former target ranges or impact areas. Prior to FY 1988, 94 BDDR projects involving unsafe buildings or structures on formerly owned or used properties were completed.

USACE also represents DoD interests at NPL sites where former properties are located and where DoD may be a Potentially Responsible Party (PRP). Former properties that have passed from DoD control may have been contaminated by past DoD operations as well as by other owners, making DoD one of several PRPs. Ongoing USACE efforts will determine the allocation, if any, of DoD cleanup responsibility. USACE also cooperates with EPA, state and other PRP representatives to facilitate the cleanup process. The following are high priority sites being worked by USACE.

## Status of Activities at Formerly Used Properties



### PA/SI PROJECTS



### ONGOING AND COMPLETED PROJECTS

## Formerly Used Properties on the NPL

- Hastings East Industrial Park, Hastings, NE
- Marathon Battery, Cold Springs, NY
- Eau Claire Ordnance Plant, Eau Claire, WI
- Morgantown Ordnance Works, Morgantown, WV
- Litchfield Park Naval Air Station, Litchfield, AZ
- Jet Propulsion Laboratory, Pasadena, CA (Proposed)
- Weldon Spring, MO (Proposed)

In FY 1989, \$41.3 million was spent on activities at former sites. The following are examples of work undertaken by USACE at formerly used properties in FY 1989.

### **Weldon Spring Ordnance Works, MO**

USACE is investigating hazardous waste contamination present at this site from production of trinitrotoluene (TNT) and dinitrotoluene (DNT) during World War II. An RI/FS is underway to determine the location and extent of soil and ground water contamination. Preliminary results indicate significant residual contamination of TNT and DNT at the former production areas. The EPA has recently nominated this site as a proposed NPL site. The proposed boundary of the NPL site includes the former site, an active training area and a chemical

plant currently being investigated by U.S. Department of Energy (DOE). The DOE is responsible for remediation of radioactive contamination at the site.

### **Martha's Vineyard, MA**

In 1988, beachgoers noticed ordnance shells emerging from the eroding dunes at an area known as South Beach, the island's only public beach facing the Atlantic Ocean. During World War II, South Beach served as an aerial and ground-based target. At that time the dunes were 200 feet inland.

A combined U.S. Army/U.S. Navy team recovered over 1,500 pieces of ordnance, none of which were live. The recovery work, accomplished on an emergency basis under DERP, began in November 1988 and was completed in May 1989. The dunes were dismantled, the ordnance

debris removed, and the dunes reconstructed. After reconstruction, the dunes were covered with a biodegradable matting, replanted with dune grass, and protected with snow fencing. The project was completed in time for the summer tourists to enjoy South Beach.

### **Nebraska Ordnance Plant, NE**

A recently completed PA/SI indicates that soil and ground water at this former ordnance plant are contaminated by explosives and solvents. An RI/FS is being carried out by USACE to determine the extent of environmental contamination and to recommend appropriate remedial actions. Bottled water has been provided to private citizens whose water is affected by the contamination. Test well drilling is also underway to replace contaminated water supply wells with new wells.



**Ordnance  
recovery at  
Martha's  
Vineyard**



# Army IRP Progress

**T**he most significant IRP growth among DoD Components in FY 1989 occurred in the Army's program. The number of installations included in the Army IRP nearly tripled while the number of sites rose from 3,208 in FY 1988 to 8,642 in FY 1989. This significant growth resulted from aggressive action taken to look at and evaluate minor installations such as reserve centers.

By the end of FY 1989, the number of Army sites where PA/SI work had been completed had risen from 3,054 to 8,554 and the number of complete RI/FSs from 300 to 570. This includes work at all listed and proposed Army NPL sites. Significant growth in the number of completions in both phases were registered, even with the reclassification of several sites. By the end of FY 1989, the number of sites where RD/RA work was complete or underway rose from 413 to 582.

In FY 1989, IAGs were signed at eight Army NPL facilities, bringing the total number of completed IAGs at Army NPL facilities to nine. PA/SI work has been completed at all of the Army's 31 listed and proposed NPL installations. RI/FS activities are underway at 23 of these facilities. Removal actions and/or Interim Remedial Actions have occurred at 20 of the Army NPL facilities.

The following examples demonstrate significant Army IRP project activities conducted in FY 1989. (Appendix B provides additional details for installations final-listed or proposed for the NPL.)

## Incineration of Contaminated Soils at Louisiana AAP

After successful completion of a performance test in January 1989, the Army began the full-scale incineration of explosive-contaminated soils from lagoons at Louisiana Army Ammunition Plant (LAAP). Although wet clayey soils caused feeding difficulties, Army engineers eliminated these obstacles. The incinerator had treated approximately 63,000 tons of soil by the end of FY 1989.

As an unexpected benefit of this project, extensive sampling demonstrated that less explosives-contaminated soils exist in the lagoons than previously estimated and that they are highly concentrated in the upper one or two feet of soil. Initial planning had estimated that five feet of soil would require incineration. This new discovery may ultimately reduce the quantity of soil to be incinerated and the total cost of the effort. The Army is presenting a proposal to regulatory authorities to reduce the volume of soil to be treated. Approval of this proposal will expedite completion of the clean-up.



Contaminated Soil Incineration at LAAP

## Decontamination of the Abandoned Nickel Carbonyl Plant at Redstone Arsenal, AL

As part of a lease agreement with the GAF Corporation, the Army dismantled and removed an abandoned nickel carbonyl plant. The extremely toxic nature of nickel carbonyl required decontamination of the plant prior to dismantling. The Army developed and demonstrated a unique sampling and flushing procedure that resulted in the successful decontamination and dismantling of the facility. The procedure promises to have a wide range of industrial applications.

## Ground Water Cleanup and Soils Incineration at the Twin Cities Army Ammunition Plant, MN

The Army has made several important advances in combating ground water and soil contamination problems in and around the Twin Cities Army Ammunition Plant (part of the New Brighton/Arden Hills NPL site). These efforts included accelerating ground water cleanup and eliminating PCB-contaminated soils. The Army expanded its regional ground water treatment system to capture and treat contaminants within both the shallow sand and gravel and deeper bedrock aquifers. The current system pumps over 2,000 gallons per minute to remove contaminants at the plant's southwest boundary and to capture contaminants at its major disposal sites.

To further their efforts, the Army presented a draft record of decision (ROD) to the State and Federal regulatory agencies – a major milestone in the remedial process. The ROD describes the Army's proposal to pump ground water from outside the plant's borders to speed up the cleanup.

Army scientists are modeling the effects of the treatment systems on regional ground water quality. These studies will strengthen DoD's ability to manage other regional ground water problems. The Army has also removed and incinerated approximately 70 tons of PCB-contaminated soil from a former disposal area at the plant.

## Dioxin Incineration at Fort A.P. Hill, VA

In March 1989, the Army successfully completed the destruction of 190 tons of dioxin-contaminated soil and debris. A state-of-the-art mobile rotary kiln was used to incinerate the materials. The resulting ash was shipped to an approved hazardous waste landfill. Full cooperation among federal, State and local officials allowed this notable case to reach a successful conclusion.



Mobile Dioxin Incinerator at Fort A.P. Hill



# Navy IRP Progress

**W**hile the number of Navy installations included in the IRP remained nearly constant, the number of sites at these installations increased by 40 percent in FY 1989 to 2,031 sites. The reason for this increase was the reclassification of many large sites into multiple smaller sites.

PA/SI completions at Navy sites rose from 1,344 to 1,980 during FY 1989 and RI/FS work was complete or underway at 830 of the 1,135 sites where it is required. The number of completed Navy RI/FSs dropped significantly in FY 1989 because the Navy extensively reevaluated and reclassified site status. A dramatic increase in RI/FS completions at Navy sites is anticipated in FY 1990. Even with the Navy's reevaluation, the number of sites with completed RD/RA work rose from 10 to 28 in FY 1989.

IAGs were signed at three of the Navy's NPL installations in FY 1989. PAs have been completed at all of the Navy's 23 listed and proposed NPL installations and SIs have been completed at 15 of the installations. RI/FS activities are underway at 20 of the Navy NPL facilities and removal actions and/or Interim Remedial Actions occurred at eight Navy NPL facilities in FY 1989.

The following are examples of significant Navy IRP project activities conducted in FY 1989. (Appendix B provides additional details for installations final-listed or proposed for the NPL.)

## Polychlorinated Biphenyls Cleanup at PWC, Guam

The Naval Civil Engineering Laboratory and the EPA Hazardous Waste Environmental Research Laboratory completed a joint pilot study to detoxify polychlorinated biphenyl (PCB) contaminated soils at the Navy's Public Works Center in Guam. Approximately 5,000 cubic yards of contaminated soil, as deep as 8 feet in some places, require cleanup. PCB soil concentrations are as high as 5,000 parts per million (ppm).

A Potassium Polyethylene Glycol (KPEG) chemical reaction system was chosen from many alternatives to treat the soils. The KPEG process is capable of detoxifying a wide variety of halogenated organic compounds, including PCBs, dioxins and dibenzofurans.

The Navy fabricated a two-ton batch system for the pilot study. Twenty tons of contaminated soil, containing 1,000 to 2,000 ppm of PCBs were treated in 13 batches at Guam. Every treated batch met the permit requirements.

Comparative cost analysis with incineration indicates a five-fold cost reduction potential from the use of the KPEG process. Continued laboratory evaluation of the process has led to significant process improvements, making the process even more cost effective. The design of a 20-ton unit to be tested in Guam in 1990 has begun. This technology has the potential to provide millions of dollars in savings at a number of DoD sites.

## Clean Contracts Awarded

The Navy has awarded three Comprehensive Long-Term Environmental Action Navy (CLEAN) contracts. Each contract is a 10-year cost-plus-award-fee contract with an approximate dollar value of \$130 million. These important contracts strengthen the Navy's ability to perform Installation Restoration activities and maintain the flexibility to provide engineering services in all environmental areas. The CLEAN contracts also enable the Navy to avoid lengthy procurements for individual projects, thereby quickening the pace of its Installation Restoration Program.

## Record of Decision at Naval Weapon Station - Concord, CA

In April 1989, the Navy achieved a major milestone in the remedial process when the Record of Decision (ROD) was signed for selection of the Final Remedial Actions at the Litigation Sites on the Naval Weapons Station in Concord, California. This will enable cleanup to proceed.

The Navy is currently preparing engineering design documents for removal of contaminated soils and long-term monitoring of remaining areas. Remedial action is scheduled to begin in July 1990.

## Interagency Agreement at Moffett Field, CA

An Interagency Agreement (IAG) for Moffett Field Naval Air Station (NAS) was signed with the EPA and the State of California in August 1989. The State of California represented both the San Francisco Bay Regional Water Quality Control Board and the Department of Health Services. This agreement was both the first Navy IAG and the first Navy three-party agreement negotiated to date. This agreement paves the way for progress on this NPL site.

## Drinking Water Treatment at Barstow MCLB, CA

Laboratory analyses revealed volatile organic contamination of ground water underlying the Yermo Annex of the Barstow Marine Corps Logistics Base in Barstow, California (primarily trichloroethylene and tetrachloroethene). As contamination levels at one of the three wells supplying drinking water to the Yermo Annex exceeded California drinking water standards, that well was immediately removed from service. A contract for the installation, operation and maintenance of two activated carbon treatment systems was awarded in July 1989. Installation was completed in September 1989 and the systems began supplying drinking water to the Annex. No contaminants are detectable in the treated drinking water.



Drinking  
Water Treat-  
ment System  
at Barstow  
MCLB



# Air Force IRP Progress

**T**he number of Air Force IRP installations and sites remained nearly constant during FY 1989. The Air Force's reclassification of site status resulted in a decrease in both PA/SI and RI/FS completions in FY 1989. PA/SI work has been completed at 3,160 of the Air Force's 3,481 IRP sites and RI/FS work is underway or complete at 2,248 of the 2,782 sites where it is needed. Further, RI/FS investigations are underway or completed at every major Air Force installation and most major industrial plants. The number of Air Force sites where RD/RA work has been completed rose dramatically in FY 1989, from 73 to 117 sites.

During FY 1989, the Air Force completed and signed IAGs at seven NPL installations. PA/SI work has been completed at 27 of the Air Force's 30 listed and proposed NPL installations and RI/FS activities are underway at all 30 of these facilities. Remedial actions and/or Interim Remedial Actions have occurred at 22 of the Air Force's NPL facilities.

The following are examples of significant Air Force IRP project activities conducted in FY 1989. (Appendix B provides additional details for installations final listed or proposed for the NPL.)

## Fuel Recovery at Holloman AFB, NM

The Air Force installed recovery trench systems and modified two existing systems to recover fuel lost from a leaking underground storage tank. The Air Force expects the system to recover at least 80 percent of the lost fuel.

## Ground Water Treatment at Harrisburg Airport ANGB, PA

The Air Force has modified a drinking water treatment system for use in a centralized ground-water remediation system at the Harrisburg Air National Guard Base. Air Force engineers redesigned the air stripping tower, chlorination equipment, and central systems to be relocated in early 1990. The system, when operational, will treat ground water from all area drinking water production wells and will meet all current health-based drinking water standards.

## Ground Water Treatment System at Castle AFB, CA

The Air Force successfully constructed a 1,400 gallon per minute granular activated carbon filtration system to treat trichloroethylene-contaminated ground water at this NPL site. The system treats ground water beneath two landfills and several chemical disposal pit sites.

## **Drainage System Capping at Williams AFB, AZ**

Air Force investigations discovered high concentrations of lead in surface soils along the southwest drainage system of the Base. The original cost to remove all contaminated soil was estimated to be nearly \$1.5 million. Further testing demonstrated that the lead was unlikely to migrate since it was tightly bound to the soil and stabilized by the clay soil of the ditch.

The Air Force proposed to solidify contaminated soils and cap the upper portion of the ditch with concrete, an innovative alternative. Solidification will involve mixing soils with various materials, typically concrete, to bind the hazardous constituents and minimize the risk of migration and exposure. The selected alternative, which the State of Arizona accepted, will save approximately \$1.4 million in cleanup costs.

## **Interim Remedial Measures at Pease AFB, NH**

The Air Force undertook remedial measures at Landfill 5 to reduce potential threats to nearby surface and ground water from hazardous constituents. The actions included drum and contaminated soil removal and construction of a ground water pump-and-treat system. The treatment system will remove free product (recyclable fuel) and dissolved constituents from ground water. It will also control the spread of the contaminants.



**Capping at  
Williams AFB  
will save \$1.4  
million**



# Defense Logistics Agency IRP Progress

**T**he Defense Logistics Agency (DLA) IRP continued to show steady progress in all areas. The number of installations in DLA's program remained almost constant in FY 1989. However, the number of sites being tracked increased significantly due to reclassification of large sites into multiple, smaller sites. PA/SI work has been completed at all of DLA's 247 sites and RI/FS work is complete or underway at 140 of the 158 sites targeted for such studies. RD/RA efforts are complete or underway at 10 of the 71 DLA sites where such work is currently anticipated.

IAG negotiations were initiated in FY 1989 at both DLA installations listed in the NPL. PA/SI work has been completed and RI/FS activities are underway at all three of the DLA installations proposed and final-listed on the NPL. Removal Actions and/or Interim Remedial Actions have occurred at one of the DLA's three NPL facilities.

The following examples demonstrate significant DLA IRP project activities conducted in FY 1989. (Appendix B provides additional details for installations final-listed or proposed for the NPL.)

## **Interagency Agreement Negotiations at Defense Depot - Ogden, UT**

Major progress was made towards completion of a three-party Interagency Agreement (IAG) with EPA Region VIII and the State of Utah for the cleanup of the Defense Depot. A final

IAG is expected during the first quarter of FY 1990. Successful completion of the IAG will allow cleanup efforts to move forward.

## **Interim Remedial Measure Contract Award at Defense Depot - Tracy, CA**

During FY 1989, DLA awarded a \$1.2 million contract for a treatment system at the Defense Depot. This Interim Remedial Measure involves constructing an air stripper to purge dissolved solvents from the ground water and discharge clean water back to the aquifer. A carbon absorption vapor control unit will be used to prevent any air pollution from the air stripper. This site has been proposed for inclusion on the NPL.

## **Bioremediation at Defense Fuel Support Point - Charleston, SC**

DLA has initiated a bioremediation project to clean up the contamination caused by a jet fuel leak at the Charleston facility. The remediation system consists of a series of strategically-located pumping wells to recover and treat ground water. Small quantities of nitrate and phosphate nutrients are added to a portion of the extracted ground water and allowed to percolate back into the ground. This effectively accelerates the natural biodegradation process. The U.S. Geological Survey, DLA's project manager, estimates that the bioremediation will be completed in three to six years.

# Other Hazardous Waste Program Progress

**T**he Other Hazardous Waste (OHW) Program, the second element of DERP, examines current operations to find cost-effective approaches to DoD's waste management activities and to prevent pollution at the point of generation. Funds are provided to promote DoD's total quality management of hazardous waste initiatives. Such efforts include research, development and demonstration of pollution prevention and hazardous waste management technology. This work includes studies of unexploded ordnance (UXO) detection and range clearance methods; investigation of alternate products, revised specifications, and improved acquisition and operating practices; procurement of hazardous waste reduction equipment; information exchange; and other environmental restoration and pollution prevention activities.

In July 1989, DoD published a directive entitled "Hazardous Materials Pollution Prevention." In it, DoD emphasizes the prevention of pollution rather than historical "end of pipe" solutions. This policy requires hazardous materials be selected, used and managed over their life cycle so that the DoD realizes the lowest cost to properly protect human health and the environment. The preferred approach is to avoid or reduce hazardous materials use. With the issuance of this Directive, DoD components are required to:

- Include guidance on hazardous materials in all directives, regulations, manuals, specifications and other guidance documents issued;
- Develop and maintain effective programs to manage hazardous materials responsibly, including the examination of alternatives to such materials

and, ultimately, the reduction in the amount and toxicity of materials used:

- Establish adequate reporting to track progress in achieving program goals;
- Participate in information exchange on hazardous materials pollution prevention; and
- Cooperate with environmental agencies pursuing similar objectives.

The July 1989 Directive augments extensive waste minimization work already underway within the services, especially the logistics community. It requires that environmental concerns be integrated into the department's everyday work.

In Fiscal Year 1989, \$33.9 million in DERP funds were provided for hazardous waste minimization projects. Notable

examples of OHW Program accomplishments follow.

## Review and Revision of Product Specifications and Standards

This ongoing effort involves review of the specifications for items procured for the Department by DLA. Recommendations are made for product substitution, elimination and/or recycling of hazardous substance specifications. Three examples of DLA efforts follow.

**Asbestos Elimination Program:** DoD guidance calls for eliminating asbestos-containing products where possible. DLA has been working with the services to implement this policy. Numerous actions have occurred in FY 1989 to support the phase out of asbestos. Among them are completing screening tests for

non-asbestos materials, replacing asbestos packaging materials with fiberglass and flex or hemp, and validating non-asbestos products as replacements for asbestos gaskets used by the Army.

**Cadmium:** An interservice cooperative effort was initiated in FY 1988 and continued in FY 1989 to identify cost-effective substitutes for cadmium coatings, including less-toxic materials such as zinc. To date, 50 cadmium specifications have been thoroughly reviewed and a search of industry and the government for alternatives has been nearly completed.

**Fuel System Icing Inhibitor (FSII):** An FSII injection system is being cooperatively developed by the DoD, the Department of Energy, and the National Institute of Petroleum Energy Research to eliminate FSII in bulk storage operations while still providing combat-ready fuels to the DoD components. Efforts in FY 1989 focused on how long the additive can be stored and remain an effective inhibitor. Alternative methods of post-storage tank or downstream injection of this chemical are being explored with the DoD Components.

### Ion Vapor Deposition

McClellan AFB (CA), a major Air Force Logistics Center responsible for the maintenance of numerous weapon systems, is developing a process to replace cadmium plating with vapor deposition of aluminum. The process may replace cadmium plating operations on specific aircraft parts. Significant reductions in hazardous waste generation are expected to result from use of the new system.



Hill AFB Solvent Distillation System

### Solvent Reuse

Hill Air Force Base (UT) has concentrated its hazardous waste minimization efforts on solvent reclamation. Used solvents from Hill's aircraft and missile systems maintenance operations are distilled for reuse, significantly reducing disposal and solvent purchase costs.

### Hazardous Waste Minimization Audits

In FY 1989 the Army increased its use of Hazardous Waste Minimization Audits to identify methods for reducing the generation of hazardous wastes. The primary focus of this effort was on the Army industrial community (i.e., ammunition plants and depots). In-depth engineering studies at these sites developed process changes and equipment modifications to reduce waste generation. In many cases the alternatives were as simple as segregating waste streams but also as complicated as major process re-tooling.

### Centers for Technical Excellence Program

The Army Depot Systems Command has begun a program to take the major hazardous waste streams generated by its facilities and identify alternatives for eliminating their generation. Responsibility for investigating waste minimization measures has been divided among several installations, with the requirement that the alternatives developed must be implementable at all other installations with similar waste streams. The first major milestone, identifying the best available technologies for eliminating each waste stream, is due in early FY 1990.

## Solvent Elimination

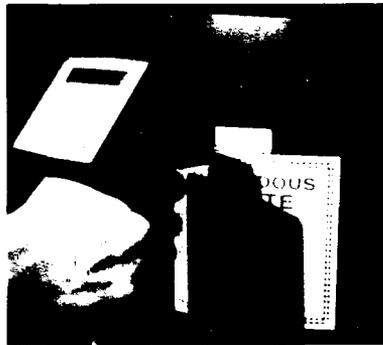
Fort Ord (CA) instituted the use of high-pressure spray washers to degrease and clean automotive parts. The use of these washers eliminated the need for dip tanks filled with trichloroethane. The total cost of these units was \$24,900. The savings from the elimination of the use of trichloroethane will provide a payback in approximately two years. Over and above the economic benefit, this change also decreases the potential detrimental health effects to the workers of using trichloroethane and eases working conditions by eliminating the need for cumbersome protective clothing.

## Propellant/Explosive/ Pyrotechnics (PEP) Reuse

Both Milan Army Ammunition Plant (TN) and Redstone Arsenal (AL) are working on projects to recover PEP materials for reuse. The Milan project involves using a dry vacuum to recover residual explosives from processing areas rather than using water to wash down the facilities. The generation of explosives manufacturing wastewater, a listed hazardous waste, will be decreased as well as the liability to the Army from contaminated ground water. The Redstone project, though still in the development phase, has already shown that propellant-filled munitions and rockets can be emptied safely and effectively. In addition, the major components of the propellant can be reused.

## Hazardous Waste Minimization Automation

The Army has developed automated systems to aid Environmental Coordinators in the management of hazardous materials and hazardous wastes on their installations. The "Hazardous Waste Management Information System" maintains information on the types, quantities and locations of hazardous materials and wastes throughout an installation. It also provides roll-ups for reporting and the "Bar Code Tracking System" to track materials and wastes through their life on a facility. An "Economics Analysis Model for Hazardous Waste Minimization Alternatives" has also been developed to provide installations with a means of comparing different alternatives on a rigorous economic basis.



Bar Coded Hazardous Wastes

## Hazardous Waste Minimization Management Review

During FY 1989 the Navy surveyed their activities to determine the amount of hazardous waste generated. They also reviewed how effective their hazardous waste minimization efforts must be to meet the Navy goal of a 50% reduction in hazardous waste generated by 1992. Over 30 technologies or approaches to minimize hazardous waste have been identified. These technologies range from solvent reclamation to product substitution. Numerous Naval installations are implementing hazardous waste minimization techniques identified in this project. Estimated cost savings per year are \$9.9 million with a corresponding reduction of 104,000 tons of hazardous waste generated.

## Hazardous Materials Reutilization Store

The Naval Submarine Base, Bangor (WA) has established a Hazardous Materials Reutilization Store. The store accepts unused hazardous material in sealed containers, in good condition, and donates it to an activity that can use it. Most materials consist of expired shelf-life items such as cleaners, sealants, paints, adhesives, oils and photographic chemicals. Records are kept on the amount of material donated and reused as well as its replacement cost.

From October 1987 to October 1988, the store redistributed approximately 1,900 items valued at \$27,000 to base activities. Approximately 38,000 pounds of

hazardous waste avoided disposal with an additional savings of \$29,000. The Navy is considering establishing similar reutilization stores at other facilities.

## Plastic Media Blasting (PMB)

Two large PMB paint stripping booths have been installed at Naval Undersea Warfare Engineering Station (NUWES) Keyport (WA). During the rework of various torpedoes, NUWES must remove paint from aluminum body sections and components. Historically, chemical strippers were used to remove paint generating approximately 5,000 gallons of stripping wastewaters every ten days. This waste required disposal as a hazardous waste at a cost of \$225,000 annually.

PMB uses soft, angular plastic "beads" which remove paint without damaging the underlying metal. It also generates a fraction of the waste seen with chemical paint stripping. PMB has eliminated approximately 90 percent of the chemical paint stripping performed at NUWES. Waste generation has been reduced by approximately 160,000 gallons per year and disposal costs by about \$200,000. In addition, the time to strip a typical torpedo body section has been shortened from 4 hours to 15 minutes.



Stripping a Torpedo Using PMB

# Research, Development and Demonstration

**T**raditional approaches to hazardous waste site clean-up often are not permanent or cost-effective solutions. They can require large capital outlays and operating costs and merely move the problem from one location to another. DoD wants to identify and develop innovative clean-up technologies and waste site investigation techniques that will be effective and cost efficient. In addition, significant effort is being focused on the development and testing of methods to reduce the generation of hazardous wastes at DoD facilities. While these efforts require large financial commitments up-front, the potential future cost savings are enormous.

In FY 1989, DoD invested approximately \$27 million in Research, Development and Demonstration (RD&D) of clean-up technologies and hazardous waste minimization. About \$13 million of this funding came from the Environmental Restoration Account, the balance from service RD&D accounts.

DoD efforts are coordinated by an Installation Restoration Technology Coordinating Committee (IRTCC) that consists of representatives of each Component. The IRTCC encourages improved communication among the Components to ensure the most effective possible use of limited RD&D funds.

A DoD/EPA/DOE working group established in 1985 addresses the high cost of hazardous waste cleanups, evaluates innovative technology needs, and develops a coordinated approach to these efforts. A report describing this group's work, known as

the Blue Book, was published in March 1989. The report includes over 138 projects applicable to more than one agency.

The following examples of recent RD&D projects demonstrate the progress made by DoD and illustrate the potential benefits of well-directed research work.

## Soil Venting

Soil venting uses vacuum blowers to pull large columns of air through contaminated soil. The air flow causes certain soil contaminants to volatilize, effectively ridding the soil of the contaminants. Field demonstration of



Soil Venting at Hill AFB

*in-situ* soil venting is being conducted at a 27,000-gallon jet fuel spill at Hill AFB (UT). This demonstration is the first test of a technology to clean up soils contaminated with jet fuel. After 9 months of venting, as much as 75 percent of the fuel has been removed from the soil. A design manual for *in-situ* soil venting will be developed based on research and field demonstration results.

### Monitoring of Trichloroethylene in Water

The Air Force developed a computer-controlled gas chromatography system so that technicians can monitor ground water for contaminant concentrations in the field rather than sending samples to an analytical chemistry lab. The methodology has been approved by EPA and Michigan. Additional research efforts are underway to increase the capability of the monitoring system to allow measurement of 10 volatile organic compounds (VOCs) in each water sample.

### Enhanced Bioremediation

A full-scale test of bioremediation was initiated at a jet fuel spill site at Eglin AFB (FL). Following 18 months of treatment, significant reductions in ground water contamination were measured. However, fuel residuals in the soil above the water table were not reduced. Based on this work, a checklist for determining whether bioremediation is appropriate for a particular site was provided to all Air Force major commands.

### Plastic Media Blasting

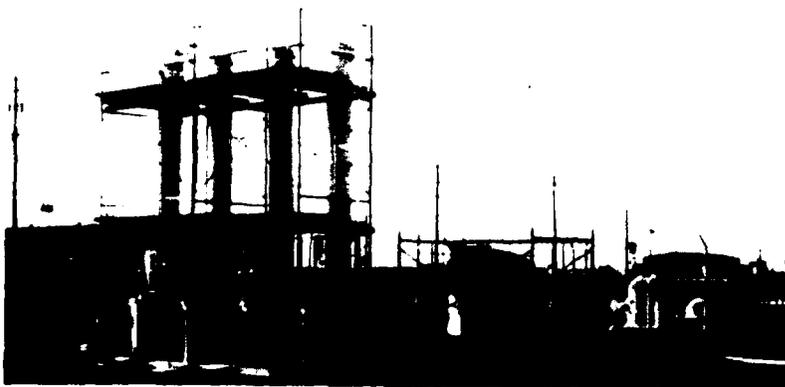
A demonstration program was conducted to evaluate the use of plastic media for paint stripping parts at Army maintenance depots. This program, conducted at Letterkenny Army Depot (PA), generated data and operational experience to allow the use of plastic media blasting at other Army facilities. The use of plastic media instead of agricultural (walnut shell) media generates less hazardous waste and improves worker health and safety.

### Risk Assessment Research

The Air Force Harry G. Armstrong Medical Research Laboratory made several significant contributions to the practice of risk assessment in FY 1989. Air Force researchers developed a model for use in assessing the risks of exposure to trichloroethylene, one of the most common ground water contaminants. The Laboratory also developed a new approach for conducting risk assessments on known and suspected carcinogens. In addition, the IRP Toxicology Guide, used extensively by Air Force engineers and scientists to conduct risk assessments, was updated in FY 1989.

### Ground Water Treatment

A pilot-scale air stripper to remove volatile organic compounds (VOC) from contaminated ground water has been successfully tested at Sharpe Army Depot (CA). The four-column system, fitted with appropriate blowers, pumps and controls, can be operated in series or parallel at flow rates of 20 to 40 gallons per minute. Data from these tests were used to design the full-scale system now in operation at Sharpe.



VOC Air Stripper at Sharpe AD

## Organometal Analysis Technology

Organometallic paints have long been used by the Navy on ship hulls to inhibit the growth of barnacles. This project developed and tested an automated monitoring system for near-real time analysis of organometals in the aquatic environment. The fully automated system consists of an analytical module containing the simple reduction vessel, an atomic absorption spectrometer detector, a liquid nitrogen storage and delivery system with a computer keyboard and screen. The system can analyze one sample every 10-15 minutes with a detection level of under one part per trillion. It will be modified to analyze other organometals at hazardous waste sites.

## Marine Environmental Survey Capability (MESC)

Conventional analytical techniques do not provide the temporal and spatial information required to make accurate assessments of dynamic nearshore environments. The objective of this project is the development of a modular water-quality mapping system to efficiently survey chemical, biological and hydrographic parameters in harbors, bays and other nearshore environments. The MESC system design is a complete, stand-alone, modular system consisting of a suite of towed and flow-through water quality sensors, an integrated navigational and positioning system and onboard data support equipment.



Organometal  
Analysis  
System

## Use of Explosives as Supplemental Fuel

Current explosive waste management practices involve open burning or incineration. An attractive alternative, both environmentally and financially, is to blend explosive wastes with fuel oil and use the resulting mixture in industrial boilers, thus recovering some of the waste's energy value. During FY 1989, a design was completed for demonstrating the technology at an Army installation in FY 1990. This design incorporated the blending, feeding and burning phases of the process.

## Paint Waste Incineration

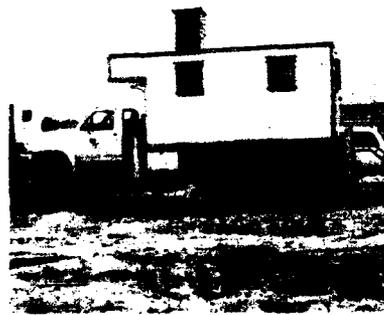
A pilot test evaluated the effectiveness of incinerating spent blast media, a large-volume hazardous waste generated at Army depots. Tests in which spent walnut shells and plastic media were treated in a rotary kiln incinerator indicated that this approach could be used to produce a nonhazardous ash. Additional comprehensive testing is planned with other paint-related wastes. Close coordination is being maintained with the Air Force and Navy during this testing program.

## Composting of Nitrocellulose-Contaminated Soil

At Badger Army Ammunition Plant (WI), the Army successfully demonstrated the feasibility of using composting to decontaminate nitrocellulose-contaminated soil. Success in this test has led to planned efforts for evaluating composting on a pilot scale to degrade nitrocellulose fines.

## Cone Penetrometer

The Army is developing a cone penetrometer as a subsurface sensing device to aid in the placement of monitoring wells. The penetrometer can also characterize subsurface contamination at hazardous waste sites. The Army has purchased a truck-mounted system. Extensive efforts are underway to develop a fiber optic sensing device to measure different contaminants from the truck-mounted system. Computer hardware and software are being obtained and developed for the system. This effort is being jointly funded by the Army, Navy and Air Force.



Cone Penetrometer

## Hot Gas Decontamination of Explosives-Contaminated Process Equipment

The Army is developing a process to decontaminate equipment used in explosives manufacturing. The process would make the equipment safe for disposal either as scrap metal or for reuse at a production facility. Testing at Hawthorne Army Ammunition Plant (CA) has successfully used a hot gas process to decontaminate metal equipment and masonry sewer pipes.

## Propellant Recovery/Reuse

DoD generates waste propellants during production operations and by retiring obsolete supplies. Army scientists and engineers have developed a technique to recycle these waste propellants. The technique allows the reuse of waste propellants in their production process, recovers the value of the raw materials and greatly reduces the volume of waste to be disposed. Laboratory tests were successful in recovering propellants in this manner. A preliminary economic analysis provided sufficient incentive to develop plans for a large-scale demonstration to be conducted in FY 1990-91.

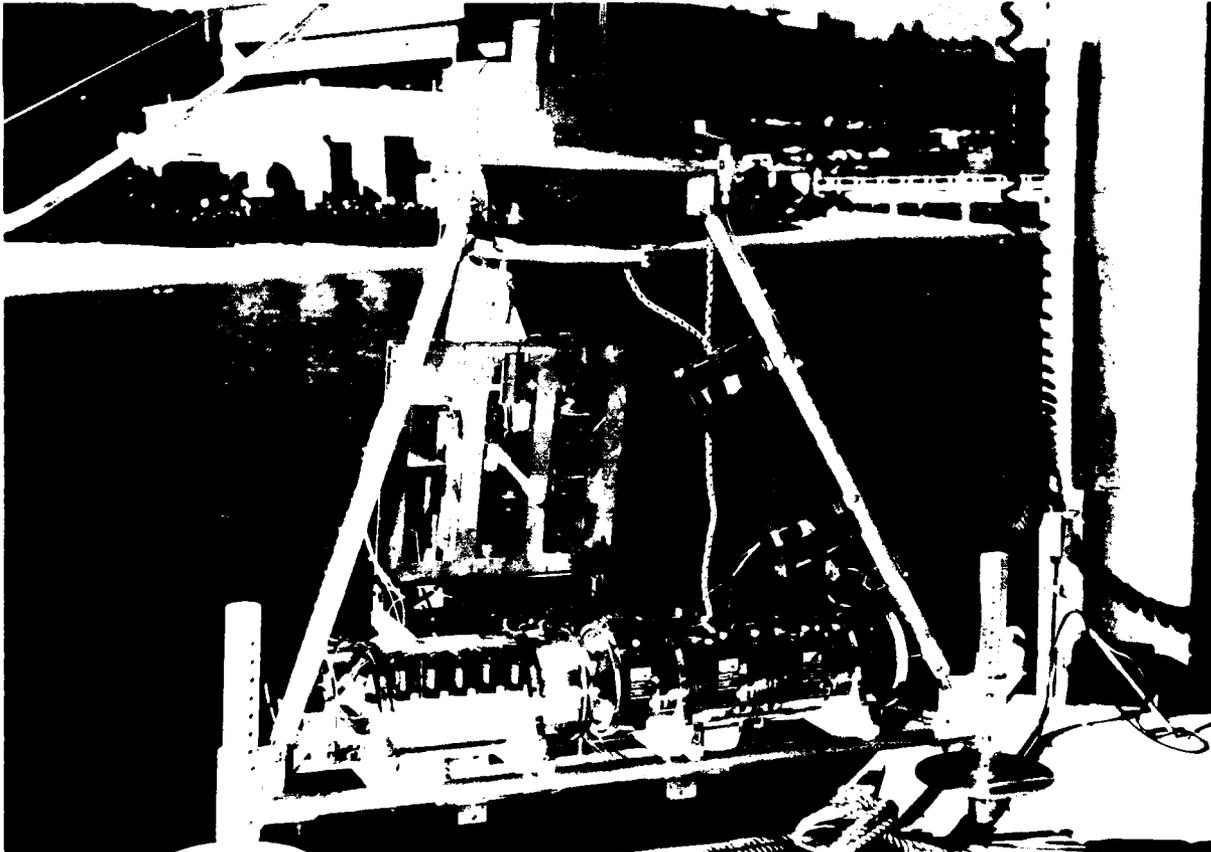
## Benthic Flux Measurements

Estimating the risk posed by contaminated sediments in water bodies has proven difficult due to uncertainties concerning the rates at which the contaminants are released into the water. For constituents that are significantly mobile, a greater risk may result from removing the sediments via dredging than from leaving the material in place.

This project will provide measurements of the actual *in situ* flux (release rate) of toxic materials from the sediment into the water. The knowledge gained will facilitate the development of cost-effective cleanup strategies.

The sampling system with its dome and associated "landing gear" is lowered from a small craft and released. Samples are collected within the dome at pre-programmed times, after which the system is retrieved using an acoustic release mechanism. The flux is calculated from analysis of the increase in toxic materials over time.

Benthic Flux Sampler



# Training of DoD Personnel in DERP Activities

**T**he Defense Environmental Restoration Program requires a team effort to effectively complete its varied and complicated tasks. This is especially true in the IRP portion of the program. DoD has implemented various training programs so that their personnel can effectively manage various aspects of the cleanup process. Listed below are sample courses of instruction provided in FY 1989.

## Installation Restoration Program (IRP) Training

This intensive one-week course of instruction is provided by the Air Force Institute of Technology at Wright Patterson AFB, Dayton, Ohio. The course provides an overview of the IRP for the various types of base and major command-level personnel who will be involved in waste site remediation. It is targeted at civil engineering personnel, public affair specialists, legal personnel and bioenvironmental engineers.

Topics covered include a review of Air Force IRP policy and management guidance, ground water hydrology, methods to deal with the public and regulatory agencies, interagency agreements, and cleanup case histories. It also reviews current R&D projects, stressing new waste site remediation technology. This course was initiated in September 1989 and will be provided four times per year. More than 200 Air Force personnel will be trained each year.

## Interagency Agreement (IAG) Workshops

In October 1989, the Air Force conducted the third of a series of IAG Workshops for Air Force legal and engineering personnel. The workshops' mission is to train personnel in negotiating IAGs. Topics included a history of IAGs; legal and technical issues, including lessons learned; negotiating principles; and the perspective of regulatory agencies such as EPA on the IAG process.

To date, approximately 150 legal and engineering personnel have been trained in problems surrounding negotiating agreements. This course will assist in the timely completion of negotiations with regulatory agencies and will help DoD to complete IAGs at their NPL sites.

## Response Personnel Health and Safety Training

Health and safety training required by OSHA continued during FY 1989 and was provided to Navy personnel involved in the IRP. This training includes the use of personal protective equipment and operation of contaminant monitoring systems.

## Defense Priority Model (DPM) Training

The Defense Priority Model (DPM) was developed to prioritize sites that require Remedial Design and Remedial Action (RD/RA). The model uses site-specific data collected during RI/FS work to refine priorities for remedial action.

During FY 1989, DoD and the Air Force sponsored five 2-day courses at various locations and trained approximately 120 DoD personnel in the use of the model. The course included an overview of the DPM, an introduction to the automated computer version of the DPM, and a sample DoD site scoring exercise. Course attendees also received a user's manual and a software program to score the sites on a personal computer. This training was put to use by participants in scoring sites scheduled for RD/RA work in FY 1990.

## Community Relations/Public Involvement Training

In FY 1989, the Navy initiated work to establish a proactive community relations and community outreach program which will involve the public in the Navy's IRP. In July 1989, the first 2-day Public Involvement Seminar was given to a few senior Navy IRP personnel, including engineering, public affairs and legal staff. The purpose of this seminar was to determine the real needs of Navy personnel in planning community involvement.

As a result of this seminar, the Navy plans to hold a nationwide conference in early FY 1990 to

provide in-depth community relations training. Areas to be covered include:

- How to meet CERCLA, SARA, and RCRA public involvement requirements;
- How to deal with the media; and
- How to plan for, prepare and deliver effective public presentations.

Additional seminars are planned nationwide to provide hands-on experience and practice in community involvement for Navy personnel associated with the IRP. This intensive community relations effort should produce a spirit of cooperation between the Navy and the local community so that a joint approach to solving waste site remediation problems can evolve. It will provide an organized, cohesive approach at the local level to keep community leaders, local government officials and affected citizens apprised of problems and progress in environmental restoration efforts.



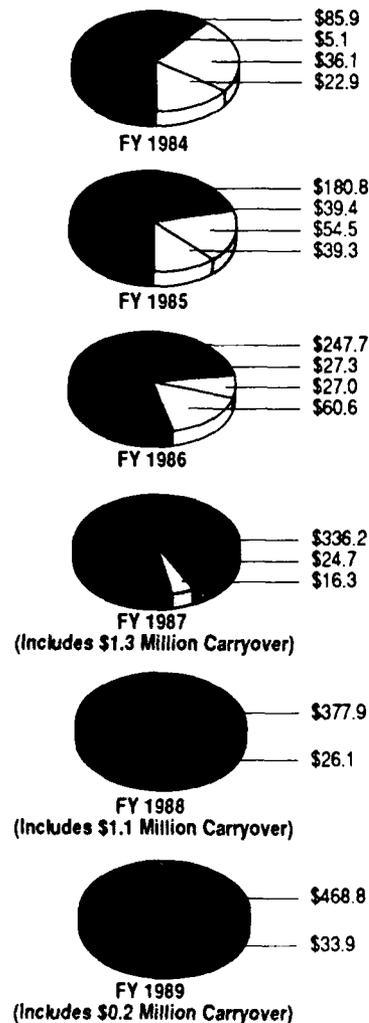
Military personnel are being trained to use the DPM

# Program Funding

In FY 1984, Congress consolidated and expanded DoD programs to clean up hazardous waste in a separate appropriation entitled the Defense Environmental Restoration Account (DERA), under the Defense Appropriations Act. The Department could thus accelerate the work and even add research and other components to the Environmental Restoration Program.

DERA Funding (Figures in Millions)

■ IRP ■ OHW □ BDDR □ HAZARDOUS WASTE DISPOSAL



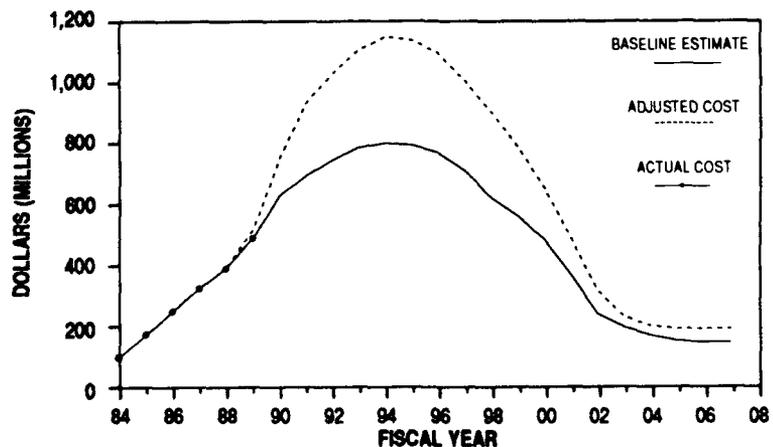
More than 84 percent of DERA funds have been allocated to the IRP since FY 1984. In FY 1989, 93 percent was expended in the IRP portion of the program. This heavy emphasis is expected to continue in FY 1990 because of the growth in these high priority requirements. The FY 1990 DoD Authorization Act provides \$601.1 million in DERA funding.

The Department has estimated the total cost of future DoD IRP activities at installations and formerly used properties to be \$9 billion (baseline) to \$14 billion (adjusted) in FY 1987 dollars. The bulk of this funding is for the more costly RD/RA cleanup step of the program.

The baseline cost estimate was developed from currently available information on site cleanup requirements. The adjusted cost estimate includes projections for sites where extensive data collection is still underway. Once this work is complete, a better definition of sites actually requiring cleanup will be possible.

Cleanup standards also remain uncertain and some agreements for remedial action at NPL installations have not been reached with EPA and state agencies. DoD will review the total program cost estimate periodically as the program matures and more information becomes available.

Installation Restoration Program Costs



# Appendix A

## Information Requested by the Superfund Amendments and Reauthorization Act

This Appendix to the Annual Report provides information requested in Section 120(e)(5) of the Superfund Amendments and Reauthorization Act of 1986 (SARA), which applies to all Federal Facilities, and Section 211 of SARA (codified at 10 USC 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 report on the progress in reaching interagency agreements under this section."
- "The specific cost estimates and budgetary proposals involved in each interagency agreement."
- "A brief summary of the public comments regarding each proposed interagency agreement."
- "A description of the instances in which no agreement was reached."
- "A report on progress in conducting investigations and studies under Paragraph (1)." [Paragraph (1) discusses the timing of RI/FS work at National Priorities List (NPL) sites].
- "A report on progress in conducting remedial actions."
- "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 B contains a description of each installation with 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 Installation Restoration Program (IRP) response actions at that installation; schedules for initiating and completing those response actions; and the status of negotiations on Interagency Agreements. The information in Appendix B answers requirements of the preceding paragraph. Tables B-1 and B-2 in Appendix B catalog DoD facilities that are final-listed and proposed for listing on the NPL.

The following paragraphs provide detailed answers to the SARA information requirements.

## **Progress in Reaching Interagency Agreements**

During FY 1989, efforts to complete Federal Facility Agreements under SARA, Section 120 were accelerated by the issuance of detailed DoD guidance; workshops held with DoD, EPA, and state representatives; and hard work by the Components. These Interagency Agreements (IAGs) received a high priority because they establish comprehensive installation-specific arrangements for proceeding with DoD's waste cleanup activities under applicable Federal and State laws. The DoD goal is an agreement in place for all installations with sites final-listed on the NPL or proposed for listing. Extensive field negotiations took place in FY 1989 with EPA and state authorities. This resulted in a firm foundation for the agreement process so that the DoD Components can enter into consistent, workable agreements nationwide.

The most significant FY 1989 accomplishment was the signing of 18 IAGs for installations listed on the NPL. The 19 installations with finalized agreements are shown in Table A-1. The large increase in signed agreements compared to FY 1988 is due to the extensive model language agreement and guidance developed in FY 1988, coupled with an all out effort by the Components to negotiate agreements. In FY 1989, the DoD Components held workshops for their field personnel on the IAG model language and other aspects of negotiating Federal Facility Agreements. They also issued additional guidance to direct field activity's efforts.

## **Interagency Agreement Cost Estimates and Budgetary Proposals**

Defense Environmental Restoration Program funding is discussed in the body of this report. The estimate for total program funding is based on existing budget documentation including program cost data from the individual DoD Component Installation Restoration Programs, and consideration of existing Superfund cost data. A list of installations with signed IAGs is shown in Table A-1 along with the estimated total investigative and cleanup cost for implementing each IAG. Total IRP costs associated with signed IAGs is \$1,055 million. These costs include past IRP costs along with budgetary estimates extending out to FY 1991 for cleanup of the various sites at installations where an IAG has been finalized.

Additional details of past expenditures at all DoD NPL installations are shown in Tables B-1 and B-2 of Appendix B. This includes funds for Interim Remedial Actions, Removal Actions, and Remedial Investigations/Feasibility Studies.

## **Public Comments Regarding Proposed Interagency Agreements**

As of September 30, 1989, public comments had been received on 4 of the 18 IAGs completed in FY 1989. These comments are summarized below.

### **Moffett Field Naval Air Station, Sunnyvale, California**

Comments from a Potentially Responsible Party (PRP) at the Middlefield-Ellis-Whisman (MEW) area of this NPL installation requested that the Navy initiate removals and contaminant source controls for hazardous waste sites on the installation before the PRPs initiate cleanup of the MEW area. This commentator requested that the Navy address the on-base sources which may contribute to the groundwater contamination at the MEW area before completing RI/FS work at other sites at Moffett Field.

EPA Region IX has requested that an agreement be reached between the Navy and the MEW PRPs before the IAG is finalized. Negotiations have commenced and a resolution is expected in 1990.

**Table A-1**  
**Signed Interagency Agreements**

Location	Cost (\$1,000)
<b>ARMY</b>	
Letterkenney AD, PA	21,980
Sharpe AD, CA	33,211
Sacramento AD, CA	20,165
Louisiana AAP, LA	40,555
Lake City AAP, MO	26,998
Savanna ADA, IL	12,752
Rocky Mt. Arsenal, CO	375,817
Joliet AAP, IL	13,343
Twin Cities AAF, MN	40,427
<b>Army Total</b>	<b>585,248</b>
<b>AIR FORCE</b>	
Tinker AFB, OK	43,007
Robins AFB, GA	27,649
Castle AFB, TX	12,549
Mather AFB, CA	9,274
McClellan AFB, CA	72,295
Norton AFB, CA	55,014
Dover AFB, DE	10,735
<b>Air Force Total</b>	<b>230,523</b>
<b>NAVY</b>	
NAS Moffett, CA	101,813
NAS Brunswick, ME	15,535
NAEC Lakehurst, NJ	121,963
<b>Navy Total</b>	<b>239,311</b>
<b>DoD TOTAL</b>	<b>1,055,082</b>

Status as of September 30, 1989

Note: Costs represent total estimated investigation and remediation costs to FY 1991.

### **Dover Air Force Base, Dover, Delaware**

The Delaware Department of Transportation requested to be included on the Technical Review Committee for this installation. This request was granted and had no effect on the IAG.

### **McClellan Air Force Base, Sacramento County, California**

More than 100 public comments were received. The general nature of most comments criticized the ability of the agreement to control the cleanup and requested more EPA control during installation remediation. The IAG will be revised.

### **Castle Air Force Base, Atwater, California**

One comment unrelated to the IAG was received. No revision to the IAG is required.

### **Norton Air Force Base, San Eernadino, California**

Less than 20 comments were received, all of which were found to be irrelevant to the IAG. The comments tended to address the state information distribution process and the Community Relations Plan. No revision to the IAG is required.

## **Instances Where No Agreement Was Reached**

There are no instances where DoD has failed to reach an agreement within the required time period.

## **Remedial Investigation/Feasibility Study (RI/FS) Progress**

SARA Section 120(e)(1) specifies that RI/FS work must be initiated at sites within six months of listing on the NPL. Remedial Investigation/Feasibility Study work has begun at 41 DoD installations final-listed on the NPL. Also, RI/FS work has been initiated at 35 additional DoD installations proposed for listing on the NPL. RI/FS start dates are shown in the Installation Narratives in Appendix B.

## **Remedial Action Progress**

Final RD/RA activities based on RI/FS recommendations, and under the terms of an IAG, have not yet begun at any DoD NPL installation. SARA Section 120(e)(2) requires that within 15 months of completion of an RI/FS and the issuance of a Record of Decision (ROD) at an NPL facility, onsite remedial action must be initiated. Only one ROD had been completed by the end of FY 1989. That ROD was completed in April 1989 for Concord Naval Weapons Station. DoD anticipates beginning remedial action at this site within the required deadline

Response actions other than final RD/RA activities have been undertaken at 47 DoD installations with sites on or proposed for listing on the NPL. This work involves several types of Removal Actions and/or Interim Remedial Actions. A summary of these actions is shown in Table A-2.

Additional information on RD/RA initiatives at DoD NPL installations is provided in the narratives in Appendix B.

**Table A-2**  
**Summary of NPL Installation Activities**

Type of Activity	Number of Activities
Alternate Water Supply/Treatment	17
Incineration	2
Site Treatment/Remediation	24
Decontamination	1
Waste Removal	32
Ground Water Treatment	20
Long-Term Monitoring	22
<b>TOTAL</b>	<b>118</b>

Note: Some installations have more than one type of action underway.

## Remedial Actions at Non-NPL Facilities

Remedial actions have been initiated at 1,192 DoD sites (including sites at NPL installations). These include Removal Actions, Interim Remedial Actions and long-term monitoring. Of these, 287 had been completed by the end of FY 1989.

## Defense Environmental Restoration Program Reporting Requirements

Section 211 of SARA (10 USC 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 C summarizes the information requested in items 1, 2, and 4 above. It denotes the number of sites undergoing each step of the IRP at any one installation. The response to item "3" above is found in the Program Funding section of this report.

Table C-1 in Appendix C provides an overall summary of the status of IRP work at installations on a state-by-state basis. Table C-2 provides a detailed listing of IRP status for each installation in the program. For each IRP phase listed in Tables C-1 and C-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.

### **Facilities Having Identified Hazardous Substances**

The universe of sites at DoD installations in the IRP is summarized on page 6 of this report and explained further in Appendix C. Referring to these tables, a PA/SI is a Preliminary Assessment/Site Inspection of an installation to determine whether it potentially has a contamination problem, and at which locations. The Remedial Investigation/Feasibility Study (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. Remedial Design/Remedial Action (RD/RA) work is performed at those facilities where an RI/FS has identified a contamination problem that needs remediation.

Confirmation of which of the 14,401 potential sites are actually contaminated and are presenting a health or environmental risk requires completion of a Remedial Investigation. Because these RIs are still underway at many sites, the absolute number of sites having hazardous substances cannot currently be determined. A minimum can be calculated by assuming that all sites with RD/RA scheduled, underway or completed have been confirmed as having identified hazardous waste that may present a risk. The present estimate of confirmed hazardous waste sites in DoD is 3,378, the sum of RD/RA work completed, underway or planned for the future, as provided on page 6.

### **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 C. Similarly, the "F" category under each type of response action indicates the number of contemplated (future) response actions for each installation. Table C-3 summarizes for each DoD service component the response action status as of September 30, 1989.

The table shows that 287 cleanups (i.e., removals, interim responses and remedial actions) have been completed. This includes 135 Army, 28 Navy, 117 Air Force, and 7 DLA sites. In addition, there are 905 site actions underway with 2,186 scheduled for future work.

### **Response Action Cost Estimates and Budgetary Proposals**

In FY 1989, the Congress appropriated \$502.6 million for the Defense Environmental Restoration Program, of which \$468.7 million were spent on the IRP. These funds were used primarily to expand and accelerate studies and remedial actions at more than 4,400 individual sites. The Program Funding section of this report, provides additional funding information.

### **Response Action Progress at Non-NPL Facilities**

DoD has continued to make progress during FY 1989 in investigating all sites or facilities on DoD installations potentially contaminated with hazardous substances 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 14,401 sites on 1,579 military installations are now included in the IRP. Of the total number of sites, 1,465 are sites associated with facilities listed on the NPL and 959 are associated with facilities proposed for listing on the NPL. Facilities not listed on the NPL have a total of 11,977 sites in various stages of the IRP. RD/RA actions are ongoing at 580 sites on non-NPL facilities.

Appendix B provides data regarding IRP response actions at DoD facilities on the NPL. The listing provided in Appendix C, in addition to providing additional information on NPL sites, provides the status of work at non-NPL facilities.

# Appendix B

## DoD Installations on the NPL or Proposed for Listing on the NPL

This Appendix to the Annual Report provides summary information for each DoD installation listed on the National Priorities List (NPL) or proposed for listing as of the end of FY 1989. Table B-1 provides key data for facilities listed on the NPL. Similar data for facilities proposed for the NPL are presented in Table B-2. Narrative summaries of each DoD installation proposed for or listed on the NPL are provided beginning on page B-8.

IAG Status in Tables B-1 and B-2 reflects the status as of September 30, 1989. The status abbreviations used are:

NS	—	Negotiations Not Started
IN	—	Negotiations Initiated
FIN	—	Finalized (signed)

The IAG Year indicated in these tables is the calendar year the IAG was (or is expected to be) signed. An "(e)" after the year denotes an estimate.

**Table B-1**  
**DoD Installations on the National Priorities List (NPL)**

Installation	State	HRS Score	Removal Action/Interim Remedial Action		RI/FS \$(K) Thru FY 89	IAG	
			Year (Latest)	\$(K) Thru FY 89		Status	Signing Year
<b>ARMY</b>							
Alabama AAP	AL	36.83	88	7,642	2,172	IN	89(e)
Anniston AD	AL	51.91	89	6,744	3,197	IN	—
Cornhusker AAP	ME	51.13	88	14,500	1,054	IN	—
Fort Dix	NJ	37.40	88	44	3,253	IN	—
Fort Lewis (Landfill No. 5)	WA	42.78	88	470	2,680	IN	—
Joliet AAP (LAP Area)	IL	35.23	85	2,580	765	FIN	89
Joliet AAP (Mfg Area)	IL	32.08	85	1,501	1,847	FIN	89
Lake City AAP	MO	33.68	89	11,800	4,965	FIN	89
Letterkenny AD (PDO Area)	PA	37.51	89	971	1,489	FIN	89
Letterkenny AD (SE Area)	PA	34.21	89	6,157	3,773	FIN	89
Lone Star AAP	TX	31.85	89	1,347	3,383	IN	—
Louisiana AAP	LA	30.26	88	31,400	4,495	FIN	89
Milan AAP	TN	58.15	84	1,002	2,373	IN	89(e)
Rocky Mtn. Arsenal	CO	58.15	89	77,256	100,830	FIN	89
Sacramento AD	CA	44.46	89	1,830	2,439	FIN	88
Savanna ADA	IL	42.20	—	—	2,698	FIN	89
Sharpe AD	CA	42.24	89	216	6,100	FIN	89
Twin Cities AAP*	MN	59.16	89	25,500	6,993	FIN	87
Umatilla ADA (Lagoons)	OR	31.36	—	—	1,633	IN	89(e)

\*Listed as New Brighton/Arden Hills, not a federal facility

(Continued)

**Table B-1**  
**DoD Installations on the National Priorities List (NPL)**

Installation	State	HRS Score	Removal Action/Interim Remedial Action		RI/FS \$(K) Thru FY 89	IAG	
			Year (Latest)	\$(K) Thru FY 89		Status	Signing Year
<b>NAVY</b>							
Bangor NSB	WA	30.42	88	10	2,488	IN	90(e)
Brunswick NAS	ME	43.38	—	—	3,498	FIN	89
Lakehurst NAEC	NJ	50.53	—	—	3,847	FIN	89
Moffett Field NAS	CA	32.90	—	—	11,432	FIN	89
<b>AIR FORCE</b>							
Castle AFB	CA	37.93	89	958	4,153	FIN	89
Dover AFB	DE	35.89	86	760	3,524	FIN	89
Fairchild AFB	WA	31.98	89	54	1,671	IN	90(e)
Griffiss AFB	NY	34.20	89	3,824	511	IN	90(e)
Hill AFB	UT	49.90	87	7,582	4,849	IN	90(e)
Mather AFB (AC&W Disp. Site)	CA	28.90	89	786	3,419	FIN	89
McClellan AFB	CA	57.93	89	26,546	15,027	FIN	89
Twin Cities AFRB	MN	33.70	87	24	1,377	IN	89
Norton AFB	CA	39.65	89	582	4,813	FIN	89
Robins AFB	GA	51.66	87	3,361	10,758	FIN	89
Tinker AFB	OK	42.24	87	8,288	6,777	FIN	88
<b>DEFENSE LOGISTICS AGENCY</b>							
DGSC Richmond	VA	33.85	—	0	4,710	IN	90(e)
Ogden Defense Depot	UT	45.10	88	186	2,364	IN	89

**Table B-2**

**DoD Installations Proposed for the National Priorities List (NPL)**

Installation	State	HRS Score	Proposed NPL Year	Removal Action/Interim Remedial Action			RI/FS \$(K) Thru FY 89	IAG	
				Year (Latest)	\$(K) Thru FY 89	Year		Signing Year	
Aberdeen PG (Aberdeen)	MD	31.45	85	—	—	250	IN	—	
Aberdeen PG (Edgewood)	MD	53.57	85	89	676	15,000	IN	—	
Fort Devens	MA	42.24	89	—	—	300	NS	—	
Fort Devens Sudbury Annex	MA	35.57	89	88	399	7	NS	—	
Fort Lewis (Logistics Center)	WA	42.78	89	89	250	3,764	IN	—	
Fort Ord	CA	42.24	89	88	250	4,245	NS	—	
Fort Riley	KS	33.79	89	89	593	35	NS	—	
Fort Wainwright	AK	42.40	89	89	357	594	NS	—	
Iowa AAP	IA	29.73	89	89	2,075	465	IN	90(e)	
Longhorn AAP	TX	39.83	89	89	229	585	NS	—	
Picatinny Arsenal	NJ	42.92	89	89	4,200	7,747	IN	90(e)	
Riverbank AAP	CA	63.94	88	89	563	4,905	NS	—	
Schofield Barracks	HI	28.90	89	86	1,600	—	NS	—	
Seneca AD	NY	37.30	89	89	500	932	NS	—	
Tobyhanna AD	PA	37.93	89	89	18	1,129	NS	—	
Tooele AD	UT	38.32	87	85	2,800	7,918	IN	—	

(Continued)

**Table B-2**

**DoD Installations Proposed for the National Priorities List (NPL)**

Installation	State	HRS Score	Proposed NPL Year	Removal Action/Interim Remedial Action		RI/FS	IAG	
				Year (Latest)	\$(K) Thru FY 89	\$(K) Thru FY 89	Status	Signing Year
<b>NAVY</b>								
Albany MCLB	GA	44.65	89	—	—	1,422	NS	—
Barstow MCLB	CA	37.93	89	89	148	1,187	NS	—
Camp LeJeune MCMR	NC	33.02	88	88	323	2,428	IN	90(e)
Camp Pendleton MCB	CA	33.79	89	—	—	786	NS	—
Cecil Field NAS	FL	31.99	89	—	—	561	NS	—
Concord NWS	CA	29.92	88	83	380	7,243	NS	—
Davisville CBC	RI	34.52	89	—	—	1,585	NS	—
Earle NWS	NJ	37.21	87	—	—	481	NS	—
El Toro MCAS	CA	40.83	88	89	173	2,119	NS	—
Fridley NIROP	MN	30.83	89	84	733	2,357	NS	—
Jacksonville NAS	FL	32.08	89	85	10	1,047	NS	—
Keyport NUWES	WA	33.60	88	87	6	1,934	NS	—
Newport NETC	RI	34.25	89	88	8	536	NS	—
Pensacola NAS	FL	42.40	89	89	56	1,500	NS	—
Sabana Seca NSGA	PR	34.28	88	88	7	109	IN	90(e)
Treasure Island NS - Hunters Point Annex	CA	48.77	89	88	1,500	7,234	NS	—
Warminster NADC	PA	57.93	86	—	—	355	IN	90(e)

(Continued)

**Table B-2**  
**DoD Installations Proposed for the National Priorities List (NPL)**

Installation	State	HRS Score	Proposed NPL Year	Removal Action/Interim Remedial Action		RI/FS \$(K) Thru FY 89	IAG	
				Year (Latest)	\$(K) Thru FY 89		Status	Signing Year
<b>NAVY (Continued)</b>								
Whidbey NAS (Ault Field)	WA	48.40	85	—	—	991	NS	—
Whidbey NAS (Seaplane Base)	WA	39.64	85	—	—	990	NS	—
Yuma MCAS	AZ	29.88	88	—	—	491	NS	—
<b>DEFENSE LOGISTICS AGENCY</b>								
Tracy Defense Depot	CA	31.12	89	89	1,400	3,450	NS	90(e)
<b>AIR FORCE</b>								
AFP PJKS	CO	42.93	89	—	—	153	IN	90(e)
AFP 4	TX	39.92	87	86	2,500	7,315	IN	90(e)
Edwards AFB	CA	33.62	89	89	7,607	3,467	IN	90(e)
Eielson AFB	AK	48.14	89	89	1,117	3,542	IN	90(e)
Elmendorf AFB	AK	45.91	89	89	1,699	394	IN	90(e)
F.E. Warren AFB	WY	39.23	89	89	1,302	1,535	IN	90(e)
George AFB	CA	33.62	89	89	7,681	2,562	IN	90(e)
Homestead AFB	FL	42.40	89	87	1,003	1,266	IN	90(e)
Loring AFB	ME	34.49	89	89	548	2,853	IN	90(e)
Luke AFB	AZ	39.73	89	89	1,511	229	IN	90(e)
March AFB	CA	31.94	89	89	465	2,777	IN	90(e)

(Continued)

# Table B-2

## DoD Installations Proposed for the National Priorities List (NPL)

Installation	State	HRS Score	Proposed NPL Year	Removal Action/Interim Remedial Action		RI/FS	IAG	
				Year (Latest)	\$(K) Thru FY 89	\$(K) Thru FY 89	Status	Signing Year
<b>AIR FORCE (Continued)</b>								
Mather AFB	CA	42.24	89	89	19	7,582	FIN	89
Mountain Home AFB	ID	57.80	89	88	200	394	IN	90(e)
Otis ANG Base/ Camp Edwards	MA	45.92	89	89	2,458	6,569	IN	90(e)
Pease AFB	NH	39.42	89	89	1,485	3,065	IN	90(e)
Plattsburgh AFB	NY	30.34	89	85	20	2,978	IN	90(e)
Travis AFB	CA	29.49	89	86	270	3,251	IN	90(e)
Wright Patterson AFB	OH	57.85	89	87	6,860	5,323	IN	90(e)
Williams AFB	AZ	37.93	89	88	73	2,736	IN	90(e)

# Aberdeen Proving Ground Edgewood and Aberdeen, Maryland

**Service:** Army

**Size:** 72,518 Acres

**HRS Score:** 53.57 (Edgewood Area),  
31.45 (Aberdeen)

**Base Mission:** Develop and test equipment; Provide training

**IAG Status:** Initiated

**Action Dates:** PA/SI completed 1976; Proposed for NPL 1985; RI/FS initiated 1986

**Contaminants:** Volatile organic compounds, arsenic, phosphates, napalm, UXO, nitrates, chemical agents

**Funding to Date:** \$20.5 million



## Preliminary Assessment/ Site Inspection (PA/SI)

Water range areas, contaminated with large quantities of UXO and accessible to local boating during non-testing periods, present a potential safety problem. Off-base contaminant migration could affect four proposed state critical habitats (as defined by the Maryland Endangered Species Act) and a national wildlife refuge. The PA/SI identified eight areas of contamination and recommended three areas for preliminary survey and two for further monitoring. Large areas contaminated or potentially contaminated with UXO, chemical munitions, and manufacturing wastes were identified. Contamination of surface and ground waters was detected, so four wells were removed from service due to volatile organic compound (VOC) contamination. Contaminant migration via surface waters may occur at five sites.

## Remedial Investigation/ Feasibility Study (RI/FS)

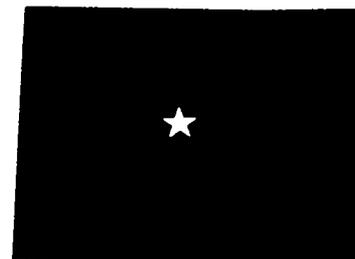
Recent environmental investigations have been pursued under RCRA. Low levels of hydrocarbons have been found in the ground water in three areas. White phosphorus has been detected in the sediment and surface waters in one area. O Field, contaminated with large quantities of chemical and explosive materials, is a source of contaminant migration. Arsenic, trichloroaniline, and DDT have been detected in surface waters. Ground water has been contaminated by VOCs. No significant off-base migration has been reported. Resampling has confirmed original survey findings. The impending IAG will initiate RI/FS efforts under CERCLA/SARA. A Technical Review Committee (TRC) was formed in November, 1988. TRC members include: the Army, USEPA Region III, the State of Maryland, Harford County, and the Town of Aberdeen.

## Remedial Design/ Remedial Action (RD/RA)

Surface cleanup of abandoned drum sites has been initiated at the Edgewood area of the grounds. Localized ground water treatment at the Edgewood Area will begin in 1990.

# Air Force Plant PJKS

## Waterton, Colorado



**Service:** Air Force

**Size:** 464 Acres

**HRS Score:** 42.93

**Base Mission:** Research and development; Missile assembly; Engine testing

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1986; RI/FS initiated 1986; Placed on NPL 1989

**Contaminants:** Chlorinated organic solvents, fuel

**Funding to Date:** \$3.30 million

### **Preliminary Assessment/ Site Inspection (PA/SI)**

The site is surrounded by approximately 5,200 acres of land owned by Martin Marietta (Denver Aerospace). Since 1956, Martin Marietta has developed missiles and missile components for the Air Force there. Its production, testing, and storage facilities are located southeast of, and at a lower elevation than the Air Force property. Chlorinated organic solvents were frequently used to clean equipment and piping. Fuels containing hydrazine were developed, purified, and tested in support of the Titan III program.

The Air Force PA/SI investigated potentially contaminated areas on the plant including the Deluge Containment Pond, a two-million gallon concrete-lined surface impoundment that receives water potentially contaminated with hydrazine from rocket engine testing; the D-1 landfill, which accepted construction debris, household wastes, and unspecified chemical wastes before its closure and cover in 1974; and three areas of a hydrazine-contaminated water and trichloroethylene (TCE) spill.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

RI/FS was initiated March, 1986. Samples taken in 1988 from monitoring wells near the contaminated areas detected TCE, 1,1,1-trichloroethane, and Freon 113. Tests conducted in 1986 identified TCE and cis-1,2-dichloroethylene in Brush Creek, which flows from the plant 1.8 stream miles to the South Platte River. The Air Force has prepared a draft RI/FS which determined the type and extent of the contamination at the plant and identified alternatives for remedial action. EPA is reviewing the draft report.

### **Remedial Design/ Remedial Action (RD/RA)**

Initiation of RD/RA work is pending completion of RI/FS activities.

# Air Force Plant 4

## Fort Worth, Texas

**Service:** Air Force

**Size:** 602 Acres

**HRS Score:** 39.92

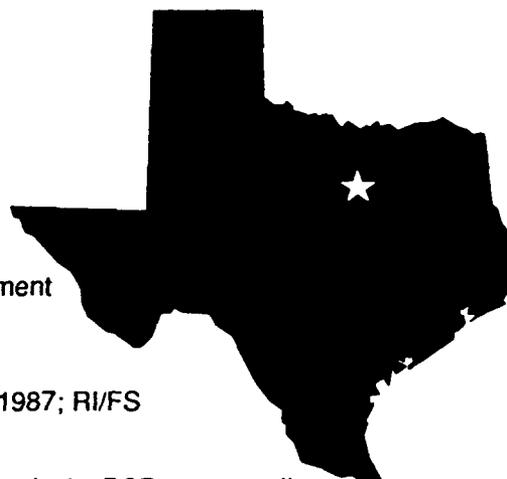
**Base Mission:** Manufacture aircraft and associated equipment

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1984; Proposed for NPL 1987; RI/FS scheduled completion 1990

**Contaminants:** Solvents, paint residues, spent process chemicals, PCBs, waste oils and fuels, heavy metals, volatile organic compounds, cyanide

**Funding to Date:** \$9.81 million



### **Preliminary Assessment/ Site Inspection (PA/SI)**

Air Force Plant 4, owned by the government, is operated by General Dynamics. Approximately 13,000 people in the city of White Settlement rely on the aquifer underlying the base for drinking water. Twenty sites were studied and 10 were identified as potentially contaminated. Ground and surface water contaminants include di-, tri-, and tetrachloroethylene, ethylbenzene, toluene, methylene chloride, heavy metals, cyanide, and petroleum products.

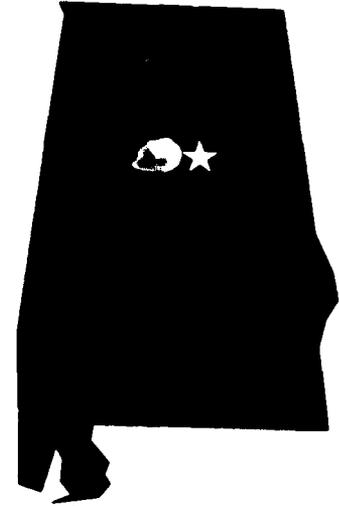
### **Remedial Investigation/ Feasibility Study (RI/FS)**

RI/FS was initiated in August, 1986. Confirmation/quantification studies examined 21 sites and confirmed contamination of soil, surface and ground water. Twelve sites were recommended for additional RI/FS study, and one site will undergo additional sampling. No further action was recommended for eight sites. The RI/FS will be completed in 1990.

### **Remedial Design/ Remedial Action RD/RA**

Contaminated soil was excavated at four sites in 1986. Wells for the city of White Settlement are sampled quarterly by EPA with future monitoring planned. RD/RA work will begin in 1991.

# Alabama Army Ammunition Plant Childersburg, Alabama



**Service:** Army

**Size:** 5,067 Acres

**HRS Score:** 36.83

**Base Mission:** Inactive; Former explosives manufacturing plant

**IAG Status:** Initiated and expected to be signed 1989

**Action Dates:** PA/SI completed 1983; RI/FS initiated 1985; Placed on NPL 1987

**Contaminants:** Munition related wastes, heavy metals, nitroaromatic compounds

**Funding to Date:** \$9.79 million

## **Preliminary Assessment/ Site Inspection (PA/SI)**

A PA/SI identified 21 sites as potential contaminant migration sources, with seven targeted for an RI/FS. The studies identified potential vertical contaminant migration within the aquifers and surface water contamination. A Confirmation Study delineated parameters and migration patterns for one aquifer and identified nitroaromatic compounds in on-site soils and in an aquifer beneath and down-gradient of the manufacturing areas.

## **Remedial Investigation/ Feasibility Study (RI/FS)**

The RI/FS, begun September, 1985, is currently ongoing under the impending IAG. Investigations to date have found the ground water contaminated with nitroaromatic compounds in concentrations above Federal Ambient Water Quality Criteria. On-site surface water is contaminated with nitroaromatic compounds and lead. Migration of contaminants at levels exceeding criteria is not expected.

## **Remedial Design/ Remedial Action (RD/RA)**

Cleanup of Area A, including soil excavation and decontamination of storage igloos and buildings, was completed in 1988. Decontamination of other areas is underway.

# Albany Marine Corps Logistic Base

## Albany, Georgia



**Service:** Navy

**Size:** 3,327 Acres

**HRS Score:** 44.65

**Base Mission:** Supply center; Training Center

**IAG Status:** Initiation expected 1990

**Action Dates:** PA/SI completed 1985; Proposed for NPL 1989; RI/FS initiated 1989

**Contaminants:** Waste oil and fuels, solvents, mineral spirits, PCBs, paints and thinners, stripping compounds, DDT, cleaning solutions

**Funding to Date:** \$1.42 million

### **Preliminary Assessment/ Site Inspection (PA/SI)**

The PA/SI identified eight potential contamination sites, six of which were recommended for confirmation studies. Sites included landfills, a storm sewer and canal, and a leaking drum storage area. Nine sites are being addressed in the SI.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

Phase I of the RCRA Facility Investigation (RFI) of nine sites was completed in 1989. Results of the RFI will be used for the RI since all installation restoration sites are also included under the RFI as Solid Waste Management Units, and data required for the RFI is similar to that required for an RI. Old sludge-drying beds are currently being corrected under RCRA. A draw-down test was performed on the recovery well that extracts water from the contaminated Upper Chala Aquifer. A conceptual design was then completed for the recovery system. At the Industrial Waste Treatment Plant, quarterly ground water monitoring continues as part of the RCRA corrective action.

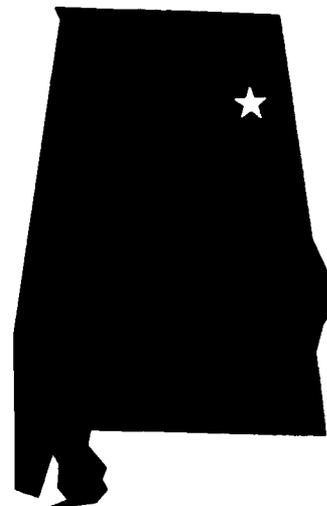
The first meeting of the Technical Review Committee (TRC) was held on September 11, 1989.

### **Remedial Design/ Remedial Action (RD/RA)**

One recovery well has been installed at the Industrial Waste Treatment Plant and old sludge drying beds were capped.

# Anniston Army Depot

## Anniston, Alabama



**Service:** Army

**Size:** 15,245 Acres

**HRS Score:** 51.91

**Base Mission:** Maintain combat vehicles and artillery equipment

**IAG Status:** Initiated

**Action Dates:** PA/SI completed 1983; RI/FS initiated 1983; Placed on NPL 1989

**Contaminants:** Volatile organic compounds, heavy metals, paints, acids, solvents, phenols, degreasers, ammunition wastes, oils and greases, fly ash

**Funding to Date:** \$10.1 million

### **Preliminary Assessment/ Site Inspection (PA/SI)**

The PA/SI identified 15 past disposal or spill sites potentially contaminated with hazardous wastes. The PA/SI also found that hazardous wastes from some sites had contaminated the surface water and were probably also contaminating the ground water.

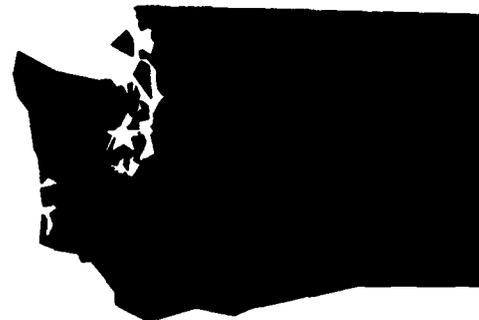
### **Remedial Investigation/ Feasibility Study (RI/FS)**

RI/FS work confirmed that the local ground water is contaminated, principally with VOCs, phenols, and metals. Low levels of contaminants have migrated beyond the Depot boundary.

### **Remedial Design/ Remedial Action (RD/RA)**

Contaminated materials at Site Z-1 were removed and excavated to an RCRA facility in 1983. An air stripper for removing volatiles from ground water has been operational since 1987. Three additional ground water treatment systems are currently being installed.

# Bangor Naval Submarine Base Silverdale, Washington



**Service:** Navy

**Size:** 6,692 Acres

**HRS Score:** 30.42

**Base Mission:** Support for Trident submarines

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1983; Site A placed on NPL 1987; RI/FS initiated 1988; Site F proposed for NPL 1989

**Contaminants:** PCBs, waste oil and grease, spent solvents, waste battery acid, pesticides, paints/ painting residues, photographic chemicals, metal plating wastes, dyes

**Funding to Date:** \$2.49 million

## **Preliminary Assessment/ Site Inspection (PA/SI)**

During extensive base construction in 1977, significant site contamination was identified. The PA/SI identified 42 sites as potentially contaminated and 10 sites were targeted for RI/FS work. Site A, the Explosive Ordnance Disposal Site, and Site F, the Wastewater Disposal Area for Demilitarization Operations were of primary concern. Ground water contamination of the uppermost aquifer has been identified at both sites. The primary contaminants of concern are typical constituents of military explosives—cyclonite (RDX) and trinitrotoluene (TNT). The shallow aquifer, soil, and surface water have all been contaminated by TNT, RDX, OTTO fuel, and ammonium picrate. The potential for contamination of nearby shoreline sediment from on-base surface water drainage was also evaluated.

## **Remedial Investigation/ Feasibility Study (RI/FS)**

RI field work for Site A was initiated in May, 1988, and an RI/FS will be completed in March, 1990. RI field work for Site F was initiated in November, 1989, and an RI/FS will be completed in 1991. RI/FSs for the other eight sites will be completed in 1993.

The Navy detected some contamination in area surface waters and shellfish, but since the data are inconclusive the risks may be very low. As part of an extensive community relations plan, the base has formed a Technical Review Committee to allow the local community to review plans. Members include: Bangor NSB; Naval Facilities Engineering Command; USEPA Region X; State of Washington Department of Ecology; Bremerton/Kitsap County Health Department; Public Utility District #1 of Kitsap County; Hood Canal Coordinating Council; and community representatives from Vineland, Washington and Olympia, Washington.

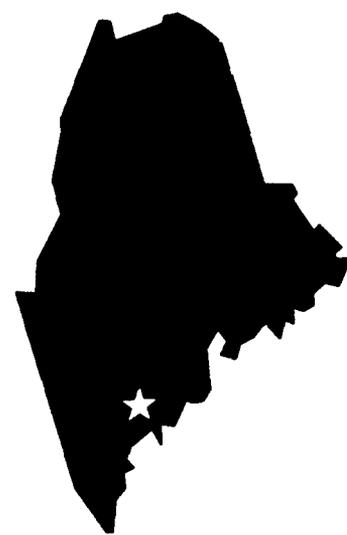
## **Remedial Design/ Remedial Action (RD/RA)**

The Navy plans to remove the limited contamination discovered in area surface waters and shellfish in 1990. Although remediation measures and funding depend on RI/FS conclusions, it is estimated that \$25 million will be expended in RD/RA waste.



# Brunswick Naval Air Station

## Brunswick, Maine



**Service:** Navy

**Size:** 7,259 Acres

**HRS Score:** 43.38

**Base Mission:** Provide facilities, services, materials, and aircraft for anti-submarine warfare

**IAG Status:** Signed 1989 with EPA

**Action Dates:** PA/SI completed 1983; RI/FS initiated 1986; Placed on NPL 1987

**Contaminants:** Waste oils, contaminated fuels, solvents, acids, paint residues, photographic chemicals, pesticides/herbicides, asbestos

**Funding to Date:** \$3.50 million

### **Preliminary Assessment/ Site Inspection (PA/SI)**

The PA/SI identified ten past disposal or spill sites that could contain hazardous contaminants. Of these, seven were designated as having a high potential for environmental contamination, thus warranting further investigation. Ground water serving 18,000 people as well as surface water and nearby wetlands may be threatened by potential contaminant migration.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

An RI/FS began April, 1986 to confirm contamination, evaluate the potential for migration, and determine migration pathways. A Technical Review Committee (TRC), established in December, 1987, has held 10 meetings to date. TRC members include: Northern Division, Naval Facilities Engineering Command; USEPA Region I; Maine Department of Environmental Protection; Town of Brunswick; and Brunswick-Topsham Water District.

### **Remedial Design/ Remedial Action (RD/RA)**

Initiation of RD/RA work is expected in 1992.

# Camp LeJeune Military Reservation Jacksonville, North Carolina

**Service:** Navy

**Size:** 88,432 Acres

**HRS Score:** 33.02

**Base Mission:** Provide housing, training, logistical, and administrative support for Fleet Marine Force Units

**IAG Status:** initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1983; RI/FS initiated 1984; Proposed for NPL 1988

**Contaminants:** Waste oils, fuels, solvents, battery acid, lithium batteries, paints, thinners, pesticides/herbicides, PCBs

**Funding to Date:** \$2.43 million



## **Preliminary Assessment/ Site Inspection (PA/SI)**

The PA/SI identified 77 past spill and disposal sites as potentially contaminated with migrants. Twenty-three of the sites were targeted for an RI/FS. Wastes disposed in landfills create a potential for soil, surface and ground water contamination. Surface waters drain from the base to the Atlantic Ocean via the New River. Both support recreational and commercial fishing. Several endangered species, including the American Alligator and the Red-Cockaded Woodpecker, inhabit protected areas on the base. Ground water is the sole source of potable water for the base and surrounding communities.

## **Remedial Investigation/ Feasibility Study (RI/FS)**

An accelerated RI/FS for the Hadnot Point Industrial Area is expected to be completed in 1990. It has already identified fuel and chlorinated solvents in the ground water and the contamination source is being investigated. Several on-base drinking water supply wells have been closed. The information available on the remaining 22 sites will be consolidated into a RI Interim Report, used on scoping the remainder of the RI/FS requirements.

A Technical Review Committee held its first meeting in June, 1988. The next meeting will be scheduled in 1990 as soon as RI/FS documentation for the Hadnot Point Industrial Area and the RI Interim Report are complete.

## **Remedial Design/ Remedial Action (RD/RA)**

Initiation of RD/RA work is expected in 1991.

# Camp Pendleton Marine Corps Base

## San Diego County, California

**Service:** Navy

**Size:** 125,000 Acres

**HRS Score:** 33.79

**Base Mission:** Provide housing, training, logistical, and administrative support for Fleet Marine Force units

**IAG Status:** Initiation expected 1990

**Action Dates:** PA/SI completed 1988; Proposed for NPL 1989; RI/FS initiated 1989

**Contaminants:** Volatile organic compounds, spent oils, fuels, PCBs, pesticides, solvents

**Funding to Date:** \$786,000



### **Preliminary Assessment/ Site Inspection (PA/SI)**

Past disposal practices could potentially contaminate soils and ground water. Ground water is the potable water source for the installation. PA/SI reports concluded that of the nine sites investigated, six warranted an RI/FS to characterize the full extent of contamination, and to develop engineering alternatives for remedial action. The SI indicated that the potable wells were not contaminated.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

RI/FS began in September, 1989 to investigate all nine original sites. The Navy is preparing a first draft of a Federal Facilities Agreement, and intends to initiate and finalize negotiations with the EPA and the State of California in 1990, prior to implementation of RI/FS field work. A Technical Review Committee is being formed and will include members from: Camp Pendleton MCB; Southwest Division, Naval Facilities Engineering Command; California Regional Water Quality Control Board, San Diego Region 9; USEPA Region IX; California Department of Health Services, Toxic Substances Control Division; and public representatives.

### **Remedial Design/ Remedial Action (RD/RA)**

Although no RD/RA activities are currently planned, removal actions will be considered if an imminent threat is identified.

# Castle Air Force Base Atwater, California

**Service:** Air Force  
**Size:** 2,777 Acres  
**HRS Score:** 37.93  
**Base Mission:** Train tanker crews; Service KC-135 stratotanker  
**IAG Status:** Signed 7/89  
**Action Dates:** PA/SI completed 1983; RI/FS initiated 1986; Placed on NPL 1987  
**Contaminants:** Spent solvents, fuels, waste oils, pesticides, cyanide, cadmium  
**Funding to Date:** \$5.11 million



## Preliminary Assessment/ Site Inspection (PA/SI)

This installation began as an Army base in 1941 and was used as an aircrew training facility. Strategic Air Command (SAC) assumed responsibility for the base in 1946. Mission-support operations have generated varying quantities of hazardous wastes.

PA/SI work was completed in October 1983. The PA/SI consolidated the investigation of 37 initially identified sites into 26 potential contamination source areas. These areas included landfills, discharge areas, chemical disposal pits, fire training areas, fuel spill areas and PCB spill areas. The Air Force believes five areas (PCB spills 4 through 8) require no further investigation because PCB contamination has been removed through appropriate response actions.

## Remedial Investigation/ Feasibility Study (RI/FS)

The RI/FS was initiated in September, 1986 and grouped the remaining 21 areas into 15 investigative sites plus a new site: the TCE plume. Results to date indicate the shallow ground water aquifer beneath and adjacent to the base is contaminated with nitrates, trace amounts of pesticides, and trichloroethylene at levels exceeding state and federal drinking water standards. The RI/FS will be completed in 1990.

## Remedial Design/ Remedial Action (RD/RA)

In 1986, the TCE-contaminated drinking water supply on base was replaced with a potable water well drawing from deeper, uncontaminated aquifers. In 1987, filter systems were installed in off-base wells to remove TCE contamination. Bottled water was supplied to off-base users prior to filter installation.

In 1988, two deep wells replaced TCE-contaminated water supplies: one for the City of Atwater (2,000 gpm) and one to meet on-base needs (2,100 gpm). These wells extend down between 800 and 900 feet. In 1989, a 1,400 gpm granular activated carbon filtration system for TCE-contaminated ground water was constructed. Additional RD/RA work will begin in 1991.

# Cecil Field Naval Air Station

## Jacksonville, Florida



**Service:** Navy

**Size:** 20,194 Acres

**HRS Score:** 31.99

**Base Mission:** Provide facilities, services, and materials for operation and maintenance of naval weapons and aircraft

**IAG Status:** Initiation expected 1990

**Action Dates:** PA completed 1985; Proposed for NPL 1989; RI/FS initiated 1989; SI scheduled completion 1991

**Contaminants:** Heavy metals, petroleum/oil/lubricants, paints, solvents, pesticides, fungicide, herbicide, acids, photographic chemicals, paint thinners, blasting grit

**Funding to Date:** \$561,000

### **Preliminary Assessment/ Site Inspection (PA/SI)**

The PA/SI identified 18 sites of potential contamination. Of these, 10 were recommended for further investigation. In 1986, the base was issued a Hazardous & Solid Waste Act (HSWA) permit which identified 14 Solid Waste Management Units (SWMUs). As required by the HSWA permit, a Remedial Feasibility Investigation (RFI) was performed on the 14 SWMUs. An additional site of potential contamination was also identified during this investigation.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

The Navy has submitted to regulatory agencies and the Technical Review Committee (TRC) a draft RI/FS Work Plan, a Community Relations Plan, a Health and Safety Plan, a Sampling and Analysis Plan, and a Site Management Plan. The first TRC meeting was held on May 11, 1989 and the next one will be held when comments concerning the RI/FS work plans have been received. The Navy has expressed to EPA and FDER its desire to negotiate Federal Facilities Agreements for NAS Cecil Field, NAS Jacksonville and NAS Pensacola simultaneously, since the language in the Agreements would be largely the same.

### **Remedial Design/ Remedial Action (RD/RA)**

RD/RA work will begin after completion of RI/FS activities.

# Concord Naval Weapons Station

## Concord, California

**Service:** Navy

**Size:** 12,922 Acres

**HRS Score:** 29.92

**Base Mission:** Transport, receive, store, inspect, test, and classify munitions; Maintain weapons

**IAG Status:** Initiation expected 1990

**Action Dates:** PA/SI completed 1984; RI/FS initiated 1984; Proposed for NPL 1988; ROD signed 1989

**Contaminants:** Heavy metals, waste solvents, acids, paints, waste oils and fuels, asbestos

**Funding to Date:** \$7.57 million



### Preliminary Assessment/ Site Inspection (PA/SI)

A PA/SI identified 32 sites of potential contamination. Thirteen Sites were recommended for an RI/FS. Three of the sites were proposed for listing on the National Priorities List in 1988. Past disposal practices and scattered unexploded ordnance could potentially cause soil, surface water and ground water contamination. With direct contact or ingestion of contaminated fish, shellfish or water, the contaminants could pose a threat to human health.

### Remedial Investigation/ Feasibility Study (RI/FS)

An RI for seven sites under litigation was completed in 1986, with the corresponding FS completed in 1988. Heavy metals possibly migrating into the Bay Area were found at these sites. Bioassays indicated movement of these metals into plants, soil-dwelling organisms, and marine sediment inhabitants. A Record of Decision (ROD) for the sites was signed in 1989. The first Technical Review Committee meeting is scheduled for January 31, 1990. Members of this Committee shall include representatives from: Concord NWS, Naval Facilities Engineering Command, USEPA Region IX, California Department of Health Services, California Regional Water Quality Control Board, Contra Costa County Health Department, and a community representative.

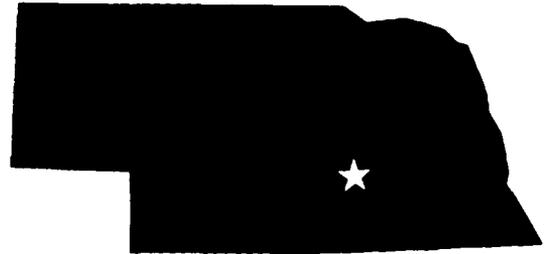
An RI/FS for four sites in the Tidal Acres began in 1987, with field work starting in September, 1989. An RI/FS for 11 sites in the Inland Area began in 1988. Field work is expected to start on those sites in Spring 1990.

### Remedial Design/ Remedial Action (RD/RA)

Contaminated debris was removed from both the Kiln Site and the Coke Pile Site. The Final Remedial Action Plans and RODs for the seven sites under litigation were signed on April 6, 1989. Remedial design continues for the sites and remedial action is expected to begin July, 1990.

# Cornhusker Army Ammunition Plant

## Hall County, Nebraska



**Service:** Army  
**Size:** 11,936 Acres  
**HRS Score:** 51.13  
**Base Mission:** Currently standby status  
**IAG Status:** Initiated  
**Action Dates:** PA/SI completed 1980; RI/FS initiated 1981; Placed on NPL 1987  
**Contaminants:** Munitions related wastes  
**Funding to Date:** \$15.5 million

### **Preliminary Assessment/ Site Inspection (PA/SI)**

The plant is currently in standby status and the Army is planning to excess it following the completion of environmental studies required for real estate transactions. An Installation Assessment Study (IAS) identified 58 sources of contamination and ground water contamination by explosive compounds. Some contaminants could migrate off base.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

A contaminant plume that affects over 500 private wells in Hall County and nearby Grand Island was detected 3 1/2 miles off-post. An RI/FS and a Public Health Evaluation report were submitted to regulators in 1986. RD/RA activities consisting of an alternate water supply and contaminant source remediation were recommended.

### **Remedial Design/ Remedial Action (RD/RA)**

In 1986, the municipal water system was extended to 800 residences in Grand Island. A dewatering system was also completed to control the high water table. Additionally, remediation was initiated on contaminated soil at 58 cesspools and leaching pits to destroy all explosive compounds. The soil was landfilled on-site in accordance with procedures agreed to by the Army and Nebraska. Incineration operations began in 1987 and ended in 1988. Approximately 40,000 tons of soil were incinerated.

# Davisville Naval Construction Battalion Center North Kingston, Rhode Island



**Service:** Navy  
**Size:** 1,284 Acres  
**HRS Score:** 34.52  
**Base Mission:** Mobilize reserve naval construction battalions; Supply construction equipment  
**IAG Status:** Initiation expected 1990  
**Action Dates:** PA/SI completed 1984; RI/FS initiated 1988; Proposed for NPL 1989  
**Contaminants:** PCB, volatile organic compounds, petroleum oil/lubricants, pesticides, lead  
**Funding to Date:** \$1.59 million

## **Preliminary Assessment/ Site Inspection (PA/SI)**

Davisville NCBC consists of the Main Center; the West Davisville Storage Area located in the Town of North Kingston, Rhode Island, approximately 10 miles south of Providence; and Camp Fogerty, a training facility located in the Town of East Greenwich, Rhode Island, 4 miles west of the Main Center.

The PA/SI addressed 14 sites. A Confirmation Study/Verification Step on 13 sites was completed in February, 1987. Three were recommended for further study by the PA/SI, seven were requested for further study by the Rhode Island Department of Environmental Management, and three were targeted for further study by the Navy. A contract for removal of PCB-contaminated concrete at two other sites is under negotiation. The remaining 10 sites will be studied under the RI/FS. The results of the Verification Step indicated that the 13 sites posed no imminent health hazard.

## **Remedial Investigation/ Feasibility Study (RI/FS)**

The Navy has completed a work plan for an RI/FS on 10 sites. Eleven Technical Review Committee (TRC) meetings have been held since April, 1988. TRC members include: Davisville NCBC; Northern Division, Naval Facilities Engineering Command; USEPA Region I; Rhode Island Department of Environmental Management; Town of North Kingston; Town of East Greenwich; USFDA; USEPA Engineering Research Laboratory, Narragansett; Naval Ocean Systems Center, San Diego, California; TRC Environmental Consultants; and Narragansett Bay Project.

## **Remedial Design/ Remedial Action (RD/RA)**

Initiation of RD/RA work is expected in 1991.

# Defense General Supply Center Richmond, Virginia

**Service:** Defense Logistics Agency

**Size:** 640 Acres

**HRS Score:** 33.85

**Base Mission:** Manage general supplies for Armed Forces

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1985; RI/FS initiated 1986; Placed on NPL 1987

**Contaminants:** Phenols, solvents, paints/paint residues, corrosives, pesticides/herbicides, refrigerants/antifreeze, photographic chemicals, oils

**Funding to Date:** \$4.71 million



## Preliminary Assessment/ Site Inspection (PA/SI)

PA/SI work revealed 28 potential past spill and/or disposal sites. Six of these were recommended for further study in an RI/FS. Three are contiguous, with a high potential for contaminant migration. Both on- and off-base water supply has been contaminated with phenols, chloroform, methylene chloride, dichlorobenzene, di-, tri- and tetrachloroethylene, and chromium.

## Remedial Investigation/ Feasibility Study (RI/FS)

RI/FS was initiated in September, 1986, and studies are nearly completed for each of the six contamination sites. Draft RIs for both the Area 50/Open Storage Area/National Guard Area and the Former Fire Training Pits have already been submitted to EPA. Following a draft letter report on the Acid Neutralization Pit, field work started in November, 1988 and a draft RI was submitted to EPA in April, 1989. An additional Field Investigation and Sampling Plan is being prepared in response to EPA comments on the Draft RI. The plan will be implemented immediately upon EPA approval. A draft IAG has been submitted to EPA on September 14, 1989, and negotiations will begin in the first quarter of 1990.

## Remedial Design/ Remedial Action (RD/RA)

After EPA approves the feasibility study, a Record of Decision (ROD) will be negotiated. The RD/RA phase will start after the ROD is signed, so that remedial actions can begin in 1991.

# Dover Air Force Base

## Dover, Delaware



**Service:** Air Force

**Size:** 3,740 Acres

**HRS Score:** 35.89

**Base Mission:** Air lift services for troops, cargo and equipment

**IAG Status:** Signed 1989

**Action Dates:** PA/SI completed 1983; RI/FS initiated 1987;  
Placed on NPL 1989

**Contaminants:** Solvents, paints, waste fuel and oils, volatile organic compounds, muriatic and nitric acids, caustic soda, cyanide, heavy metals, phenols

**Funding to Date:** \$4.28 million

### Preliminary Assessment/ Site Inspection (PA/SI)

Some wastes were buried in drums and others were disposed of in various on-base locations covering 44 acres. A PA/SI identified 11 areas as potential sources of contamination. Seven were targeted for RI/FS work. The upper aquifer was contaminated with low levels of volatile organics and heavy metals. The deeper aquifer provides drinking water to the base and is not contaminated.

### Remedial Investigation/ Feasibility Study (RI/FS)

A presurvey, completed in June, 1986, investigated 12 sites and confirmed that the concentration of VOCs and metals in soils, sediments, surface and ground water exceed Delaware's drinking water standards at several sites. Contaminant source areas and the extent of contaminant migration are currently being investigated under an RI/FS that was initiated in August, 1987. Completion of the RI/FS is expected in 1990.

### Remedial Design/ Remedial Action (RD/RA)

In 1985, a removal and closure action was conducted to clean up the old industrial waste basin, the major source of ground water contamination. Remedial actions were conducted to comply with state regulatory requirements. Solid Waste Disposal Area D-8 was remediated and closed in 1988. Additional RI and RD work will continue in this fiscal year.

# Earle Naval Weapons Station

## Colts Neck, New Jersey



**Service:** Navy

**Size:** 11,134 Acres

**HRS Score:** 37.21

**Base Mission:** Ammunition, logistics and administrative support for home-ported ships

**IAG Status:** Initiation expected 1990

**Action Dates:** Proposed for NPL 1984; PA/SI completed 1986; RI/FS initiated 1988

**Contaminants:** Heavy metals, petroleum/oils/lubricants, organic solvents, degreasers, paint residues, corrosive acids

**Funding to Date:** \$481,000

### Preliminary Assessment/ Site Inspection (PA/SI)

Both the ground water system beneath the Colts Neck facility and the surrounding surface waters are used extensively by public and private interests. Run-off from any on-base contamination threatens public health and the environment.

The PA identified 29 potentially contaminated sites, and an SI was completed in 1986, for two explosive ordnance disposal sites, five landfills, two paint chip disposal sites, an air pollution control residue spill site, and an explosive washout area. An SI for 16 of the remaining 18 sites is expected to begin in 1989.

### Remedial Investigation/ Feasibility Study (RI/FS)

An RI work plan for 11 sites is currently being prepared. In October, 1988, the Navy held the first Technical Review Committee meeting. Members include: NWS Earle; Northern Division, Naval Facilities Engineering Command; USEPA Region II; State of New Jersey Department of Environmental Protection; Monmouth County Health Department; and Howell and Middletown Townships.

### Remedial Design/ Remedial Action (RD/RA)

Initiation of RD/RA work is expected in 1990.

# Edwards Air Force Base

## Kern, Los Angeles and San Bernardino Counties, California

<b>Service:</b>	Air Force
<b>Size:</b>	800 Square Miles
<b>HRS Score:</b>	33.62
<b>Base Mission:</b>	Aircraft research and development center
<b>IAG Status:</b>	Initiated and expected to be signed 1990
<b>Action Dates:</b>	PA/SI completed 1982; RI/FS initiated 1986; Proposed for NPL 1989
<b>Contaminants:</b>	Waste oils, solvents, nitric acid, organic volatile compounds
<b>Funding to Date:</b>	\$11.1 million



### Preliminary Assessment/ Site Inspection (PA/SI)

The Main/South Base, at the western edge of Rogers Dry Lake, is used primarily for maintaining and refueling aircraft. Large amounts of fuel have been spilled and poor disposal practices have resulted in the release of organic solvents to the ground there. Other sites in the area include an abandoned sanitary landfill containing pesticides and heavy metals, an area where electroplating wastes were dumped, and the industrial waste pond which contains high heavy metals concentrations. The North Base, five miles to the northeast of the Main Base area has a drum storage site at the north end of Rogers Dry Lake, and three unlined surface impoundments where wastes were poured during the 1960s and 1970s. Contaminants include waste oils, solvents, and nitric acid generated primarily by the Air Force Rocket Propulsion Laboratory. According to a 1987 IRP report, Trichloroethylene, trans-1,2-dichloroethylene, 1,2-dichloroethylene, tetrachloroethylene, and methylene chloride are present in the shallower ground

water aquifer underlying the Main/ South Base. EAFB's 13,800 employees obtain drinking water from wells within 3 miles of the Main/South Base.

Seven sites are being assessed to confirm presence of contaminants and assess the need to make these areas formal IRP sites.

### Remedial Investigation/ Feasibility Study (RI/FS)

An RI/FS was initiated August, 1986 to determine the type and extent of contamination and to identify alternatives for remedial action. The sites identified at EAFB include drum disposal areas, waste disposal pits, underground storage tanks, a leaking jet fuel pipeline, rocket test stands, oxidation/evaporation ponds, landfills, fire protection training areas, TCE- and other spill-sites.

Regulatory agencies are reviewing a recommendation of no further action for 10 sites. The initial response is that further *investigative work will be required* prior to approval of this recommendation.

### Remedial Design/ Remedial Action (RD/RA)

In 1984, drums and contaminated soil in a drum disposal area (Site 1) were removed and the site capped. In addition, contaminants at the Main Base toxic waste disposal area (Site 2) were removed and the site regraded. LTM was initiated. In the South Base POL storage area (Site 5) tanks were excavated or filled with clean sand and the area was regraded.

In 1989, a ground water treatment system was installed and placed in operation. Ground water will continue to be monitored in 1990. Fifteen underground storage tanks were also removed from IRP sites at Edwards in 1989.

# Eielson Air Force Base

## Fairbanks North Star Borough, Alaska



**Service:** Air Force

**Size:** 19,790 Acres

**HRS Score:** 48.14

**Base Mission:** Tactical support to Alaskan Air Command

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1982; RI/FS initiated 1986; Proposed for NPL 1989

**Contaminants:** Heavy metals, petroleum/oil/lubricants, volatile organic compounds, solvents

**Funding to Date:** \$4.66 million

### Preliminary Assessment/ Site Inspection (PA/SI)

Eielson AFB contains active and closed unlined landfills that extend into ground water, shallow trenches where weathered tank sludge was buried, drum storage areas, and other disposal/spill areas. Sampling to date has identified numerous contaminants in both soils and ground water. Lead, arsenic, chromium, copper, nickel, and zinc have been found in the soil at the drum storage area; and trans-1,2-dichloroethylene and lead have been found in shallow on-site monitoring wells. An estimated 9,000 people obtain drinking water from deep aquifer wells within 3 miles of the base. Five additional sites are scheduled to receive PA/SI activities during 1990.

### Remedial Investigation/ Feasibility Study (RI/FS)

RI/FS was initiated in August, 1986. Ongoing RI/FS planned for approximately 28 sites during 1990, will determine the extent of contamination at the base and identify alternatives for remedial action. The work plan for 1990 is scheduled to be completed early in the year. Fourteen locations have been recommended for no further action.

### Remedial Design/ Remedial Action (RD/RA)

Several monitoring wells have been converted into static recovery wells to remove floating petroleum product from area ground water, but only small quantities of free product have been recovered. A product recovery system complete with an oil/water separator and carbon filtration unit is planned for 1990 to remove a known concentration of floating fuel from the groundwater. Other plans for 1990 include the removal of numerous tanks and drums containing various hazardous wastes. Remedial design activities are scheduled at ten sites across Eielson AFB for the next two years. A contaminated soil storage area and asphalt dryer system are planned for treating fuel-saturated materials.

# Elmendorf Air Force Base

## Greater Anchorage Area Borough, Alaska



**Service:** Air Force

**Size:** 13,100 Acres

**HRS Score:** 45.91

**Base Mission:** Headquarters to Alaskan NORAD Region; F-15 Fighter Wing; NORAD Region Operations Control Center; Rescue Coordination Center; Military Airlift Group flying transports

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1983; RI/FS initiated 1986; Proposed for NPL 1989

**Contaminants:** Volatile organic compounds, heavy metals, petroleum/oil/lubricants, solvents, paints

**Funding to Date:** \$2.09 million

### Preliminary Assessment/ Site Inspection (PA/SI)

Elmendorf AFB is bounded to the west by Knik Arm of Cook Inlet and to the east by Fort Richardson Army Post. Ship Creek flows along its southern perimeter. Elmendorf AFB is host to the 21st Tactical Fighter Wing and contains closed and active landfills, drum storage areas, waste disposal sites, and spill areas.

An estimated 121,000 individuals reside within 3 miles of the installation but drinking water for these residents is obtained from surface supplies located 12 to 30 miles north of the base. Emergency backup water supply wells for Elmendorf are located within 3 miles of identified contamination.

The PA/SI initially identified 12 areas of contamination which subsequently increased to 52 areas for study. Initially, focus was on five contaminated areas. In the past, landfills D-5 and D-7 received hazardous wastes, including lead acid batteries and waste solvents. The unlined and unbermed landfills are located in sandy and gravelly soils. Shop

wastes, including solvents and paint thinners, were disposed of in Site D-17, a naturally occurring unlined trench. At Site IS-1, fuel in Building 42-400 spilled onto floor drains that feed into gravel-bottom dry wells. The last area included in the initial investigation is a JP-4 spill site. Additional site investigations are planned for approximately 18 sites during 1990.

### Remedial Investigation/ Feasibility Study (RI/FS)

Continued RI/FS are planned for approximately 20 locations during 1990. Additional field work will be conducted at former landfills, hazardous waste disposal locations and spill sites. Shop wastes, including solvents and paint thinners have been discharged through building drains emptying into a naturally occurring unlined ditch and/or dry wells. An interim remedial action is scheduled for site SP-5, the location of an active fuel seep. An oil/water collection system and interception trench are planned for installation during the summer. The final RI/FS workplan was completed in the

Fall of 1989. The studies to date at 32 sites indicate eight sites will require no further action.

### Remedial Design/ Remedial Action (RD/RA)

Removal actions planned for 1990 include remediation of an abandoned asphalt drum staging area, removal of an 8,000-gallon underground storage tank, the removal of abandoned 28,000-to-50,000 gallon JP-4 tanks, and the resloping and covering of an old sanitary landfill. Interim remedial measures include installation and operation of a ground water treatment system at the JP-4 spill site. Additional remedial design and remedial actions will be scheduled based on information obtained from the planned RI/FS efforts.

# El Toro Marine Corps Air Station Irvine, California

**Service:** Navy

**Size:** 4,700 Acres

**HRS Score:** 40.83

**Base Mission:** Major west coast jet fighter facility

**IAG Status:** Initiation expected 1990

**Action Dates:** PA completed 1987; Proposed for NPL 1988;  
SI combined with RI/FS and initiated 1989

**Contaminants:** Waste fuels and oils, organic solvents, degreasers,  
paints, photographic chemicals, PCBs, corrosives,  
refrigerants, pesticides, herbicides, volatile  
organic compounds

**Funding to Date:** \$2.12 million



## Preliminary Assessment/ Site Inspection (PA/SI)

Ground water surrounding El Toro MCAS is used for both agricultural and domestic purposes, and surface water flows to the Upper Newport Bay Ecological Reserve. The Orange County Water District has identified volatile organic compounds contamination in ground water over a 3 mile radius off-base.

The PA/SI identified 17 potentially contaminated sites, nine were recommended for further investigation. A perimeter ground water investigation was completed in 1989. This study confirmed the existence of three discreet plumes of contamination at or near the base boundary, but raised questions as to whether or not the base is the sole responsible party for the off-base contamination. An SI workplan was developed in 1988 to evaluate the individual sites, but due to budget constraints, will be implemented as the first phase of the RI/FS. Regulatory agency review of this work plan resulted in the

addition of 10 sites, for a new total of 19. The California Regional Water Quality Control Board has requested that as many as 40 or more sites be added.

## Remedial Investigation/ Feasibility Study (RI/FS)

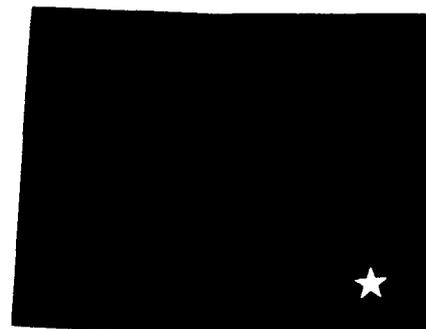
The Navy is preparing a first draft of a Federal Facilities Agreement, and intends to initiate and finalize negotiations with EPA and the State of California in 1990, prior to the implementation of RI/FS field work. A Technical Review Committee (TRC) has been established. TRC members include: El Toro MCAS; Southwest Division, Naval Facilities Engineering Command; USEPA Region IX; State of California Department of Health Services; California Regional Water Quality Control Board; Orange County; Orange County Water District; Irvine Water District; and public representatives.

## Remedial Design/ Remedial Action (RD/RA)

A treatability study was implemented in 1989 to test the feasibility of using activated carbon to remove contaminants from ground water. Ground water is being continuously pumped from three existing monitoring wells and treated using this system. RD/RA activities are expected to be initiated in 1992. Additional removal actions will be considered if an imminent threat is identified.

# F. E. Warren Air Force Base Cheyenne, Wyoming

**Service:** Air Force  
**Size:** 5,866 Acres  
**HRS Score:** 39.23  
**Base Mission:** Strategic Air Command operations; Strategic Missile Wing; Aerospace Rescue and Recovery Squadron  
**IAG Status:** Initiated and expected to be signed 1990  
**Action Dates:** PA/SI completed 1985; RI/FS initiated 1987; Proposed for NPL 1989  
**Contaminants:** Lubricating oils, solvents, paints, coal and fly ash, batteries/battery acid  
**Funding to Date:** \$2.84 million



## **Preliminary Assessment/ Site Inspection (PA/SI)**

Agricultural lands and industrial developments surround F.E. Warren AFB. According to tests conducted in May and June, 1987 by the U. S. Geological Survey (USGS), TCE and chloroform are present in monitoring wells on the base. An estimated 2,400 people obtain drinking water from private deep aquifer wells upgradient and within 3 miles of hazardous substances on the base. USGS also detected lead in soil at the firing range, and TCE in Crow and Diamond Creeks on the base downgradient of spill areas. The Air Force has identified 18 areas as potentially containing hazardous substances that can migrate. These 18 areas include seven areas involving spills or leaks, six landfills, two fire training areas, a battery acid disposal pit, the firing range, and a contaminated surface water area.

## **Remedial Investigation/ Feasibility Study (RI/FS)**

RI/FS initiated in April, 1987. Work continues at 17 sites. It is scheduled for completion in 1990.

## **Remedial Design/ Remedial Action (RD/RA)**

Water wells have been installed to monitor ground water contamination. By Fall 1989, soils and TCE were being removed from spill Site 7, a major contaminant source for both ground water and Diamond Creek. Ground water recovery and treatment will begin in Spring 1990.

# Fairchild Air Force Base Spokane, Washington

**Service:** Air Force

**Size:** 4,300 Acres

**HRS Score:** 31.98

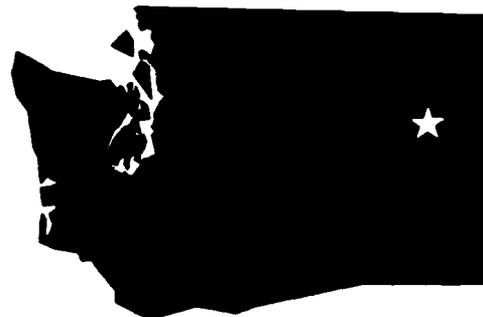
**Base Mission:** Strategic Air Command operations

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1985; RI/FS initiated 1988; Placed on NPL 1989

**Contaminants:** Solvents, fuels, oils, electroplating chemicals, cleaning solutions, corrosives, photographic chemicals, paints, thinners, pesticide residues, PCBs, low-level radioactive wastes

**Funding to Date:** \$1.76 million



## Preliminary Assessment/ Site Inspection (PA/SI)

A well within base boundaries is a standby water supply for the base's 5,200 employees. Approximately 250 private wells serving about 12,000 people are within 3 miles of the facility. West Medical Lake, Medical Lake, and Silver Lake, located within 3 miles downstream of the base, support wildlife and are used for recreational activities.

The PA/SI identified 21 waste-disposal sites at Fairchild AFB and one site at the USAF/FAA operations at Mical Peak. Land-use restrictions are in effect. Four waste areas covering 85 acres comprise the NPL site and include: Building 1034 French drain and dry well system; two landfills, one northeast of taxiway 8 and one at Craig Road; and the industrial waste lagoons. More than 4,000 drum-equivalents of carbon tetrachloride and other solvents, paint wastes, plating sludges containing cadmium and lead, and related industrial wastes have been disposed in the four areas.

## Remedial Investigation/ Feasibility Study (RI/FS)

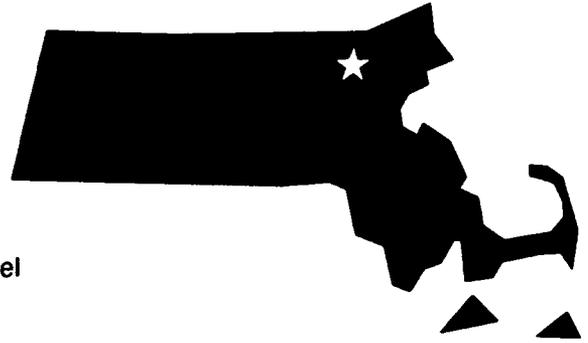
An RI/FS for 10 sites was initiated in 1988 and is expected to be completed in 1991. The industrial waste lagoons, a fire training area, and two base landfills lead the list of sites being assessed in the RI/FS.

## Remedial Design/ Remedial Action (RD/RA)

RD/RA activities include providing Vietzke Village a new potable water line. Additional remedial actions for the coming years 1990/1991 include remediating a fire training area, a fuel spill site at a pumphouse facility, and a ground water treatment system for the Craig Road landfill.

# Fort Devens

## Fort Devens, Massachusetts



**Service:** Army

**Size:** 9,416 Acres

**HRS Score:** 42.24

**Base Mission:** Army Reserve and National Guard personnel training; Army Security Agency Training Center and School support

**IAG Status:** Not started

**Action Dates:** PA/SI completed 1982; RI/FS initiated 1989; Proposed for NPL 1989

**Contaminants:** Volatile organic compounds, petroleum products, battery acid, PCBs, pesticides, herbicides, photographic chemicals, medical wastes

**Funding to Date:** \$328,000

### Preliminary Assessment/ Site Inspection (PA/SI)

The initial assessment recommended: (1) no follow-up studies; and (2) the Fort Devens Sanitary Landfill facility closure plan should be coordinated with the Commonwealth of Massachusetts. In 1985, Fort Devens applied for a RCRA Part B permit for its Hazardous Waste Storage Facility. In the permit process, Fort Devens identified 40 solid waste management units (SWMUs).

### Remedial Investigation/ Feasibility Study (RI/FS)

A Master Environmental Plan was prepared in 1989. It identifies and prioritizes all potential hazardous waste sites and proposes appropriate investigative and/or corrective action efforts for each site.

### Remedial Design/ Remedial Action (RD/RA)

RD/RA work will begin after completion of RI/FS activities.

# Fort Devens Sudbury Training Annex Middlesex County, Massachusetts

**Service:** Army

**Size:** 2,301 Acres

**HRS Score:** 35.57

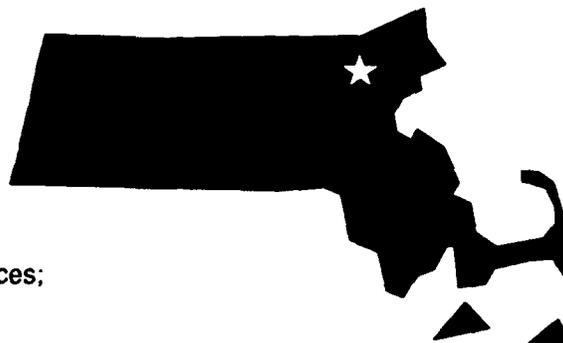
**Base Mission:** Troop training; Geophysics laboratory services;  
Fish and wildlife management

**IAG Status:** Not started

**Action Dates:** PA/SI completed 1980; Proposed for NPL 1989;  
RI/FS completion expected 1993

**Contaminants:** Volatile organic compounds, petroleum products, PCBs, pesticides, herbicides

**Funding to Date:** \$406,000



## **Preliminary Assessment/ Site Inspection (PA/SI)**

Sudbury Annex is managed by Fort Devens Army Installation, located approximately 12 miles to the northwest. Prior to 1982, Sudbury Annex was part of the Natick Research Development and Engineering Center (NRDEC). In 1982, all but a small housing area was excised to Fort Devens. The PA/SI recommended a follow-on survey of Sudbury Annex to confirm the presence/absence of contamination, and to determine the extent of contaminant migration.

## **Remedial Investigation/ Feasibility Study (RI/FS)**

An RI was performed for 11 sites in November, 1986. Two sites were recommended for further monitoring for a minimum of one year to determine the extent of contaminant migration within the soils and subsurface environment. Although three sites were identified as contributing to the NPL score, one site (a PCB Spill Area) has been remediated.

## **Remedial Design/ Remedial Action (RD/RA)**

RD/RA work will begin after completion of RI/FS activities.

# Fort Dix

## Pemberton Township, New Jersey

**Service:** Army

**Size:** 32,600 Acres

**HRS Score:** 37.40

**Base Mission:** Army Reserve and National Guard training and combat support

**IAG Status:** Not started

**Action Dates:** RI/FS initiated 1985; Placed on NPL 1987; PA/SI completed 1989

**Contaminants:** Volatile organic compounds, heavy metals, petroleum/oil/lubricants, solvents, photographic chemicals, pesticides/herbicides, medical wastes

**Funding to Date:** \$3.30 million



### Preliminary Assessment/ Site Inspection (PA/SI)

During the PA, the Army identified 21 past disposal and/or spill sites potentially contaminated with hazardous waste. Twenty-one sites were further investigated during the SI phase of the project. Ground water contamination was observed at 10 sites. Lead, nickel, and cadmium were found at four sites, and petroleum hydrocarbons were also found at four. VOCs [1,1,1-trichloroethane, 1,1,2-trichloroethene (TCE) and chloroform] were present at three sites. Buried fuel tanks or contaminated sources were identified at two locations. The PA/SI recommended further investigation of 10 sites to determine the presence, magnitude and extent of contamination.

### Remedial Investigation/ Feasibility Study (RI/FS)

RI/FS was initiated September, 1985, and indicated a plume of contaminated ground water emanating from the southwestern portion of the Fort Dix Sanitary Landfill. The contaminants do not appear to be highly concentrated. A geophysical field investigation suggested that the stream and associated surface water bodies act as a hydraulic barrier to suspected contaminant migration. The recommended course of action is to cap the lower 50 acres of the landfill with an impermeable membrane and to initiate a stringent monitoring program. An installation-wide RI of 14 sites confirmed ground water contamination at three sites and potential contamination at two more.

### Remedial Design/ Remedial Action (RD/RA)

A proposed action plan and Record of Decision are currently being formulated and RD is scheduled for 1990.

# Fort Lewis

## Pierce County, Washington

**Service:** Army

**Size:** 86,541 Acres

**HRS Score:** 42.78

**Base Mission:** Logistics for High Technology Test Bed program; Induct troops; Provide training

**IAG Status:** Initiated

**Action Dates:** PA/SI completed 1984; Landfill 5 placed on NPL 1987; RI/FS initiated 1988; Logistics Center proposed for NPL 1989

**Contaminants:** Spent solvents, metal plating wastes, pesticides, PCBs, waste oils and fuels, volatile organic compounds, asbestos, coal liquification wastes, polycyclic aromatic hydrocarbons, paints, battery electrolytes, chromium and phosphoric acid, paint strippers and thinners

**Funding to Date:** \$4.2 million



### Preliminary Assessment/ Site Inspection (PA/SI)

The PA/SI identified 26 sites potentially contaminated with hazardous wastes, of which 15 were recommended for an RI/FS. No evidence of off-base contaminant migration via surface or ground waters was found, but evidence of ground water degradation from liquified-coal production spillage was found. Both lagoon sediment and underlying ground water are contaminated with TCE, and hazardous chemicals were detected at Landfill 5.

### Remedial Investigation/ Feasibility Study (RI/FS)

RI/FS was initiated in May, 1988, and detected di- and trichloroethylene in ground water beneath the Logistics Center. The contamination is flowing from the Center towards the American Lake Gardens housing area. The contamination zone is approximately 10,000 feet long, 2,500 feet wide, and extends 80 feet into the subsurface. Three potential sources of TCE contamination have also been identified. A site investigation at the Park Marsh Landfill is underway because the Veterans Administration may have used it to dispose of medical waste, paints, thinners, and general refuse.

### Remedial Design/ Remedial Action (RD/RA)

Installation of a liner and leachate collection system at Landfill 5 is planned following completion of a Feasibility Study.

# Fort Ord Marina, California

**Service:** Army  
**Size:** 29,598 Acres  
**HRS Score:** 42.24  
**Base Mission:** Training center  
**IAG Status:** Not started  
**Action Dates:** PA/SI completed 1983; RI/FS initiated 1988;  
Proposed for NPL 1989  
**Contaminants:** Metals and VOAs  
**Funding to Date:** \$8.09 million



## **Preliminary Assessment/ Site Inspection (PA/SI)**

The PA/SI identified several sanitary landfills and materials handling procedures in need of correction. Although no off-post migration of contaminants was suspected at the time, off-post contamination of the City of Marina's drinking water wells was subsequently discovered. The suspected source is a sanitary landfill. It should be noted, however, that salt-water intrusion had already rendered the contaminated wells useless for potable purposes.

## **Remedial Investigation/ Feasibility Study (RI/FS)**

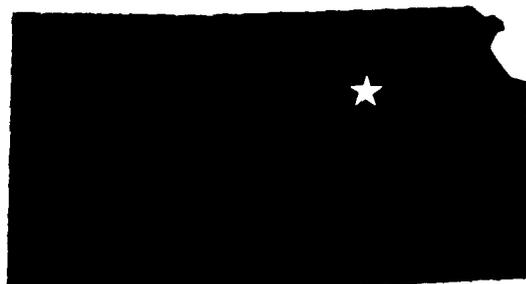
RI/FS was initiated in October, 1988. Workplans have been completed for several sites, including the landfill suspected as the source of the Marina wells contamination, a fire burn pit, and an AAFES Gas Station. Contaminants include VOAs and metals. IAG negotiations have not begun.

## **Remedial Design/ Remedial Action (RD/RA)**

A ground water/soil treatment system at the Fritzsche Army Air Field has been operating for over a year. Wells that may conduct contaminants along the boundary of Fort Ord and the City of Marina are also being closed.

# Fort Riley

## Junction City, Kansas



**Service:** Army

**Size:** 152 Square Miles

**HRS Score:** 33.79

**Base Mission:** Headquarters of U.S. Army First Infantry Division

**IAG Status:** Not started

**Action Dates:** PA/SI completed 1983; Proposed for NPL 1989; RI/FS initiation expected 1990

**Contaminants:** Cleaning solvents, pesticides

**Funding to Date:** \$630,000

### **Preliminary Assessment/ Site Inspection (PA/SI)**

A PA/SI focused on past and current usage of toxic and hazardous materials, and the potential for these substances to migrate off the installation. The PA/SI determined that toxic/hazardous wastes (primarily waste oils and degreasing solvents) were formerly (mid 1960s to 1970) disposed of in the landfill southwest of Camp Funston. The landfill has been investigated and was closed in accordance with the State of Kansas regulations. Limited geohydrological and water quality data indicate that contaminants are not migrating at significant rates from the landfill. The area around Fort Riley is predominantly rural and agricultural. The Fort incorporates seven landfills, numerous motor pools, burn and firefighting pit areas, hospitals, dry cleaning shops, and pesticide storage and mixing areas. The sanitary landfill at Camp Funston and the Main Post (cleaning solvents and pesticide residues) are suspected as potential sources of contamination at Fort Riley.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

Current RI/FS efforts are scheduled for Fort Riley beginning 1990. To date, \$35,774 has been expended on various RI activities. They include monitor well installations, landfill characterization, and ground water sampling and analyses.

### **Remedial Design/ Remedial Action (RD/RA)**

RD/RA work will begin after completion of RI/FS activities.

# Fort Wainwright

## Fairbanks North Star Borough, Alaska



**Service:** Army

**Size:** 911,604 Acres

**HRS Score:** 42.40

**Base Mission:** Training for soldiers and equipment testing in arctic conditions

**IAG Status:** Not started

**Action Dates:** PA/SI completed 1983; Proposed for NPL 1989; RI/FS initiated 1989

**Contaminants:** Petroleum/oil/lubricants, heavy metals, solvents, pesticides, paints

**Funding to Date:** \$951,000

### Preliminary Assessment/ Site Inspection (PA/SI)

An Army assessment completed in September, 1981 identified several sites where waste handling practices did not conform to guidelines. They include the North Post, the sanitary landfill, the fire training pit, and the Fairbanks Terminal & Eielson Pipeline. The characteristics of these sites indicate no migration can occur, so a survey was not recommended.

### Remedial Investigation/ Feasibility Study (RI/FS)

RI/FS initiated in August, 1989. Workplans are currently being developed for the RI/FS at Fort Wainwright.

### Remedial Design/ Remedial Action (RD/RA)

RD/RA work will begin after completion of RI/FS activities.

# Fridley Naval Industrial Reserve Ordnance Plant

## Fridley, Minnesota



<b>Service:</b>	Navy
<b>Size:</b>	83 Acres
<b>HRS Score:</b>	30.83
<b>Base Mission:</b>	Design and manufacture advanced weapons systems
<b>IAG Status:</b>	Initiation expected 1990
<b>Action Dates:</b>	PA/SI completed 1988; RI/FS initiated 1988; Proposed for NPL 1989
<b>Contaminants:</b>	Heavy metals, volatile organic compounds, petroleum/oil/lubricants
<b>Funding to Date:</b>	\$2.46 million

### Preliminary Assessment/ Site Inspection (PA/SI)

The northern portion of the Naval Industrial Reserve Ordnance Plant (NIROP) is government-owned but operated by a private contractor (FMC). The remainder of the facility is owned independently by FMC. Highly permeable sands, conducive to the downward migration of contaminants, lie below the facility. Underlying these sands the potable water in aquifers is susceptible to contamination. These aquifers, in turn, discharge into the Mississippi River, which supplies the potable water for Minneapolis. The water supply intake for Minneapolis is located approximately one mile downstream of the NIROP.

Three sites identified as potential contaminant migration sources were recommended for an RI/FS. A series of investigations performed between November, 1983 and June, 1988 identified trichloroethylene (TCE) in the ground water. The plant discontinued using TCE during the first quarter of 1987.

### Remedial Investigation/ Feasibility Study (RI/FS)

A Technical Review Committee has been formed. Members include: USEPA Region V; Northern Division, Naval Facilities Engineering Command; Minnesota Pollution Control Agency; USACE, Omaha District; County of Anoka; City of Fridley; FMC, Inc.; M.V. CC; and NIROP Fridley. A Draft Federal Facilities Agreement has been prepared and is being forwarded to Naval Facilities Engineering Command for review.

### Remedial Design/ Remedial Action (RD/RA)

Interim Removal Action involved removal and disposal of 1,200 cubic yards of soil and 43 drums containing PCB wastes, flammable solids, and base solids. This effort, initiated in 1983, was completed in 1984 at a cost of \$733,000.

The Navy recommended and the EPA and the Minnesota Pollution Control Agency approved installation of a treatment and disposal system for ground water.

# George Air Force Base

## Victorville, California

**Service:** Air Force

**Size:** 5,347 Acres

**HRS Score:** 33.62

**Base Mission:** Tactical fighter operations; Train aircraft and maintenance personnel; Maintain aircraft and ground support

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1986; RI/FS initiated 1986; Proposed for NPL 1989

**Contaminants:** Petroleum/oil/lubricants, volatile organic compounds, heavy metals

**Funding to Date:** \$10.2 million



### **Preliminary Assessment/ Site Inspection (PA/SI)**

In the PA/SI the Air Force identified several potentially contaminated areas. These sites include the Waste POL Leach Field, the Fire Training Area, the Hazardous Waste Storage Yard, the STP Percolation Ponds, the Abandoned Waste Fuel Dry Well, the Southeast Disposal Area, the Northeast Disposal Area, and the Industrial/Storm Drain. These sites were investigated further in 1986 and 1988 under the IRP.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

Remedial Investigation field studies were conducted in 1986 and 1988. Results indicate POL, VOC, and heavy metal contamination of soils in several areas, and TCE and radionuclide contamination of ground water. The radioactive materials are believed to be naturally occurring within the region. No further action is recommended at five sites, monitoring for two years will be conducted to confirm previous findings. Feasibility studies are planned for the POL Leach field and the five training areas within the Northeast Disposal Area in 1990.

### **Remedial Design/ Remedial Action (RD/RA)**

The remedial action construction contract for the Northeast Disposal Area was awarded in 1989. The remedial action will extract the TCE-contaminated ground water and treat it via air stripping. The remedial action construction contract for the Industrial/Storm Drain was awarded in 1989. Under this contract contaminated sludge and soil will be removed to preclude contaminant migration to ground water.

# Griffiss Air Force Base

## Rome, New York

**Service:** Air Force

**Size:** 5,836 Acres

**HRS Score:** 34.20

**Base Mission:** Air refueling operations; Long-range bombardment

**IAG Status:** Initialized and expected to be signed 1990

**Action Dates:** PA/SI completed 1981; Placed on NPL 1987; RI/FS scheduled completion 1990

**Contaminants:** Volatile organic compounds, heavy metals, greases, degreasers/caustic cleaners, dye, penetrants, solvents

**Funding to Date:** \$4.33 million



### Preliminary Assessment/ Site Inspection (PA/SI)

The Mohawk River borders the main base on the west and south. To date, no off-base wells have been closed due to contamination, but several private wells have had filters installed. The PA/SI identified 19 sites containing hazardous materials from past disposal activities. Four sites were recommended for an RI/FS. The study detected surface contamination at the Tank Farm and potential ground water contamination from dry wells and a lindane spill.

### Remedial Investigation/ Feasibility Study (RI/FS)

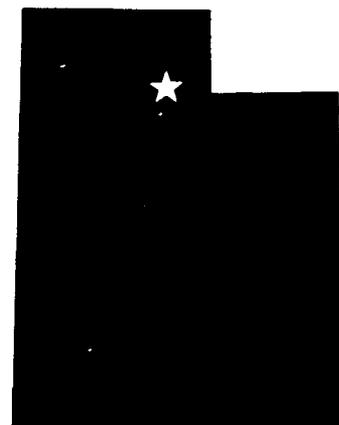
RI/FS began in October 1987. Initial studies detected contaminated ground water in a limited area near Landfill 1; PCB-contaminated soils at Building 112; fuel product contamination of soils and ground water at the Tank Farm; heavy metal contamination of soils in the Battery Disposal Pits; and VOC contamination of ground water at Landfill 7. The RI/FS is planned for completion in 1990.

### Remedial Design/ Remedial Action (RD/RA)

In 1985 and 1986, contaminated soil was removed from several IRP sites. Several underground storage tanks were removed from the Tank Farm and contaminated soil was removed from the Battery Acid Disposal Pits in 1987. Additional underground storage tanks were removed in 1988. Remedial actions in 1989 included modifications to a landfill cap and the removal of several underground storage tanks. Contaminated soil from an area adjacent to an aircraft nosedock is scheduled for remedial action in 1990. Additional RD/RA activities are expected to begin in 1991 for several sites.

# Hill Air Force Base

## Ogden, Utah



**Service:** Air Force

**Size:** 6,666 Acres

**HRS Score:** 49.90

**Base Mission:** Logistics for weapons systems

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** RI/FS initiated 1985;  
Placed on NPL 1987; PA/SI on-going

**Contaminants:** Volatile organic compounds, sulfuric and chromic acids, solvents,  
petroleum wastes

**Funding to Date:** \$14.4 million

### Preliminary Assessment/ Site Inspection (PA/SI)

The Installation Restoration Program (IRP) includes investigation and clean-up activity at 25 sites on base, six Air Force sites off-base, and two private off-base sites. Of the 25 on-base sites, 12 are grouped into five geographic areas (operable units) along the northeast, south, and west sides of the base.

Operable Unit 1 contains Landfills #3 and #4, chemical disposal pits #1 and #2, and the fire training area. Pollutants in these sites include industrial waste water treatment plant sludges, liquid chemicals (primarily hydrocarbons), and other hazardous and municipal wastes. Operable Unit 2 is chemical disposal pit #3, which received trichloroethene (TCE) and other solvents and sludges. Operable Unit 3 comprises Berman Pond, several underground storage tanks that leak solvents and sodium hydroxide, and drying beds for industrial wastewater treatment plant sludges. Operable Unit 4 consists of Landfills #1 and #2. Although no hazardous waste has been detected, trichloroethene was dumped near these sites along a road. Oper-

able Unit 5 is the Tooele Army Rain Shop, contaminated by paint stripping and other industrial activities.

The Air Force sites off-base include two landfills, Chemical Disposal Pit #4, an herbicide-orange test-site, the Utah Test & Training Range (UTTR) explosive ordnance disposal site, and the Little Mountain Test Annex industrial sludge disposal site. Landfill #5, received hazardous waste, while the other landfill received municipal trash. Chemical Disposal Pit #4 primarily received petroleum hydrocarbons. The herbicide-orange test-site was found to be uncontaminated. The UTTR site received wastes from burning ordnance and rocket motors. The Little Mountain site holds a concrete-lined sludge bed containing wastewater treatment plant sludges.

A private site off-base on Layton ranch received chromium-contaminated soil from Hill AFB. The contamination has been removed and the site is undergoing RCRA clean closure. A second private off-base site contains agricultural field drains contaminated with low levels of trichloroethene (20 ppb), possibly from Hill AFB. Assessment

of the health risks is being planned.

The initial PA for Hill AFB was completed in 1982. Subsequent SIs were conducted in 1984 and 1986-87. Fourteen sites at Hill AFB, two UTTR sites and one site at Little Mountain were evaluated. As a result, Hill AFB was placed on the NPL in July, 1987 with twelve sites grouped into five operable units. The UTTR and Little Mountain sites were not placed on the NPL.

Since NPL placement Hill AFB and UTTR sites have been identified. Currently seven Hill AFB and five UTTR sites are in various stages of PA/SI studies.

### Remedial Investigation/ Feasibility Study (RI/FS)

RI/FS initiated in March, 1985. The five operable units at Hill AFB are in various stages of RI/FS study. All operable units experience contaminant migrating off-base via shallow groundwater. The deeper drinking water aquifer does not seem to be affected. Two storm water retention ponds and the Little Mountain sludge drying bed are also being studied.

The RI/FS for Operable Unit 1 has identified at least 14 VOCs

# Hill Air Force Base

## Ogden, Utah

(Continued)

in ground water, including chlorinated-ethenes, ethanes, benzene, methyl ethyl ketone and toluene. Concentrations range from 160 ppb to 27,000 ppb. Chromium has been measured as high as 1,900 ppb. Lower levels of contaminants are migrating off-base. Continued RI studies will focus on off-base migration and the potential for migration to deeper aquifers.

The RI/FS for Operable Unit 2 has detected nine dense non-aqueous phase liquid contaminants, of which trichloroethene is by far the most prevalent at 1,700,000 ppb. Other VOCs included chlorinated-methanes, -ethenes, -ethanes, toluene and acetone. Off-base contamination was discovered in the shallow aquifer, including trichloroethene at 600 ppb. RI/FS studies have included pump tests and treatability analysis for these wastes. The RI studies are complete and the report is being prepared.

The RI/FS for Operable Unit 3 found five VOCs in shallow ground water, including highs of 1,100 ppb of 1,1,1-trichloroethane, 200 ppb of trichloroethene, 300 ppb of cadmium, 1,500 ppb of chromium and 3,000 ppb of lead. The contaminants may have migrated off-base to the Layton ranch field drains. RI studies at this unit will assess potential migration to off-base areas and to deeper aquifers. A storm water retention pond is also being studied.

The RI/FS for Operable Unit 4 found four VOCs in shallow ground water, including highs of 10,000 ppb of trichloroethene on-base and 200 ppb off-base. Other VOC concentrations are much lower. Contaminant distribution patterns indicate roadside dumping was responsible rather than landfill deposits. The field work for the RI is almost complete.

Attention will focus on interpretation, modeling, risk assessment, and the feasibility study.

The RI/FS for Operable Unit 5 began in Summer 1989. No contamination was found in on-base shallow ground water, but five VOCs were detected in soil gas. Three of these VOCs contain 1,1,-trichloroethane, trichloroethene, 1,2-dichloroethene, 1,1-dichloroethane, and chloroform. Four of these five chemicals have been detected off-base in a spring, but concentrations are within drinking water standards. Nevertheless, Hill AFB is monitoring the spring water for a year to confirm concentration findings. A storm water retention pond is being studied and more field work is planned.

The RI is complete for the Little Mountain sludge beds. Contaminants, predominately phenol and heavy metals, have not migrated beyond the ditch behind the beds. Therefore, risk to the environment and humans is negligible. A Decision Document for no further action is recommended.

Records of Decision are expected to be signed in 1993, completing the RI/FS process. The Air Force, the EPA, and the State of Utah have been negotiating an IAG since 1988. Differences between the EPA and the State of Utah exist regarding which law is applicable—RCRA or CERCLA.

### Remedial Design/ Remedial Action (RD/RA)

On base, Hill AFB has initiated remedial actions at Operable Units 1, 2, and 3, as well as at three other sites.

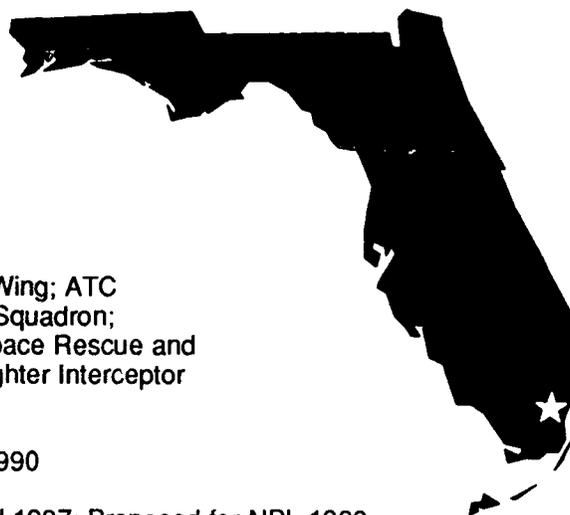
Interim remedial actions at Operable Unit 1 were performed to lessen off-base contaminant migration. Hill AFB capped 70 acres of landfill, extracted and

treated contaminated ground water from seven wells and two infiltration galleries, and installed a mile-long bentonite slurry wall. Over 50 million gallons of contaminated ground water have been treated. As a result of these actions, VOC concentrations in off-base seeps decreased 99 percent since 1984.

Off-base, contaminated ground water from Operable Unit 2 has been treated by activated-carbon since 1987. Two property owners have been hooked up to municipal water and supplied with irrigation water. Recovery and disposal of organic phase liquids at Operable Unit 2 is being planned. At this unit Berman Pond was capped. In 1989, Operable Unit 3 soil venting removed 26,500 pounds of fuel, of which 90 percent was destroyed with catalytic incineration. Two old PCB spill sites are scheduled for excavation and disposal in the next year.

# Homestead Air Force Base

## Homestead, Florida



<b>Service:</b>	Air Force
<b>Size:</b>	2,916 Acres
<b>HRS Score:</b>	42.40
<b>Base Mission:</b>	Tactical Air Command; F-16 Fighter Wing; ATC sea-survival school; Tactical Control Squadron; Naval Security Group Activity; Aerospace Rescue and Recovery Squadron (AFRES) and Fighter Interceptor Group operations
<b>IAG Status:</b>	Initiated and expected to be signed 1990
<b>Action Dates:</b>	PA/SI completed 1986; RI/FS initiated 1987; Proposed for NPL 1989
<b>Contaminants:</b>	Metal plating wastes, volatile organic compounds, cyanide
<b>Funding to Date:</b>	\$2.27 million

### Preliminary Assessment/ Site Inspection (PA/SI)

The area around Homestead AFB is mostly agricultural. Wastes have been disposed on site since the facility's inception in 1942. Electroplating operations were conducted on-site, and plating wastes containing heavy metals and cyanides were allegedly disposed directly on the ground.

The PA/SI identified three major areas of concern; the Fire Protection Training area, the Residual Pesticide Disposal Area, and the Electroplating Disposal area.

### Remedial Investigation/ Feasibility Study (RI/FS)

RI/FS was initiated in August, 1987, and the Fire Protection Training Area, Electroplating Waste Disposal Area, and Residual Pesticide Disposal Area were studied. IRP studies have detected VOCs and high concentrations of ethyl ether in ground water there and downgradient of Fire Training Area 3. Approximately 5,500 gallons of ethyl ether were disposed in the area in

January 1984 by the Federal Drug Enforcement Agency and Dade County. Analytical results from the remedial investigation showed ground water contaminant levels of 26 ug/l benzene, 25 ug/l chlorobenzene, and 52 ug/l ethylbenzene. Sampling a year later detected ethyl ether and lower concentrations of benzene and chlorobenzene, while ethylbenzene was not detected.

The Electroplating Waste Disposal Area, located east of Building 164, consists of grass lawns and asphalt parking areas. Analysis showed heavy metals in the ground water at concentrations below allowable maximum levels. Cyanide was detected at 24 ug/l in one monitor well. Concentrations of sealant metal and cyanide were found in soil and sediment samples. The metals concentrations were comparable to those commonly found in the background soils.

From 1977 to 1982, at the Residual Pesticide disposal site, pesticides were sprayed or dumped onto the area, and then chlorine bleach and ammonia were applied to accelerate the decomposition of the pesticide compounds. Analytical results

showed low levels of organochlorine insecticides in surface soil samples. No organochlorine pesticide or chlorinated herbicides were detected in the ground water samples.

### Remedial Design/ Remedial Action (RD/RA)

Interim Remedial Action was taken in 1987 to remove approximately 25 underground storage tanks from various IRP sites. RD/RA work is expected to begin in 1990.

# Iowa Army Ammunition Plant Middletown, Iowa



**Service:** Army

**Size:** 19,127 Acres

**HRS Score:** 29.73

**Base Mission:** Load-Assemble-Pack a variety of conventional munitions and fusing systems

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1980; RI/FS initiated 1981; Proposed for NPL 1989

**Contaminants:** Volatile organic compounds, heavy metals, waste solvents, explosives containing sludges

**Funding to Date:** \$2.54 million

## Preliminary Assessment/ Site Inspection (PA/SI)

Mason and Hangar-Silas Mason Company, Incorporated currently operates the Iowa Army Ammunition Plant (IAAP). A PA/SI assessed the impact on the environment of the use, storage, treatment, and disposal of toxic and hazardous materials and defined conditions which may adversely effect health and welfare or result in environmental degradation. Four major contamination areas were identified: Line 1, the Load-Assemble-Pack Areas, the Demolition Area, and the Waste Lagoons.

## Remedial Investigation/ Feasibility Study (RI/FS)

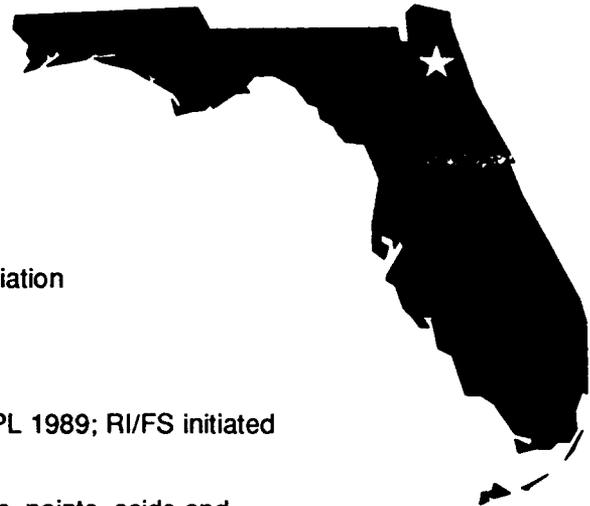
RI/FS was initiated in February, 1981, and a contamination survey was completed in October, 1982. Explosives contamination was found in surface and ground waters within the Brush Creek drainage system. The former Line 1 impoundment and the Pinkwater Lagoon adjacent to Line 800 were identified as sources of contamination. RDX was migrating off site via Brush and Spring Creeks. A follow-on environmental survey was completed in August, 1984 to further assess the contamination in the Line 1 and Line 800 areas. An Endangerment Assessment and FS were completed in July, 1989 and August, 1989, respectively. A Federal Facilities Compliance Agreement between the Army and EPA was signed in April, 1988. The installation was subsequently proposed for the NPL, and IAG negotiations were initiated.

## Remedial Design/ Remedial Action (RD/RA)

Trench 5 and Line 6 areas are currently being excavated and/or capped.

# Jacksonville Naval Air Station

## Jacksonville, Florida



**Service:** Navy

**Size:** 3,820 Acres

**HRS Score:** 32.08

**Base Mission:** Provide services and materials for aviation activities and aircraft overhaul

**IAG Status:** Initiation expected 1990

**Action Dates:** PA completed 1985; Proposed for NPL 1989; RI/FS initiated 1989; SI scheduled completion 1991

**Contaminants:** Heavy metals, petroleum/oil/lubricants, paints, acids and caustic, phenols, waste solvents, radioisotopes and low-level radioactive radium paint wastes, Cyanide

**Funding to Date:** \$1.17 million

### **Preliminary Assessment/ Site Inspection (PA/SI)**

The PA addressed 43 sites and the SI covered 20 sites. Sixteen SI sites received an Expanded SI. A Technical Review Committee convened on May 12, 1989 to consider imminent placement on the NPL of 10 sites proposed for RI/FS and 7 sites proposed for RD/RA.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

The Navy projects that 10 sites will be investigated in a future RI/FS.

### **Remedial Design/ Remedial Action (RD/RA)**

A Removal Action was completed at Site 27, the PCB Transformer Pad. NAS, Jacksonville and the Navy are working on a Tri-Service Cone Penetrometer project at 3 projected RD/RA sites and are developing 27 Records of Decisions recommending no further action.

# Joliet Army Ammunition Plant

## Joliet, Illinois



<b>Service:</b>	Army
<b>Size:</b>	36 Square Miles
<b>HRS Score:</b>	32.08 (manufacturing area) 35.23 (LAP area)
<b>Base Mission:</b>	Manufacture and Load-Assemble-Pack (LAP) explosives and explosive-filled munitions
<b>IAG Status:</b>	Signed 1989 with EPA and State of Illinois
<b>Action Dates:</b>	PA/SI completed 1978; RI/FS initiated 1981; Manufacturing Area placed on NPL 1987; LAP Area placed on NPL 1989
<b>Contaminants:</b>	Munitions-related wastes, volatile organic compounds, heavy metals
<b>Funding to Date:</b>	\$3.35 million

### Preliminary Assessment/ Site Inspection (PA/SI)

Joliet Army Ammunition Plant (JAAAP), consisting of a Manufacturing Area and a Load-Assemble-Pack (LAP) Area, is a government-owned/contractor-operated facility. Since 1977, the facility has been maintained in standby condition.

The PA/SI identified the potential presence of trinitrotoluene (TNT), DNT, RDS and tetryl, as well as nitric and sulfuric acids, toluene and various heavy metals. Past practices may have contaminated ground and surface water, sediment, and soil.

### Remedial Investigation/ Feasibility Study (RI/FS)

*Investigative studies have centered mainly on the Manufacturing Area and identified various contaminants in the ground and surface water, sediment, and soil. Nine contaminated sites have been delineated in the Manufacturing Area, with 21 more potentially contaminated locales targeted for future investigation in the LAP Area. Contaminants from past operations may have migrated off-site via surface water. There is no indication of contamination of off-post potable water supplies at this time.*

### Remedial Design/ Remedial Action (RD/RA)

*In 1985, over seven million gallons of explosive-contaminated red water was removed from the Red Water Lagoon and transported off-site for disposal. Explosives-contaminated sludge and the lagoon liner were also removed, and the area was capped with clay.*

*Two surface impoundments in the Manufacturing Area containing ash from past incineration of explosives were recapped in 1985.*

*No RD/RA for LAP Area has been developed to date.*

# Keyport Naval Undersea Warfare Engineering Station Keyport, Washington



**Service:** Navy

**Size:** 4,959 Acres

**HRS Score:** 33.60

**Base Mission:** Prove, overhaul, and issue torpedoes

**IAG Status:** Initiation expected 1990

**Action Dates:** PA/SI completed 1984; RI/FS initiated 1985;  
Proposed for NPL 1986

**Contaminants:** Metal plating wastes, solvents, cleaners/degreasers, paint residues, thinners, and strippers, waste oils and fuels, acids and caustics, dyes, contaminated fuel solids and rinsewaters, pesticides

**Funding to Date:** \$1.98 million

## **Preliminary Assessment/ Site Inspection (PA/SI)**

The PA/SI identified 23 sites as potential contaminant migration sources, with six recommended for an RI/FS. The study concluded that past disposal practices may have contaminated portions of a shallow aquifer and adjacent marsh. Potential off-site contamination of bay and marsh sediment may impact oysters, fish, and shellfish.

## **Remedial Investigation/ Feasibility Study (RI/FS)**

The RI/FS now underway should be completed in 1991. Marine sampling of water, sediment, and shellfish tissue was completed in 1989. Land-based sampling consisting of soil, gas, surface and ground water is scheduled to begin in March, 1990.

## **Remedial Design/ Remedial Action (RD/RA)**

Initiation of RD/RA work is expected to begin in 1991.

# Lake City Army Ammunition Plant Independence, Missouri



**Service:** Army

**Size:** 3,955 Acres

**HRS Score:** 33.68

**Base Mission:** Manufacture, store, and test small arms ammunition

**IAG Status:** Signed 1989

**Action Dates:** PA/SI completed 1979; Placed on NPL 1987; RI/FS initiated 1987

**Contaminants:** Oils/greases, heavy metals, solvents, explosives

**Funding to Date:** \$25.2 million

## **Preliminary Assessment/ Site Inspection (PA/SI)**

Lake City Army Ammunition Plant(LCAAP) has manufactured, stored, and tested small arms ammunition continuously since 1941, except for a five-year period following World War II. Virtually all waste treatment and disposal has been on-site. LCAAP has relied heavily on lagoons, landfills, and burn pits for waste disposal. Industrial operations have generated large quantities of potentially hazardous waste including oils/greases, solvents explosives and metals.

The Installation Assessment identified numerous waste areas on-base, but because of a clay layer in the soil, no testing was recommended. A PA/SI, however, identified 73 waste sites containing over 100 individual units. These were later consolidated to 34 sites. Field testing was conducted at seven representative areas and ground water contamination (volatile organics, explosives, and heavy metals) was detected at all seven. An RI/FS was recommended for the entire site.

## **Remedial Investigation/ Feasibility Study (RI/FS)**

RI/FS was initiated in September, 1987, and it confirmed contamination of the ground water beneath the entire site as above federal and state criteria. Drinking water wells of private residents immediately north may have volatile organic contamination. More off-post sampling is planned.

## **Remedial Design/ Remedial Action (RD/RA)**

Numerous explosive waste lagoons at LCAAP have been closed since 1986. Air strippers are currently being installed in the plant's drinking water supply facilities.

# Lakehurst Naval Air Engineering Center

## Lakehurst, New Jersey

**Service:** Navy

**Size:** 7,382 Acres

**HRS Score:** 50.53

**Base Mission:** Develop and test weapons systems

**IAG Status:** Signed 1989 with EPA, expected to be final 1990

**Action Dates:** PA/SI completed 1983; Placed on NPL 1987; RI/FS initiated 1987

**Contaminants:** Waste oils and fuels, solvents, degreasers, paints, paint residues, photographic chemicals, acids, PCBs, pesticides/herbicides, refrigerants

**Funding to Date:** \$3.90 million



### Preliminary Assessment/ Site Inspection (PA/SI)

An extensive, environmentally-sensitive pineland preservation that supports recreational, wildlife and agricultural uses surrounds Lakehurst NAEC. Nearby communities utilize a shallow aquifer adjacent the base for drinking water.

The PA/SI identified 44 potentially contaminated sites, and RI/FS is considering 43 of these sites.

### Remedial Investigation/ Feasibility Study (RI/FS)

Completed RI/FS field work confirmed contamination at several sites, although analysis of potable well-water showed no evidence of contamination. A draft report is scheduled to be completed by October, 1989. In addition, initial screening of the FS for 16 priority sites continues. Aquifer characterization testing is scheduled for 1990.

A Technical Review Committee has been formed. Members include: USEPA Region II; New Jersey Department of Environmental Protection; New Jersey Pineland Commission; Ocean County Health Department; Town of Manchester; Town of Jackson; Township of Plumstead; Borough of Lakehurst; NAEC Lakehurst; and Northern Division, Naval Facilities Engineering Command.

### Remedial Design/ Remedial Action (RD/RA)

Initiation of RD/RA work is expected in 1991.

# Letterkenny Army Depot Chambersburg, Pennsylvania



**Service:** Army

**Size:** 19,511 Acres

**HRS Score:** 34.21 (SE Area)  
37.51 (PDO Area)

**Base Mission:** Maintain and test tracked vehicles and missiles; Issue chemicals and petroleum; Store, demilitarize, and modify ammunition

**IAG Status:** Signed 1989 with EPA and State of Pennsylvania

**Action Dates:** RI/FS initiated 1982; PA/SI completed 1983; Southeast area placed on NPL 1987; Property Disposal Office Area placed on NPL 1989

**Contaminants:** Petroleum/oil/lubricant wastes, pesticides, solvents, cleaning agents, metal plating wastes, phenolics, volatile organic compounds, painting residues and thinners, explosives

**Funding to Date:** \$12.4 million

## Preliminary Assessment/ Site Inspection (PA/SI)

A PA/SI identified 14 potentially contaminated sites, all targeted for an RI/FS. Significant contamination of ground water by aromatic hydrocarbons and volatile chlorinated hydrocarbons has been found. Elevated levels of contaminants have migrated off-base. Nitrate concentrations at levels above the national standard were detected in the ground water.

## Remedial Investigation/ Feasibility Study (RI/FS)

The RI/FS was initiated in June, 1982, and it confirmed contamination at 11 sites. Ground and surface waters have been contaminated with chlorinated hydrocarbons, chlorinated organic solvents, toluene, chloroform, and heavy metals. Soils have been contaminated by xylene, heavy metals, chloroform, aromatic and chlorinated hydrocarbons, and chlorinated organic solvents. Contaminants have migrated beyond Depot boundaries. A dye study is currently underway to define contaminant flow. The quality of the ground water at the IWTP lagoon is being assessed under RCRA requirements.

## Remedial Design/ Remedial Action (RD/RA)

An alternate water system was provided in September, 1987. An in-situ volatilization system has been installed to determine its ability to treat soils. Ground water treatment at the former IWTP lagoon area was initiated in June, 1989. The contract for closure of the lagoon has been awarded, with closure operations expected in 1990.

# Lone Star Army Ammunition Plant Texarkana, Texas

**Service:** Army

**Size:** 15,546 Acres

**HRS Score:** 31.85

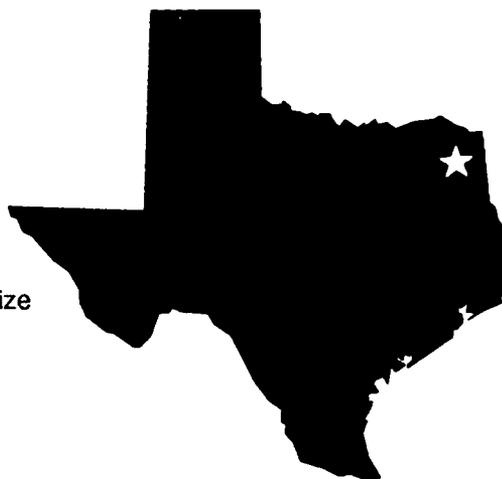
**Base Mission:** Load-Assemble-Pack, renovate, and demilitarize ammunition and explosives

**IAG Status:** Initiated

**Action Dates:** PA/SI completed 1978; Placed on NPL 1987; RI/FS initiated 1987

**Contaminants:** Munitions-related wastes, heavy metals, petroleum/oil/lubricants

**Funding to Date:** \$4.73 million



## Preliminary Assessment/ Site Inspection (PA/SI)

Lone Star AAP is a government-owned/contractor-operated plant run by Day and Zimmerman, Inc., and employs about 2,000 people. Past disposal practices included burial of drummed and undrummed wastes in landfills, wells, and cisterns; disposal of explosives in a 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. Potential ground water contaminant migration off-post could affect approximately 200 private wells used for potable purposes located within 2 miles of the post.

The PA/SI found nitrobenzenes and heavy metals in manufacturing, disposal, demolition, and lagoon areas and determined the contaminants could migrate beyond base boundaries via surface and subsurface waters. A follow-on in-depth investigation was recommended to determine if contaminants are migrating off-base.

## Remedial Investigation/ Feasibility Study (RI/FS)

RI/FS was initiated in September, 1987. A Contamination Survey investigated 10 areas of potential contamination and discovered heavy metal contamination in ground and surface waters, and in surface soils. Small concentrations of sulfates, chlorides, DNT, and dieldrin were detected in the ground water. The survey concluded that no contamination was migrating off-post and recommended ground water monitoring for several sites. A follow-on remedial investigation recommended clean-up feasibility studies for seven sites and further investigation of four sites. The remaining sites contained no significant contamination and no further investigation was recommended. State and Federal regulators are reviewing the RI findings and recommendations.

Leaking underground fuel tanks at the installation gas station have been drained and fueling operations have been moved to another location. The soils and

ground water are being investigated to determine the extent of the fuel contamination. Interim removal design plans are under contract to be developed as soon as the extent of contamination is determined.

## Remedial Design/ Remedial Action (RD/RA)

The Chromic Acid (North G Area) and O-Line (South O Area) ponds have been closed and are currently being monitored.

# Longhorn Army Ammunition Plant Karnack, Texas

**Service:** Army

**Size:** 8,493 Acres

**HRS Score:** 39.83

**Base Mission:** Load-Assemble-Pack pyrotechnic and illuminating/signal munitions and solid propellant rocket motors

**IAG Status:** Not started

**Action Dates:** PA/SI completed 1980; Proposed for NPL 1989; RI/FS initiation expected 1990

**Contaminants:** Heavy metals, volatile organic compounds, munitions-related wastes, petroleum/oil/lubricants

**Funding to Date:** \$814,000



## Preliminary Assessment/ Site Inspection (PA/SI)

The Longhorn Army Ammunition Plant primarily produced 2,4,6-trinitrotoluene (246 TNT) flake and acid for munition production during World War II. Flake production ceased and the current mission commenced in 1945.

A PA/SI recommended that an environmental survey be conducted. A Contamination Survey and follow-up studies identified contamination of on-site surface and ground water and soils that emanate from the Active Burning Ground/Rocket Motor Washout Pond Area, the TNT Production Area, the Flashing Area, and the Landfill (old).

## Remedial Investigation/ Feasibility Study (RI/FS)

A preliminary survey confirmed two sources for VOC ground water contamination beneath the Active Burning Ground and identified a third potential source. The contaminant plume has not moved significantly in the last 30 years nor migrated off-post. Additional RI/FS work is recommended for 1990 to further define water and soil contamination at the site and to identify remedial actions.

## Remedial Design/ Remedial Action (RD/RA)

In 1984, the Rocket Motor Washout Pond Area was capped.

# Loring Air Force Base

## Limestone, Maine



<b>Service:</b>	Air Force
<b>Size:</b>	9,000 Acres
<b>HRS Score:</b>	34.49
<b>Base Mission:</b>	Headquarters to Strategic Air Command's 42nd Bombardment Wing
<b>IAG Status:</b>	Initiated and expected to be signed 1990
<b>Action Dates:</b>	PA/SI completed 1984; RI/FS initiated 1986; Proposed for NPL 1989
<b>Contaminants:</b>	Waste oils, fuels, spent solvents, PCBs, pesticides, heavy metals
<b>Funding to Date:</b>	\$3.40 million

### **Preliminary Assessment/ Site Inspection (PA/SI)**

Historically, wastes have been burned or buried in landfills. Surface water less than 3 miles downstream is used for recreational activities and fresh water wetland is 500 feet from Landfill 3. The PA/SI identified four potentially contaminated sites.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

RI/FS was initiated in October, 1986 and disclosed that monitoring wells on-base were contaminated with methylene chloride, trichloroethylene (TCE), carbon tetrachloride, and barium. The wells are on or downgradient to several widely scattered disposal areas. Two are old, adjacent gravel pits that were used for landfill and cover 190 acres. Landfill 2 was used for disposal of hazardous wastes from 1956 to 1974, and Landfill 3 saw similar use from 1974 to the early 1980s. In the 0.5 acre Fire Department Training Area, large quantities of hazardous materials were disposed of through landfilling until 1968.

From 1968 to 1974 these materials were disposed of by burning. The 600 acre flightline area, with its industrial shops and maintenance hangars, was a primary generator of hazardous waste on-base. While some generated wastes were disposed of on the ground or in storm and sewer drains in the area, most wastes were disposed of elsewhere. Soils in the flightline area also contain significant amounts of fuel, oil, and various volatile organic chemicals (VOCs). An estimated 1,200 people obtain drinking water from wells within 3 miles of hazardous substances on the base. The nearest well is less than 500 feet from where transformers were buried. According to the 1986 IRP report, water in the flightline drainage ditch, a 2,500-foot portion of a tributary to Greenlaw Creek, is contaminated with methylene chloride, tetrachloroethylene, 1,1-trichloroethane, TCE, and iron. The ditch receives storm water discharges from several sewers draining the flightline area and the nose dock area, both locations where fuels were handled.

### **Remedial Design/ Remedial Action (RD/RA)**

RA was initiated in 1989. Planned remedial actions for 1990 include removal of 64 underground storage tanks from multiple sites across Loring AFB. A ground water treatment facility will also be installed to become operational in 1991. Additional RD/RA activities are expected to begin in 1991.

# Louisiana Army Ammunition Plant

## Doyline, Louisiana



**Service:** Army

**Size:** 14,974 Acres

**HRS Score:** 30.26

**Base Mission:** Load-Assemble-Pack operations;  
Manufacture shell metal parts

**IAG Status:** Signed 1989

**Action Dates:** PA/SI completed 1978; RI/FS initiated 1985;  
Placed on NPL 1989

**Contaminants:** Oils, grease, degreasers, phosphates, solvents, metal plating sludges, acids, flyash, TNT and RDX explosives

**Funding to Date:** \$38.1 million

### Preliminary Assessment/ Site Inspection (PA/SI)

The Louisiana Army Ammunition Plant (LAAP) is owned by the government and operated by the Thiokol Corporation. It currently employs 1,680 people.

The PA/SI concluded that the explosive loading and disposal areas of the plant were heavily contaminated with explosive wastes, primarily trinitrotoluene (TNT), RDS and Tetryl. In addition, sumps and unlined ponds in the metal parts production area were contaminated with waste from plating and fabrication operations. No explosives were found in the surface water leaving the installation. There also was no indication of contaminant migration off the installation via ground or surface waters. Due to the high potential for future migration of the explosive contamination, a water quality monitoring program was recommended.

### Remedial Investigation/ Feasibility Study (RI/FS)

The RI/FS was initiated in November, 1985, and indicated no off-post migration. On-post wells, however, were contaminated with explosives, including TNT, RDX, and HMX. The contaminated ground water had reached the southern boundary so as part of an updated RI, four wells were installed off the installation's southern boundary in 1988.

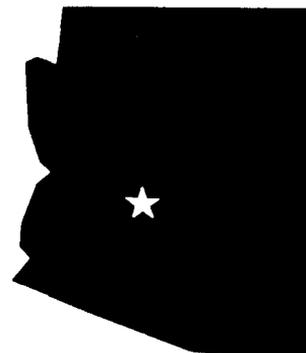
The resulting analysis indicated that the explosive-contaminated ground water had migrated off the southern post boundary. Consequently, a monitoring program for drinking water wells off the northern and southern boundaries of LAAP has been established.

### Remedial Design/ Remedial Action (RD/RA)

Incineration of explosives-contaminated soil, and treatment of contaminated surface water in Area P began in 1987. Work is expected to be completed by the second quarter of 1990.

# Luke Air Force Base Glendale, Arizona

**Service:** Air Force  
**Size:** 4,198 Acres  
**HRS Score:** 39.73  
**Base Mission:** Aircraft maintenance  
**IAG Status:** Initiated and expected to be signed 1990  
**Action Dates:** PA/SI completed in 1985; RI/FS initiated 1986; Proposed for NPL 1989  
**Contaminants:** Petroleum/oil/lubricants, volatile organic compounds  
**Funding to Date:** \$1.74 million



## Preliminary Assessment/ Site Inspection (PA/SI)

Luke AFB is located in the Sonoran Desert and rests on a broad alluvium-filled valley within the western portion of Phoenix Basin. In the PA/SI, the Air Force identified a number of potentially contaminated areas, including five sites where hazardous wastes were disposed. These sites were subsequently investigated in 1983 and 1986 as part of the IRP.

## Remedial Investigation/ Feasibility Study (RI/FS)

The subsurface geology of Luke AFB complicates the direction of ground water flow. It is characterized by a valley-fill sequence of interbedded silts, silty clays and sands, sands and gravels and caliche. Under unconfined conditions, ground water is generally greater than 300 feet below the ground surface. Historically, ground water withdrawal for irrigation has exceeded recharge, causing declining water levels. Agricultural wells create a cone of depression west of the base, further complicating the direction of ground-water flow.

Two old fire training sites in bermed areas were used to simulate aircraft fire by burning POL wastes. The South Fire Department Training Area (Site No. 6) was in operation from 1941-46 and the North Fire Department Training Area (Site No. 7) was in operation from 1963-73. Site No. 6 near-surface soil samples contained elevated levels of oil and grease and low levels of volatile organics. Deeper soil borings contained elevated levels of oil and grease, and low levels of volatile organics. These findings prompted a pre-design study to determine the extent of contamination and gather the requisite information for preparing a feasibility study and the subsequent remedial action design. Three monitoring wells were installed, one presumed to be upgradient and two downgradient. The water table was measured at 360 feet below ground surface. No significant contaminants were detected.

## Remedial Design/ Remedial Action (RD/RA)

Remedial actions to date include closing a former waste oil and contaminated JP-4 fuel storage site under RCRA. The subject tanks were removed and the area was capped with concrete. Monitoring wells are in place. In addition, the leaking underground storage tank at the base service station was removed. Remedial action is planned for the North Fire Training Area. The pre-design field work is complete. A final report and feasibility study of remedial action alternatives is expected in December, 1989.

# March Air Force Base Riverside, California

**Service:** Air Force  
**Size:** 7,000 Acres  
**HRS Score:** 31.94  
**Base Mission:** Aircraft maintenance and repair; Refueling operations; Training activities  
**IAG Status:** Initiated and expected to be signed 1990  
**Action Dates:** PA/SI completed 1984; RI/FS initiated 1986; Proposed for NPL 1989  
**Contaminants:** Volatile organic compounds, heavy metals  
**Funding to Date:** \$3.28 million



## Preliminary Assessment/ Site Inspection (PA/SI)

Soils on March AFB are contaminated with organics and metals and primary ground water contaminants are trichloroethane (TCE) and perchloroethylene (PCE). An estimated 11,600 people obtain drinking water from municipal wells within 3 miles of hazardous substances on MAFB. It is also adjacent to light industrial, agricultural, and residential areas.

As part of the PA/SI the Air Force investigated 39 potentially contaminated sites on base. The sites included three fire training areas, seven inactive landfills, underground solvent storage tanks, an engine test cell, and spills. Significant contamination was found at seven of the 39 sites. Three regions of ground water contamination beneath the base were also identified.

## Remedial Investigation/ Feasibility Study (RI/FS)

RI/FS efforts continue. On-Base Well No. 1 was contaminated with trichloroethylene, tetrachloroethylene, and cis-1,2-dichloroethylene at levels that exceed state drinking water standards. It was, therefore, taken out of service. The RI/FS report for the sites currently being investigated is due in late 1990. Ground water concentrations range from 170 ppb PCE and 110 ppb TCE on-base, to 15 ppb TCE in one off-base private well. The other contaminated private well concentration is 5 ppb TCE on average. The private well owner has been provided with bottled drinking water since the contamination was discovered.

## Remedial Design/ Remedial Action (RD/RA)

In 1989, activities supporting design of a system for removing TCE from ground water at 6 sites began. RD/RA activities planned for 1990 include a contaminated ground water interception and treatment system, pump and disposal of free product beneath a fueling system, removal of abandoned underground storage tanks, and contaminated soil removal.

# Mather Air Force Base

## Sacramento, California

**Service:** Air Force

**Size:** 5,934 Acres

**HRS Score:** 42.24

**Base Mission:** Strategic Air Command bomber support operations;  
Navigator training

**IAG Status:** Signed 1989 with EPA and State of California

**Action Dates:** PA/SI completed 1982; RI/FS initiated 1984;  
Placed on NPL 1989

**Contaminants:** Solvents, cleaners, organic volatile compounds,  
metal plating wastes

**Funding to Date:** \$7.60 million



### Preliminary Assessment/ Site Inspection (PA/SI)

Water quality analyses of drinking water in wells on and near the base indicate the presence of trichloroethylene and other solvents in the shallow ground water system. In 1979, drinking water contamination was first discovered when sampling from the production well at the Aircraft Control and Warning (AC&W) area on Mather AFB confirmed the presence of trichloroethylene (TCE). To date, ground water contamination has been confirmed at the AC&W Site, the 7100 Area (south-western corner of the base), and the West Ditch (western border of the base). Both the 7100 Area and West Ditch are suspected of causing off-base contamination.

The PA/SI identified 23 sites as potentially contributing to contamination due to past operations and disposal practices. Twenty sites were targeted for an RI/FS. The main area of concern was contamination of the upper aquifer. EPA is now proposing to expand these sites to include the entire base.

### Remedial Investigation/ Feasibility Study (RI/FS)

Remedial Investigation (RI) for Mather AFB began in 1984 as Installation Restoration Program (IRP) Phase II efforts. Performed in three stages, the first investigated the source and extent of contamination at three areas on the base, including the AC&W Disposal Site, considered a high priority by the Air Force. The second stage investigated 15 other areas on the base. The third stage intensified the monitoring and sampling of ground water at the three sites covered in Stage I. These three stages of Phase II have been completed.

RI/FS work continues. The RI includes a deep borehole, two deep wells, six shallow wells, a Soil Organic Vapor (SOV) survey, several soil borings, and comprehensive soil and ground water sampling. The RI is expected to lead directly to evaluation of the feasibility of a pump and treat ground water system.

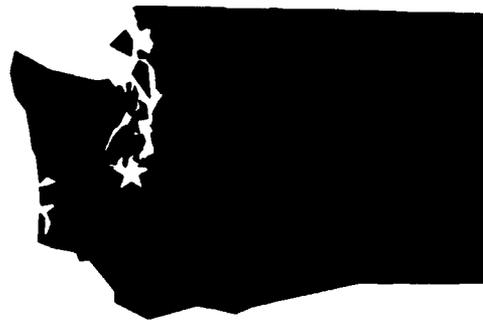
A comprehensive water level measurement and ground water sampling program began in September, 1989 and will probably

continue for at least two years. This program includes all current and future monitoring wells at Mather AFB. Analyses for volatile organics will be performed on all wells. Other parameters will be added on a site-by-site basis.

### Remedial Design/ Remedial Action (RD/RA)

The base provided a permanent alternate drinking water supply to all homes and businesses along Happy Lane. This was completed in May 1989. Additional water connections were installed for homes along Old Placerville Road. DERA-eligible underground storage tanks (USTs) have been removed. Twenty-seven USTs suspected of leaking were excavated and the underlying soils tested. Additional RD/RA activities are expected to begin in 1990/91.

# McChord Air Force Base Tacoma, Washington



**Service:** Air Force

**Size:** 7,199 Acres

**HRS Score:** 43.24

**Base Mission:** Airlift services to troops, cargo, equipment, passengers, and mail

**IAG Status:** Initiated and expected to be signed 1989

**Action Dates:** PA/SI completed 1982; RI/FS initiated 1987; Placed on NPL 1987

**Contaminants:** Volatile organic compounds, chloroform, solvents, detergents, paints, hydraulic fluid, corrosion removing compounds, acids, pesticides, developer and fixer, heavy metals, sodium cyanide, thinners and strippers

**Funding to Date:** \$7.83 million

## Preliminary Assessment/ Site Inspection (PA/SI)

Almost 500,000 gallons of hazardous substances have been used and disposed on the base.

Sixty-two disposal sites were identified and 34 targeted for an RI/FS. Di- and trichloroethylene were detected in the surface and ground water and could migrate on- and off-base. The base, the Lakewood Water District, and American Lake Gardens (a private development get their drinking water from the aquifer partially underlying McChord AFB. Well over 10,000 people within three miles of the base depend on the aquifer for their drinking water.

## Remedial Investigation/ Feasibility Study (RI/FS)

RI/FS initiated in May, 1987. Investigations completed to date indicate low-level contamination of surface and ground water. Contaminant migration north and west of the base was confirmed. The contaminant plume is 250 feet wide and present in the water column 40 to 70 feet below the ground surface. Quantities of di- and trichloroethylene were discovered at American Lake Gardens Housing Tract in excess of health department action levels. In addition, public water supply wells adjacent the base were closed due to low-level concentrations of organic solvents and other priority pollutants.

## Remedial Design/ Remedial Action (RD/RA)

A new potable water system for American Lake Gardens Housing Tract was completed in 1986. RD/RA activities are expected to be implemented in 1991.

# McClellan Air Force Base Sacramento, California

**Service:** Air Force

**Size:** 2,951 Acres

**HRS Score:** 57.93

**Base Mission:** Logistics for aircraft, missile, space, and electronics programs

**IAG Status:** Signed 1989 with EPA and State of California

**Action Dates:** RI/FS initiated 1984; Placed on NPL 1987; PA/SI on-going

**Contaminants:** Organic solvents, metal plating wastes, caustic cleaners/degreasers, paints, waste lubricants, photochemicals, phenols, chloroform, spent acids and bases, PCB-contaminated oils

**Funding to Date:** \$41.6 million



## Preliminary Assessment/ Site Inspection (PA/SI)

A 1979 Air Force study detected ground water contamination, so two on-base and three off-base wells were closed. Contamination has since been found in a number of off-base wells, including a municipal well. Approximately 23,000 people in the area depend on the ground water for domestic and agricultural use. Twelve Preliminary Operable Units have been identified for investigation and potential remediation.

A PA/SI identified 46 potential contaminant migration sites, 36 of which were grouped as one site. The 36 sites have been grouped into four main areas: Area A contains a burial pit, a sludge pit, and a sodium valve trench. Area B contains a surface disposal site, a scrap metal burial pit, and an open storage area. Area C contains: 11 burial pits, three sludge/oil pits, two sodium valve trenches; a sludge burial pit, a burning pit, a creek debris sludge pit, a radioactive hazardous waste storage area, and an oil storage/burning pit. Area D contains three sludge oil pits, a burning burial pit, a sludge oil/refuse burning/burial pit, a

sludge burn/burial pit, a sludge pit, a sodium valve trench, and an industrial sludge landfarm. Since Phase I, 125 possibly contaminated areas have been identified. A PA/SI for a number of additional potentially contaminated areas is being conducted.

## Remedial Investigation/ Feasibility Study (RI/FS)

RI work is underway at 68 sites already investigated and further action is expected at 27 of them. Ground water contamination is primarily in the shallow aquifer, but has moved to deeper aquifers to a depth of 320 feet. A comprehensive CERCLA-RI/FS workplan was developed with schedules to implement the RI/FS. The RI/FS is expected to be completed for all 171 sites by 1998.

## Remedial Design/ Remedial Action (RD/RA)

Remedial Actions are underway at Capchart Gas Station, Davis Site, and Area D. Additional RD/RA work is underway in Area B. An RI/FS Management Plan has been finalized and the following cleanup actions have been completed. The Air Force provided approximately 548 residents with hookups to an alternate water source at a cost of \$3.5 million. A carbon filtration treatment system has been installed for base well #18. A ground water treatment plant (GWTP) costing \$3 million was placed on line in 1986 and treats water extracted from Areas C and D. The Air Force has initiated an off-site investigation to determine the extent of any off-site contaminant migration. Further RD/RA activities are expected to be initiated in 1990.

# Milan Army Ammunition Plant

## Milan, Tennessee

**Service:** Army

**Size:** 22,544 Acres

**HRS Score:** 58.15

**Base Mission:** Load-Assemble-Pack, ship, and demilitarize explosive ordnance

**IAG Status:** Initiated and expected to be signed 1989

**Action Dates:** PA/SI completed 1978; Placed on NPL 1987; RI/FS initiated 1987

**Contaminants:** Munitions-related wastes, heavy metals, organic solvents, paints, thinners, acids

**Funding to Date:** \$3.56 million



### Preliminary Assessment/ Site Inspection (PA/SI)

MAAP is owned by the government and operated by Martin Marietta. It presently employs 1,600 people.

The PA/SI concluded that the demolition areas, wastewater lagoons, burning grounds, draining ditches and streams were contaminated with explosive wastes plus zinc, chromium, iron, sulfates and phosphates. Of 11 areas sampled in November 1978, explosive-contaminants were found in three water supply wells near the O-Line Lagoon area. These three wells were subsequently taken out of service.

### Remedial Investigation/ Feasibility Study (RI/FS)

A two-phase survey completed in 1983 concluded that MAAP ground and surface waters were contaminated with trinitrotoluene (TNT), DNT and RDX. Contamination was moving toward the plant boundaries; ground and surface waters at the installation boundaries contained mercury at levels exceeding Federal EPA water quality criteria. Ground and surface water within MAAP contained lead and chromium but migration studies were inconclusive. The major sources of contamination identified were the "O" Line Lagoons, the explosives-burning ground, the ammunition destruction area and drainage ditches associated with these areas. Regular sampling and analysis of existing wells continue. RI/FS was initiated in September, 1988. A formal RI/FS process to remove the "O" Line Lagoons from the NPL was initiated in 1988. A contract to perform the RI at the "O" Line Lagoons, the open burning grounds, and six other Solid Waste Management Units was awarded in April, 1989. The work should be completed in December, 1990.

### Remedial Design/ Remedial Action (RD/RA)

The "O" Line Lagoons were capped and seeded with grass in December, 1984. Areas of suspected residual explosive contamination of surface soils were excavated. Additional wells to monitor leaching of contaminants into ground water have been installed. Post-closure maintenance of grounds and fences continues. If necessary, further RD/RA activities will be initiated in 1991.

# Moffett Naval Air Station

## Sunnyvale, California

**Service:** Navy

**Size:** 3,919 Acres

**HRS Score:** 32.9

**Base Mission:** Training for air/patrol squadrons and antisubmarine warfare; Headquarters for Commander Patrol Wings of Pacific Fleet

**IAG Status:** Signed 1989 with EPA and State of California, expected final 1990

**Action Dates:** PA completed 1984; Placed on NPL 1987; RI/FS initiated 1988; SI scheduled completion 1989

**Contaminants:** Metal plating wastes, PCBs, waste oil and fuels, painting residues, organic solvents caustics, coolants, pesticides, asbestos, freon, dyes

**Funding to Date:** \$11.7 million



### Preliminary Assessment/ Site Inspection (PA/SI)

Approximately 272,000 people depend on wells, located within 3 miles of Moffett Field, as sources of drinking water. The estuarine wetlands of San Francisco Bay are adjacent the base.

A PA/SI identified nine sites as potential contaminant migration sources and eight were targeted for an RI/FS. 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.

### Remedial Investigation/ Feasibility Study (RI/FS)

Nineteen sites are currently being investigated in the RI/FS, including nine identified in the PA/SI and ten additional incorporated as a result of a Cease and Desist Order to Moffett Field by the California Regional Water Quality Control Board. RI/FS workplans were finalized in March and April, 1988. The RI will be conducted in 2 phases. Phase I of the RI started May, 1988 and Phase II is scheduled to commence in November, 1989. Upon completion of Phase I, sites that have been sufficiently characterized and require no additional Phase II work will be evaluated for the purposes of conducting Operable Unit Remedial Actions.

### Remedial Design/ Remedial Action (RD/RA)

A removal action to address leaking tanks and sumps is planned for 1990. The evaluation and closure of abandoned wells which may be potential conduits for subsurface cross-contamination have also been initiated.

# Mountain Home Air Force Base

## Mountain Home, Idaho



<b>Service:</b>	Air Force
<b>Size:</b>	9 Square Miles
<b>HRS Score:</b>	57.80
<b>Base Mission:</b>	Tactical Air Command; Tactical Fighter Wing, with F-111A fighter and EF-111A electronic countermeasure operations
<b>IAG Status:</b>	Initiated and expected to be signed 1990
<b>Action Dates:</b>	PA/SI completed 1986; RI/FS initiated 1986; Proposed for NPL 1989
<b>Contaminants:</b>	Volatile organic compounds, petroleum/oil/lubricants, heavy metals
<b>Funding to Date:</b>	\$1.0 million

### Preliminary Assessment/ Site Inspection (PA/SI)

Mountain Home AFB has been controlled by the Tactical Air Command since 1965. Hazardous materials and wastes have been used and generated at Mt. Home for aircraft maintenance and industrial operations. Prior to 1969, base wastes were disposed of by several then-accepted methods, including incineration and landfilling of solid wastes, discharge of liquid wastes to sanitary sewers, and the use of waste oil for road oiling. The area around the base is primarily agricultural, and wells supporting 14,000 people and land irrigation are just 3 miles from hazardous substances on the base.

In the PA/SI, the Air Force identified potentially contaminated areas where POL products, solvents, and pesticides were disposed. These sites were subsequently investigated in 1985 and 1988 as part of the IRP.

### Remedial Investigation/ Feasibility Study (RI/FS)

Lagoon Landfill, the site of the current base wastewater lagoon, served as the main base sanitary landfill between 1952 and 1956, but in addition to general refuse, POL products were also disposed of here. Heptachlor, delta-BHC, and silver were detected in the lagoon water in 1985. Monitors installed near the center of the landfill detected lead and cadmium in the ground water. The site was investigated further in 1988 when soil, surface and ground water samples were collected and analyzed for metal, volatile and semi-volatile organics, and total petroleum hydrocarbons. Any compounds detected within these media were within the range of background levels of maximum contaminant levels for drinking water.

The "B" Street Landfill served as the main base landfill between 1956 and 1969. Waste oils, fly ash, solvents, jet fuel, and tank cleaning sludge, and possibly 20 drums of DDT were placed in trenches and burned or covered with fill. During 1983 and 1985 ground water and soil samples were collected and analyzed for metal, organics, and

petroleum hydrocarbons, but no metal concentrations in the soils and ground water were above background levels. Although organics and petroleum hydrocarbons were detected in shallow soil samples within former disposal trenches, no vertical migration was evident in either soils or ground water. A feasibility study was initiated to identify remedial action alternatives at the fire training area. A Baseline Endangerment Assessment was performed to ensure that the site poses no threat to human health or the environment.

### Remedial Design/ Remedial Action (RD/RA)

A remedial action plan for a fire training pit at Mountain Home was completed in 1988. Remedial actions will be implemented upon conclusion of the on-going investigations.

# Newport Naval Education and Training Center

## Newport, Rhode Island



**Service:** Navy  
**Size:** 1,400 Acres  
**HRS Score:** 34.25  
**Base Mission:** Logistics support; Training center  
**IAG Status:** Initiation expected 1990  
**Action Dates:** PA/SI completed 1984; RI/FS initiated 1988; Proposed for NPL 1989  
**Contaminants:** Paints, oils, spent acids, solvents, PCB-contaminated soil  
**Funding to Date:** \$536,000

### Preliminary Assessment/ Site Inspection (PA/SI)

Migration of contaminants pose a potential threat to the underlying aquifer. Surface drainage and ground water from potentially contaminated sites flow directly into the Narragansett Bay. Such potential contamination could adversely affect shellfish harvested for human consumption.

The PA/SI identified 18 potentially contaminated sites plus six sites where sufficient evidence exists to warrant further studies.

### Remedial Investigation/ Feasibility Study (RI/FS)

An RI/FS work plan was completed for five sites in March, 1989. A Technical Review Committee (TRC) has been formed. TRC members include: Newport NETC; Northern Division, Naval Facilities Engineering Command; Rhode Island Department of Environmental Management; USEPA Region I; Cities of Portsmouth, Middletown, and Newport; Narragansett Bay Project representatives; and Melville Marine Industries. Field work has begun at the McAllister Point Landfill.

### Remedial Design/ Remedial Action (RD/RA)

RD/RA work will begin after completion of RI/FS activities.

# Norton Air Force Base

## San Bernardino, California

**Service:** Air Force

**Size:** 2,376 Acres

**HRS Score:** 39.65

**Base Mission:** Military Airlift Command Base

**IAG Status:** Signed 1989

**Action Dates:** PA/SI completed 1982; RI/FS initiated 1986; Placed on NPL 1987

**Contaminants:** Waste oils and fuels, solvents, paint strippers and residues, refrigerants, acidic plating solutions, metal plating residue

**Funding to Date:** \$8.4 million



### Preliminary Assessment/ Site Inspection (PA/SI)

The PA/SI identified 20 sites of potential contaminant migration. Eighteen of the sites were targeted for an RI/FS, including two landfills, six discharge areas, four chemical pits, a fire training area, a fuel spill area, a PCB spill area, a chemical spill area, two waste storage areas, an underground storage tank area, and a low level radioactive waste burial site. After additional study, two more sites were identified in 1987.

### Remedial Investigation/ Feasibility Study (RI/FS)

Initial investigations found that soils at several sites were contaminated with solvents, fuel derivatives and metals. An Inter-Agency Agreement between the installation and the regulatory community was signed as required by CERCLA. An RI/FS effort is underway to characterize all 22 sites, with a draft expected early in 1990. In addition, a comprehensive RI/FS work plan (strategy plan) is under development. A draft RI/FS workplan was submitted to the EPA and the state for review prior to finalization early in 1990. A comprehensive ground water plan was also provided.

### Remedial Design/ Remedial Action (RD/RA)

A removal action was taken in 1985-86 to clean up the on-base Industrial Wastewater Treatment Plant sludge drying beds. Monitoring of a TCE-contaminated well continues and a pump and treat system is being designed for implementation in 1990 to act as a barrier to further TCE migration. In 1989, 24 underground storage tanks were removed. Further RD/RA activities are expected to begin in 1990.

# Ogden Defense Depot

## Ogden, Utah



**Service:** Defense Logistics Agency

**Size:** 1,139 Acres

**HRS Score:** 45.10

**Base Mission:** Electronic equipment, industrial construction equipment, textiles, package petroleum, and industrial/commercial chemicals distribution

**IAG Status:** Initiated and expected to be signed 1989

**Action Dates:** PA/SI completed 1980; Placed on NPL 1987; RI/FS initiated 1987

**Contaminants:** Solvents, paint/paint residues, POL, insecticides, chemical warfare agents (mustard and phoagene gas training kits), methyl bromide, metal plating wastes/sludges, PCB-transformer oils, degreasers, acids and bases, sand-blast residues

**Funding to Date:** \$2.55 million

### **Preliminary Assessment/ Site Inspection (PA/SI)**

The PA/SI identified 44 sites as potential contaminant migration sources. Seventeen of these were recommended for RI/FS investigation.

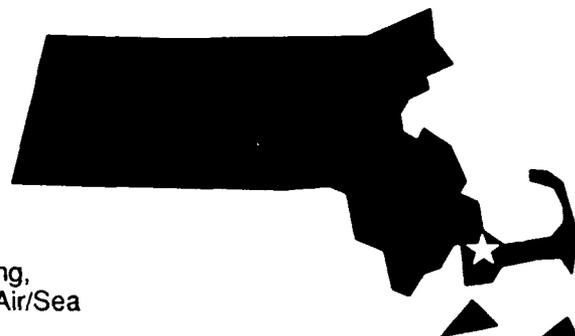
### **Remedial Investigation/ Feasibility Study (RI/FS)**

RI/FS was initiated in September, 1987 when ground water monitoring wells were installed and soil borings were taken at 17 sites. Sampling of soil and ground water has confirmed concentrations of benzene, trichloroethene, vinyl chloride, trans-1,2-dichloroethene, cis-1,2-dichloroethene, methylene chloride, chlordane, zinc, and cadmium above the established Federal Maximum Contaminant Levels. One possible contaminant migration retardant may be an upward water flow gradient from two artesian aquifers. The Federal Facility Agreement identifies four operable units. A Record of Decision will be developed for each unit.

### **Remedial Design/ Remedial Action (RD/RA)**

Vials of mustard agents and irritant grenades were removed from disposal pits in June, 1988. RD/DA activities are scheduled for initiation in 1990.

# Otis Air National Guard Base/ Camp Edwards Sandwich, Massachusetts



<b>Service:</b>	Air Force
<b>Size:</b>	21,000 Acres
<b>HRS Score:</b>	45.92
<b>Base Mission:</b>	Provide Army and Air National Guard training, East Coast Air Defense, and Coast Guard Air/Sea Rescue
<b>IAG Status:</b>	Initiated and expected to be signed 1990
<b>Action Dates:</b>	Proposed for NPL 1989
<b>Contaminants:</b>	Waste solvents, emulsifiers, penetrants, photographic chemicals, volatile organic compounds
<b>Funding to Date:</b>	\$11.1 million

## Preliminary Assessment/ Site Inspection (PA/SI)

While the Nondestructive Testing Laboratory operated (1970-78), waste solvents, emulsifiers, penetrants, and photographic developers were disposed of on-base. Effluent from the sewage treatment plant was also disposed of on-base. In 1984, the U. S. Geological Survey (USGS) detected a plume of trichloroethane, tetrachloroethylene, and trans-1,2-dichloroethylene south of the base and downgradient of the base water treatment plant. In late 1985, the Town of Falmouth found that volatile organic compounds had contaminated a town well located near the plume. The Guard performed studies and determined, along with the State Department of Engineering and Environmental Quality, that over 200 private wells and the town well should not be used for potable purposes. Under an agreement developed with the Town of Falmouth, the Air Force provided funding, and the town provided water in 1986 to these private residents. The plume has been monitored by the Air National

Guard and the USGS since identification. In 1989, additional water services were installed downgradient of the plume. As the plume moves, work is being done to prevent any public health problems. EPA has designated the Cape Cod aquifer underlying MMR as a Sole Source Aquifer under the Safe Drinking Water Act. The Towns of Falmouth and Mashpee have private wells downgradient from known contamination. The drinking water for these towns is potentially threatened by contamination. Ashument Pond, less than a mile downgradient of the waste water treatment plant and the former Fire Training Area, is used for recreational activities. Flow from both facilities enters the western edge of the pond. A fresh water wetland is 3,600 feet downstream.

An extensive program was started in 1985 to investigate the entire 21,000 acres of land. Agreements were made for the Air National Guard, the Army National Guard, and the Coast Guard to perform a comprehensive study under the direction of the Air National Guard. A Pre-

liminary Assessment completed in 1986 indicated potential contamination at 61 sites on the land occupied by the Air and Army National Guard and the Veterans Cemetery, and a potential for contamination at 12 sites on the Coast Guard Station. A review by the EPA, Air National Guard, and Massachusetts concluded that 42 sites required further investigation. The sites include fire training areas, landfills, fuel spill areas, fuel storage areas, and vehicle maintenance areas. The waste products associated with these areas include solvents, fuels, and chlorinated solvents.

## Remedial Investigation/ Feasibility Study (RI/FS)

The sites were prioritized and remedial investigations (RI) were initiated at the 21 priority sites. Final RI work is proceeding at those sites with Focused Feasibility Studies under review by the EPA and the state for two sites.

RI investigations are also starting on the remaining sites. In addition to these studies, wells have been installed along the

# **Otis Air National Guard Base/ Camp Edwards Sandwich, Massachusetts**

(Continued)

southern border of the base to detect any contamination possibly migrating off-base from the 42 sites and flowing into the Towns of Falmouth and Mashpee. No contamination has been detected flowing toward the Towns of Fourn or Sandwich on the northern border of the base.

## **Remedial Design/ Remedial Action (RD/RA)**

The Air Force installed new water lines in 1986-87 to the affected residences and replaced the city well. In 1989, additional water lines were installed in three affected areas in Ashument Valley.

# Pease Air Force Base

## Portsmouth/Kensington, New Hampshire

**Service:** Air Force

**Size:** 4,365 Acres

**HRS Score:** 39.42

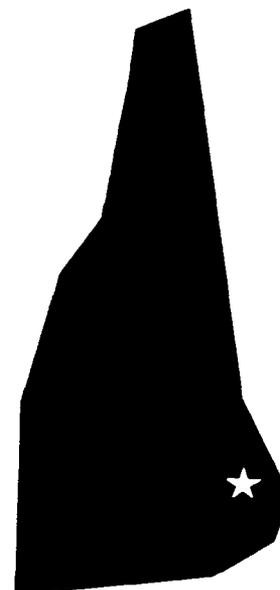
**Base Mission:** Aircraft maintenance

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1986; RI/FS initiated 1987; Proposed for NPL 1989

**Contaminants:** Organic solvents, pesticides, paint strippers, hydrocarbons

**Funding to Date:** \$4.55 million



### Preliminary Assessment/ Site Inspection (PA/SI)

The area around Pease AFB is commercial-residential. The base abuts a tidal estuary called Great Bay which leads to Little Bay 3 miles downstream, both used for shellfishing and recreational activities. Both coastal and fresh water wetlands are along surface water migration pathways from the base. An estimated 9,000 people obtain drinking water from public and private wells within 3 miles of the base.

A 1986 Air Force study identified 18 waste disposal areas on the base. Thirteen areas received hazardous wastes, including seven landfills, two areas where waste oil and solvents were burned for fire training exercises, and four areas where solvents and other liquid wastes were discharged on the ground. At present, all hazardous wastes generated on the base are disposed of off-site at EPA-regulated facilities.

### Remedial Investigation/ Feasibility Study (RI/FS)

Tests conducted in 1977 determined that a well supplying drinking water to 8,700 people on-base was contaminated with trichloroethylene (TCE). RI/FS was initiated in September, 1987. According to a 1988 IRP report, traces of heptachlor and lindane were found contaminating surface water along the surface run-off pathway from one of the landfills. Lead and zinc were found in sediments of three major drainage ditches on the base. The base holds a permit for a RCRA hazardous waste storage facility under Subtitle C of the Resource Conservation and Recovery Act (RCRA). It holds a National Pollutant Discharge Elimination System permit for the discharge of treated wastewater into the Piscataqua River.

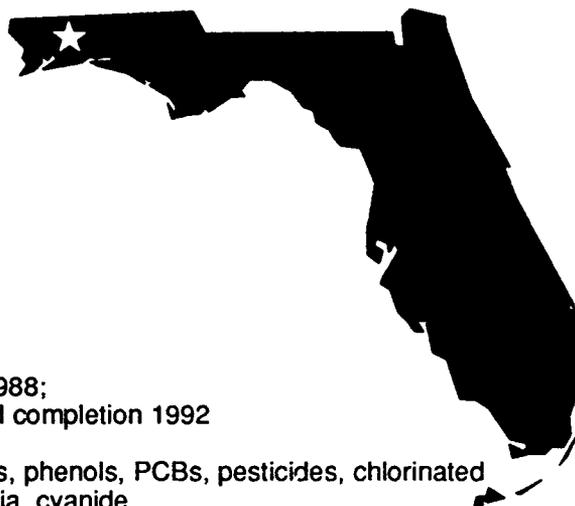
### Remedial Design/ Remedial Action (RD/RA)

In 1984, an aeration system was installed to remove TCE from all base water supply wells. The TCE levels are no longer detectable so the system has been discontinued.

Work began in August, 1989 to implement interim remedial measures at Landfill #5. It entails removal of drums and contaminated soil probably impacting surface and ground water. Interim remedial measures consist of utilizing pump and treat technologies to remove free product and dissolved constituents from ground water, and to limit migration. Additional site characterization and interim remedial measures at three sites in the industrial shop are planned for 1990.

# Pensacola Naval Air Station

## Pensacola, Florida



**Service:** Navy

**Size:** 5,969 Acres

**HRS Score:** 42.40

**Base Mission:** Flight training; Naval Air Depot

**IAG Status:** Initiation expected 1990

**Action Dates:** PA completed 1983; RI/FS initiated 1988; Proposed for NPL 1989; SI scheduled completion 1992

**Contaminants:** Paints, metal plating wastes, asbestos, phenols, PCBs, pesticides, chlorinated and non-chlorinated solvents, ammonia, cyanide

**Funding to Date:** \$1.50 million

### Preliminary Assessment/ Site Inspection (PA/SI)

Past disposal practices included burning in unlined pits, depositing in disposal areas, storing aviation gas in fuel tanks, and discharging liquid wastes to industrial sewers, sanitary sewers and surface impoundments.

The PA/SI identified 36 potentially contaminated sites with 17 recommended for additional work. Hydrogeology of the area is conducive to contaminant migration through the soil. High rainfall coupled with ground water flow could cause off-base contaminant migration.

The RCRA Facility Assessment (RFA) identified 36 Solid Waste Management Units (SWMU) in the RCRA/HSWA Permit dated August 26, 1988. Seventeen sites required a RCRA Facility Investigation (RFI). These sites are also IRP sites identified in the PA/SI and RI/FS.

### Remedial Investigation/ Feasibility Study (RI/FS)

An RI/FS covering 36 sites began in December, 1988 in conjunction with the RFI. A contract was awarded for the development of site investigation work plans for all sites (SWMU and IRP sites) at Pensacola NAS. Draft work plans were submitted to EPA Region IV in May, 1989. The work plans submitted are intended to cover requirements for both the RI/FS and RFI investigations.

Interim remedial actions at the Industrial Waste Treatment Plant are removing gross contamination from the sludge drying beds, polishing pond, and surge pond. Ground water is being treated and monitored at this site to assess the effects of these units on the environment.

The first meeting of the Technical Review Committee (TRC) was held on January 12, 1989. NAVFACENCOM, SOUTHNAVFACENCOM, and NAS Pensacola representatives met in July, 1989 to develop a draft Federal Facility Agreement (FFA) which was submitted to EPA on September 1, 1989.

### Remedial Design/ Remedial Action (RD/RA)

A ground water recovery system has operated since January, 1987 at Site 33. In the future, impoundments at Site 33 will undergo formal closure (RCRA).

# Picatinny Arsenal

## Rockaway Township, New Jersey



**Service:** Army

**Size:** 6,500 Acres

**HRS Score:** 42.92

**Base Mission:** U.S. Army Armament Research, Development, and Engineering Center

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1987; Proposed for NPL 1989

**Contaminants:** Heavy metals, volatile organic compounds, nitroaromatics

**Funding to Date:** \$11.9 million

### **Preliminary Assessment/ Site Inspection (PA/SI)**

Picatinny Arsenal employs approximately 6,400 people. Potential contamination in ground water, surface water, sediment, and soils is suspected.

The PA identified 33 locations of known or suspected hazards.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

An RI/FS Concept Plan is currently being prepared by Argonne National Laboratory. A phased RI/FS will begin upon approval.

### **Remedial Design/ Remedial Action (RD/RA)**

An Interim Remedial Action to pump and treat TCE-contaminated ground water near Building 24, an inactive metal shop, is planned for 1990.

# Plattsburgh Air Force Base Plattsburgh, New York

**Service:** Air Force  
**Size:** 3,440 Acres  
**HRS Score:** 30.34  
**Base Mission:** Tactical Wing of Strategic Air Command;  
Combat Crew training and NCO Leadership School  
**IAG Status:** Initiated and expected to be signed 1990  
**Action Dates:** PA/SI completed 1986; RI/FS initiated 1987; Proposed for NPL 1989  
**Contaminants:** Organic solvents, PCBs  
**Funding to Date:** \$3.0 million



## **Preliminary Assessment/ Site Inspection (PA/SI)**

Toluene, TCE, 1,1,1-trichloroethane, methylene chloride, and 1,2-dichloroethane are present in drainage ditches in areas where solvents and jet fuels were spilled. Tests conducted in 1987 found MEK, TCE, and trans-1,2-dichloroethylene in two shallow monitoring wells downgradient of a drum storage area. An estimated 2,000 people obtain drinking water from wells within 3 miles of the base.

The EPA evaluated eight hazardous waste accumulation or disposal sites and four spill areas to develop the HRS score for Plattsburgh AFB.

## **Remedial Investigation/ Feasibility Study (RI/FS)**

Plattsburgh AFB prepared and is implementing an RI/FS work plan for 24 sites.

## **Remedial Design/ Remedial Action (RD/RA)**

RD/RA activities planned for 1990 include remediation at both the former fire training area and a DOT spill at the Defense Reutilization and Marketing Office (DRMO). Additional remedial actions will be implemented based on results of the RI/FS.

# Riverbank Army Ammunition Plant

## Riverbank, California

**Service:** Army

**Size:** 172 Acres

**HRS Score:** 63.94

**Base Mission:** Grenade and projectile steel cartridge casings manufacture

**IAG Status:** Initiation expected 1990

**Action Dates:** PA/SI completed 1980; RI/FS initiated 1981; Proposed for NPL 1988

**Contaminants:** Cyanide and chromium wastes

**Funding to Date:** \$5.47 million



### Preliminary Assessment/ Site Inspection (PA/SI)

The Riverbank Army Ammunition Plant (RBAAP) is a government-owned/contractor-operated facility currently employing about 320 persons. Past operations have contaminated the ground water beneath the plant with cyanide and chromium wastes and the off-post potable water supply utilized by approximately 70 residents.

A PA/SI identified potentially contaminated sites, including the Industrial Wastewater Treatment Plant (IWTP), an abandoned landfill, and four Evaporation/Percolation (E/P) Ponds located 1.5 miles north of the plant near the Stanislaus River.

### Remedial Investigation/ Feasibility Study (RI/FS)

Chromium contamination has been traced to past operation of the IWTP. The abandoned landfill is the source of cyanide contaminants. Both contaminants have entered the ground water aquifers beneath the plant. Their migration off-post affects the potable domestic water supply. Sampling of domestic supply wells off-post is conducted quarterly. The E/P Ponds contain zinc concentrations above California limits for surface impoundments.

### Remedial Design/ Remedial Action (RD/RA)

In response to finding chromium contamination above state limits, off-post domestic supply wells at three residences were replaced with deeper wells. Construction of an interim ground water treatment system is underway.

Remedial measures to reduce the concentrations in the E/P Ponds are scheduled for 1990.

# Robins Air Force Base

## Houston County, Georgia



**Service:** Air Force

**Size:** 8,810 Acres

**HRS Score:** 51.66

**Base Mission:** Aircraft logistics

**IAG Status:** Signed 1989

**Action Dates:** PA/SI completed 1982; RI/FS initiated 1986; Placed on NPL 1987

**Contaminants:** Volatile organic compounds, paint strippers and thinners, paints, solvents, phosphoric and chromic acids, oils, cyanide, carbon remover, phenols

**Funding to Date:** \$14.1 million

### Preliminary Assessment/ Site Inspection (PA/SI)

Robins AFB is located in the Coastal Plain of Georgia and includes a 1,200 acre wetland. Units of the highly permeable Cretaceous Aquifer lie beneath it. The water supply for the base and the City of Warner Robins could potentially be affected by any contamination in ground or surface water because their water is derived from this aquifer. More than 10,000 people are potentially affected. Trichloroethylene and tetrachloroethylene have been detected in ground water near the site and phenols in surface water on the site. The base has 13 areas containing hazardous waste from past disposal activities.

The PA/SI identified 13 sites as contamination sources and targeted nine for RI/FS work. Ground water contamination with a high potential for contaminant migration was detected at three sites. Two areas covering 67 acres comprise the NPL site. In landfill #4, 1,500 drums are stored, and an adjacent sludge lagoon contains phenols and metal plating wastes.

### Remedial Investigation/ Feasibility Study (RI/FS)

RI/FS initiated in September, 1986. Nine sites were investigated and then redefined into six zones. In zone 1, contamination of ground and surface water and sediments by organic solvents and cyanide was confirmed. In zone 2, ground and surface water contamination was detected. In zone 3, high levels of petroleum products, TOX, and lead were found in the ground water. In zone 4, ground water contamination by TOX, phenols, and cyanides was detected. In zone 5, solvents were found. No significant contamination was detected in zone 6. The NPL site is covered by an Interagency Agreement signed in June, 1989.

### Remedial Design/ Remedial Action (RD/RA)

The DDT spill site located in zone 2 has been covered with asphalt. Several underground storage tanks were removed and water supply wells were replaced in 1987. RD/RA activities are expected to begin in 1991.

An IRP Master plan has been approved for Robins AFB for 1988 through 1992. The plan will consider contaminant sources, migration, and the development of remedial alternatives. A specific remedial action plan for source control has also been developed for Landfill 4 and the adjacent sludge lagoon.

# Rocky Mountain Arsenal

## Adams County, Colorado



**Service:** Army

**Size:** 17,228 Acres

**HRS Score:** 58.15

**Base Mission:** Decontamination and cleanup of real estate, facilities, and equipment

**IAG Status:** Federal Facilities Agreement established in 1989 among USEPA, Army, Department of Interior, ATSDR and Shell Chemical Company

**Action Dates:** RI/FS initiated in 1984; PA/SI completed 1985; Placed on NPL 1987

**Contaminants:** Pesticides; mustard gas and nerve agents; mercury; lead; arsenic; chlorides of aluminum, arsenic, sulfur, thionyl, and cyanogen; hydroxides and fluorides; diisopropyl methyl phosphonate (DIMP); dichloropentadiene (DCPO); dibromochloropropane (DBCP); sulfates; solvents; dimethyl disulfide; acids; methyl isobutyl ketone; dithiane oxathiane; chlorophenylmethylsulfide; sulfoxide; and sulfane

**Funding to Date:** \$222 million

### Preliminary Assessment/ Site Inspection (PA/SI)

The Army completed a Material Contamination Survey in August, 1973 and an installation assessment in March, 1977. These studies identified 19 areas potentially contaminated with heavy metals, chemical agents, incendiaries, and industrial wastes.

### Remedial Investigation/ Feasibility Study (RI/FS)

During 1989, Rocky Mountain Arsenal (RMA) completed 95 percent of the overall Remedial Investigation for the on-post operable unit, including completion of seven remedial investigation study area reports and the off-post operable unit remedial investigation.

The Feasibility Study continues and will evaluate over 1,000 remediation technologies for applicability to the final cleanup of RMA.

### Remedial Design/ Remedial Action (RD/RA)

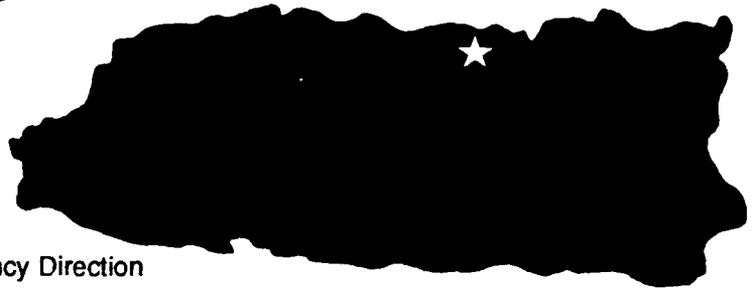
During 1989, several intermediate response actions were initiated to contain contamination sources, reduce the extent of contaminant migration and decrease the cost of the final remediation. Recharge trenches were installed at the North Boundary System and improvements were made to the Northwest Boundary System. Engineering design for three new intercept and treatment systems located north of Basin F, in the Basin A neck area, and off-post, north of RMA are completed.

Basin F closure was completed in May, 1989. Approximately 8.5 million gallons of liquid and 500,000 tons of contaminated soil have been removed and placed in safe, temporary storage. This effort represents the largest single DoD cleanup effort to date at an NPL site. Engineering assessments have also been completed for destruction of the Basin F liquids.

Other actions include the completion of the engineering assessments for the destruction and disposal of liquid wastes, preparation for the cleanup and dismantling at the Hydrazene Blending and Treatment Facility, and the capping of approximately 90 percent of the 273 abandoned wells.

# Sabana Seca Naval Security Group Activity

## Sabana Seca, Puerto Rico



**Service:** Navy

**Size:** 2,252 Acres

**HRS Score:** 34.28

**Base Mission:** Operation of High Frequency Direction Finding Facility

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1984; RI/FS initiated 1985; Proposed for NPL 1988

**Contaminants:** Pesticides, herbicides, paints, oils, solvents

**Funding to Date:** \$109,000

### Preliminary Assessment/ Site Inspection (PA/SI)

Past disposal methods in landfills created the potential for soil and ground water contamination. Ground water is the base's potable water supply. Spillage of herbicides and pesticides, and the rinsing of application equipment have contaminated the areas adjacent the pesticide shop. Sightings of endangered wildlife have been reported in numerous locations.

A PA/SI identified seven potentially contaminated sites, including five which did not require further action. The former pesticide shop (Site 6) and the leachate ponding area (Site 7) were recommended for an RI/FS. The source of the leachate at Site 7 is the municipal landfill adjacent to the Station boundary.

### Remedial Investigation/ Feasibility Study (RI/FS)

Two rounds of sampling have been completed. Analyses indicate that soils are contaminated at Site 6, the Former Pest Control Shop but no ground water contamination has been detected there. The leachate contamination at Site 7 originates at an off-site source (the municipal landfill). However, its inclusion in the scope of the RI/FS is a precautionary measure to protect the base water supply. The Navy will continue to pursue legal avenues with regard to the migration of contamination onto the Station.

A Technical Review Committee held its first meeting in January 1989. The next meeting will be scheduled during 1990 when the documentation for Site 6 has been completed.

### Remedial Design/ Remedial Action (RD/RA)

In 1988, the Navy installed a fence around the Former Pest Control Shop, Site No. 6, to prevent human exposure to spilled pesticides. RD/RA work will begin after completion of RI/FS activities.

# Sacramento Army Depot

## Sacramento, California

**Service:** Army

**Size:** 485 Acres

**HRS Score:** 44.46

**Base Mission:** Depot for electronics materials;  
Manufacture parts

**IAG Status:** Signed 1988 with EPA and State of California

**Action Dates:** PA/SI completed 1979; RI/FS initiated 1984;  
Placed on NPL 1987

**Contaminants:** Waste oil and grease, solvents; metal plating wastes;  
Wastewaters containing caustics, cyanide, heavy metals

**Funding to Date:** \$7.49 million



### **Preliminary Assessment/ Site Inspection (PA/SI)**

PA/SI work identified several industrial areas and spill/disposal sites as potential sources of contaminant migration. Surface run-off is the likely source of contamination of Morrison Creek.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

Ground water sampling indicates contamination both on- and off-site, primarily with trichloroethylene and heavy metals. Heavy metals have also been found in the sediment of Morrison Creek.

### **Remedial Design/ Remedial Action (RD/RA)**

The installation is closing the old oxidation lagoons and oil burn pits and has developed plans to remove leaking storage tanks. A Record of Decision is scheduled for signature in Fall 1989 for the on-post Ground Water Treatment System Interim Remedial Action. Construction is expected to be completed in late 1990 or early 1991. RD/RA activities including construction of a ground water treatment system, and a ground water monitoring system are expected to begin in 1992.

# Savanna Army Depot Activity

## Savanna, Illinois



**Service:** Army

**Size:** 13,062 Acres

**HRS Score:** 42.20

**Base Mission:** Depot for munitions and explosives;  
manufacture and store chemicals

**IAG Status:** Signed 1989 with EPA and State of Illinois

**Action Dates:** PA/SI completed 1979; RI/FS initiated 1980;  
Placed on NPL 1989

**Contaminants:** Munitions-related wastes

**Funding to Date:** \$2.70 million

### **Preliminary Assessment/ Site Inspection (PA/SI)**

Three potable water sources near Savanna Army Depot and the shallow aquifer 5 meters below may be contaminated. Lagoons adjacent to the Mississippi River could also contaminate these drinking water sources. Surface contamination could affect the large wintering population of bald eagles. The PA/SI initially identified 59 potentially contaminated sites. These were later consolidated into 45 sites. Local munitions-related contamination was detected in sediments of the TNT washout-area leaching-pond, and in ground water on-base.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

The RI/FS, initiated in September, 1980, identified and confirmed the extent and concentration of ground water and soil contamination in the lagoon sediment. The lagoon leached TNT and other chemicals to the ground water. Sampling of selected ground and surface water sites determined the extent of contaminant migration. Testing and monitoring of aquifers will continue.

### **Remedial Design/ Remedial Action (RD/RA)**

Incineration of TNT-contaminated soils and remedial action at the lagoon is scheduled for 1990. The incineration will proceed as an operable unit.

# Schofield Barracks

## Oahu, Hawaii

**Service:** Army

**Size:** 17,725 Acres

**HRS Score:** 28.9

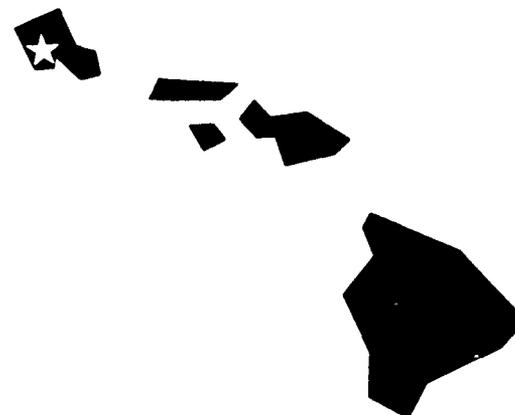
**Base Mission:** Home for Army's Oahu Island mobile defense

**IAG Status:** Not started

**Action Dates:** PA/SI completed 1984; Proposed for NPL 1989

**Contaminants:** Organic solvents

**Funding to Date:** \$1.6 million



### Preliminary Assessment/ Site Inspection (PA/SI)

Schofield Barracks was established in 1908 as a base for the Army's mobile defense of Pearl Harbor and the entire island. The area around the barracks is generally rain forest. The facility is divided into two areas: the East Range and the Main Post. The closest municipality is Wahiawa to the north.

In April, 1985, the Hawaii Department of Health informed the Army that high levels (30 ppb) of trichloroethylene (TCE) contaminated wells supplying drinking water to 25,000 people at Schofield Barracks. An additional 55,000 people in Wahiawa and Miliani obtain drinking water from public wells within 3 miles of hazardous substances on the base. Three miles downstream of the base, Wahiawa Reservoir is used to irrigate 3,000 acres of pineapple fields and for recreational activities. The maximum contaminant level for TCE is 5 ppb (Federal MCL).

A PA/SI identified pesticide storage, burning ground, wash-rack activities, and paint filters disposal activities that could contaminate the municipal landfill.

No evidence of ground water contamination was found at the time of the study. Further SI work is required to identify the source of the TCE contamination.

### Remedial Investigation/ Feasibility Study (RI/FS)

In September, 1986, the Army began removing TCE from contaminated wells on-base to ensure safe drinking water. This interim response action will be modified as required, based upon findings of the upcoming RI/FS. RI/FS activities will be initiated following completion of all PA/SI-related efforts, probably under the auspices of an IAG.

### Remedial Design/ Remedial Action (RD/RA)

RD/RA work will begin after completion of RI/FS activities.

# Seneca Army Depot

## Romulus, New York

**Service:** Army

**Size:** 10,600 Acres

**HRS Score:** 37.30

**Base Mission:** Receive, store, distribute, maintain, and demilitarize conventional ammunition, explosives, and special weapons

**IAG Status:** Not started

**Action Dates:** PA/SI completed 1989; Proposed for NPL 1989; RI/FS initiation expected 1990

**Contaminants:** Volatile organic compounds, chlorinated organic solvents, heavy metals

**Funding to Date:** \$1.43 million



### Preliminary Assessment/ Site Inspection (PA/SI)

Seneca Army Depot employs approximately 700 civilian and 300 to 400 military employees. Chlorinated organic solvents from the incinerator ash landfill have been detected in ground water on-post and in seasonal surface seeps off-post. Occupants of a farmhouse near the field where the seeps occur may be receptors. No private wells are affected. Soils in the open burning/open detonation (OB/OD) ground are contaminated with heavy metals that apparently do not migrate.

The PA/SI identified the potential for ground water contamination at the incinerator ash landfill and recommended an SI. The SI confirmed off-post migration of contaminated ground water and identified several source areas within the landfill.

### Remedial Investigation/ Feasibility Study (RI/FS)

RI/FS investigations are planned in January, 1990 for the landfill and in September, 1990 for the OB/OD ground. These investigations will characterize contaminant source areas, define the extent of contamination, and evaluate health risks.

### Remedial Design/ Remedial Action (RD/RA)

Evaluation of the effectiveness of a ground water treatment technology for the incinerator ash landfill will begin in 1990. This interim response consists of a carbon treatment bed installed at the installation boundary. The treatment bed is designed to intercept ground water and remove contaminants before the ground water flows off post.

# Sharpe Army Depot Lathrop, California

**Service:** Army  
**Size:** 72 Acres  
**HRS Score:** 42.24  
**Base Mission:** Depot for general supplies  
**IAG Status:** Signed 1989 with EPA and State of California  
**Action Dates:** PA/SI completed 1980; RI/FS initiated 1984;  
Placed on NPL 1987  
**Contaminants:** Volatile organic compounds, heavy metals  
**Funding to Date:** \$12.5 million



## Preliminary Assessment/ Site Inspection (PA/SI)

Sharpe Army Depot (SHAD) employs 1,200 people. Wastes have been landfilled or buried on-site. The PA/SI indicated contamination from landfilling in the north and south ends of the Depot, in areas referred to as the "north balloon" and "south balloon" because they are encircled by a railroad turnaround. The study identified contaminants in the burning pits and burial sites in the central area of the depot. The PA/SI found solvent wastes, predominantly trichloroethylene (TCE) contaminating soil and ground water in the area.

## Remedial Investigation/ Feasibility Study (RI/FS)

The RI/FS was initiated in July, 1984. The complexity and extent of site contamination and the intense regulatory oversight have necessitated two separate RI sampling operations. A third and probably final round of sampling is scheduled for February, 1990. Sampling data confirm the presence of TCE in the upper three aquifers at several locations. TCE levels up to 3,380 ug/l have been measured. The California allowable level for TCE is 5 ug/l. TCE from SHAD has also contaminated ground water off post.

## Remedial Design/ Remedial Action (RD/RA)

The Army has constructed an interim ground water treatment system and is constructing a second system to contain and treat contamination in the most seriously affected areas. A system designed to capture and treat contamination in the north balloon area, will be operational in September, 1990.

# Tinker Air Force Base

## Oklahoma City, Oklahoma

**Service:** Air Force

**Size:** 4,277 Acres

**HRS Score:** 42.24

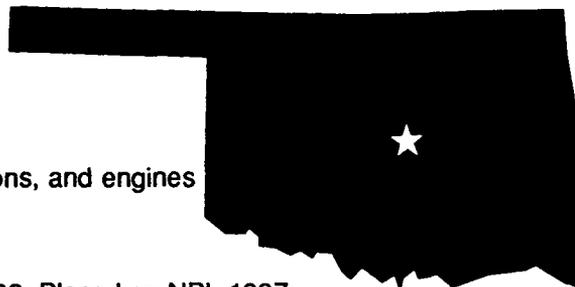
**Base Mission:** Worldwide repair depot for aircraft, weapons, and engines

**IAG Status:** Signed 1988

**Action Dates:** PA/SI completed 1982; RI/FS initiated 1983; Placed on NPL 1987

**Contaminants:** Organic solvents, heavy metals

**Funding to Date:** \$15.1 million



### Preliminary Assessment/ Site Inspection (PA/SI)

The base is within the North Canadian River Drainage Basin and drains into Crutcho and Soldier Creeks. It overlies the Garber-Wellington Aquifer. Soldier Creek and Building 3001 constitute the NPL site. Two Soldier Creek tributaries carry storm and treated industrial water from Building 3001. The main contaminants are organic solvents [trichlorethylene (TCE), and 1,2-dichloroethene] formerly used for degreasing and aircraft maintenance, and heavy metals (hexavalent chromium) formerly used in plating operations. To date, three drinking water wells within or adjacent Building 3001 have been taken out of service and plugged. The contamination plume covers 220 acres (within base boundary) under Building 3001 and the upper (non-producing) aquifer zones. The base and 75,000 customers in Midwest City draw water from the producing zones of the aquifer. Tinker AFB's past operations and disposals have created the following IRP sites: six landfills (one on leased land) containing 1,705,000 cubic yards of industrial and sanitary waste; two industrial waste pits; one supernatant pond;

two abandoned fire training areas; five disposal sites; and twelve fuel contaminated sites caused by leaking underground storage tanks. Three on-base creeks are also suspected of being contaminated.

The PA/SI work for the original fourteen IRP sites was completed in April, 1982. Subsequent PA/SI work was completed as each new site was proposed for the IRP.

### Remedial Investigation/ Feasibility Study (RI/FS)

Initial investigations commenced in September, 1983 and have been completed for wells 17, 18, and 19, the fuel farm, landfill 5, the North Fuel Area (B3001 - operable unit), Sludge Drying Beds, Industrial Waste Treatment Plant Pits, and Building 3001. To date, these investigations have revealed contamination plumes underneath Building 3001, Landfills 1-4, Landfill 6, and the North Fuel Area (B3001). No off-base contaminant migration has been confirmed to date. An Interagency Agreement covering the NPL sites was completed in December, 1988.

### Remedial Design/ Remedial Action (RD/RA)

Landfill 6 has been capped and remedial actions completed for wells 17, 18, and 19. Most fuel has been recovered from the Fuel Farm. Landfill 5 is recommended for capping and fuels/vapors are recommended for recovery from the North Fuel Area. The recommended remedial action for the B3001 ground water will go out for public approval and a Record of Decision is scheduled for October, 1990, as required by the Interagency Agreement.

# Tobyhanna Army Depot

## Tobyhanna, Pennsylvania



**Service:** Army

**Size:** 1,400 acres

**HRS Score:** 37.93

**Base Mission:** Logistics for communications/electronics equipment; Largest communications/electronics overhaul facility in Army

**IAG Status:** Not started

**Action Dates:** PA/SI completed 1980; RI/FS initiated in 1987; Proposed for NPL 1989

**Contaminants:** Volatile organic compounds, heavy metals

**Funding to Date:** \$1.75 million

### Preliminary Assessment/ Site Inspection (PA/SI)

Volatile organic compounds (VOCs) contaminate private off-post wells adjacent to the southeast corner of the Depot.

The PA/SI recommended no follow-on survey. During the update to the initial assessment (February, 1988), an RI/FS was recommended to address the VOC contamination of the Depot's supply well No. 3 (on-post) and off-post private wells.

### Remedial Investigation/ Feasibility Study (RI/FS)

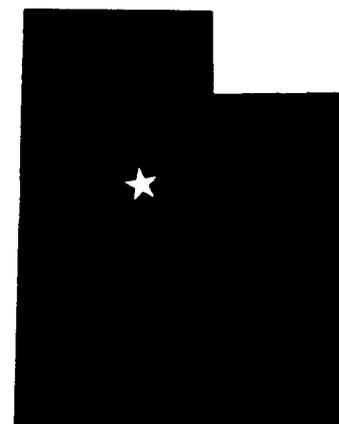
The RI/FS, initiated in July, 1987, addressed VOC contamination in the southeast corner of the Depot. Two source areas have been confirmed with one only a few hundred feet from affected off-post wells. The feasibility study's preferred response measures are passive volatilization for contaminated soils (tilling soils within a specially constructed building); pumping and treating ground water; and providing an alternate water source either interim treatment units or a tie-in to the Tobyhanna Water Company.

### Remedial Design/ Remedial Action (RD/RA)

A treatability study is being conducted for the passive soil volatilization technology. Negotiations for the tie-in to the water company continue. The Army has been providing bottled water for 26 residences and one business since March, 1987.

# Tooele Army Depot

## Tooele County, Utah



**Service:** Army

**Size:** 44.087 Acres

**HRS Score:** 38.32

**Base Mission:** Store and supply equipment; Build and repair locomotives, railcars, and transport cars

**IAG Status:** Initiated

**Action Dates:** PA/SI completed 1980; Proposed for NPL 1984; RI/FS initiated 1987

**Contaminants:** Heavy metals, petroleum/oil/lubricants, PCBs, paint primers, cleaning, plating and explosive wastes

**Funding to Date:** \$10.7 million

### **Preliminary Assessment/ Site Inspection (PA/SI)**

Historic disposal practices 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. Consequently, ground water may be threatened by contaminant migration from the waste sites; plant and animal life in the area could also be affected.

The PA/SI identified potential ground water contaminant migration. Five sites present a significant threat to public health and the environment, including explosives found in the ground water beneath the TNT washout pond. Ground water contaminated with diesel fuel could also seep into bedrock.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

An Environmental Survey indicated that trichloroethylene (TCE) from the Industrial Wastewater Lagoon (IWL) was migrating to the northern boundary on-base. RI/FS initiated in September, 1987. An RI Addendum Report concluded that a plume of ground water contamination containing TCE from the IWL extends off-post approximately 2,500 ft.

### **Remedial Design/ Remedial Action (RD/RA)**

The Industrial Wastewater Lagoon was granted interim status under RCRA in 1985. This required installation of monitoring wells, but the previously documented evidence of ground water contamination caused TEAD to enter into a Consent Decree with the State of Utah. As a result, a Ground Water Quality Assessment was conducted. The Consent Decree also required TEAD to cease discharging wastewater into the IWL and to close the lagoon.

# Tracy Defense Depot

## Tracy, California

**Service:** Defense Logistics Agency

**Size:** 448 Acres

**HRS Score:** 31.12

**Base Mission:** Store and distribute food, medical, electronic, industrial/construction equipment, and textiles for Armed Forces in the western U.S. and Pacific

**IAG Status:** Not started

**Action Dates:** PA/SI completed 1982; RI/FS initiated 1986; Proposed for NPL 1989

**Contaminants:** Heavy metals, petroleum/oil/lubricants, volatile organic compounds, TCE, PCE

**Funding to Date:** \$3.45 million



### Preliminary Assessment/ Site Inspection (PA/SI)

The PA/SI identified 29 sites of contamination on-depot with strong contamination migration potential. All of these 29 sites will be included in the RI/FS investigations. The upper ground water aquifer, both on- and off-base, is contaminated with both trichloroethylene (TCE) and tetrachloroethylene (PCE) beyond federal safety standard limits.

### Remedial Investigation/ Feasibility Study (RI/FS)

RI/FS began in September, 1986, on 29 sites. In addition to the contaminated upper aquifer, the soil on-depot is likewise contaminated. Eighty-one monitoring wells have been installed, and 50 soil borings and 180 soil vapor tests have been conducted.

### Remedial Design/ Remedial Action (RD/RA)

An Interim Remedial Measure (IRM) contract awarded in September, 1989 will lead to the construction of an air stripper to remove contaminants from the ground water. The estimated completion date for the stripper is the first quarter of 1991.

# Travis Air Force Base

## Solano County, California

<b>Service:</b>	Air Force
<b>Size:</b>	5,025 Acres
<b>HRS Score:</b>	29.49
<b>Base Mission:</b>	Military Air Command; Headquarters to 22nd Air Force; Medical Center
<b>IAG Status:</b>	Initiated and expected to be signed 1990
<b>Action Dates:</b>	PA/SI completed 1985; RI/FS initiated 1986; Proposed for NPL in 1989
<b>Contaminants:</b>	Volatile organic compounds, heavy metals, polynuclear aromatic hydrocarbons
<b>Funding to Date:</b>	\$3.52 million



### Preliminary Assessment/ Site Inspection (PA/SI)

The area around Travis AFB is primarily agricultural. Industrial operations on-base include various shops where aircraft components are cleaned with solvents.

The PA/SI identified 14 sites potentially contributing to contamination due to past operations and disposal practices. They include old landfills, a closed Sewage Treatment Plant, fire fighting training areas, disposal pits, spill areas, and the storm drainage system. Volatiles present in the storm sewer system, particularly TCE, could possibly reach Union Creek. Point Arena AFS, an auxiliary installation occupying 81 acres on a mountain top in Mendocino County, contains both mercury contamination and possibly volatile organic compound contamination.

### Remedial Investigation/ Feasibility Study (RI/FS)

An RI/FS is underway to determine the type and extent of contamination and to identify alternatives for remedial action. Two additional sites have been added to the investigation, the Cyanide Disposal Pit (CDP) where about 250 pounds of cyanide were buried, probably in 1967, and the Grazing Management Units, where a swelling affliction has been observed in horses. The RI/FS report scheduled to be released in the summer of 1989 was delayed to permit further investigation. Preliminary analysis indicates near impermeable fine-grained alluvial sediments exist beneath the base. Localized buried sand and gravel channels represent likely pathways for contaminant migration. The ground water at Travis AFB contains naturally elevated concentrations of several metals and common anions. The contaminants detected in the ground

water include volatile organics and metals. Metals and polynuclear aromatic hydrocarbons (PAHs) were detected in the surface water, sediments of the storm sewers, and Union Creek. Additional studies to determine the scope of any needed remedial actions are planned for 1990.

### Remedial Design/ Remedial Action (RD/RA)

Twenty-seven underground storage tanks were removed from various IRP sites at Travis AFB in 1986. Additional RD/RA activities are expected to begin in 1990/1991.

# Treasure Island Naval Station—Hunters Point Annex

## San Francisco, California

**Service:** Navy

**Size:** 936 Acres

**HRS Score:** 48.77

**Base Mission:** Support Pacific Fleet

**IAG Status:** Initiation expected 1990

**Action Dates:** RI/FS initiated 1987; Proposed for NPL 1989; PA/SI on-going

**Contaminants:** Paints, solvents, fuels, acids, bases, heavy metals, PCBs, asbestos, phenols, polyaromatic hydrocarbons, volatile organic compounds

**Funding to Date:** \$7.78 million



### Preliminary Assessment/ Site Inspection (PA/SI)

Formerly the Hunters Point Naval Shipyard, Hunters Point Annex was established in 1869 as the first dry dock on the Pacific Coast. The Navy purchased the installation in 1939 and leased it to Bethlehem Steel Company. The Navy operated Hunters Point Annex as a shipbuilding and repair facility from 1941 until 1976. Triple A Machine Shop then leased the facility from 1976 to 1986 and subleased numerous buildings to private tenants. Testing in 1987 detected benzene, PCBs, toluene, and phenols in on-site ground water. A bottling company draws ground water from a spring approximately one mile from Hunters Point Annex. Offshore sediments contain elevated levels of heavy metals and polyaromatic hydrocarbons. Area surface waters are used for recreational activities, commercial navigation, and fishing.

To date, the RI/FS has included 11 sites. Two ongoing PA/SIs may identify additional sites to add to the RI/FS. Five removal actions are planned for

1990 including site treatment, decontamination, and waste removal.

### Remedial Investigation/ Feasibility Study (RI/FS)

A Technical Review Committee was formed in 1988. Members of the Committee include representatives from: COMMON-BASE San Francisco; Treasure Island Naval Station; Western Division, Naval Facilities Engineering Command; California Department of Health Services; California Regional Water Quality Control Board; Bay Area Air Quality Management District; USEPA Region IX; Bay Conservation Development Commission; and the City and County of San Francisco.

Completion of the RI/FS is expected in 1992.

### Remedial Design/ Remedial Action (RD/RA)

Removal actions were implemented in 1987 and 1988 to clean up PCBs and to reduce leaching of copper and lead from a pile of sand-blasting residue. RD/RA work will begin after completion of RI/FS activities.

# Twin Cities Air Force Reserve Base

## Minneapolis, Minnesota



**Service:** Air Force

**Size:** 280 Acres

**HRS Score:** 33.70 (One site only, Small Arms Range Landfill)

**Base Mission:** Tactical Airlift

**IAG Status:** Initiated and expected to be signed 1989

**Action Dates:** PA completed 1983; SI completed 1986; Placed on NPL 1987; RI completed 1989 (Past Fuel Spill only)

**Contaminants:** Oil/petroleum/lubricants, spent solvents and cleaners, battery acid, strippers, painting wastes (containing metals such as chromium), PCB-contaminated oils, and chlorinated hydrocarbons

**Funding to Date:** \$1.91 million

### Preliminary Assessment/ Site Inspection (PA/SI)

The Air Force Reserve completed the PA in March, 1983 and the SI in April, 1986. This study identified ten sites as potentially harmful to the environment. The Small Arms Range Landfill, was placed on the National Priorities List in July, 1987 with a HRS score of 33.70. It is located on non-contiguous property two miles from the main base property and was the primary solid waste disposal site from 1963 to 1972. The landfill primarily contains general refuse, but industrial waste products may have been buried or burned in this landfill. These products include paint thinners and removers, paint, primers, lacquers, and paint filters which contained chromium in the paint, and 100 to 200 gallons of leaded fuel sludge. This landfill is almost three acres in size, and is located adjacent to the Minnesota River within the 100-year flood plain. The northern boundary of the Minnesota Valley National Wildlife Refuge lies 500 feet from the landfill. It flooded once in 1965.

The USEPA HRS staff estimated 64,700 people living in the Minneapolis-St. Paul metropolitan area depend on public and private wells for drinking water within a 3-mile area of the landfill.

The other nine sites include a landfill, fuel spills, sludge burial pit, hazardous waste drum storage area, battery shop leaching pit, and underground storage tanks. The PA/SI identified a possible plume of AVCAS on the ground water table at the Past Fuel Site, and also identified some additional potential contamination problems.

### Remedial Investigation/ Feasibility Study (RI/FS)

For the NPL site, Small Arms Range Landfill, initial investigation studies were completed in 1986 and the RI/FS is now underway. Ground water data at the landfill indicated detectable concentrations of oil and grease, barium, trichloroethylene, silver, and dichloroethylene, but far below State and Federal drinking water standards. Only one compound, mercury, showed a con-

centration (2 ug/l) equal to Federal drinking water standards. The 20 monitoring wells around the site screen the ground water from 5 to 30 feet below level surface. The Draft RI Report is scheduled to be completed in February, 1990.

Negotiations for a Federal Facility Agreement (FFA) between the Air Force, USEPA, and the State of Minnesota concluded on August 15, 1989. Due to differences between the DoD and State of Minnesota on the issue of reimbursement, the FFA has only been signed by the Air Force and USEPA.

The RI/FS for one site, Past Fuel Spill, is scheduled for completion in January, 1990. A plume of AVGAS has been discovered floating on the ground water table and migrating to the southwest. A variation of the "pump and treat" method will probably be the chosen remediation alternative. It will involve pumping the contaminated water to the surface, separating out the liquid AVGAS, and disposing of the AVGAS at an appropriate facility.

# Twin Cities Air Force Reserve Base Minneapolis, Minnesota

(Continued)

A RI/FS is currently underway for five other sites; MOGAS

Spill, Suspected Oil Spill Area, Former Hazardous Waste Drum Storage Area, Underground Tank leak, and Battery Acid Leaching Pit. Field work for this project is scheduled to be done in Spring 1990.

## **Remedial Design/ Remedial Action (RD/RA)**

RD/RA activities at the NPL landfill may follow RI/FS activities. This will be determined following the completion of the RI/FS.

The remedial design for the "pump and treat" system will be completed immediately following the finalization of the FS for the Past Fuel Spill. Remedial action is scheduled to be funded in 1990. Interim remediation measures for removing AVGAS product from a well near the center of the contamination zone were started in January, 1988, and were discontinued in September, 1989.

Remedial action was accomplished at the JP-4 Spill Site between 1984 and 1985. A state approved venting system was installed, and effluent contaminant levels dropped until they were no longer detectable in laboratory analysis. The system was removed upon state concurrence that the site does not pose any threat to human health or the environment.

# Twin Cities Army Ammunition Plant

## New Brighton, Minnesota



**Service:** Army

**Size:** 2,560 Acres

**HRS Score:** 59.16

**Base Mission:** Small arms and projectile casing manufacture

**IAG Status:** Signed 1987 with EPA and State of Minnesota

**Action Dates:** RI/FS initiated 1981; Placed on NPL 1982;  
PA/SI completed 1988

**Contaminants:** Volatile organic compounds, heavy metals, solvents, acids and caustics, fuels, cleaners, paints, explosives

**Funding to Date:** \$32.5 million

### Preliminary Assessment/ Site Inspection (PA/SI)

Sources located on TCAAP have contaminated ground water primarily with volatile organic compounds (VOCs). The contamination affects water supplies for the cities of New Brighton and St. Anthony, located respectively 2.5 and 4.5 miles down-gradient. The PA/SI verified the presence of 14 potentially contaminated sites. Concurrent field investigations conducted since 1981 verified three major sources of regional ground water contamination. Site D is a former series of earthen impoundments utilized for industrial waste disposal. Site G is a former landfill utilized for building and industrial waste disposal. Site I (Bldg. 502) is the area where industrial operations introduced VOCs to the ground water system. Two other sites are contributors to perched ground water contamination. These sites consist of Site A, a former disposal area for industrial waste, and Site K (Bldg. 103), where industrial operations introduced VOCs to the ground water system. The remaining 14 sites have not contributed significantly to ground water contamination at TCAAP.

### Remedial Investigation/ Feasibility Study (RI/FS)

Honeywell, Inc., an industrial tenant of TCAAP, and the Department of the Army (DA) have installed approximately 300 monitoring wells both on and off the plant to define the magnitude and extent of ground water contamination. The FFA requires the DA to complete a remedial investigation on TCAAP and requires the EPA to conduct an investigation of off-plant areas. These efforts are progressing. The feasibility study will be conducted by DA following their completion.

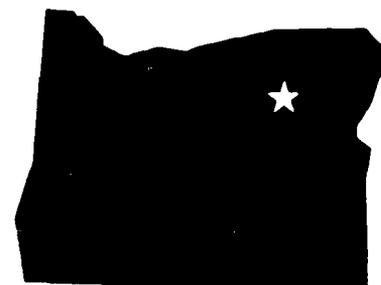
### Remedial Design/ Remedial Action (RD/RA)

A regional ground water treatment system being installed will extract and treat ground water, prevent contaminant migration beyond plant boundaries, and contain highly-contaminated ground water within the plant interior.

Additional efforts to preclude ground water contamination include installation of two in-situ volatilization (ISV) systems at Sites D and G; ground water treatment at Site I; incineration of contaminated soils; and provision of contaminated soil storage facilities. Efforts have also been conducted at Sites A and K to prevent contamination from migrating within the perched ground water system.

# Umatilla Army Depot

## Hermiston, Oregon



**Service:** Army

**Size:** 19,729 Acres

**HRS Score:** 31.36

**Base Mission:** Ammunition storage

**IAG Status:** Initiated and expected to be signed 1989

**Action Dates:** PA/SI completed 1980; Placed on NPL 1987; RI/FS initiated 1989

**Contaminants:** Metals, red fuming, nitric acid, aniline, pesticides, RDX, nitrates, TNT, TNB, HMX, DNT isomers

**Funding to Date:** \$6.29 million

### Preliminary Assessment/ Site Inspection (PA/SI)

The PA/SI identified and targeted several major contaminant sources for RI/FS work. These areas contained explosive wastes and unexploded ordnance. Ground water under the lagoon was contaminated with cyclenite (RDX), nitrates, trinitrotoluene (TNT), TNB, RMX, and DNT. An enhanced preliminary assessment in support of base closure activities is being prepared concurrently with the RI/FS Work Plan under the IAG. It is expected to be submitted in April, 1990.

### Remedial Investigation/ Feasibility Study (RI/FS)

A Phase I RI determined the washout lagoon contaminated the alluvial aquifer with TNT, RDX, HMX, TNB, DNT, and nitrates. Additionally, the shallow basalt aquifer contained very trace quantities (approximately 1 ppb) of explosives. Several solid waste management units including the deactivation furnace, active and inactive landfills, the ammunition demolition area, and several septic tanks showed various industrial and explosive contaminants. RI/FS was initiated in August, 1989. Work conducted under the IAG will cover 57 sites, 22 of them in the ammunition demolition area.

### Remedial Design/ Remedial Action (RD/RA)

A treatability study has begun at the explosive washout lagoons. The composting is anticipated to begin February, 1990 and to continue 12 to 14 months.

# Warminster Naval Air Development Center

## Warminster Township, Pennsylvania



**Service:** Navy

**Size:** 921 Acres

**HRS Score:** 57.93

**Base Mission:** Research and development for naval aircraft systems, antisubmarine warfare systems, and software

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** PA/SI completed 1981; Proposed for NPL 1986; RI/FS initiated 1988

**Contaminants:** Volatile organic compounds, metal plating wastes, painting residues, PCB-contaminated waste oils, fuels, solvents, asphalt, coolants

**Funding to Date:** \$355,000

### Preliminary Assessment/ Site Inspection (PA/SI)

Numerous private and public wells are located within 3 miles of the installation and provide drinking water for over 100,000 people in the area. Local surface water is used for recreational and industrial purposes. A PA/SI identified eight sites as potential contaminant migration sources recommended for an RI/FS. Chromium and lead were found in surface waters. Chromium and di- and trichloroethane were discovered in on-site wells at levels above EPA water-quality standards. Ground water monitoring continues.

### Remedial Investigation/ Feasibility Study (RI/FS)

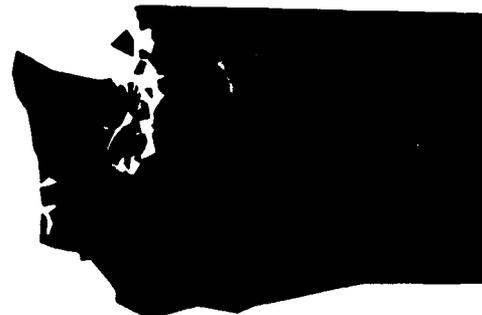
The Navy has a Final Work Plan for the RI/FS. A Technical Review Committee (TRC) has been formed. TRC members include: Warminster NADC; Northern Division, Naval Facilities Engineering Command; Warminster Township; Warminster Township Water and Sewer Authority; Northampton Township; Northampton Township Water and Sewer Authority; Ivyland Borough; Upper Southampton Township; Upper Southampton Township Water Authority; Bucks County Department of Health; USEPA Region III; and Pennsylvania Department of Environmental Resources. RI field work is expected to begin in 1989.

### Remedial Design/ Remedial Action (RD/RA)

Initiation of RD/RA work is expected in 1992.

# Whidbey Island Naval Air Station

## Whidbey Island, Washington



**Service:** Navy

**Size:** 7,000 Acres

**HRS Score:** 48.40 (Ault Field)  
39.64 (Seaplane Base)

**Base Mission:** Provide services and materials for aviation operations

**IAG Status:** Initiation expected 1990

**Action Dates:** PA/SI completed 1984; Proposed for NPL 1985; RI/FS initiated 1988

**Contaminants:** Volatile organic compounds, petroleum/oil/lubricants

**Funding to Date:** \$1.98 million

### **Preliminary Assessment/ Site Inspection (PA/SI)**

Ground water is used extensively for water supply throughout much of Whidbey Island. Contaminant migration could occur via ground and surface water.

A PA/SI identified 51 past spill and/or disposal sites, with 44 sites targeted for an RI/FS. A Current Situation completed in January, 1988 determined that surface water runoff may have contaminated sediment and biota in nearshore areas around the island, and that contaminants from several sites could migrate in ground water. An accelerated initial investigation completed in September, 1989 at the Site 6 Landfill found chlorinated solvents in the shallow aquifer. The contaminants appear to have migrated just beyond the edge of Government property. Private wells tested around the property in 1988 were unaffected by the landfill contamination.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

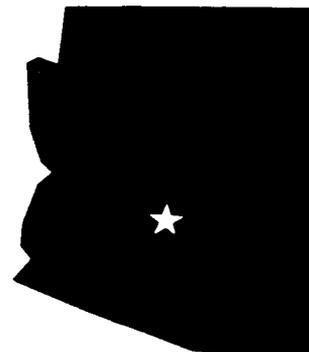
An Action Plan submitted to the EPA and the Washington State Department of Ecology in September, 1989, groups the 44 RI/FS sites into 10 operable units to be investigated and remediated in phases. A Technical Review Committee has been formed with representatives of NAS, Whidbey Island; Engineering Field Activity Northwest, Naval Facilities Engineering Command; USEPA Region X; ATSDR; State of Washington Department of Ecology; Island County Emergency Services; Citizens Ground Water Advisory Committee; Oak Harbor Citizen; and Navy contractors.

### **Remedial Design/ Remedial Action (RD/RA)**

Initiation of RD/RA work (in phases) is expected in 1993.

# Williams Air Force Base Chandler, Arizona

**Service:** Air Force  
**Size:** 4,127 Acres  
**HRS Score:** 37.93  
**Base Mission:** Pilot training; Aircraft and ground equipment maintenance  
**IAG Status:** Initiated and expected to be signed 1990  
**Action Dates:** PA/SI completed 1984; RI/FS initiated 1986; Proposed for NPL 1989  
**Contaminants:** Waste solvents, fuels and lubricants, heavy metals  
**Funding to Date:** \$2.81 million



## Preliminary Assessment/ Site Inspection (PA/SI)

Irrigated farmland and desert surround Williams AFB. Past disposal practices have contaminated soils with heavy metals and ground water with petroleum products. The Air Force has completed an initial assessment and the potentially contaminated areas include a past fire protection training area, drainage systems, and landfill and spill areas.

## Remedial Investigation/ Feasibility Study (RI/FS)

A workplan has been developed for an RI/FS to determine the type and extent of contamination and to identify alternatives for remedial action. Field investigations are underway.

## Remedial Design/ Remedial Action (RD/RA)

The Southwest Draining System was remediated in 1988 by installing a soil cement and concrete cap on the upper 350 feet of the ditch. This action was agreed to by State of Arizona regulatory officials.

Monitoring wells about 350 feet deep are being installed at the liquid fuels storage area to determine the extent of vertical migration of leaked fuel. Shallow wells about 250 feet deep have been installed to plot the extent of this plume. Pump tests will be conducted to gather data needed for remedial design of a proposed pump and treat facility.

Ten sites at Williams AFB are not expected to require further action. The necessary documentation is expected to be complete by late 1990. Proposed Plans would then be required for only three sites.

Interim remedial actions planned for 1990 include the removal of 20 underground storage tanks and associated contaminated soils. This will include the 11 tanks located at the liquid fuels storage area. RD/RA activities are expected to begin in 1990-1992. Long Term Monitoring is expected to start in 1993 and continue for a period of two years.

# Wright-Patterson Air Force Base Dayton, Ohio



**Service:** Air Force

**Size:** 8,511 Acres

**HRS Score:** 57.85

**Base Mission:** Headquarters to Air Force Logistics Command, Aeronautical Systems Division and Air Force Institute of Technology; Medical Center

**IAG Status:** Initiated and expected to be signed 1990

**Action Dates:** RI/FS initiated 1986; Proposed for NPL 1988; PA/SI on-going

**Contaminants:** Waste oil and fuels, acids, plating wastes, solvents, pesticides, batteries and radioactive wastes

**Funding to Date:** \$12.2 million

## Preliminary Assessment/ Site Inspection (PA/SI)

Past Air Force activities in support of operational missions have created 58 unlined waste disposal areas throughout the base, including landfills, fire training areas and coal storage piles. As a result, contaminated potable ground water used by the City of Dayton and the base.

Known sites were rated in 1982 during the first phase of the Installation Restoration Program (IRP). Twenty-four sites located on the base contained hazardous material. In 1985 the Phase II, Stage Confirmation/Quantification was completed. As a result of recommendations made from the Phase I, Stage I report, Site Investigations for two landfills were conducted in 1986. At present, 58 sites have completed Preliminary Assessments and 17 are proceeding into Site Investigations.

## Remedial Investigation/ Feasibility Study (RI/FS)

In August, 1986 the Phase II, Stage II of the IRP was initiated to confirm the contamination. Results from this study supplement the follow-on RI/FS effort. On November 2, 1989 the RI/FS contract was awarded for 39 sites. The RI/FS is currently scheduled to be completed in the year 2002. Landfills 8 and 10 have been the highest concern due to their proximity to the Woodland Hills residential area. Both landfills were a "trench and cover" operation for disposal of general refuse and chemical waste. Ground water in the vicinity of Landfill 8 was contaminated with benzene and TCE. Landfill 10 is contaminated with VOCs. However, complications have arisen with landfill subsidence, gas generation and venting, and with seepage of leachate. In June, 1987, the US Geological Survey (USGS) performed a hydrogeologic assessment of the strata underlying the base to understand ground water movement and the direction of contaminant migration. The complete USGS study will provide a technical foundation for future base-wide IRP activities.

Regional ground water flows in a southwesterly direction towards the City of Dayton's drinking water well fields. The existence of permeable soils in the area exacerbates this concern. Inter-agency Agreement negotiations have stalled due to State and EPA disagreements. The base is under an Administrative Order of Consent (February, 1988) specifying site remedial investigation and cleanup processes.

## Remedial Design/ Remedial Action (RD/RA)

Drinking water from base wells is being treated for VOC contamination. Biological treatment of a 3000-gallon JP-4 spill is underway. Additional removal action activities, such as drum removal leachate collection and off-site migration mitigation, are expected to be initiated in 1990.

# Yuma Marine Corps Air Station

## Yuma, Arizona

**Service:** Navy

**Size:** 3,000 Acres

**HRS Score:** 29.88

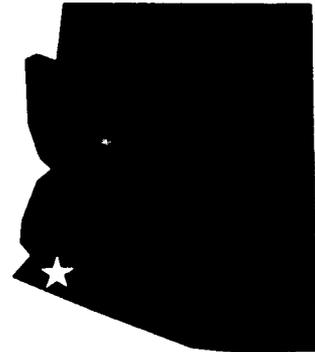
**Base Mission:** Tactical aircrew combat training

**IAG Status:** Initiation expected 1990

**Action Dates:** PA completed 1985; Proposed for NPL 1988; SI combined with RI/FS and initiated 1989

**Contaminants:** Volatile organic compounds, waste fuels, oils, degreasers, solvents, paints, PCBs, pesticides, herbicides, photographic chemicals

**Funding to Date:** \$491,000



### **Preliminary Assessment/ Site Inspection (PA/SI)**

Ground water is a potable water source for Yuma MCAS, the City of Yuma, and for industrial and agricultural purposes. Past disposal practices contaminated soils and ground water. A PA/SI identified 12 potentially contaminated sites, and recommended that two sites be further studied to confirm contamination. An SI was completed for these two sites in early 1988. In response to a State of Arizona Request made July, 1988, 11 of the 12 original IAS sites will be further investigated. Subsequently, two additional sites have been identified and will also be investigated.

### **Remedial Investigation/ Feasibility Study (RI/FS)**

A Technical Review Committee has been formed and the first Committee meeting is being scheduled. Members include representatives from the City of Yuma; the Arizona Department of Environmental Quality; USEPA Region IX; Yuma MCAS; Southwest Division, Naval Facilities Engineering Command; and the public. Development of the RI/FS workplan will begin in early 1990 and implementation will begin in the fourth quarter 1990. The Navy is preparing a first draft of a Federal Facilities Agreement, and intends to initiate and finalize negotiations with EPA and the State of Arizona in 1990, prior to the implementation of RI/FS field work.

### **Remedial Design/ Remedial Action (RD/RA)**

Although no RD/RA activities are currently planned, removal actions will be considered if an imminent threat is identified.

# Appendix C

## Status of Installation Restoration Program Installations

This Appendix to the Annual Report provides three tables summarizing the status of activities at all DoD installations included in the Installation Restoration Program (IRP) as of the end of FY 1989.

Table C-1 summarizes IRP site status by state. These same data are broken down in Table C-2 by state, DoD component (Army, Navy, Air Force and Defense Logistics Agency) and installation. Table C-3 provides a status summary by DoD component.

The status abbreviations used in this Appendix are as follows:

- C** — Number of sites for which a particular study or action has been completed
- U** — Number of sites having a particular study or action underway
- F** — Number of sites scheduled to have a study or action performed in the future.

**Table C-1**
**Department of Defense Environmental Restoration Program  
 Installation Restoration Program Status Summary, As of September 30, 1989**

State	Number of Sites									
	Number of		PA/SI		RI/FS			RD/RA		
	Installations	Sites	C	U	C	U	F	C	U	F
Alabama	39	470	467	3	34	42	123	17	6	22
Alaska	50	498	461	2	95	261	42	41	36	95
Arizona	18	292	289	3	5	62	13	4	16	51
Arkansas	25	221	220	1	31	31	0	28	5	8
California	112	1,713	1,556	139	86	491	395	21	132	443
Colorado	17	346	345	0	222	53	0	1	171	23
Connecticut	18	91	85	6	1	12	0	0	2	2
Delaware	11	87	87	0	0	59	2	0	2	15
District of Columbia	8	18	16	1	0	3	0	1	0	3
Florida	55	487	468	10	36	210	27	4	41	169
Georgia	32	458	454	2	93	56	13	0	89	44
Guam	10	95	87	8	1	23	28	1	1	28
Hawaii	32	176	175	0	5	24	26	1	2	44
Idaho	20	68	68	0	1	10	0	0	1	7
Illinois	49	368	360	8	4	61	25	6	4	20
Indiana	25	240	239	1	0	29	8	0	1	22
Iowa	26	166	166	0	0	20	2	0	16	6
Kansas	20	242	237	4	0	55	4	0	0	44
Kentucky	24	338	337	1	0	2	2	0	0	1
Louisiana	23	152	146	5	10	37	22	8	2	24
Maine	9	62	48	3	1	29	16	1	4	28
Maryland	44	479	466	11	2	53	22	2	16	38
Massachusetts	18	190	189	1	9	75	33	0	5	67
Michigan	30	152	150	0	2	48	4	3	14	27
Minnesota	28	212	207	2	3	35	1	4	5	20
Mississippi	24	153	152	0	39	9	22	8	6	35
Missouri	22	213	211	2	5	67	55	6	1	45
Montana	12	77	76	0	0	20	8	0	0	8

(Continued)

**Table C-1**
**Department of Defense Environmental Restoration Program  
 Installation Restoration Program Status Summary, As of September 30, 1989**

State	Number of Sites									
	Number of		PA/SI		RI/FS			RD/RA		
	Installations	Sites	C	U	C	U	F	C	U	F
Nebraska	15	119	119	0	64	15	10	58	1	13
Nevada	7	174	174	0	23	23	23	0	0	38
New Hampshire	6	51	51	0	3	27	0	0	4	11
New Jersey	23	332	323	7	10	134	81	0	45	84
New Mexico	20	241	241	0	8	41	19	2	7	18
New York	79	533	511	17	14	63	32	6	80	48
North Carolina	38	264	260	2	30	55	6	1	11	39
North Dakota	18	62	54	0	0	8	5	0	1	9
Ohio	47	340	328	11	2	52	34	1	5	38
Oklahoma	46	270	264	2	9	105	50	8	3	38
Oregon	17	146	145	0	0	18	16	0	0	18
Pennsylvania	92	593	570	20	29	54	31	1	30	39
Puerto Rico	9	80	78	0	0	46	13	2	0	50
Rhode Island	16	71	69	0	1	15	3	2	2	10
South Carolina	30	267	262	4	7	64	22	4	14	51
South Dakota	10	45	39	0	4	11	3	0	0	4
Tennessee	24	248	245	3	10	106	15	3	2	68
Texas	76	658	647	3	55	140	44	26	52	50
Trust Territories	2	26	26	0	0	23	3	0	0	24
Utah	19	230	215	11	12	46	11	1	21	15
Vermont	5	19	19	0	0	2	0	0	0	2
Virginia	56	812	796	7	69	107	14	8	28	106
Washington	45	408	404	0	11	196	49	3	16	58
West Virginia	29	112	111	1	7	11	4	4	4	10
Wisconsin	43	208	200	0	0	14	0	0	1	0
Wyoming	6	28	27	0	0	18	6	0	0	6
<b>Total</b>	<b>1,579</b>	<b>14,401</b>	<b>13,941</b>	<b>301</b>	<b>1,053</b>	<b>3,271</b>	<b>1,387</b>	<b>287</b>	<b>905</b>	<b>2,186</b>

## Table C-2

Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>ALABAMA</b>									
Army									
AFRC Birmingham	4								
AFRC Cullman	5								
AFRC Gadsden	3								
Alabama AAP	36		30			12	2		
Anniston Army Depot	31			31		2	1		
Coosa River Storage Annex (Anniston)	1								
Fort McClellan	57				34	1			
Fort Rucker	106		1		73				2
Phosphate Dev Works	1		1				1		
Redstone Arsenal	70								
USARC Abbeville	4								
USARC Anniston	3								
USARC Beltline	5								
USARC Birmingham 01	14								
USARC Birmingham 02	1								
USARC Dothan	2								
USARC Enterprise	3								
USARC Foley	1								
USARC Fort Rucker (ASF 157)	6								
USARC Gadsden	5								
USARC Holt	1								
USARC Huntsville (Patton Rd)	11								
USARC Jasper	3								
USARC Lincoln (Talladega)	6								
USARC Marion	3								
USARC Mobile (Wright)	12								
USARC Montgomery (Moniac)	10								
USARC Montgomery (Screws)	3								
USARC Opelika	2								
USARC OPP	2								
USARC Sheffield	5								
USARC Troy	2								
USARC Tuscaloosa	9								
USARC Tuskegee	2								
USARC York	1								

(Continued)

## Table C-2

Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			F
	C	U	C	U	F	C	U	F	
<b>Navy</b>									
Olf Barin Field	5				5				
<b>Air Force</b>									
Birmingham Municipal Airport	10	3			6				6
Dannelly Field ANG	5				5				5
Maxwell AFB	17		2	11		2	2		9
<b>Alabama Totals</b>	<b>467</b>	<b>3</b>	<b>34</b>	<b>42</b>	<b>123</b>	<b>17</b>	<b>6</b>		<b>22</b>
<b>ALASKA</b>									
<b>Army</b>									
Fort Greeley	21								
Fort Richardson	38		38						
Fort Wainwright	46			46					
Gerstle River Test Site	5								
Nat'l Guard Alaska, CSMS, Anchorage									
National Guard 1st BN SCT HQ, Nome									
National Guard 2nd BN SCT, HQ, Bethel									
National Guard 4th BN SCT HQ, Juneau									
National Guard 5th BN SCT HQ, Anchor									
National Guard Bur		1							
<b>Navy</b>									
NAS Adak	32				21				8
NAVARCLAB Barrow	11								
NOSC Special Areas Alaska		1							
<b>Air Force</b>									
Alaskan Dewline	49		23						
Bear Creek RRS	7								
Bethel RRS					9				
Big Mountain RRS							1		
Campion AFS	7		2	4	2		1		6
Cape Lisburne AFS	6		1	5			6		
Cape Newenham AFS	6		1	5		6			
Cape Romanzof AFS	11			11					
Clear AFB	14		14				5		

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			F
	C	U	C	U	F	C	U		
Cold Bay AFS	4		1	3			1	3	
Duncan Canal RRS	1		1				1		
Eielson AFB	46			46	2		5	36	
Elmendorf AFB	37		2	42	7		2	5	
Fire Island	1		1				1		
Fort Yukon AFS	5			5				5	
Galena Airport	6			6				6	
Gold King Creek Radio Relay Site	1		1				1		
Granite Mountain RRS			1				1		
Indian Mountain Research Site	11			11			1	10	
King Salmon AFS	18			17			1		
Kotzebue	5			4	1				
Kulis ANG Base	1								
Murphy Dome AFS	7			7				6	
Naknek Recreation Camps	3			3			3		
Nikolski Radio Relay Site	1								
Nome Tank Farm	1						1		
North River Radio Relay Site	2								
Ocean Cape Radio Relay Site	1		1				1		
Pillar Mountain RRS	1		1					1	
Port Heiden Radio Relay Site	1		1				1		
Shemya AFB	23		2	21		23	1		
Smugglers Cove Radio Relay	1		1				1		
Soldotna RRS	1		1				1		
Sparrevohn AFS	8			8				8	
Tatalina AFS	12		1	11		12			
Tin City AFS	9		1	5				1	
Unalakleet RRS	1			1					
Alaska Totals	461	2	95	261	42	41	36	95	

**ARIZONA**

## Army

Buckeye	1							
Florence	1							
Fort Huachuca	62							
Navajo Army Depot	47							
Popago	1		1				1	

(Continued)

## Table C-2

Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
USARC Douglas	2								
USARC Phoenix	13								
USARC Phoenix 02	1								
USARC Tucson	1								
USARC Tucson	2								
Yuma Proving Ground	43				1				1
<b>Navy</b>									
MCAS Yuma	13				3				3
<b>Air Force</b>									
AFP No. 44, Tucson	14			14			14		
Davis Monthan AFB	4	3	1	28			1		28
Luke AFB	21		2	8		3			7
Sky Harbor IAP (Phoenix ANG)	5				1				1
Tucson IAP (Arizona ANG)	8				8				8
Williams AFB	13		1	12		1			3
Arizona Totals	289	3	5	62	13	4	16		51

## ARKANSAS

<b>Army</b>									
AFRC North Little Rock (Pike)	8								
Fort Chaffee	33								
Pine Bluff Arsenal	66		30			28	2		
USARC Arkadelphia	1								
USARC Blytheville	1								
USARC Camden	10								
USARC Conway	10								
USARC El Dorado (02)	1								
USARC El Dorado (Garrett)	5								
USARC Fayetteville	5								
USARC Fort Smith	1								
USARC Harrison	9								
USARC Hot Springs	8								
USARC Jonesboro	7								
USARC Little Rock (ASF 19)	4								
USARC Little Rock (Finkbeiner)	5								

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
USARC Little Rock (Terry)	2								
USARC Monticello	1								
USARC Nashville, AR	1								
USARC Pine Bluff	6								
USARC Russellville	1								
USARC West Memphis	2								
<b>Air Force</b>									
Eaker AFB	9	1	1	8					8
Fort Smith MAP	1								
Little Rock AFB	23			23				3	
Arkansas Totals	220	1	31	31	0		28	5	8

**CALIFORNIA**

<b>Army</b>									
AFRC	1								
AFRC Fresno	4								
AFRC Los Alamos (ASF 28F)	5								
Camp Elliott	1								
Camp Roberts	38								
Chinese Camp	1								
East Fort Baker	1								
Fort Cronkite	2								
Fort Hunter Liggett	21					21			
Fort Irwin	36					16			
Fort Mac Arthur	14								
Fort Ord	166					12		4	
H.F. Radio Receiver, Santa Rosa	3								
Hamilton Army Air Field	6		1					1	
Lawrence Livermore Nat'l Laboratory	1								
Oakland Army Base	7								
Parks Reserve Forces Training Area	3	8							
Presidio of Monterey	14								
Presidio of San Francisco	66					61			
Presidio of San Francisco/Ft. Baker	1					1			
Presidio of San Francisco/Rio Vista	2					2			
Riverbank AAP	19		1			8		9	

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites									
	PA/SI		RI/FS			RD/RA				
	C	U	C	U	F	C	U	F		
Sacramento AD	15			2	5				2	
SAT COM		1								
Sharpe Army Depot	14			2	12		1		1	
Sierra Army Depot	22			7	14		1			
Sloughouse	1									
USARC Bakersfield	8									
USARC Bell (AMSA 15)	22									
USARC Camp Pendleton	8									
USARC Clovis	1									
USARC El Monte	5									
USARC Fresno (AMSA 14-G)	11									
USARC Long Beach	5									
USARC Los Alamitos (ECS 16)	14									
USARC Los Angeles 01	5									
USARC Los Angeles 02	4									
USARC NORCO	3									
USARC Pasadena, CA	5									
USARC San Bernardino (AMSA 19G)	9									
USARC San Diego	3									
USARC Santa Ana	5									
USARC Santa Barbara	5									
USARC Stanton (Garden Grove)	5									
USARC Upland	5									
USARC Van Nuys	3									
Van Nuys Maintenance Shop		1								
<b>Navy</b>										
CBC Port Hueneme	21				9		1		9	
FASOTRAGRUPACDET Warner Springs	1									
MCAGCC 29 Palms	20			9					7	
MCAS El Toro	18					1		1		
MCAS Tustin	15					5	1	1		
MCB Camp Pendleton	10					7	1		6	
MCLB Barstow	35			5			1		4	
MCMWTC Bridgeport	9			5			1	4		
MCRD San Diego	2					2			2	
NAF El Centro	16					14			14	
NALF Crows Landing	5							1		

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites									
	PA/SI		RI/FS			RD/RA			F	
	C	U	C	U	F	C	U	F		
NALF San Clemente Island	15				12				12	
NAS Alameda	20			20					20	
NAS Lemoore	15			10		1			3	
NAS Miramar	10			5		1			5	
NAS Moffett Field	19			19					12	
NAS North Island	12			5					5	
NAVPHIBASE Coronado	5				2					
NCS Stockton	5			5					5	
NIROP Pomona		1								
NIROP Sunnyvale	16			3					3	
NOSC Morris Dam Facility Azusa	1				1				1	
NOSC San Diego	8				3				3	
NPGS Monterey	2				2				2	
NRTF Dixon	2				1					
NS Long Beach San Pedro Housing		1								
NS San Diego	7				4				3	
NS Treasure Island	25				20				9	
NSB San Diego	4				3				3	
NSC Oakland	4				4				4	
NSC Oakland, Alameda Annex	2			1					1	
NSC Oakland, Fuel Depot, Richmond	4				4				4	
NSC San Diego	6				2				2	
NSY Hunter's Point	14			11		1	11			
NSY Long Beach	12				4	1				
NSY Mare Island	25	1		23					18	
NTC San Diego	3				3				3	
NWC China Lake	44			17			1		8	
NWS Concord	29		7	17			23			
NWS Seal Beach	11			11					10	
OLF Imperial Beach	5									
PMTC Point Mugu	11			1	2				7	
Salton Sea Test Range		1								
WESTNAVFACENGCOM San Bruno		1								
<b>Air Force</b>										
AFP No. 19, San Diego	6		1	5			6			
AFP No. 42, Palmdale	26			25						
AFP No. 70, Folsom	1	11			2	1				
Beale AFB	27	1	8	18	2		2		6	

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		PI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
Castle AFB	32	1	3	29			4	8	
Edwards AFB	28		17	12	1	3	1	11	
Fresno ANG	4				4			4	
George AFB	66		11	13	1	1	15	8	
Los Angeles AFS	14		5	9			8	5	
March AFB	30	5		15	24			17	
Mather AFB	40		6	34		6	2	19	
McClellan AFB	74	102	17	60	100	1	15	161	
Norton AFB	19	4	1	22			17	2	
Onizuka AFS	5			4	1				
Travis AFB	25		5	19	2		1	1	
Vandenberg AFB	45		1	16			1	8	
<b>Defense Logistics Agency</b>									
DDTC Tracy	29			29			1		
DFSP Estero Bay	1				1			1	
DFSP Norwalk	2			1				1	
DFSP Ozol	2		1	1			1	1	
DFSP San Pedro	2		1	1				2	
<b>California Totals</b>	<b>1556</b>	<b>139</b>	<b>86</b>	<b>491</b>	<b>395</b>	<b>21</b>	<b>132</b>	<b>443</b>	

**COLORADO**

<b>Army</b>									
AFRC Boulder	6								
AFRC Fort Carson	1								
Fitzsimmons Army Med Center	1								
Fort Carson	49		49						
Pueblo Depot Activity	35								
Rocky Mountain Arsenal	155		153	2		1	153		
USARC Aurora 01	1								
USARC Aurora 02	1								
USARC Denver	3								
USARC Fort Carson (ECS 42)	9								
USARC Fort Collins (AMSA 21G)	11								

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			F
	C	U	C	U	F	C	U	F	
<b>Air Force</b>									
AFP PJKS	33		11	21			16	16	
Buckley ANG	9		1	7			1	7	
Cheyenne Mountain							1		
Lowry AFB	11			11					
Peterson	9		8	1					
USAF Academy	11			11					
<b>Colorado Totals</b>	<b>345</b>	<b>0</b>	<b>222</b>	<b>53</b>	<b>0</b>	<b>1</b>	<b>171</b>	<b>23</b>	

**CONNECTICUT****Army**

Family Housing Manchester 25	1								
Family Housing Milford 17	1								
Family Housing New Britain 57	1								
Family Housing Portland 36	1								
Family Housing Shelton 74	1								
Family Housing Westport 73	1								
Stratford Army Engine Plant	22		1	1			2		
USARC East Windsor	9								
USARC Fairfield	4								
USARC Hartford	4								
USARC Middleton	5								
USARC Milford	9								
USARC New Haven	7								
USARC Waterbury	4								

**Navy**

NSB New London	13			11					2
NWIRP Bloomfield		6							

**Air Force**

Bradley ANG	1								
Orange AGS	1								
<b>Connecticut Totals</b>	<b>85</b>	<b>6</b>	<b>1</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>DELAWARE</b>									
<b>Army</b>									
First Army Recreation Area	1								
New Castle	1								
Nike Site, Rehoboth	1								
Pea Patch Island	1								
USARC Dover	5								
USARC Lewes	5								
USARC New Castle	5								
USARC Seaford	2								
USARC Wilmington	4								
<b>Air Force</b>									
Dover AFB	57			55	2		2		13
Greater Wilmington APT (DE ANG)	5			4					2
<b>Delaware Totals</b>	<b>87</b>	<b>0</b>	<b>0</b>	<b>59</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>15</b>
<b>DISTRICT OF COLUMBIA</b>									
<b>Army</b>									
Camp Simms	1						1		
Fort McNair	7								
U.S. Soldier's and Airmen's Home									
Walter Reed Army Medical Center	3								
<b>Navy</b>									
COMNAVDIST Washington	1								
NRL Washington	1								
NS Anacostia		1							
<b>Air Force</b>									
Bolling AFB	3			3					3
<b>District of Columbia Totals</b>	<b>16</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>

(Continued)

## Table C-2

Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>FLORIDA</b>									
<b>Army</b>									
ARRCOM Orlando Facility		1							
Aviation Supply Facility, 49-A		3							
Camp Blanding		1							
USA AMSA 47G/Miami		4							
USA Palatka AMSA 55-M									
USARC Coral Gables		2							
USARC Fort Lauderdale (Nininger)		7							
USARC Gainesville (1300)		1							
USARC Gainesville (Layton)		3							
USARC Hollywood (AFA 48A)		4							
USARC Jacksonville (Burpee)		3							
USARC Jacksonville (Milam)		5							
USARC Jacksonville (Phillips)		1							
USARC Kissimmee		3							
USARC Lakeland		7							
USARC Milton		1							
USARC Ocala		4	1						
USARC Orlando (ECS McCoy Annex)		13							
USARC Orlando (McCoy 03)		4							
USARC Orlando (Orange County)		4							
USARC Palatka		1							
USARC Palatka (AMSA 55W)		8							
USARC Panama City		1							
USARC Pensacola		3							
USARC Perry		5							
USARC Port Charlotte		6							
USARC St. Petersburg (AMSA 51M)		6							
USARC St. Petersburg		7							
USARC Taft		2							
USARC Tallahassee		2							
USARC Tampa		3							
USARC West Palm Beach (Babcock)		7							
USARC West Palm Beach (Gun Club)		1							
West Palm Beach		1			1			2	

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>Navy</b>									
NAS Cecil Field	18	1		19					14
NAS Jacksonville	45				10	1	8		
NAS Key West	16			16					6
NAS Pensacola	37			37					31
NAS Whiting Field	19			18			17		
NCSC Panama City	8			7					6
NRL UWS REF Det Orlando	1								
NS Mayport	16			10					10
NSWC Det Ft. Lauderdale	1								
NTC Orlando	10			4					4
NTTC Pensacola	1			1					
<b>Air Force</b>									
Eglin AFB	37		21	14		1	8		21
ESC (Tyndall)	1		1				1		
Homestead AFB	17		3	12	1		2		11
Hurlburt AFB	11			11					
Jacksonville ANG	8				8				8
MacDill AFB	38	5	1	22	5		1		19
Patrick AFB	33		7	25			3		25
Tyndall AFB	25	3	3	13	3		1		14
<b>Defense Logistics Agency</b>									
DFSP Lynn Haven	1								
DFSP Tampa	1								
<b>Florida Totals</b>	<b>468</b>	<b>10</b>	<b>36</b>	<b>210</b>	<b>27</b>	<b>4</b>	<b>41</b>		<b>169</b>

**GEORGIA**

<b>Army</b>									
AFRC Waycross	8								
Fort Benning	85		85				85		
Fort Gillem	5		1						
Fort Gordon	78								
Fort McPherson	9								
Fort Stewart	85								
Hunter Army Airfield	10								

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
Hunter ILS Middle Marker	1								
USARC Athens	5								
USARC Augusta 02	6								
USARC Carrollton	5								
USARC Chamblee	4								
USARC Columbus (Macon Road)	1								
USARC Columbus (Midtown Dr.)	1								
USARC Dobbins AFB	8								
USARC Dublin	7								
USARC East Point Atlanta	6								
USARC Forest Park	5								
USARC Fort Valley	2								
USARC Gainesville	7								
USARC Macon	7								
USARC Rome	2								
USARC Savannah	6								
USARC Tifton	6								
<b>Navy</b>									
MCLB Albany	13			9					4
NSF Kings Bay	16			16					
<b>Air Force</b>									
AFP No. 6 Marietta	14	1		1					
Dobbins AFB	7			1	5				4
Moody AFB	18	1		2	13		3		12
Robins AFB	16			3	13	2	1		13
Savannah FTS ANG	4					4			4
Savannahg IAP ANG	7					7			7
<b>Georgia Totals</b>	<b>454</b>	<b>2</b>		<b>93</b>	<b>56</b>	<b>13</b>	<b>0</b>	<b>89</b>	<b>44</b>

**GUAM**

<b>Navy</b>									
NAS Agana	2				2				2
NAVCAMS WESTPAC Guam	11				4				3
NAVMAG Guam	5				2				1
NAVREGDENCEN Guam	1				1				1

(Continued)

## Table C-2

Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
NAVSHIPREPFAC Guam	5				2				2
NAVSTA Guam	17				5				3
NSD Guam	4				2				2
PWC Guam	3				3	1			2
<b>Air Force</b>									
Andersen AFB	39	4	1	22	4		1		8
Johnston Island		4		1	3				4
<b>Guam Totals</b>	<b>87</b>	<b>8</b>	<b>1</b>	<b>23</b>	<b>28</b>	<b>1</b>	<b>1</b>		<b>28</b>

## HAWAII

### Army

Diamond Head Crater	1								
Fort Kamehameha	1								
Fort Shafter	5								
Kapalama Mil Res	2								
Kilauea Mil Res	3								
Makua Military Reservation	4								
Nike Site 3 and 4	1								
Pohakula Training Area	1								
Schofield Barracks	1								
Tripler Army Medical Center	4								
Waiawa Gulch	1								

### Navy

Camp H.M. Smith, Oahu	1				1				
INACTSHIPDET Pearl Harbor	1								
MCAS Kaneohe Bay	20				4				4
NAS Barbers Point	9				1				1
NAVCAMS EASTPAC	14				4				2
NAVMAG Lualualei	6				3				3
NS Pearl Harbor	4				2				
NSC Pearl Harbor	10			5					4
NSY Pearl Harbor	13				5	1			3
PMRF Barking Sands	3				3				3
PWC Pearl Harbor	3				3				3

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>Air Force</b>									
Bellows AFS	3			2				1	
Hickam AFB	17		2	1			2	1	
Hickam POL	13			12					12
Kaala AFS	8		3						3
Kaena Pt Station	1								
Kokee AFS	2								
Maui AFS	13								
Palehua Solar Obs	2								
Punamano AFS	1								
Wheeler AFB	7			4					4
<b>Hawaii Totals</b>	<b>175</b>	<b>0</b>	<b>5</b>	<b>24</b>	<b>26</b>	<b>1</b>	<b>2</b>	<b>44</b>	

**IDAHO**

<b>Army</b>	
AFRC Idaho Falls	4
ARCO AEC Site	1
Bonneville	1
Broken Kettle Training Area	1
Buhl	1
Gooding	1
Gowen Field	1
Hailey	1
Idaho Fall	1
Kelly Canyon	1
Kimana	1
Orchard Range	1
Saint Anthony	1
Twin Falls City	1
USARC Boise (AMSA 3)	12
USARC Coeur D'Alene	8
USARC Rexburg	6
USARC Twin Falls	8

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>Air Force</b>									
Gowen Field, Boise ANG	4			4					4
Mountain Home AFB	13		1	6			1		3
<b>Idaho Totals</b>	<b>68</b>	<b>0</b>	<b>1</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>7</b>

**ILLINOIS**

<b>Army</b>									
AFRC Joliet (McDonough)	4								
AFRC Waukegan	6								
Fort Sheridan	10		1				1		
Joliet AAP	36			9	21		3		
Maintenance Center, N. Riverside	1								
O'Hare IAP	1								
Rock Island Arsenal	31								
Savanna Army Depot Activity	45			2					2
St. Louis Support Center	8								
USA Training Area Joliet	1								
USARC Arlington Heights	6								
USARC Aurora	5								
USARC Aurora (Howell Pl)	1								
USARC Canton	9								
USARC Centralia	4								
USARC Chicago (Bryn Mawr Ave.)	8			1				1	
USARC Chicago (Gibson)	1								
USARC Chicago (Kedzie Ave.)	1								
USARC Chicago (Pulaski)	5								
USARC Danville	1								
USARC Decatur	7								
USARC East St. Louis	7								
USARC Fairfield	1								
USARC Fort Sheridan (82)	1								
USARC Fort Sheridan (AMSA 47)	10								
USARC Fort Sheridan (N. Shore)	4								
USARC Galesburg	3								
USARC Harvey	6								
USARC Homewood	4								
USARC Joliet (Railroad)	4								

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites									
	PA/SI		RI/FS			RD/RA				
	C	U	C	U	F	C	U	F		
USARC Kankakee	9									
USARC Marion	5									
USARC Maywood (AMSA 46)	11									
USARC Peoria (Northmore)	6									
USARC Peru (Veterans Memorial)	5									
USARC Quincy	5									
USARC Rockford (15th Ave.)	2									
USARC Rockford (Arthur Avenue)	6									
USARC Rockford (First)	1									
USARC Springfield	4									
<b>Navy</b>										
Libertyville Nike Site	4									
NAS Glenview	9			9					2	
NTC Great Lakes	14			6					5	
<b>Air Force</b>										
Capital ANG		2			2					2
Chanute AFB	22			22				1		6
Greater Peoria ANG		6			2		2			2
O'Hare Air Reserve	12		3	4				2		1
Scott AFB	8			8						
Springfield-Beckley Municipal AP	6									
<b>Illinois Totals</b>	<b>360</b>	<b>8</b>	<b>4</b>	<b>61</b>	<b>25</b>	<b>6</b>	<b>4</b>	<b>20</b>		

**INDIANA****Army**

AFRC Bloomington	4									
AFRC Evansville	10									
AFRTA	1									
Crane Army Ammunition Activity	1									
Fort Benjamin Harrison	15									
Indiana AAP	25									
Jefferson Proving Ground	36									
Newport Army Ammunition Plant	13			8						1
USARC Edinburg	7									
USARC Ft. Benjamin Harrison (McGee)	10									

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites									
	PA/SI		RI/FS			RD/RA				
	C	U	C	U	F	C	U	F		
USARC Ft. Wayne (Gillespie)	4									
USARC Gary	5									
USARC Indianapolis	2									
USARC Jeffersonville	18									
USARC Lafayette	8									
USARC Lake Station	7									
USARC Peru (Grissom AFB)	7									
USARC Richmond	2									
USARC Scottsburg	9									
USARC South Bend (AMSA 39)	12									
USARC Terre Haute	5									
<b>Navy</b>										
NWSC Crane	18			10			1		9	
<b>Air Force</b>										
Fort Wayne ANG	5			2	2				3	
Grissom AFB	9	1		9					3	
Hulman ANG	6				6				6	
<b>Indiana Totals</b>	<b>239</b>	<b>1</b>	<b>0</b>	<b>29</b>	<b>8</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>22</b>	

**IOWA**

<b>Army</b>										
AFRC Dubuque	8									
AFRC Waterloo	5									
Fort Des Moines	9									
Iowa Army Ammunition Plant	32			16			16			
USARC Ames	8									
USARC Cedar Rapids	4									
USARC Cherokee	8									
USARC Creston	1									
USARC Davenport	4									
USARC Decorah	7									
USARC Des Moines (63/64/139)	2									
USARC Des Moines (Bldg. 100)	12									
USARC Fort Dodge	2									
USARC Garner	6									

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			F
	C	U	C	U	F	C	U	F	
USARC Iowa City	1								
USARC Middletown	8								
USARC Mt. Pleasant	4								
USARC Muscatine	1								
USARC Ottumwa	2								
USARC Pocahontas	7								
USARC Sac City	4								
USARC Sioux City	13								
USARC Washington (AMSA 30)	5								
USARC Washington	7								
<b>Air Force</b>									
Des Moines ANG	4			4					4
Sioux City ANG	2					2			2
Iowa Totals	166	0	0	20	2	0	16		6

**KANSAS**

<b>Army</b>									
Fort Leavenworth	56								
Fort Riley	31								
Kansas AAP	36								
Nat'l Guard Armory/Parking Lot - KC									
Smokey Hill	1								
Sunflower AAP	32			32					32
USARC Emporia	2								
USARC Great Bend	1								
USARC Hays	5								
USARC Independence	5								
USARC Kansas City	3								
USARC Lawrence	3								
USARC Osage City	6								
USARC Parsons	8								
USARC Pittsburg	6								
USARC Salina	5								
USARC Wichita (Wallace)	8								

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>Air Force</b>									
Forbes Field	10			6				4	
McConnell AFB	17	4		17	4				8
<b>Defense Logistics Agency</b>									
DIPEF Atchison	2								
<b>Kansas Totals</b>	<b>237</b>	<b>4</b>	<b>0</b>	<b>55</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>44</b>	

**KENTUCKY**

<b>Army</b>									
AFRC Hopkinsville	1								
AFRC Lexington	7								
Fort Campbell	34								
Fort Knox	199								
Greenville	1								
Lexington-Blue Grass ADA	23			2					
Somerset	1								
USARC Bardstown	10								
USARC Beattyville	1								
USARC Berea	1								
USARC Bowling Green	1								
USARC Fort Knox (ECS 63)	9								
USARC Georgetown	1								
Lexington (Barrow)	12								
USARC Lexington (Blue Grass)	6								
USARC Louisville (Bowman Hangar 7)	9								
USARC Louisville (Century)	2								
USARC Madisonville	2								
USARC Maysville	3								
USARC Owensboro	2								
USARC Pikeville	6								
USARC Paducah 01	1								
<b>Navy</b>									
NOS Louisville	5				2				1

(Continued)

## Table C-2

Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>Air Force</b>									
Standiford Field		1							
<b>Kentucky Totals</b>	<b>337</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	
<b>LOUISIANA</b>									
<b>Army</b>									
Former NAAS-New Iberia		1							
Fort Polk	20		1		8	1			
Louisiana AAP	7		7			7			
New Orleans Army Base		1							
Pearson Ridge		4							
USARC Alexandria		2							
USARC Baton Rouge (Roberts)		4							
USARC Baton Rouge (Saurage)		6							
USARC Bogalusa		8							
USARC Hammond		4							
USARC Houma		4							
USARC Lafayette		4							
USARC Lake Charles		2							
USARC Monroe		1							
USARC New Orleans (Canal Street)		1							
USARC New Orleans (Diamond)		3							
USARC New Orleans (Fleming)		7							
USARC New Orleans 05 (Kenner)		3							
USARC Shreveport 02		2							
<b>Navy</b>									
NAS New Orleans	12				8				5
NSA New Orleans	2				2				1
<b>Air Force</b>									
Barksdale AFB	29	3		29	3				12
England AFB	19	2	2	8	1		2		6
<b>Louisiana Totals</b>	<b>146</b>	<b>5</b>	<b>10</b>	<b>37</b>	<b>22</b>	<b>8</b>	<b>2</b>	<b>24</b>	

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>MAINE</b>									
<b>Army</b>									
Bangor IAP	1								
Caswell	1								
Riley-Bog Brook	1								
<b>Navy</b>									
NAS Brunswick	12			11					7
NAVCOMMU Cutler	2				2				2
<b>Air Force</b>									
Bangor ANG	2				2				2
Loring AFB	26	3		17	11		4		15
<b>Defense Logistics Agency</b>									
DFSP Casco Bay	1			1					1
DFSP Searsport	2		1		1		1		1
<b>Maine Totals</b>	<b>48</b>	<b>3</b>	<b>1</b>	<b>29</b>	<b>16</b>		<b>1</b>	<b>4</b>	<b>28</b>

**MARYLAND**

<b>Army</b>									
Aberdeen Proving Ground	66			6	5				
Blossom Point Field Test Activity	12			2					
Fort Detrick	46								
Fort George G. Meade	72								
Fort Ritchie	5		1						
Gaithersburg Res Facility	11								
Harry Diamond Labs	39								
Lauderick Creek Training Area	1								
Nike Site 79, Foster	1								
Nike Site, Phoenix	1			1			1		
Nike Site, Wayland	1								
Phoenix Mil. Res.	2								
USARC Annapolis	4								
USARC Baltimore (Jecelin)	4								
USARC Baltimore (Sheridan)	3								

(Continued)

**Table C-2****Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989**

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
USARC Baltimore (Turner)	3								
USARC Camp Springs	6								
USARC Cumberland	8								
USARC Curtis Bay (AMSA 83)	7								
USARC Curtis Bay (Brandt)	3								
USARC Frederick (Flair)	7	1							
USARC Gaithersburg	2								
USARC Greenspring	10								
USARC Hagerstown	6								
USARC Riverdale	3								
USARC Westminster	7								
<b>Navy</b>									
DTRESCEN Bethesda		8							
NAS Patuxent River	31			15		1	2	9	
NAVCOMMU Cheltenham	1								
NAVEDTECHCEN Indian Head	9								
NAVMEDCOM NATCAPREG Bethesda	6				4				4
NAVRECCEN Solomon Island		1							
NESEA St. Inigoes	2								
NOS Indian Head	29			5					1
NRL Chesapeake Bay Detachment	8								
NRL Waldorf	1				1				1
NS Annapolis	1				1				1
NSWC Solomons		1							
NSWC White Oak	14			7					7
NTC Bainbridge	2			2					2
U.S. Naval Academy	1								
<b>Air Force</b>									
Andrews AFB	16		1	15			14	2	
Martin Airport ANG	15				11				11
<b>Defense Logistics Agency</b>									
DNCS Curtis Bay	1								
<b>Maryland Totals</b>	<b>467</b>	<b>11</b>	<b>2</b>	<b>53</b>	<b>22</b>	<b>2</b>	<b>16</b>	<b>38</b>	

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>MASSACHUSETTS</b>									
Army									
Auburn	1								
Camp Edwards	1		1						
Family Housing Hull 36	1								
Family Housing Namant 17	1								
Fort Devens	36				1				
Fort Devens/Sudbury Annex	11			11					
Materials Technology Laboratory	20			20					
US Army R&D & Engr Center	5								
USARC Attleboro	9								
Navy									
NAS South Weymouth	5				5				5
NIROP Pittsfield		1							
NWIRP Bedford	2			2					2
Air Force									
AFP No. 28, Everett	4								
AFP No. 29, Lynn	3								
Barnes ANG	7				7				7
Hanscom AFB	13		6	7			5		6
Otis ANG	54			28	20				41
Westover AFB	16		2	7					6
Massachusetts Totals	189	1	9	75	33		0	5	67

**MICHIGAN**

Army									
AFRC Saginaw	1								
Camp Grayling Airfield	1		1					1	
Custer RFTA	1								
Detroit Arsenal	1								
Fort Custer Recreation Area	1								
Keweenaw Field Station	1								
Michigan Army Missile Plant	10								

(Continued)

## Table C-2

Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
Nike Site 58	1								
Pontiac Storage Facility	8								
Tank-Automotive Command Support Act	1								
USARC Ann Arbor	2								
USARC Bad Axe	5								
USARC Battle Creek (AMSA 42)	10								
USARC Bay City	7								
USARC Detroit	4								
USARC Flint	3								
USARC Grand Rapids	8								
USARC Inkster	3								
USARC Kalamazoo	4								
USARC Muskegon (Parslow)	10								
USARC Pontiac (Featherstone)	1								
USARC Romulus	1								
USARC Southfield	4								
USARC Traverse City (AMSA 34)	5								
<b>Air Force</b>									
K.I. Sawyer	15			13	1		2		3
Phelps Collins ANG	8			8					8
Selfridge ANG	8			8					8
W.K. Kellogg Regional Airport	6			6					6
Wurtsmith AFB	19		1	13	2		3	11	1
<b>Defense Logistics Agency</b>									
DFSP Escanaba	1				1				1
<b>Michigan Totals</b>	<b>150</b>	<b>0</b>	<b>2</b>	<b>48</b>	<b>4</b>		<b>3</b>	<b>14</b>	<b>27</b>

### MINNESOTA

#### Army

AFRC Rochester	9								
AFRC St. Cloud	3								
Twin Cities AAP	23			16	1		2	1	5
USARC Brainerd	3								
USARC Buffalo	6								
USARC Cambridge	5								

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
USARC Cannon Falls	2								
USARC Duluth	5								
USARC Faribault (Beebe)	8								
USARC Fergus Falls	6								
USARC Fort Snelling (AMSA 23)	35								
USARC Le Sueur	2								
USARC Mankato	11								
USARC Marshall	1								
USARC New Prague	1								
USARC Paynesville	4								
USARC So. International Falls	9								
USARC St. Joseph (AMSA 23)	10								
USARC Wabasha	10								
USARC Walker	4								
USARC Willmar	8								
USARC Winona	4								
USARC Winthrop	8								
USARC Worthington	1								
<b>Navy</b>									
NIROP Minneapolis	4		3			2	3		
NIROP St. Paul		2							
<b>Air Force</b>									
Duluth IAP	13			13				11	
Minn. St. Paul IAP	12			6			1	4	
<b>Minnesota Totals</b>	<b>207</b>	<b>2</b>	<b>3</b>	<b>35</b>	<b>1</b>	<b>4</b>	<b>5</b>	<b>20</b>	

**MISSISSIPPI**

<b>Army</b>									
AFRC Jackson	6								
Camp McCain	1								
USARC Brookhaven	3								
USARC Greenville	2								
USARC Greenwood (AMSA 144)	13								
USARC Gulfport (Hickey)	4								
USARC Hattiesburg	3								

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
USARC Jackson (Scott)	11								
USARC Jackson (Terry Road)	1								
USARC Lyon (Clarksdale)	6								
USARC Meridian	4								
USARC Pascagoula 02	3								
USARC Starkville	2								
USARC Tupelo	6								
USARC Vicksburg 01	2								
USARC Vicksburg 02	9								
USARC Vicksburg 04	2								
<b>Navy</b>									
CBC Gulfport	9			8					3
NAS Meridian	4				4				
<b>Air Force</b>									
A.C. Thompson	5				5				5
Columbus AFB	27		26	1		8	5		2
Gulfport NCBC	5		1		3		1		5
Keesler AFB	15		12		1				11
Key Field ANG	9				9				9
Mississippi Totals	152	0	39	9	22	8	6		35

**MISSOURI**

<b>Army</b>									
Camp Clark	1								
Fort Leonard Wood	50				50				
Gateway AAP	10								
Lake City AAP	34			34		6			18
Nike Site 30	1								
St. Louis AAP	3								
USARC Bethany	1								
USARC Independence	3								
USARC Joplin	2								
USARC Richards Gebaur	5								
USARC Rolla	7								
USARC Springfield	7								

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
USARC St. Joseph	8								
USARC St. Louis 03	1								
USARC Washington	2								
Weldon Springs Chemical Plant	28								
Weldon Springs Training Area	19			19					19
<b>Navy</b>									
NPRO St. Louis		1							
<b>Air Force</b>									
Lambert Field (St. Louis)		1							
Richard Gebaur	7		5	1	1		1		4
Rosecrans Memorial Airport	4				4				4
Whiteman AFB	18			13					
<b>Missouri Totals</b>	<b>211</b>	<b>2</b>	<b>5</b>	<b>67</b>	<b>55</b>	<b>6</b>	<b>1</b>	<b>45</b>	

**MONTANA**

<b>Army</b>									
Fort Missoula	2								
Limestone Hills	1								
Mt. ANG OMS #5, Belgrande									
USARC Billings (AMSA 5-G)	11								
USARC Bozeman	1								
USARC Butte	5								
USARC Great Falls	5								
USARC Helena	5								
USARC Helena (ECS 6)	10								
USARC Kalispell	8								
<b>Air Force</b>									
Great Falls ANG (Montana ANG)	8				8				8
Malmstrom	20			20					
<b>Montana Totals</b>	<b>76</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>8</b>	

(Continued)

## Table C-2

Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>NEBRASKA</b>									
<b>Army</b>									
Camp Ashland	1								
Cornhusker AAP	64		64			58		2	
Hasting	1								
Lincoln Support Facility	2								
Mead	1								
Stanton	1								
Stapleton	1								
USARC Fremont	5								
USARC Hastings	3								
USARC Lincoln	2								
USARC Omaha (Ft. Omaha)	3								
USARC Omaha (Woolworth St.)	7								
<b>Navy</b>									
NRC Lincoln	2				2				2
<b>Air Force</b>									
Lincoln ANG	9				6				6
Offutt AFB	17			15	2		1		3
<b>Nebraska Totals</b>	<b>119</b>	<b>0</b>	<b>64</b>	<b>15</b>	<b>10</b>	<b>58</b>	<b>1</b>	<b>13</b>	

## NEVADA

<b>Army</b>									
AFRC Las Vegas	11								
Hawthorne Army Ammunition Plant	78			1	14				
Indian Springs Range	1								
Reno	1								
<b>Navy</b>									
NAS Fallon	27			21					22

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>Air Force</b>									
Nellis	49		23	1	2				9
Reno Cannon IAP (Nevada ANG)	7				7				7
<b>Nevada Totals</b>	<b>174</b>	<b>0</b>	<b>23</b>	<b>23</b>	<b>23</b>	<b>0</b>	<b>0</b>		<b>38</b>

**NEW HAMPSHIRE**

<b>Army</b>									
Hopington West	1								
USARC Londonderry	1								
<b>Navy</b>									
NSY Portsmouth	5			5					2
<b>Air Force</b>									
New Boston AFS	13			2			1		
Pease AFB	30		2	20			3		8
<b>Defense Logistics Agency</b>									
DFSP Newington	1		1						1
<b>New Hampshire Totals</b>	<b>51</b>	<b>0</b>	<b>3</b>	<b>27</b>	<b>0</b>	<b>0</b>	<b>4</b>		<b>11</b>

**NEW JERSEY**

<b>Army</b>									
AFRC Red Bank (Monmouth)	1								
Brittin USARC	3								
Eradcom Flight Test Activity	3								3
Fort Dix	21		6	8					3
Fort Monmouth	9								
Military Ocean Terminal, Bayonne	38			38			38		
Pedricktown Support Facility	5								
Picatinny Arsenal	91				65				1
Storck USARC, Northfield	4								
Stryker USARC, Trenton	3								
Unit Train & Eq. Site, Plumstead Twp.									
USARC Caven Point	13								
USARC Edison (Kilmer)	14								
USARC Edison (Weigel)	2								

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
USARC Lodi	6								
USARC Mount Freedom	6								
USARC Newark		1							
<b>Navy</b>									
NAEC Lakehurst	45			43					39
NAPC Trenton	9				9				3
NWS Earle Colts Neck	29			29					17
<b>Air Force</b>									
Atlantic City APT		6			6				6
McGuire AFB	20		4	16	1		7		12
<b>Defense Logistics Agency</b>									
DNSC Summerville	1								
<b>New Jersey Totals</b>	<b>323</b>	<b>7</b>	<b>10</b>	<b>134</b>	<b>81</b>	<b>0</b>	<b>45</b>	<b>84</b>	

**NEW MEXICO**

<b>Army</b>									
Carlsbad	1								
Demming	1								
Dona Ana Ranges	6								
Fort Wingate	18				8				
Santa Fe	1								
Taos	1								
Tucumcari	1								
USARC Albuquerque	2								
USARC Albuquerque (Jenkins)	6								
USARC Artesia	5								
USARC Las Cruces	4								
USARC Roswell	1								
USARC Santa Fe	2								
USARC Silver City	4								
Walker Annex	1								
White Sands Missile Range	73				7				

(Continued)

## Table C-2

Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>Air Force</b>									
AFP No. 83, Albuquerque	6			6					
Cannon AFB	22		3	15	1	1	4	3	
Holloman AFB	49		3	10	2		2	7	
Kirtland AFB	37		2	10	1	1	1	8	
<b>New Mexico Totals</b>	<b>241</b>	<b>0</b>	<b>8</b>	<b>41</b>	<b>19</b>	<b>2</b>	<b>7</b>	<b>18</b>	

## NEW YORK

<b>Army</b>									
AFRC Albany	9								
AFRC Ft. Wadsworth	6								
Farmingdale NG				1				1	
Fort Drum	70						70		
Fort Hamilton	5			1			1		
Fort Tilden	3								
Fort Totten	1								
Fort Wadsworth	1								
Malone	1								
McDonald USARC, Jamaica									
Niagara Falls AFRC	1								
Nike Site 24	1								
Olean	1								
Organizatnl Maint. Shp #45, Bayshore Rochester									
Rochester	1								
Roosevelt USARC, Hempstead	2								
Seneca AD	32			2				1	
Stewart Army Support	1								
Ticonderoga	1								
USA Bellmore Maint. Facility	7								
USA Engineer District, Buffalo									
USARC Amherst	9								
USARC Amityville	6								
USARC AMSA 9	1								
USARC Batavia	2								
USARC Bronx (Patterson)	2								
USARC Bronx (Yonkers)	3								
USARC Bullville	10	1							

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
USARC Canandaigua	6								
USARC Canton	8								
USARC Corning	5								
USARC Elizabethtown	10								
USARC Elmira	8								
USARC Glen Falls	1								
USARC Ithaca	1								
USARC Kingston	8								
USARC Malone	7								
USARC Massena	4								
USARC Massena (ECS-1 Subshop A)	10								
USARC Medina (Shelby)	1								
USARC Newburgh (ASF 10)	5								
USARC Newburgh (Dupont)	1								
USARC Newburgh (Stewart Field)	5								
USARC Niagara Falls (AMSA 5)	25								
USARC Ogdenburg	4								
USARC Olean	2								
USARC Orangeburg	18								
USARC Owego	4								
USARC Penn Yan	3								
USARC Plattsburg	8								
USARC Poughkeepsie	4								
USARC Queens	7								
USARC Rocky Point	7								
USARC Tappan	6								
USARC Tonawanda	5								
USARC Utica	5	1							
USARC Watertown	11								
USARC Wayland	4								
USARC Webster (AMSA 7G)	12								
USMA West Point	1								
Youngstown Training	1								
Navy									
NIROP Rochester								1	
NS New York Stapleton								1	
NS New York Staten Island								3	

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			F
	C	U	C	U	F	C	U		
NWIRP Bethpage	3			3					3
NWIRP Calverton	10					8			8
<b>Air Force</b>									
AFP No. 38, Lewiston	10						6		
AFP No. 59, Johnson City	4			4					
Griffiss AFB	36	6	3	25	6		5		15
Hancock Field	7		7						
Niagara Falls IAP	13	1	1	13					13
Plattsburgh AFB	23	1	2	10	6		3		1
Roslyn AGS		1							
Schenectady Airport ANG	2				2				2
Stewart ANG	2			2					2
Suffolk ANG	7			1					1
Suffolk County (Former)	1		1				1		
Youngstown Test (RADC)	9	1			10				
<b>Defense Logistics Agency</b>									
DFSP Verona	1			1					1
<b>New York Totals</b>	<b>511</b>	<b>17</b>	<b>14</b>	<b>63</b>	<b>32</b>	<b>6</b>	<b>80</b>	<b>48</b>	

**NORTH CAROLINA**

<b>Army</b>									
AFRC Asheboro	1								
Camp Mackall	4								
Fort Bragg	26		26						
Military Ocean Terminal, Sunny Point	2								
OMS 17	1								
Tarheel Army Missile Plant	1								
USARC Albemarle	4								
USARC Asheville	1								
USARC Brevard	2								
USARC Charlotte	7								
USARC Concord	1								
USARC Durham	3								
USARC Durham 02	1								
USARC Fort Bragg	7								

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
USARC Garner	4								
USARC Graham	1								
USARC Greensboro	3								
USARC Greenville	6								
USARC Hickory	2								
USARC High Point	1								
USARC Kinston	5								
USARC Lumberton	1								
USARC Morehead City	4								
USARC Raleigh 01	2								
USARC Rocky Mount	2								
USARC Salisbury	3								
USARC Wilmington	3								
USARC Wilmington (AMSA 126-G)	5								
USARC Wilson	2								
USARC Wilson, NC	8								
USARC Winston-Salem	3								
USARC Winston-Salem (King)	4								
USARC Winston-Salem 02	2								
<b>Navy</b>									
MCAS Cherry Point	34			16			1		14
MCB Camp LeJeune	79			24					15
<b>Air Force</b>									
Douglas IAP	2					2			2
Pope AFB	8			2	6			8	
Seymour-Johnson AFB	15	2		2	9	4		3	8
<b>North Carolina Totals</b>	<b>260</b>	<b>2</b>		<b>30</b>	<b>55</b>	<b>6</b>	<b>1</b>	<b>11</b>	<b>39</b>

**NORTH DAKOTA****Army**

Garrison	1								
ND ANG Army Av. Sup. Fac., Bismark									
ND ANG CMB Sup. Mnt. Shp., Devils Lake									
ND ANG Organ. Mnt. Shop 3, Grand Forks									
ND ANG Organ. Mnt. Shop 4, Bismark									

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
ND ANG Organ. Mnt. Shop 5, Jamestown									
ND ANG Organ. Mnt. Shop 6, Valley City									
ND ANG Organ. Mnt. Shop 7, Mott									
ND ANG Unit Trn. Eq. Shp., Devils Lake									
Stanley R. Mickelson, SFG Rsl 1	2								
USARC Bismarck (AMSA 21)	16								
USARC Fargo	8								
USARC Grand Forks	6								
Williston	1								
<b>Air Force</b>									
Grand Forks AFB	6			5			1		3
Hector ANG (ND ANG)	10					5			5
Minot AFB	3			3					1
<b>Defense Logistics Agency</b>									
DFSP Grand Forks	1								
<b>North Dakota Totals</b>	<b>54</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>9</b>	

**OHIO**

<b>Army</b>									
Blue Rock	1								
Camp Sherman	1								
Lima Army Tank Center	1								
Nike Site 78	1								
USA Engineer District, Pittsburgh									
USARC Akron (Schaffner)	9								
USARC Bellaire	2								
USARC Cadiz	8								
USARC Canton 01	4								
USARC Cincinnati (Morrow)	5								
USARC Columbus (300)	4								
USARC Columbus (AMSA 56)	11								
USARC Columbus (Whitehall)	3								
USARC Dayton	9								
USARC Delaware	7								
USARC Fremont	3								

(Continued)

## Table C-2

Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites									
	PA/SI		RI/FS			RD/RA			F	
	C	U	C	U	F	C	U			
USARC Jamestown	4									
USARC Kenton	4									
USARC Kings Mills (AMSA 59)	11									
USARC Lima (Faze)	7									
USARC Mansfield	6									
USARC Marietta	7									
USARC Marion	5									
USARC Milan	13									
USARC Parma (Mote)	7									
USARC Perrysburg (AMSA 72)	11									
USARC Portsmouth	5									
USARC Sharonville	5									
USARC Springfield	4									
USARC Toledo (Phillips)	1									
USARC Troy	1									
USARC Warren	9									
USARC Warrensville Heights	1									
USARC Wooster	3									
USARC Zanesville	3									
Navy										
NWIRP Toledo			1							
Air Force										
AFP No. 16, Evandale	4				3	1		1		
AFP No. 85, Columbus	7			1	6					
Mansfield Lahm Airport ANG			8			8				8
Newark AFS	10				6					1
Rickenbacker ANG	27									
Toledo Express Airport ANG	8									
Wright-Patterson AFB	61	2		1	33	25		4		29
Youngstown	4				4					
Defense Logistics Agency										
DCSC Columbus	24							1		
DESC Dayton	6									
DFSP Cincinnati	1									
Ohio Totals	328	11		2	52	34		1	5	38

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>OKLAHOMA</b>									
Army									
AFRC Midwest City	8								
Army Aviation Support Facility	1								
Camp Gruber	1								
Combined Support Maintenance Shop	1								
Fort Sill	47				47				
Hugo	1								
Kegleman Aux Field	1								
McAlester AAP	50				50				
OMS 01	1								
OMS 02	1								
OMS 05	1								
OMS 06	1								
OMS 08	1								
OMS 10	1								
OMS 11	1								
OMS 14	1								
OMS 15	1								
Perry	1								
USARC Ada	4								
USARC Antlers	5								
USARC Ardmore	4								
USARC Chickasha	3								
USARC Clinton	2								
USARC Durant	4								
USARC Enid	2								
USARC Fort Sill (ECS 65)	9								
USARC Lawton	1								
USARC McAlester	1								
USARC Miami	3								
USARC Muskogee	6								
USARC Norman	3								
USARC Norman 02	4								
USARC Oklahoma City (Krowse)	8								
USARC Oklahoma City (Perez)	5								
USARC Okmulgee	4								

(Continued)

**Table C-2****Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989**

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			F
	C	U	C	U	T	C	U		
USARC Shawnee	2								
USARC Stigler	2								
USARC Stillwater	1								
USARC Tulsa (Reese)	4								
<b>Air Force</b>									
AFP No. 3, Tulsa	8			12					3
Altus AFB	10			10					10
Oklahoma City ANG		1							
Tinker AFB	29		3	20	2	1	2		19
Tulsa IAP		1			1				1
Vance AFB	19		6	13		7	1		5
Will Rogers World Airport	1								
<b>Oklahoma Totals</b>	<b>264</b>	<b>2</b>	<b>9</b>	<b>105</b>	<b>50</b>	<b>8</b>	<b>3</b>		<b>38</b>

**OREGON**

<b>Army</b>									
AFRC Coos Bay	3								
AFRC Roseburg	2								
AFRC Warrenton	1								
Camp Adair	1								
Redmond	1								
Umatilla Army Depot Activity	83			18					2
USA Coe Willamette, West Linn									
USARC Corvallis	2								
USARC Eugene	2								
USARC Medford	2								
USARC Portland (Airport)	1								
USARC Portland (South)	11								
USARC Portland (West)	9								
USARC Salem	2								
<b>Air Force</b>									
Kingsley Field	8				8				8
North Bend ANG	8								
Portland ANG	9				8				8
<b>Oregon Totals</b>	<b>145</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>16</b>	<b>0</b>	<b>0</b>		<b>18</b>

(Continued)

## Table C-2

Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>PENNSYLVANIA</b>									
Army									
AFRC Beaver Falls	6								
AFRC Bellefonte	2	2							
AFRC Erie	4								
AFRC Folsom	6								
AFRC Philadelphia 06	9								
ANG Maint. Shop, Harrisburg									
ANG Maint. Shop #10, Philadelphia									
ANG Maint. Shop #28, Williamsport									
C.E. Kelly Support Facility	4								
Carlisle Army Barracks	17								
East Jadwin Dam	1								
Family Housing Pittsburgh 43	1								
Fort Indiantown Gap	5								
Fort Mifflin	1								
Frankford Arsenal	6								
Hays AAP	1								
Letterkenny Army Depot	46	15		15			3	1	
Lock Haven	1								
Manor Launch Site		1							
New Cumberland Army Depot	20								
Nike Site 93	1								
Nike Site, Finleyville	1								
Nike Site, Gastonville	1								
Scranton Army Ammunition Plant	10								
Tobyhanna AD	19		19				19		
USARC Altoona	6								
USARC Ashley	8								
USARC Belle Vernon	4								
USARC Bethlehem	3								
USARC Bristol	9								
USARC Brookville	4								
USARC Brownsville	6								
USARC Butler	4								
USARC Center Square	8								
USARC Chambersburg	8								

(Continued)

**Table C-2****Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989**

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
USARC Chester	5								
USARC Clarion	1								
USARC Clearfield	6								
USARC Downingtown	1								
USARC Du Bois	3								
USARC Edgemont	17								
USARC Erie	3								
USARC Farrell	2								
USARC Franklin	2								
USARC Germantown	11								
USARC Gettysburg	4								
USARC Greensburg	4								
USARC Greensburg (AMSA 104)	4								
USARC Harrisburg	7								
USARC Horsham 01	9								
USARC Horsham 02	1								
USARC Indiana	4								
USARC Johnston 01	10								
USARC Johnston 02	4								
USARC Kane	1								
USARC Kittanning	3								
USARC Lancaster	6								
USARC Lewsiburg	7								
USARC Lewistown	8								
USARC Lock Haven	9								
USARC Marcus Hook	5								
USARC Meadville	1								
USARC New Castle (AMSA 110)	7								
USARC New Kensington	3								
USARC Norristown	6								
USARC North Park	1								
USARC Oil City	1								
USARC Pittsburgh 01	2								
USARC Pittsburgh 02	2								
USARC Pittsburgh 03	4								
USARC Punxsutawncy (AMSA 106)	7								
USARC Reading	8								
USARC Schuylkill Haven	14								

(Continued)

## Table C-2

Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
USARC Scranton	5								
USARC St. Mary's	6								
USARC State College	6								
USARC Tobyhanna	8								
USARC Uniontown	3								
USARC Washington	3								
USARC Williamsport	6								
USARC Willow Grove	1								
USARC Willow Grove (ASF 28)	8								
USARC Willow Grove (Wurts)	19								
USARC York	4								
<b>Navy</b>									
NADC Warminster	9			8					8
NAS Willow Grove	17					17			10
NSY Philadelphia	15			12			1		10
SPCC Mechanicsburg	11			10					10
<b>Air Force</b>									
Greater Pittsburgh IAP	8			5					
Olmsted Field	5	2		7				7	
Willow Grove ARF	7			3	4		1		
<b>Defense Logistics Agency</b>									
DPSC Philadelphia	14					14			
<b>Pennsylvania Totals</b>	<b>570</b>	<b>20</b>		<b>29</b>	<b>54</b>	<b>31</b>	<b>1</b>	<b>30</b>	<b>39</b>

### PUERTO RICO

#### Army

Camp Santiago	1								
Fort Allen	6								
Fort Buchanan	28				28				28
USCG Air Station (Former Ramey AFB)									

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			F
	C	U	C	U	F	C	U	F	
<b>Navy</b>									
NS Roosevelt Roads	20			16			1		7
NSGA Sabana Seca	7			2			1		2
Supship San Juan	3								
<b>Air Force</b>									
Muniz ANG	10					10			10
Punta Salinas ANG	3					3			3
<b>Puerto Rico Totals</b>	<b>78</b>	<b>0</b>	<b>0</b>	<b>46</b>	<b>13</b>	<b>2</b>	<b>0</b>	<b>50</b>	

**RHODE ISLAND**

<b>Army</b>									
AFRC Providence (Hopkins)	1								
ANG, North Smithfield									
Camp Fogarty	1								
US Army N. Smithfield Nike Site 99	1								
USARC Bristol	2								
USARC Cranston	1								
USARC Fort Nathaniel Greene	4								
USARC Lincoln (AMSA 68G)	13								
USARC Providence (Harwood)	4								
USARC Warwick	8								
<b>Navy</b>									
CBC Davisville	14			10			2		3
NETC Newport	15			5			1		4
NUSC East Lyme	1					1			1
NUSC Fishers Island	1					1			
<b>Air Force</b>									
Quonset State Airport ANG	1								
DFSP Melville	2		1		1		1		1
<b>Rhode Island Totals</b>	<b>69</b>	<b>0</b>	<b>1</b>	<b>15</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>10</b>	

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>SOUTH CAROLINA</b>									
<b>Army</b>									
Charleston Army Depot	1								
Clarks Hill Reservation	1								
Fort Jackson	21								
USARC Aiken	5								
USARC Anderson	8								
USARC Charleston	6								
USARC Clemson	4								
USARC Columbia (Forest Drive)	6								
USARC Florence	1								
USARC Fort Jackson (ECS 124-G)	5								
USARC Fort Jackson (Lee Rd.)	2								
USARC Fort Jackson (McWhorter)	4								
USARC Greenville 01 (Mahon)	12								
USARC Greenville 02 (Kukowski)	12								
USARC Greenwood (Montague)	1								
USARC Myrtle Beach	4								
USARC North Charleston	12								
USARC Orangeburg	2								
USARC Rock Hill	6								
USARC Spartanburg	3								
USARC York	10								
<b>Navy</b>									
MCAS Beaufort	23				12				3
MCRD Parris Island	19				7				2
NAVBASE Charleston	12			12			4		1
NWS Charleston	18			6					6
<b>Air Force</b>									
Charleston AFB	25	1	2	22	1		4		19
McEntire ANG	8			8					8
Myrtle Beach AFB	16	2	2	10	2		3		11
Shaw AFB	14	1	2	6			6		1

(Continued)

**Table C-2****Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989**

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			F
	C	U	C	U	C	U	F		
Defense Logistics Agency									
DFSP Charleston	1		1			1			
<b>South Carolina Totals</b>	<b>262</b>	<b>4</b>	<b>7</b>	<b>64</b>	<b>22</b>	<b>4</b>	<b>14</b>	<b>51</b>	

**SOUTH DAKOTA****Army**

ANG OMS 10, Sioux Falls

ANG OMS 2, Rapid City

ANG OMS 3, Lemmon

ANG OMS 4, Webster

ANG OMS 7, Pierre

ANG OMS 8, Brookings

USARC Aberdeen 8

USARC Sioux Falls 8

**Air Force**

Ellsworth AFB 17 4 11 1 2

Joe Foss 6 2 2

**South Dakota Totals 39 0 4 11 3 0 0 4****TENNESSEE****Army**

AEDC Tullahoma 1

AFRC Johnson City 6

Catoosa Range 1

Holston AAP 24

John Sevier 1

Milan Army Ammunition Plant 19 19 1

Smyrna Airport 1

USARC Chattanooga 4

USARC Chattanooga (Guerry) 3

USARC Greeneville 5

USARC Knoxville 6

USARC Lyell (AFRC) 3

USARC Memphis 01 7

USARC Memphis 02 3

USARC Nashville 1

(Continued)

**Table C-2****Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989**

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
USARC Oak Ridge	4								
Volunteer AAP	28								
<b>Navy</b>									
NAS Memphis	13			4					5
NWIRP Bristol	9					5			5
<b>Air Force</b>									
Arnold AFB	18	3	10	8	2		2		10
McGhee Tyson Airport	11				7				7
Memphis ANG	1								
Nashville ANG	1				1				1
<b>Defense Logistics Agency</b>									
DDMT Memphis	75			75			2		40
<b>Tennessee Totals</b>	<b>245</b>	<b>3</b>	<b>10</b>	<b>106</b>	<b>15</b>		<b>3</b>	<b>2</b>	<b>68</b>

**TEXAS**

<b>Army</b>									
Addicks Reservoir	1								
AFRC Corpus Christi (AMSA 7)	8								
AFRC Mesquite	4								
AFRC Midland	5								
Barker Dam DZ	1								
Camp Barkeley	1								
Camp Bullis	16								
Camp Swift	1								
Canyon Lake Recreation Area	1								
Corpus Christi AD	1		1					1	
Corpus Christi USARC	1								
Decatur	1								
El Paso Site	1								
Fort Bliss	28								
Fort Hood	52								
Fort Sam Houston	28								
Fort Wolters	1								
Fuels and Lubricant Research Lab	2								

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
Lake Lavon, North Gully, Wylie	1								
Lone Star AAP	13		12	1		2			
Longhorn AAP	27			11		1			
Nike Site 80	1								
Panhandle Training Area	1								
Red River Army Depot	32								
Reservoir Texarcana	1								
Saginaw Army Aircraft Plant	1								
USA Houston Armed Forces Center	1								
USARC Abilene	14								
USARC Alice	1								
USARC Amarillo 02	1								
USARC Austin (Camp Mabry)	15								
USARC Bay City	7								
USARC Beaumont (Laurel)	1								
USARC Brownsville	4								
USARC Bryan (Moore)	7								
USARC Conroe (ASF 62)	4								
USARC Corpus Christi (Memorial)	4								
USARC Dallas 01 (Muchert)	5								
USARC Dallas 02	2								
USARC El Paso	1								
USARC Fort Bliss (Biggs Field Pet)	1								
USARC Houston 02 (AMSA 4)	11								
USARC Huntsville	1								
USARC McAllen	2								
USARC Pasadena	4								
USARC Port Arthur	4								
USARC San Antonio (Boswell)	5								
USARC San Antonio (Callaghan)	3								
USARC San Marcos	2								
USARC Seagoville	6								
USARC Sinton	4								
USARC Victoria	5								
USARC Waco	9								
USARC Wichita Falls	6								
USARC Wichita Falls 02	1								

(Continued)

**Table C-2****Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989**

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			F
	C	U	C	U	F	C	U		
USARC Yoakum	4								
West Cleveland	1								
<b>Navy</b>									
NAS Chase Field	4				4				1
NAS Corpus Christi	15			3			1		
NAS Dallas	12				2				2
NAS Kingsville	13				6				2
NWIRP Dallas	11			7					6
NWIRP McGregor	16			3			2		3
<b>Air Force</b>									
AFP No. 4, Ft. Worth	23		10	13			23		
Bergstrom AFB	27		1	12	1				10
Brooks AFB	10	1	2	1	8	1			2
Carswell AFB	14	1	1		11				
Dyess AFB	10		1	8			2		2
Ellington ANG	3				2				2
Goodfellow AFB	5		1	4			1		
Kelly AFB	32	1	3	27	10		6		3
Lackland	24		5	9		10			9
Laughlin	13		5	8		5			
Randolph AFB	20		4	13		2	4		4
Reese AFB	13		4	9		3			4
Sheppard AFB	16		5	11			5		9
<b>Texas Totals</b>	<b>647</b>	<b>3</b>	<b>55</b>	<b>140</b>	<b>44</b>	<b>26</b>	<b>52</b>		<b>50</b>

**TRUST TERRITORIES**

<b>Navy</b>									
NAF Midway	3				3				1
<b>Air Force</b>									
Wake Island Airfield	23			23					23
<b>Trust Territories Totals</b>	<b>26</b>	<b>0</b>	<b>0</b>	<b>23</b>	<b>3</b>	<b>0</b>	<b>0</b>		<b>24</b>

(Continued)

**Table C-2**

Department of Defense Environmental Restoration Program  
 State by State Installation Status Listing, As of September 30, 1989

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
<b>UTAH</b>									
<b>Army</b>									
Blanding Launch Area	1								
Dale Rex Hall									
Fort Douglas	23								
Green River Test Site	1								
Tooele AD	23			2			1		
Tooele AD, South Area	20				3				2
USARC Logan	8								
USARC Ogden	9								
USARC Ogden (AMSA 31)	6								
USARC Ogden Depot	11								
USARC Pleasant Grove	4								
USARC Provo	8								
USARC Salt Lake City	8								
Wig Mountatin Area	5								
<b>Navy</b>									
NIROP Magna	6			6					
<b>Air Force</b>									
AFP No. 78, Corinne	10		9	1			10		
Hill AFB	28	3	3	20	1		10	3	
Salt Lake City IAP ANG (Utah ARNG)		8			7				7
<b>Defense Logistics Agency</b>									
DDOU Ogden	44			17			1		3
<b>Utah Totals</b>	<b>215</b>	<b>11</b>	<b>12</b>	<b>46</b>	<b>11</b>		<b>1</b>	<b>21</b>	<b>15</b>

**VIRGINIA****Army**

AFRC Lynchburg	2
Arlington Hall Station	1
Byrd Field	1
Callaghan	1
Cameron Station	5

(Continued)

**Table C-2****Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989**

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			F
	C	U	C	U	F	C	U		
Fort A.P. Hill	245								
Fort Belvoir	42		1						
Fort Eustis	26		26				26		
Fort Lee	22	1	1			2			
Fort Monroe	3								
Fort Myer	5								
Fort Pickett	10	2							
Fort Story	3		1						
NG VA Beach	1								
Radford AAP	30								
Richlands	1								
USARC Abingdon	5								
USARC Alexandria	3								
USARC Chesterfield (AMSA 90)	8								
USARC Chincoteague (Wallops Is.)	5								
USARC Christiansburg (AMSA 89)	9								
USARC Churchland (Portsmouth)	3								
USARC Covington	1	1							
USARC Culpeper	1								
USARC Galax	5								
USARC Hampton	10								
USARC Lawrenceville	7								
USARC Martinsville	1								
USARC Radford	3								
USARC Richmond 01 (Monteith)	2								
USARC Richmond	7								
USARC Salem	2								
USARC Springfield (AMSA 91)	8								
Vint Hill Farms Station	4		1						
Woodbridge Research Facility	9								
<b>Navy</b>									
Arlington Service Center		1							
COMNAVBASE Norfolk	18			6					6
FCTC Dam Neck	6			4					2
MCCDC Quantico	19			7			1		7
NADEP Norfolk	1							1	
NAS Oceana	21			12					10

(Continued)

**Table C-2****Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989**

Installations	Number of Sites									
	PA/SI		RI/FS			RD/RA			F	
	C	U	C	U	F	C	U			
NAVHOSP Portsmouth	2				2					
NAVPHIBASE Little Creek	17			11					10	
NAVRADSTA Driver	8			3					3	
NFD/NSC Craney Island	13			5					4	
NSC Cheatham Annex Williamsburg	12			4					2	
NSC Yorktown Fuels Division	20			14					14	
NSGA Nwest Chesapeake		1								
NSWC Dahlgren	34			8					4	
NSY (Norfolk) Portsmouth	19			8					7	
NWS Yorktown	20			16					9	
<b>Air Force</b>										
Byrd ANG (Richmond IAP)	4			1	3				3	
CONUS Radar Sites	38		38				5		19	
Langley AFB	24	1	1	2	9		1			
<b>Defense Logistics Agency</b>										
DGSC Richmond	28			6					6	
DNSC Newhaven	1									
Virginia Totals	796	7	69	107	14		8	28	106	

**VERMONT****Army**

Ethan Allen Firing Range	6
USARC Chester	4
USARC Montpelier	6
USARC Winooski	1

**Air Force**

Burlington IAP (Vermont ANG)	2			2					2
Vermont Totals	19	0	0	2	0		0	0	2

**WASHINGTON****Army**

AFRC Bellingham	7
AFRC Bellingham (Stevens)	8

(Continued)

## Table C-2

Department of Defense Environmental Restoration Program  
State by State Installation-Status Listing, As of September 30, 1989

Installations	Number of Sites									
	PA/SI		RI/FS			RD/RA				
	C	U	C	U	F	C	U	F		
AFRC Ellensburg	4									
AFRC Port Orchard	1									
AFRC Tacoma	1									
AFRC Yakima	2									
Camp Murray	1		1				1			
Camp Seven Mile	1									
Federal Regional Center Bothell	1									
Fort Lewis	68			68					1	
Nike Site 13-14	1									
Nike Site 43	1									
USARC Bothell	3									
USARC Clarkston	1									
USARC Everett	7									
USARC Fort Lawton (AMSA 7)	12									
USARC Kennewick	7									
USARC Longview	2									
USARC Moses Lake	1									
USARC Pasco	1									
USARC Redmond	1									
USARC Spokane	12									
USARC Trentwood (AMSA 8)	8									
USARC Tumwater	3									
USARC Walla Walla	1									
USARC Wenatchee	2									
USARC Yakima (Pendleton)	8									
Vancouver Barracks	1					1				
Washington ANG, Centralia										
Washington ANG, Ephrata										
Washington ANG, Montesano										
Yakima Firing Center	39					39				
<b>Navy</b>										
NAS Whidbey Island	50			45					35	
NAVHOSP Bremerton	1					1			1	
NAVRESMAINTRAFAC Puget Sound	1									
NSB Puget Sound	1					1			1	
NSB Bangor	44			18			1		6	
NSC Puget Sound	1					1			1	

(Continued)

**Table C-2****Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989**

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
NSC Puget Sound Manchester	2				1			1	
NSY Puget Sound	7				2				
NUWES Indian Island Det.	10			3		1		2	
NUWES Keyport	9			6				6	
<b>Air Force</b>									
Fairchild AFB	25		1	22	2		1	3	
McChord AFB	46		8	33	1		14		
<b>Defense Logistics Agency</b>									
DFSP Mukilteo	2		1	1		1		1	
<b>Washington Totals</b>	<b>404</b>	<b>0</b>	<b>11</b>	<b>196</b>	<b>49</b>	<b>3</b>	<b>16</b>	<b>58</b>	

**WISCONSIN****Army**

ANG 13, Wassau	
ANG AASF 1, West Bend	
ANG AASF 2, Madison	
ANG OMS 5, Whitefish Bay	
ANG OMS 6, Kenosha	
ANG OMS 8, Janesville	
ANG OMS 11, Green Bay	
ANG OMS 14, Wisconsin Rapids	
Badger Army Ammunition Plant	11
Camp Williams	1
Camp Wismer	1
Fort McCoy	26
INO Range	1
Truax Field (Army)	1
USARC Appleton	2
USARC Beaver Dam	3
USARC Beloit	4
USARC De Pere (AMSA 51)	9
USARC Dodgeville	5
USARC Eau Claire (Keith)	7
USARC Fond du Lac	2
USARC Green Bay	1

(Continued)

**Table C-2****Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989**

Installations	Number of Sites								
	PA/SI		RI/FS			RD/RA			
	C	U	C	U	F	C	U	F	
USARC Green Bay (Buchanan Street)	6								
USARC Ladysmith	7								
USARC Madison (AMSA 50)	13								
USARC Madison (O'Connell)	3								
USARC Madison (Park St.)	1								
USARC Menasha	3								
USARC Milwaukee (AMSA 49)	11								
USARC Milwaukee (Logan)	3								
USARC Milwaukee (Silver Spring)	16			1			1		
USARC Onalaska (AMSA 53)	6								
USARC Onalaska (Industrial Road)	12								
USARC Oshkosh	2								
USARC Pewaukee	3								
USARC Racine	3								
USARC Sheboygan	1								
USARC Sparta (Fort McCoy 240)	1								
USARC Sparta (Ft. McCoy ECS 67)	14								
USARC Wausau	4								
<b>Air Force</b>									
Gen. Mitchell Field	4			4					
Truax Field (Air Force)	3								
Volk Field ANG	10			8					
Wisconsin Totals	200	0	0	14	0	0	1	0	

**WEST VIRGINIA**

<b>Army</b>									
AFRC Morgantown	5								
AFRC South Charleston	7								
Hinton	1								
USARC Beaver	2								
USARC Bluefield	5								
USARC Clarksburg	3								
USARC East Raintier	4								
USARC Elkins	4								
USARC Fairmont	3								
USARC Grafton	3								

(Continued)

**Table C-2**

**Department of Defense Environmental Restoration Program  
State by State Installation Status Listing, As of September 30, 1989**

Installations	Number of Sites									
	PA/SI		RI/FS			RD/RA			F	
	C	U	C	U	F	C	U			
USARC Grantsville	4									
USARC Huntington	3									
USARC Jane Lew	1									
USARC Lewisburg	1									
USARC Martinsburg	4									
USARC New Martinsville	4									
USARC Parkersburg	3									
USARC Parkersburg (AMSA 114)	5									
USARC Ripley	3									
USARC Romney	4									
USARC Valley Grove (AMSA 109)	6									
USARC Weirton	3									
USARC Wheeling	2	1								
Volcano Range	1									
West Virginia Ordnance Works	11		7			3	4			
<b>Navy</b>										
ABL Mineral County	10			10					6	
<b>Air Force</b>										
EWVRA Shepherd Field	4					1				
Kanawha County Airport	1			1						
Yeager	4					4				4
<b>West Virginia Totals</b>	<b>111</b>	<b>1</b>	<b>7</b>	<b>11</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>10</b>	

**WYOMING**

**Army**

AASF, Cheyenne	1									
Landel	1									
Lovell	1									
Sheridan	1									

**Air Force**

Cheyenne ANG (Wyoming ANG)	5					5				5
F.E. Warren AFB	18			18	1					1
<b>Wyoming Totals</b>	<b>27</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	

**Table C-3**

Department of Defense Environmental Restoration Program  
 Cummulative IRP Response Action Status, As of September 30, 1989

Component	Number of Sites			
	C	S	U	F
<b>PA/SI</b>				
Army	8,554	3,842	39	0
Navy	1,980	94	36	0
Air Force	3,160	94	226	20
DLA	247	0	0	0
<b>Grand Total</b>	<b>13,941</b>	<b>4,030</b>	<b>301</b>	<b>20</b>

<b>RI/FS</b>				
Army	570	64	536	530
Navy	10	284	820	305
Air Force	466	275	1,782	534
DLA	7	7	133	18
<b>Grand Total</b>	<b>1,053</b>	<b>630</b>	<b>3,271</b>	<b>1,387</b>

<b>RD/RA</b>				
Army	135	23	447	128
Navy	28	86	87	725
Air Force	117	350	368	1,272
DLA	7	3	3	61
<b>Grand Total</b>	<b>287</b>	<b>462</b>	<b>905</b>	<b>2,186</b>

C = Total number of sites completed by end of FY89.

S = Number of new starts in FY89.

U = Number of sites underway at end of FY89.

F = Number of sites scheduled for new study/action (FY90 or beyond).