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# ARMY RESTORATION STATUS AND PROGRESS

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The Army's commitment to the restoration program remains strong as we continue to make progress toward our goals of reducing risk and restoring property for future generations. With our regulatory and community partners, we are exploring ways to improve and accelerate cleanup. Achieving site closure, ensuring long-term remedies and establishing a Military Munitions Response program are challenges we are prepared to face.

—Raymond J. Fatz, Deputy Assistant Secretary of the Army  
for Environment, Safety, and Occupational Health

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As the world changes, so do the requirements of our military. The Army recognizes these challenges and is adapting to our country's defense needs. As the Army continues to transform into a more agile, responsive, and sustainable force, a significant aspect of its ability to ensure force preparedness is a commitment to safety of human health and the environment.

In 1992, the Army charted a way forward in environmental restoration with *U.S. Army Environmental Strategy in the 21st Century*. Since that time, the Army's environmental restoration strategy has evolved, responding to new initiatives and challenges. Developed in December 2000, the Army Environmental Campaign Plan, and its Operational Directive, are its latest commitment to the environment. The plan draws its insights from the Army's overall transformation strategy.

## Goals and Priorities

Meeting the Defense Planning Guidance (DPG) goals remains the main focus of the Army's environmental restoration program. To that end, the Army has also placed priority on—

- ❑ Exploring innovative contracting initiatives to expedite the current environmental restoration process and reduce costs

- ❑ Continuing improvement in meeting completion schedules (see bar charts on page 60).

Focusing on these priorities will enhance the Army's ability to meet the DPG goals.

In FY01, the Army maintained steady, level funding by obligating \$389.1 million from the Environmental Restoration, Army (ER, Army) account for restoration activities at active Army installations (including \$10.1 million for the Military Munitions Response program (MMRP)). The funding charts on page 61 outline the Army's environmental funding profile through FY03. The Army's BRAC program obligated \$255.4 million for restoration activities at closing installations, including \$38.3 million for MMRP in FY01.

The FY02-to-completion cost for the active Installation Restoration program (IRP) is estimated at \$3.3 billion. The annual update to the cost-to-complete (CTC) estimate has stabilized after a declining trend in the estimate over the past several years. The FY02-to-completion cost for the BRAC environmental restoration program is estimated at approximately \$1.0 billion. These CTC estimates do not

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# Army Facts

## In Fiscal Year 2001 (FY01)...

- ❑ The Army designated 287 active-installation sites as remedy in place (RIP) or response complete\* (RC).
- ❑ The Army designated 175 Base Realignment and Closure (BRAC) restoration sites as RIP or RC.
- ❑ Sixteen active installations and 13 BRAC installations achieved RIP or RC status at all sites on the installation.
- ❑ The number of active-installation sites not evaluated for relative-risk was reduced from 8 to 7. The number of BRAC sites not evaluated for relative-risk was reduced from 14 to 6.

## Through FY01...

- ❑ The Army has identified 10,308 potentially contaminated sites at 1,078 active installations (see Active Site Status chart). Of these sites, 8,732 require no further remedial action, although some may require LTM.
- ❑ Restoration activities are planned or under way at 1,576 active-installation sites.

- ❑ The Army has identified 1,912 potentially contaminated restoration sites (not including sites with unexploded ordnance (UXO)) at 118 BRAC installations (see BRAC Site Status chart). Of these sites, 1,539 require no further action other than LTM. Restoration activities are planned or under way at 373 BRAC sites.
- ❑ Army has completed 1,007 remedial action constructions (RA-C) and has 97 remedial action operations (RA-O) under way at active installations. The Army has completed 400 BRAC RA-C and has 11 RA-O under way.
- ❑ The Army has completed 1,056 interim actions at 696 active-installation sites, and 229 interim actions at 186 BRAC installation sites.
- ❑ The Army has 58 sites that potentially contain UXO (sites where UXO is addressed in support of reuse and property transfer), located at 23 BRAC installations. Twenty-eight of these sites require no further action other than LTM.

Note: The data presented in the Army Facts above reflect updated and revised data as of the end of FY01.

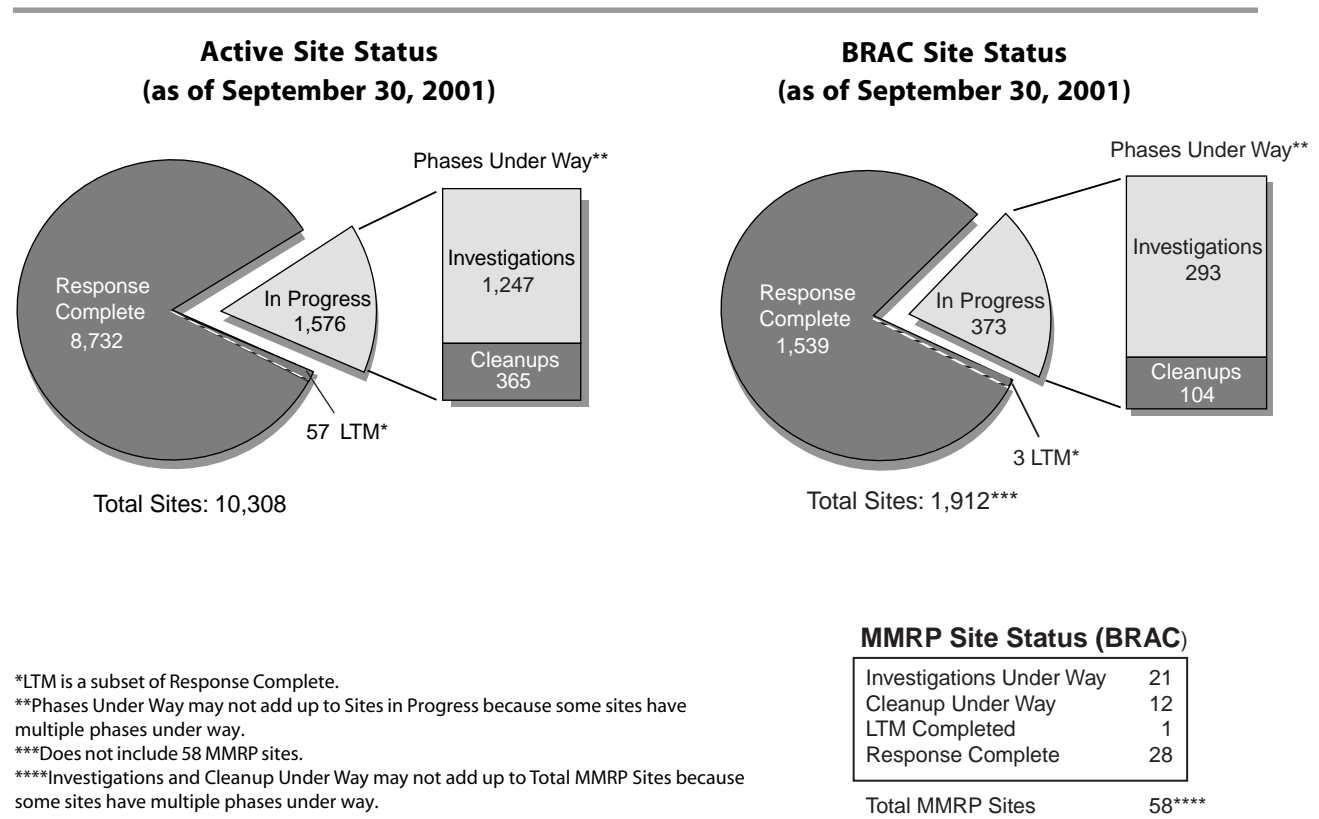
\*Response complete (RC) from investigation includes projects where funding was used to perform preliminary assessments, site inspections, engineering evaluations/cost analysis, and/or remedial investigation/feasibility study phase efforts and found the site did not pose a risk to human health and the environment. RC from cleanup includes projects where risks to human health and the environment have been eliminated or decreased.

include anticipated program management costs. Trends in CTC are shown in bar charts for both ER and BRAC sites (see page 61).

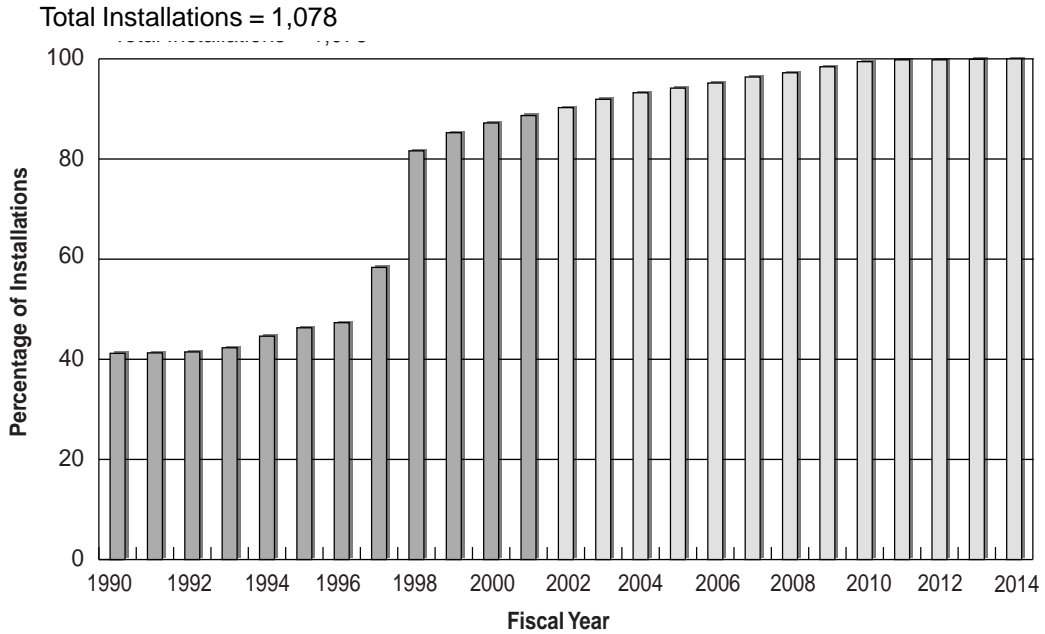
## Organization and Management

The Army's environmental restoration program is managed under the Assistant Secretary of the Army (Installations & Environment) (ASA(I&E)) and the Assistant Chief of Staff for Installation Management (ACSIM). In addition to managing active-installation and BRAC environmental restoration programs, the ASA(I&E) and ACSIM oversee the management of the Formerly Used Defense Sites (FUDS) program (refer to FUDS chapter for further information). Funding for the

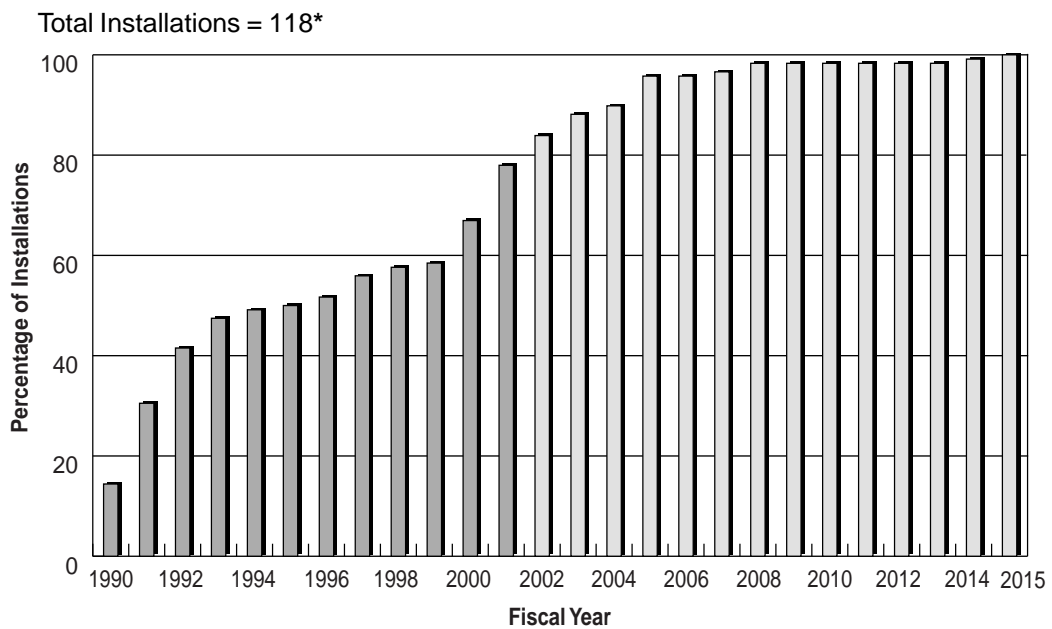
IRP has been decentralized to the major commands within the Army. For the BRAC environmental restoration program, funds are managed through the ACSIM's BRAC Office. In both the active-installation and the BRAC environmental restoration programs, the Army installations are the focal point of restoration activity. The installation environmental coordinator manages the day-to-day activities, which are executed primarily under contract through the U.S. Army Corps of Engineers (USACE). The Army Environmental Center, a field-operating agency under ACSIM, provides program management support and oversight for ACSIM, while the Center for Health Promotion and Preventive Medicine plays a key role in



**Active Installations Achieving Final Remedy in Place or Response Complete  
(cumulative and projected, FY90 through completion)**



**BRAC Installations Achieving Final Remedy in Place or Response Complete  
(cumulative and projected, FY90 through completion)**

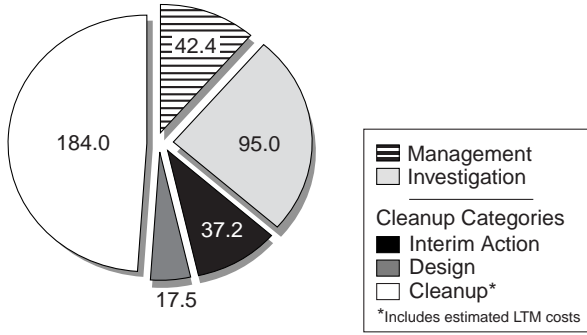


\*Excludes UXO sites (several installations contain both IRP and UXO sites, two installations contain only UXO sites).

### Army Environmental Restoration Funding Profile (in millions of dollars)

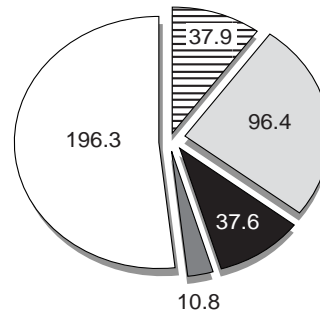
#### FY00 Army Funds Obligated

Total = \$376.2 million



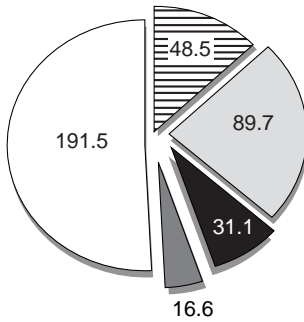
#### FY01 Army Funds Obligated

Total = \$379.0 million



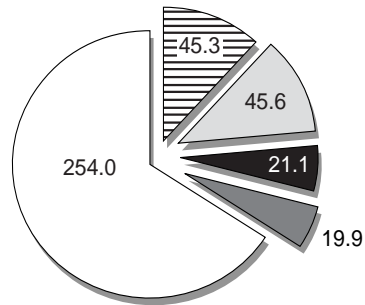
#### FY02 Army Execution Planned

Total = \$377.2 million



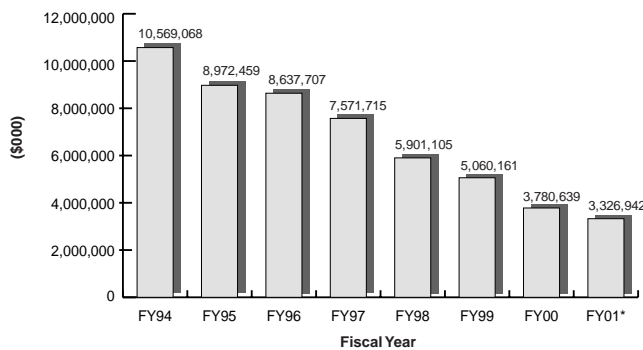
#### FY03 Army Planning Estimate

Total = \$385.9 million



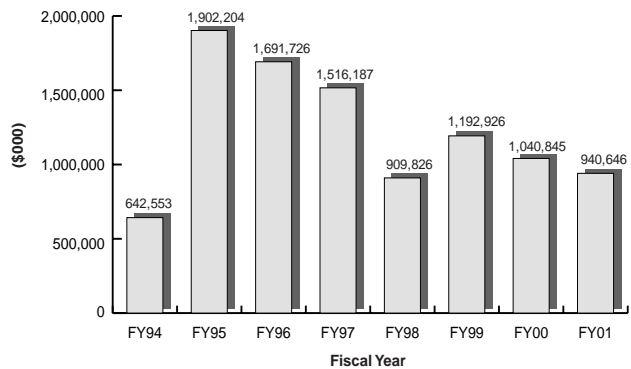
Due to rounding, category subtotals may not equal fiscal year totals. Funding charts do not include unexploded ordnance costs.

#### Army ER Cost-to-Complete Trends (in \$000)



Note: Funding represents site level data and does not include management and support or other miscellaneous costs not directly attributable to specific sites.  
\*FY01 excludes estimates for closed ranges.

#### Army BRAC Cost-to-Complete Trends (in \$000)



Note: Funding represents site level data and does not include management and support or other miscellaneous costs not directly attributable to specific sites.

providing risk assessment expertise and review of decision documents. The organizational chart below outlines the Department of the Army.

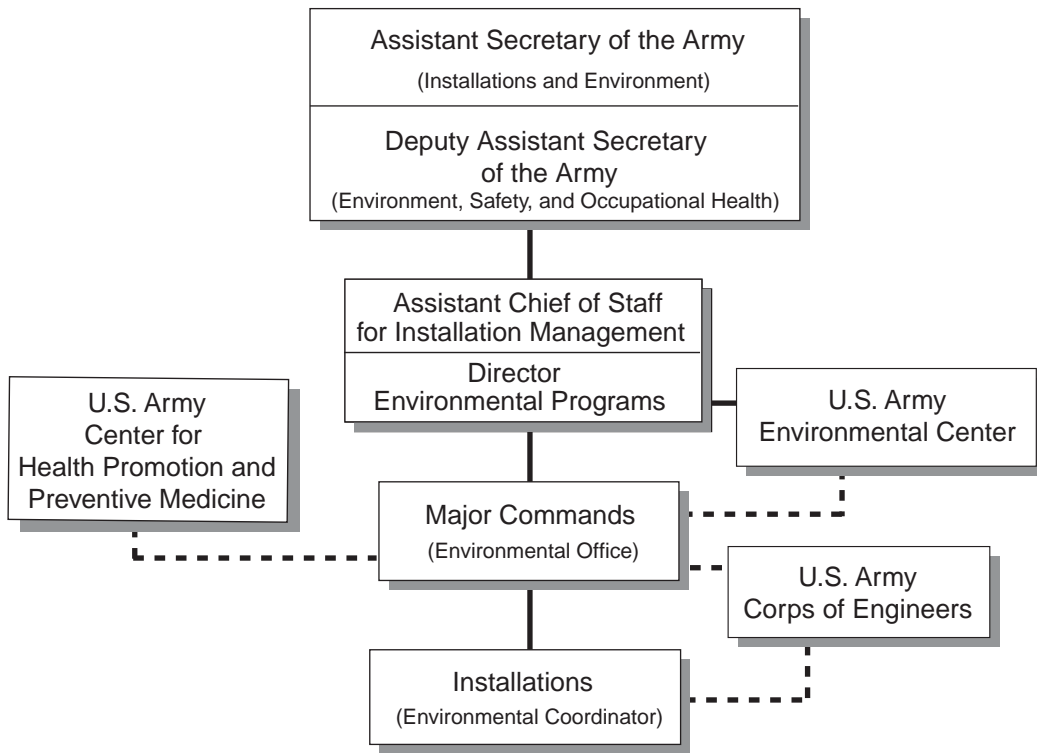
## Program Accomplishments

In FY01, 16 installations, including 5 active installations and 11 Reserve centers, achieved RIP/RC status in the active IRP. Thirteen installations achieved RIP/RC in the BRAC environmental restoration program. These accomplishments brought the FY01 total for Army installations reaching RIP/RC to 89 and 78 percent of the projected goal for IRP and BRAC, respectively. The bar charts on the following page summarize the Army's accomplishments towards

implementing interim actions and achieving RC at both BRAC and active installations.

In the IRP, 93 percent of high relative-risk sites will meet the DPG goal of attaining RIP/RC by the end of FY07. Eighty-three sites at 15 installations are currently projected to miss this goal. The schedules for these sites will be reviewed to determine if they can be accelerated. Funding requirements for these sites will also be reviewed and funds may be reprioritized if necessary. Revised schedules will be reflected in future semiannual data submissions. The Army is projecting to meet the interim goal of having medium relative-risk sites attain RIP/RC by FY11, and all installations are projected to meet

### Department of the Army

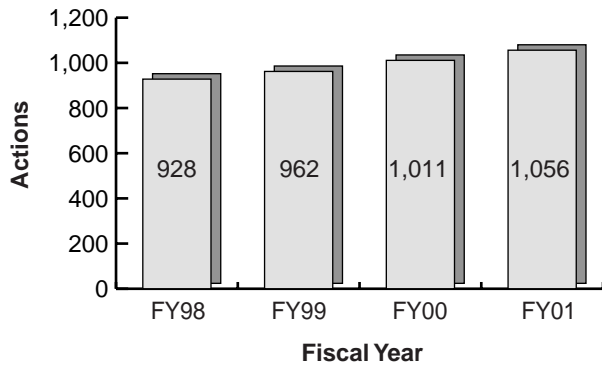


the final goal of having all sites reach RIP/RC by FY14.

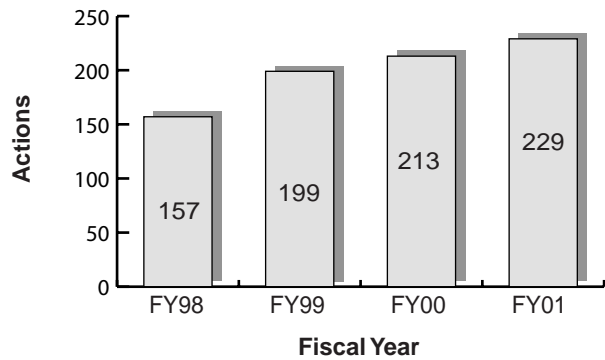
In the BRAC program, progress was made toward completing investigations and remedial actions. The Army exceeded the interim DPG goal of having 75 percent of installations reach RIP/RC by the end of FY01 (78 percent of installations attained RIP/RC status). It fell short, however,

of the interim goal of having 90 percent of BRAC restoration sites at RIP/RC by the end of FY01, with only 81 percent achieving RIP/RC. Ninety-six percent of Army installations will achieve the FY05 BRAC goal of 100 percent RIP/RC attainment. Current projections indicate that the Army will miss the FY05 goal at 27 sites at 5 installations. Installations that will miss this

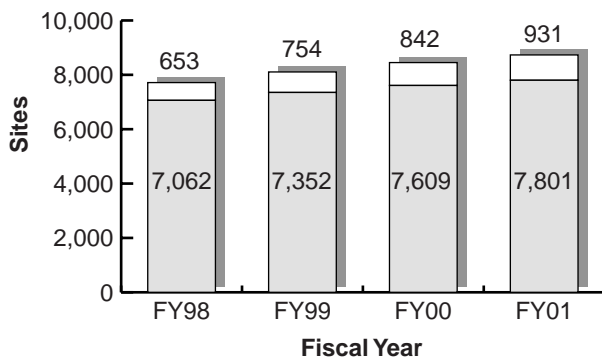
**Cumulative Interim Actions Completed at Active Sites\***



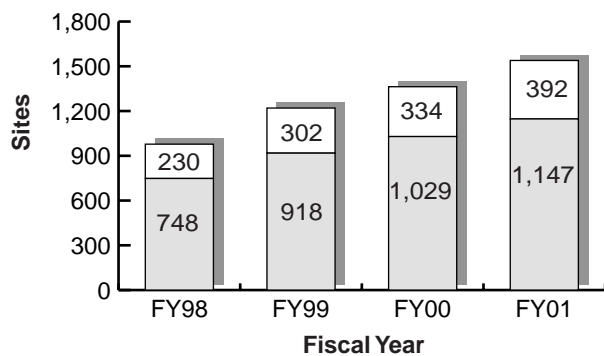
**Cumulative Interim Actions Completed at BRAC Sites\***



**Active Sites with Response Complete\***



**BRAC Sites with Response Complete\***



- Sites reaching Response Complete from Cleanup
- Sites reaching Response Complete directly from Investigation

\* FY98 through FY00 totals have been updated since the previous Annual Report to reflect new and revised data as of FY01. BRAC totals exclude 58 MMRP sites.

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goal are Fort McClellan, Alabama; Fort Ord, California; Red River Army Depot, Texas; Pueblo Chemical Depot, Colorado; and Savanna Depot Activity, Illinois. Complex technical issues constitute the primary reason for missing the goal. The Army is monitoring these installations closely and working with the regulators to ensure program progress.

The Army continues to partner with stakeholders and to work closely with regulators to ensure that projected execution schedules are realistic and achievable. Both the BRAC program and the active IRP continue to progress toward completion of restoration activities in a cost-effective and efficient manner.

## Management Initiatives and Improvements

In FY01, the Army continued its efforts to enhance its cleanup program through contract initiatives, technical meetings and workshops, and system optimization. The Army has focused on finding means of accelerating cleanups and achieving cost savings. Various contractual initiatives have been explored and implemented to gain efficiencies and take advantage of shared site-completion responsibility. In FY01, the Army focused on extending the impact of available funds by awarding four guaranteed fixed-price remediation (GFPR) contracts and three third-party environmental cleanup contracts at BRAC installations. The four GFPR contracts awarded were at Fort Devens, Massachusetts; Hingham Annex, Massachusetts; Lompoc Disciplinary Barracks, California; and Fort Sheridan, Illinois. Benefits of GFPR contracts include minimal risk of cost overrun and schedule delays. The Army's GFPR contracts at Rio Vista, California, awarded in FY99, and

Camp Pedricktown, New Jersey, awarded in FY00 (BRAC installations), have progressed successfully to date. In addition, in FY01, the Army awarded one pilot GFPR contract at an active installation, Fort Gordon, Georgia.

The Army is currently pilot testing the concept of a regional LTM contract in EPA Region 7. The intent of such a regional contract is to gain efficiencies by conducting similar efforts across a number of installations. This initiative is being managed by the USACE, Kansas City District, through a 3-year multiple award remediation contract awarded in FY01 for administration through annual delivery orders. The current pilot program covers LTM activities at active installations, BRAC installations, and FUDS properties. If the pilot is successful, contracts may be implemented in other regions and may be extended to include environmental compliance activities.

In an effort to improve phase completion projections, Army leadership held major command exit strategy meetings to review BRAC installation plans for program completion. Follow-on program meetings with Army Materiel Command installations were held to identify major issues and requirements and commit needed resources for meeting or shortening times to achieve RIP/RC.

The groundwater extraction and treatment effectiveness review (GWETER) program continued to help the Army optimize its groundwater treatment systems. GWETER experts evaluate the conditions at sites currently operating pump-and-treat systems and determine a more cost-effective alternative to these existing systems. For example, our understanding of natural attenuation processes has matured over the past decade, and this practice of allowing





### FOCUS ON THE FIELD:

## ***PER Workshops Continue to Streamline Environmental Restoration***

The Army's technical assistance and Principles of Environmental Restoration (PER) Workshop efforts continued to support installations during FY01 on a variety of technical issues. In addition to supporting the award of GFPR contracts for several BRAC installations, technical assistance supported the development of reasonable cleanup objectives for Tooele Army Depot, Milan AAP, Lake City AAP, Joliet AAP, Red River Army Depot, and Camp Bullis.

pollutants to degrade naturally has gained wider acceptance among regulators and the public. By optimizing its existing systems and setting proper cleanup objectives, the Army could avoid \$100 million in costs over the next 10 years.

Pueblo Chemical Depot has realized a cost savings of \$4 million thus far, with an annual cost savings of \$750,000. Through a combined technical assistance and GWETER effort at Tooele Army Depot, a comprehensive strategy was developed for completion of the installation's cleanup program, resulting in reductions in cleanup CTC estimates from \$83.3 million to \$38.6 million, a cost savings of \$44.7 million.

## **Relative-Risk Implementation**

Only 13 sites in the Army's environmental restoration program have not yet been evaluated for relative-risk (7 active, 6 BRAC). Twelve of these sites are not accessible due to safety reasons. The final site cannot be evaluated because of a lack of chemical contaminant comparison values. The relative-risk ranking charts for both active and BRAC installations, on the following page, summarize Army's progress ranking sites.

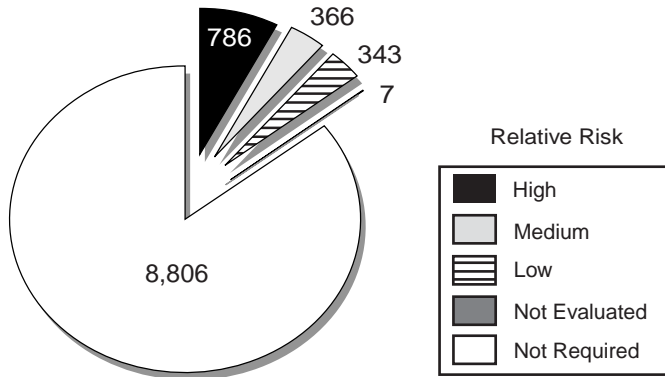
## **Information and Technology Transfer**

Innovative technologies continue to be applied at Army installations. Projects currently under way include—

- ❑ Using environmentally-friendly dredging processes
- ❑ Using a multiphase extraction and air emission system
- ❑ Employing in situ bioremediation via land application as a cost saving measure.

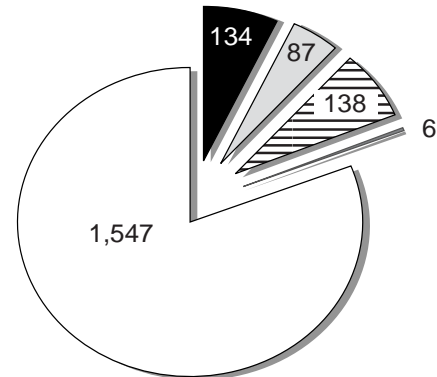
In addition, the Army is working to develop standardized sites for testing and demonstrating current and emerging UXO sensor technologies. The goal is to develop a systematic approach to determining false alarm rates, detection capability, reacquisition, ability to discriminate between UXO and other detected anomalies, and system efficiency. This approach will, in turn, result in a series of standardized site protocols and the marketing and dissemination of viable, effective, and cost-efficient sensor technology. Aberdeen Proving Ground will be the first of three sites targeted for this project; the knowledge gained

**Relative-Risk Ranking for Active Sites in Progress**



Total Sites = 10,308

**Relative-Risk Ranking for BRAC Sites in Progress**



Total Sites = 1,912\*

\*Excludes 58 MMRP sites.



**FOCUS ON THE FIELD:**

***Badger Army Ammunition Plant, Wisconsin, Uses Environmentally-Friendly Dredging Process***

In FY00, the Army identified the need to remove about 80,000 cubic yards of mercury-contaminated sediment from the bottom of Gruber's Grove Bay at Badger Army Ammunition Plant in Barbaroo, Wisconsin. Funding was received in September 2000, and design work started immediately. In this first stage of the project, the Army's team approach to working with state and federal regulators resulted in remarkably quick approval of the proposed remedy design. This approved design included setting a performance standard for sediment removal according to depth, eliminating extensive sampling for metals content, and possible delays related to unexpected analytical results. Subsequent testing showed that the sediment met the low-hazard standards of the state, allowing disposal on installation lands.

At this point, an environmentally-friendly method of sediment dredging was devised, using a dredge with an underwater cutter head and a vacuum system that kept the bay water clear while completely removing the sediment. The sediment was pumped into a lined collection area, where woven fabric tubes, 200 feet long and 8 feet high, with multiple fill ports, retained the sediment while releasing the carriage water. The water seeping from the filled tubes collected in a lined lagoon, and then sprayed as irrigation water on surrounding farmland. This water has consistently met all standards. The dredging of Gruber's Grove Bay was completed on November 18, 2001, less than 14 months after receipt of project funding. The sediment collection area will be covered with a 3-foot layer of soil next spring. State regulators will provide a bay bottom revegetation plan as part of their use of the bay as a research area. During the dredging phase of the project, state and federal regulators and other interested parties regularly visited the site, which is now used as a model for other dredging projects throughout the country.



### FOCUS ON THE FIELD:

## ***Innovative Cleanup Technology at Fort Campbell, Kentucky Army Airfield***

The Fort Campbell Army Airfield (CAAF), Kentucky, supports the 101st Airborne Division and other continuous aviation operations. In 1985, petroleum contamination was discovered in the groundwater during installation of underground storage tank monitoring equipment at CAAF. Subsequent investigation revealed leaks in an abandoned fuel line as the likely cause of this contamination. Efforts to recover the petroleum through use of existing technologies were ineffective because of the impermeable soil in the area.

In May 2000, a proprietary multiphase extraction and air emissions treatment system was used at the site in a vacuum extraction pilot test. The system, pictured here, uses truck-mounted equipment to create a vacuum on specially constructed extraction wells in order to draw water, organic vapors, and the petroleum into a tank mounted on the truck. The



**A multipurpose treatment system in use at CAAF.**

liquid is then separated and the volatilized fuel travels out of the tank through a hose, where it is mixed with additional air. This mixture is then used as fuel to run the twin V-8 engines that power the extraction system, thus reducing operating costs.

Typical extraction rates for the system vary widely depending on the vapor available at each well, but this technology has often achieved rates in excess of 40 gallons per hour at the CAAF. From March through August 2001 alone, more than 22,000 gallons of fuel were recovered. Results of the pilot test were also used to locate additional extraction

wells, which provided the additional advantage of further delineating the extent of contamination. This new system remains effective at CAAF and could be used under a variety of difficult soil conditions to remove fuel from groundwater and subsurface soil.

there will then be transferred to Massachusetts Military Reservation, Massachusetts, and Yuma Proving Ground, Arizona. This project is funded by the Environmental Security Technology Certification Program.

## **UXO Program Highlights**

In FY00, the Army conducted a brief survey of all of its ranges via an on-line questionnaire (the advance range survey). In FY01, as a follow-up

to the survey, the Army initiated a detailed, site-specific inventory of closed, transferred, and transferring ranges and other UXO sites not located on operational ranges. This full inventory will be complete in FY03. The data gathered under this effort will serve as the basis for identifying the requirements for the newly established MMRP.

In the IRP, limited UXO investigation and response work continued in support of ongoing



**FOCUS ON THE FIELD:**

***In Situ Bioremediation via Land Application Saves Money at Watervliet Arsenal, New York***

In a research project that has the potential to save millions of dollars in contaminated site remediation costs for the U.S. Armed Forces, the U.S. Army Corps of Engineers (USACE), working with Malcolm Pirnie, Inc., designed and conducted laboratory-scale and pilot-scale studies of an innovative application of bioremediation technology for in situ treatment of petroleum hydrocarbon-contaminated soil at the Watervliet Arsenal in New York.

Under consent order to remediate the site, USACE demonstrated a cost-effective cleanup approach that will also be applicable at other military sites nationwide. This approach consisted of in situ bioremediation via land application – the use of natural microorganisms in soil to destroy contaminants at the site through biodegradation. With land application, also known as land farming, contaminated soil is spread in a layer, and aerobic microbial degradation of contaminants is stimulated through soil aeration and/or addition of minerals and nutrients.

Unlike other technologies, this approach involved no major excavation or construction of windrows, no aboveground structures, and no handling of materials. It also entailed very limited operation and maintenance expenditures (no electricity, pipeline, or energy costs) and relatively little effort (only monthly turning of the soil). In addition, land farming technology has the advantage of actually destroying contaminants instead of merely transferring contaminated soil off site. After the soil has been successfully remediated, the land will be available for a wide variety of beneficial uses, eliminating potential land use restrictions.

To date, the Watervliet Arsenal pilot study has achieved most of its goals: concentrations of total petroleum hydrocarbons and polyaromatic hydrocarbons have been reduced by nearly 70 percent and 76 percent, respectively, and the viability of land farming for full-scale use has been demonstrated. The work was completed on schedule and on budget (at \$770,000) and yielded initial savings of more than half a million dollars.

cleanup projects, such as clearing UXO from drilling or excavation areas for safety purposes.

In the BRAC program, the Army has prioritized ordnance removal efforts in support of property reuse while deferring all other ordnance removal. The BRAC program is awaiting clarification on how the MMRP will address UXO on BRAC properties, as well as the escalating cost of addressing UXO. As UXO characterization of

BRAC properties is completed, CTC estimates for the properties' remediation continue to grow. In the FY01 BRAC CTC estimate, 40 percent of the costs are related to UXO. This represents a substantial increase from the FY00 CTC update, in which only 28 percent of the costs were UXO related.

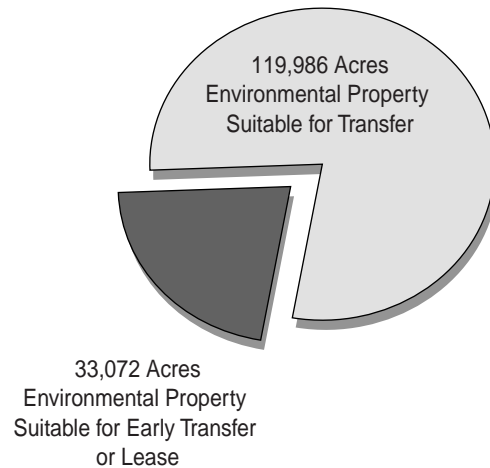
## Outreach

The Army recognizes that outreach to stakeholders, including regulatory and community members, is the key to progress toward installation cleanup. The Army currently has 67 Restoration Advisory Boards (RABs) at 31 active and 36 BRAC installations. The RABs hold regular meetings to keep the local community informed of restoration activities. In addition to outreach through RABs, Installation Action Plan Workshops were conducted at 45 active installations in FY01, bringing together Army, regulatory, and community stakeholders to review installation strategies (including projected schedules and costs) for program completion. Many installations also continue to participate in formal tiered partnering with state regulators and EPA. The DoD Regional Environmental Offices are another avenue for improving regulatory interaction.

## BRAC Highlights

In the BRAC program, the Army is transferring contaminated property as well as cleanup responsibility to third parties via environmental services cooperative agreements (ESCA). An ESCA is an agreement between the Army and a government entity that obligates funds for environmental services and transfers responsibility for the property's environmental restoration to a local entity. This agreement allows the Army to obligate the necessary funds up-front for the completion of environmental work at a property and to transfer the property early under the Early Transfer Authority. The Army BRAC Office completed the first ESCA in early September 2001 when it transferred the responsibility for cleanup of certain contaminated parcels at Military Ocean Terminal Bayonne, New Jersey, to

### Environmental Condition of BRAC Property



the Bayonne Local Redevelopment Authority. Two other BRAC installations, U.S. Army Operations, Fitzsimons, Colorado, and Reserve Forces Training Area, Devens, Massachusetts, awarded ESCAs in FY01. Potential advantages of ESCAs are the cost savings that may be achieved by integrating restoration with redevelopment and the accelerated reuse of property. The Environmental Condition of BRAC Property figure summarizes the Army's progress in property transfer.