

***The Army is evolving toward a results-oriented restoration program with increased efficiency so that we can accelerate cleanup consistent with planned investment levels. We want to meet Defense planning goals and close out sites, reducing the Army's liability and freeing resources for warfighting and modernization. Key mechanisms for achieving this efficiency are use of competition, outsourcing, privatization, and partnering with federal and state regulators and local communities.***

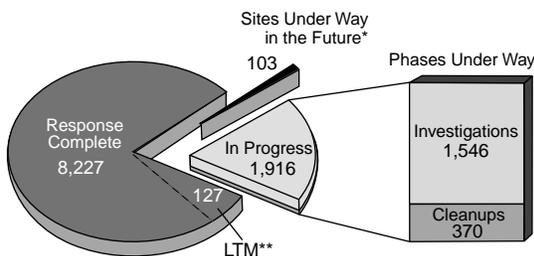


Raymond J. Fatz,  
Deputy Assistant Secretary of the Army

## Restoration Status and Progress

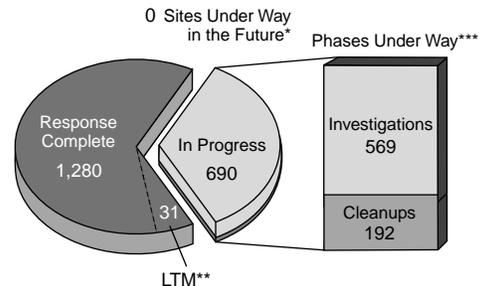
In Fiscal Year 1999 (FY99), the Army continued to make progress toward completion of its restoration program. In doing so, it built on several FY98 initiatives, including independent technical review of installation restoration programs, optimizing use of resources for groundwater treatment systems, and implementation of a Web-based data system. These initiatives allowed the Army to reduce the cost of completing the program, while ensuring protection of human health and the environment. The following pages describe progress on these initiatives and new initiatives launched in FY99, as well as the general status of the Army's restoration program.

**Active Site Status  
as of September 30, 1999**



Total Sites: 10,246

**BRAC Site Status  
as of September 30, 1999**



Total Sites: 1,970

\*Includes cleanup sites that are between phases.

\*\*LTM is a subset of Response Complete.

\*\*\*Phases Under Way may not add up to Sites-in-Progress because some sites have multiple phases under way.

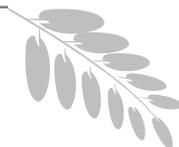
## In FY99...

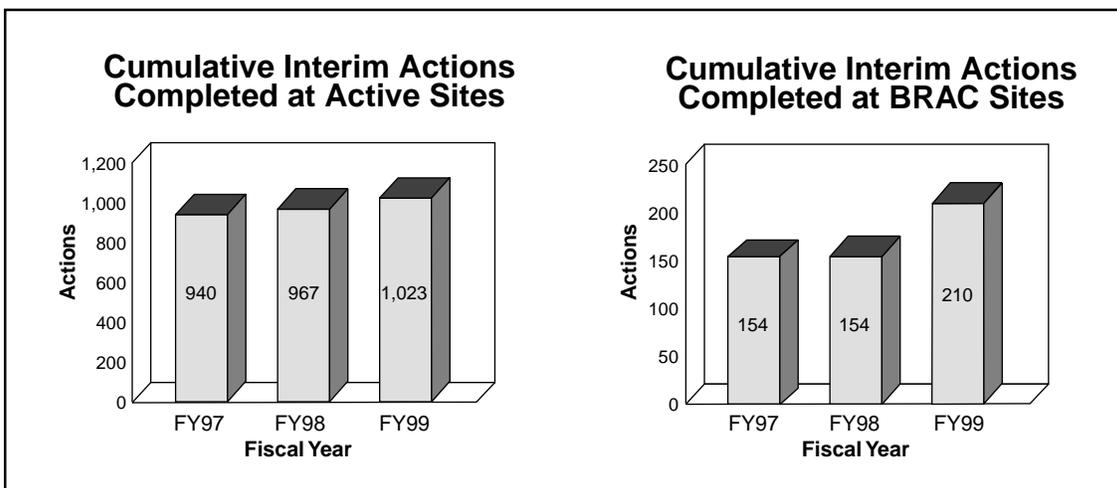
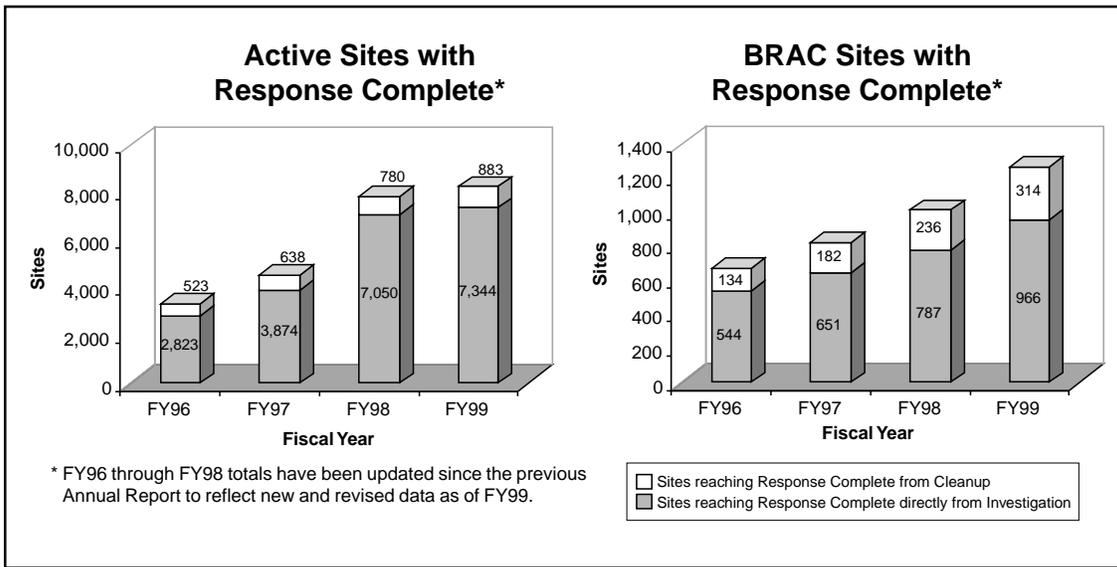
---

- In FY99, the Army determined that 266 sites undergoing studies or cleanup at active installations require no further action.
  - The Army completed studies and cleanups at 228 Base Realignment and Closure (BRAC) restoration sites. These sites now require no further action.
  - Eleven active installations and one BRAC installation, excluding U.S. Army Reserve Centers, achieved Remedy in Place (RIP) or Response Complete (RC) status at all sites.
- 

## Through FY99...

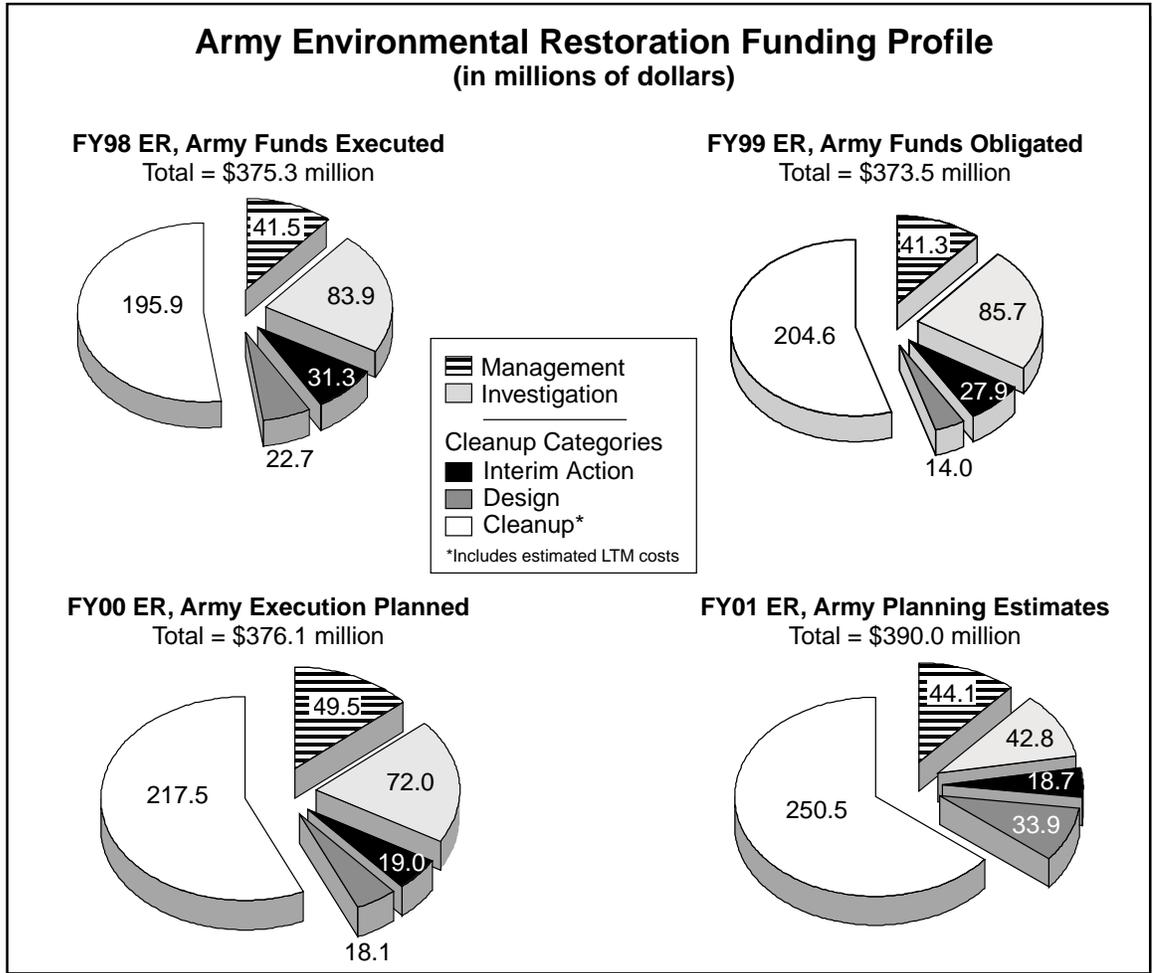
---

- The Army has identified 10,246 potentially contaminated sites at 1,081 active installations. Of these sites, 8,227 require no further remedial action (although some may require long-term monitoring (LTM)).
  - Restoration activities are planned or under way at 2,019 active installation sites.
  - The Army has identified 1,970 potentially contaminated restoration sites at 120 BRAC installations. Of these sites, 1,280 require no further action other than LTM. Restoration activities are planned or under way at 690 BRAC sites.
  - The Army has completed final remedy construction at 915 active installation sites, 80 of which require remedial action operation (RA-O). The Army has completed final remedy construction at 337 BRAC sites, 9 of which require RA-O.
  - The Army has completed 1,023 interim actions at 647 sites at active installations.
  - Thirty-seven BRAC cleanup teams (BCTs) are in place to support fast-track cleanup at installations where there is excess property. Two BCTs have been adjourned (Cameron Station and Presidio of San Francisco). At all other BRAC locations, the Army has appointed a point of contact for fast-track cleanup.
- 



## Goals and Priorities

In FY99, the major focus of Army program managers for both the Installation Restoration (IR) and the BRAC environmental restoration programs was improving the reliability of the cost-to-complete (CTC) database and the associated task of programming future, or out-year, costs against the myriad sites in each program. The challenge of developing a credible CTC is great, but spreading those costs over the out-years in a way that supports program goals is an even greater challenge.



Environmental restoration involves —

- Investigations
- Design
- Construction
- Operations and monitoring.

The scope and cost of typical construction activities are generally easy to project. As for potentially contaminated sites, however, there is often little or no information. It is a challenge to develop the scope and costs of these environmental responses. In cases where the Army must project cost estimates and schedules on the basis of limited information, the timing and costs of response activities are equally uncertain. Nonetheless, the Army must develop out-year projections of both cost and time requirements in order to defend restoration dollars within the programming and budgeting process.

The cost of completing cleanup at all active Army installations is \$5.1 billion. Each year, the cost of completing cleanup has declined by more than the amount spent on cleanup during that year. Factors contributing to the Army's decreasing CTC estimates for restoration requirements include —

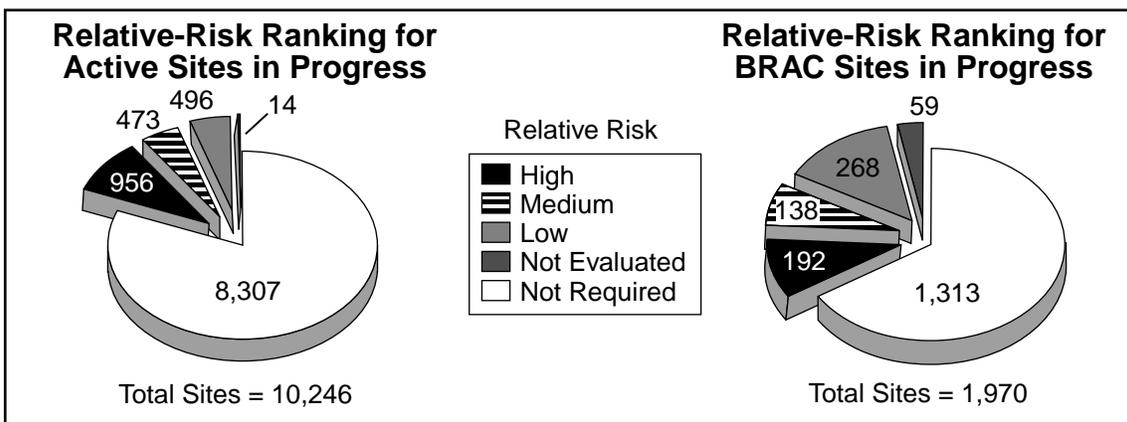
- Partnering with regulators through Installation Action Plan workshops
- Use of independent technical reviews (ITRs)
- Application of innovative technologies and risk-based cleanups.

The cost of completing environmental restoration at BRAC installations is \$1.4 billion and includes closure-related compliance costs, and in some instances, costs for removal of unexploded ordnance (UXO).

In the BRAC environmental restoration program, the Army is focusing on making property environmentally suitable for transfer. In addition to addressing imminent threats to human health and the environment, the BRAC program emphasizes property reuse potential in establishing restoration priorities. The Army continues to explore avenues for facilitating community reuse while addressing environmental restoration issues. The Army also is using early transfer authority and land use controls to expedite community reuse. A number of tools help Army installation staff select cost-effective approaches to addressing environmental issues. These tools include —

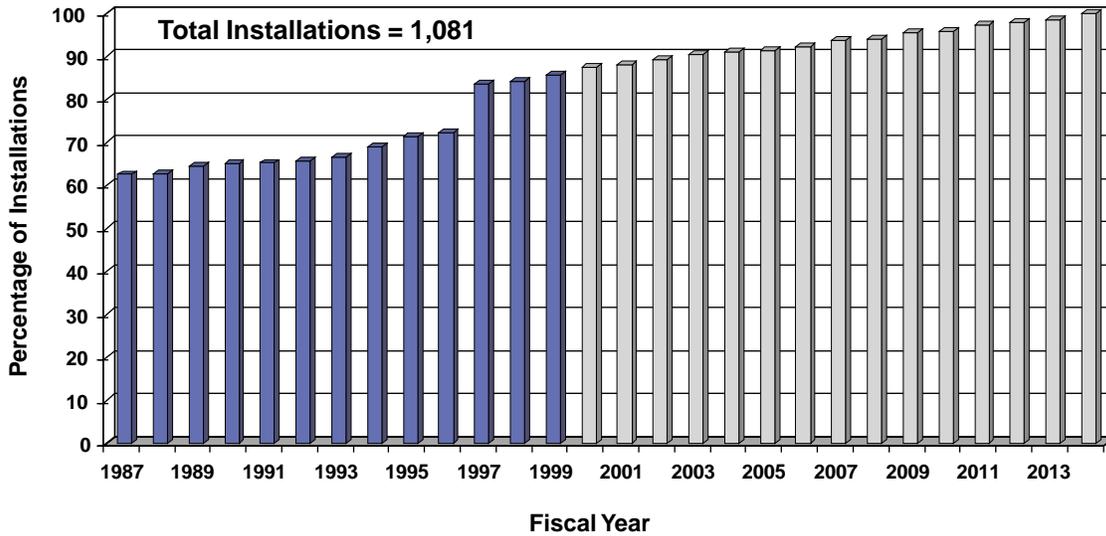
- Technical assistance visits
- Principles of Environmental Restoration (PER) workshops
- Groundwater extraction and treatment effectiveness reviews.

In FY99, the Army obligated \$277 million for BRAC environmental restoration activities, yet the BRAC CTC remained unchanged between FY98 and FY99, at \$1.4 billion. This represents an overall increase in the BRAC CTC after years of steady decline. The primary factor contributing to the increase in the BRAC CTC was the refinement of estimates for UXO clearance at closing installations. The estimates are being refined due to the focus on UXO as an environmental restoration issue. The Range Rule development is also impacting the future of UXO clearance at closing installations. UXO clearance costs may continue to grow as the Range Rule is implemented.

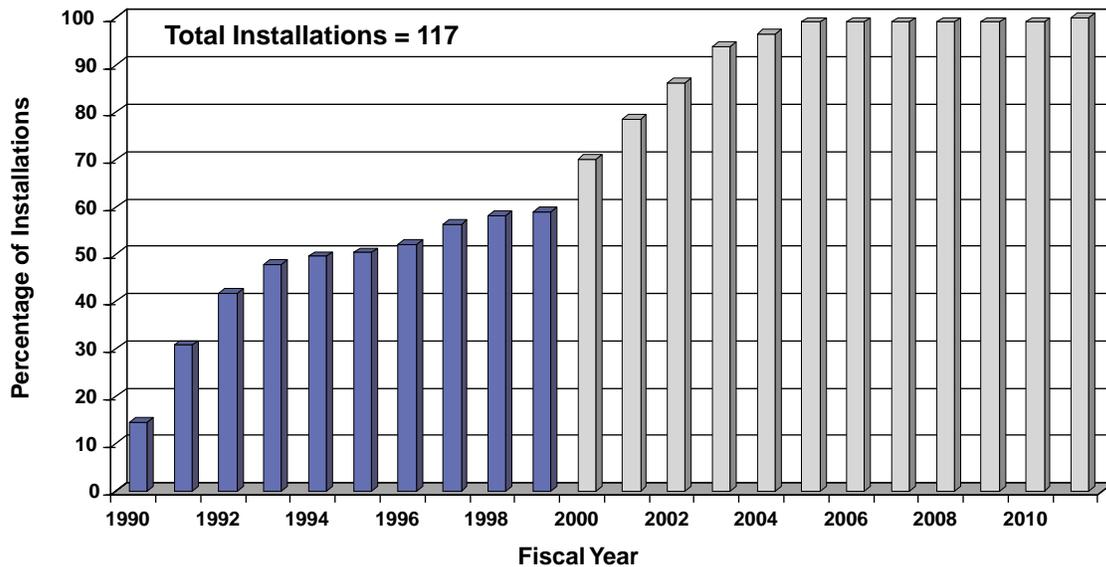


The Army is attempting to draw on private sector expertise and incentives to help it execute its program in ways that are more consistent with private entities' business practices. There is a wealth of expertise in the private sector that can help the Army fulfill its cleanup responsibilities in a more timely and cost-effective manner. The Army has explored many innovative ways of executing its program, some of which are described in the following paragraphs. This exploration of private-sector methods does not reduce the

**Active Installations Achieving Final Remedy in Place or Response Complete (cumulative, FY87 through completion)**



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



\*Does not include three Army installations that have only UXO.

Army's responsibility or liability for the environmental contamination it has caused, but helps the Army fulfill its responsibilities in a more cost-effective way.

## Program Accomplishments

In FY99, the Army reduced the number of BRAC installation sites that had not been evaluated for relative risk from 290 to 59. Only 3 percent of all BRAC sites still require evaluation. These relative-risk evaluations are essential to installation restoration efforts because they help the Army and installations sequence restoration activities.

In FY99, the Army expanded its independent technical reviews, begun under the BRAC program in FY98, to the IR program. The ITR program involves a one-week review of the technical, legal, and project management aspects of specific projects within an installation's restoration program. The review is conducted by a panel of Army and non-Army experts from various technical disciplines associated with environmental restoration. In FY99, the Army conducted ITRs at 14 BRAC installations and 8 active installations. These reviews identified \$13.5 million and almost \$220 million in potential cost avoidance for BRAC and active installations respectively.

A new and exciting cost-saving initiative begun in FY99 is Groundwater Extraction and Treatment Effectiveness Reviews (GWETERs). This effort helps the Army optimize use of resources for operating and maintaining groundwater pump-and-treat systems — the Army's largest restoration expense. The Army currently operates major groundwater pump-and-treat systems at 30 installations. These systems have annual system operating costs totaling approximately \$25 million. The average construction cost for each of these systems is approximately

The Army's challenge for FY00 is to ensure that the potential cost avoidances revealed by the ITR program are accepted by the regulatory community and affected stakeholders and then implemented. To meet this challenge, the Army is directing technical assistance to installations where it has identified potential efficiencies. To this end, the Army will send one or more technical experts to help the installation implement the recommended efficiencies.

### Army Achieves Cleanup Milestones, Reduces Costs

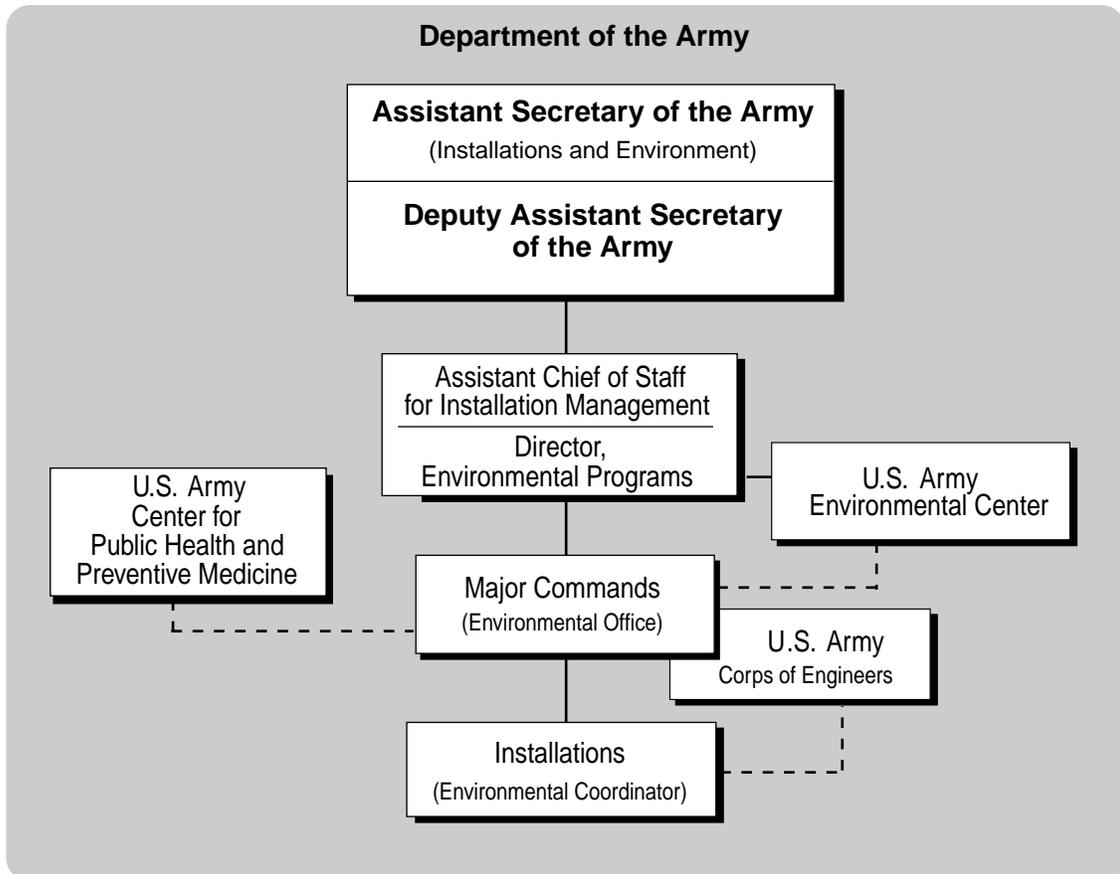
The Army directed funding to the "buyout" of ongoing cleanup at 10 active installations in FY99 and at 13 active installations in FY00. This process entails concluding cleanup at these installations and bringing all sites to RIP/RC status so that the offices can be closed and management and overhead costs can be reduced. The only remaining work at the installations will be LTM and operations. The Army actually moved 11 installations (not including Reserves) to RIP/RC status in FY99, with 14 now planned (not including Reserves) for FY00.

\$3 million, and the systems have a design life of at least 30 years. The five GWETERs conducted in FY99 project potential lifecycle cost avoidances of \$80 million. Review recommendations include eliminating, or reducing the scope of, expensive groundwater treatment systems or using less expensive alternative technologies, such as —

- Monitored natural attenuation
- Enhanced bioremediation
- In situ oxidation.

These technologies shorten the time that active pump-and-treat systems must operate to reach the final cleanup objective. GWETER is an ongoing effort and will continue to identify cost-saving opportunities for the Army's restoration program.

The Army also updated its program management guidance for both the active sites and BRAC environmental restoration programs. These guidance documents provide installations with more consistent direction and a single information source that addresses most of the pertinent guidance that the installations use on a day-to-day basis.



## Management Initiatives and Improvements

Perhaps the single most effective management initiative undertaken by the Army is the Installation Action Plan workshop. These workshops bring together stakeholders, including regulators, local government representatives, and community members, to help the Army prioritize and allocate resources for installation requirements. The open and honest discourse fostered by the workshops has led to estimated savings of more than \$141 million during the workshops' first 3 years of implementation at Army Forces Command (FORSCOM) installations. The Army continued to improve and expand on the Installation Action Plan workshops in FY99 and began conducting such workshops in the Army Materiel Command, whose industrial installations have the bulk of the Army restoration requirements.

As mentioned previously, the Army is working to adopt beneficial practices from the private sector. To accomplish this, the Assistant Secretary of the Army (Installations, Logistics, and Environment) directed Army staff to develop and implement initiatives (collectively called "A New Generation of Cleanup") that help the Army benefit from private-sector expertise.

After developing and evaluating several innovative contracting approaches, Army staff directed the Army major commands and the U.S. Army Corps of Engineers to pilot test two types of contracting mechanisms — consolidated regional contracts and guaranteed fixed-price remediation (GFPR) contracts. The first of these mechanisms consolidates under a single contract the RA-O and LTM for all active, BRAC, and Formerly Used Defense Sites (FUDS) installations and properties in a U.S. EPA Region. The Army hopes to award at least one contract of this type during FY00.

### Principles of Environmental Restoration (PER) Workshops Improve Decision Making

Based on findings from the ITR program, the Army identified a need to improve project decision-making and uncertainty management and to expand the use of streamlining techniques. To address these needs, the Army developed and piloted a PER workshop in FY99. The intent of this workshop is to teach the project management team (including the Army, regulators, and contractors) to use four restoration principles to make efficient, innovative restoration decisions as a team. The PER workshops emphasize the need to conduct decision-based planning, including up-front identification of decision milestones, decision criteria, and exit criteria. Through effective planning, installations can avoid conducting investigations that lead only to further investigation instead of to cleanup decisions and site closeout. The Army plans to conduct PER workshops at several installations in FY00.

GFPR, the Army's second contracting initiative, requires the contractor to accomplish all environmental remediation at an installation for a fixed price. What distinguishes GFPR from other fixed-price contracts is its exit criteria — regulatory closeout of the property and remediation of both known and unknown contamination. These criteria mean that the GFPR contractor must remediate, for the agreed-upon price, all contamination at the site, whether or not the contamination was known and specified when the contract was awarded. The contractor therefore cannot use change orders or other mechanisms to recoup costs for unspecified work. Contractors are able to provide the guarantee by purchasing insurance to underwrite any potential cost increases. The contractors' incentive is that they believe they can provide the necessary services at less cost than they could with the use of conventional government contracting tools. In FY00, the Army will conduct GFPR pilot tests at two BRAC installations — Rio Vista, California, and Camp Pedricktown, New Jersey. The Army hopes to use the GFPR contracting mechanism for at least one active installation as well.

## **Innovative Technologies and Information and Technology Transfer**

In FY99, the Army and its installations and properties implemented several innovative remedial technologies and information and technology transfer efforts.

- Fort Lewis, Washington, is now using an innovative groundwater remediation technology called in situ redox manipulation (ISRM) developed by Northwest National Laboratory. ISRM involves injection of a nontoxic chemical solution that chemically activates naturally occurring iron compounds in certain groundwater contaminants. The groundwater contaminants move through the permeable treatment zone created by the injection and are either destroyed or immobilized through chemical reactions with the activated iron. In this way, the contaminants are either destroyed or converted into nontoxic, biodegradable by-products. At Fort Lewis, the cost avoidance achieved through use of this method is estimated at \$30 million.
- At Badger Army Ammunition Plant (AAP), remedial project managers combined technological and financial know-how

to cost-effectively clean up explosives contamination in groundwater. The installation's project managers first determined that they could use ethanol, a form of alcohol, to help remove explosives contaminants from groundwater. Ethanol enhances the breakdown of the explosives through a process known as denitrification, acting as a nutrient for bacteria. Ordinarily, use of ethanol in this treatment process would have been subject to \$40,000 in federal liquor taxes. However, quick-thinking project support staff at Badger AAP contacted the Treasury Department's Bureau of Alcohol, Tobacco and Firearms and learned that the Army would be exempt from the tax if it applied for and received a site-specific permit granting the exemption.

- At Tooele Army Depot, use of an innovative technology was instrumental in determining the source of a groundwater solvent plume. Because groundwater at the depot was located more than 200 feet below the ground surface, finding the source through conventional means would have been very expensive. Therefore, Tooele used a Gore Sorber® passive soil gas system to pinpoint the exact source of the solvent contamination through an iterative process. The Army followed up this process with active soil gas and vertical soil gas monitoring wells. This innovative approach is expected to save both time and money.

The Army continued to refine its Defense Site Environmental Restoration Tracking System (DSERTS) and CTC databases to correlate schedules and cost information and refine and improve reporting. Improving the use of data reporting systems as a management tool is a long-standing goal of the Army's installation restoration program. The Army is now focusing on collection of pertinent information for efforts such as —

- Land use controls
- The range inventory
- Five-year reviews.

To improve reporting in these and other areas, the Army is developing reports that can be generated by installation, major command, and headquarters staff to document program progress. The Army is also using the Internet to update Web-based reporting systems. The latter effort has presented hardware and connectivity challenges, which the Army is working to overcome.

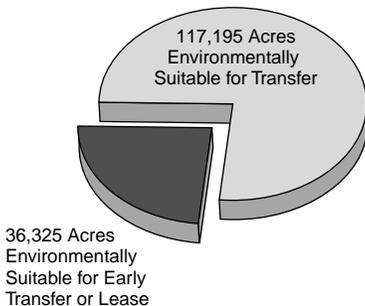
By the end of FY99, the Army had 66 restoration advisory boards (RABs). Four new RABs were established during the fiscal year, and two RABs adjourned. The Army continues to evaluate community interest in establishing RABs at other installations to ensure that it can fully benefit from community involvement in its cleanup program.

## Outreach

In FY99, the Army completed the five remaining outreach meetings with the U.S. EPA Regions, an initiative that began in FY98. These forums brought together Army major command and headquarters managers and each Region's U.S. EPA and state regulators. Establishing common goals, understanding organizational structures, and clarifying the budgeting process were among program issues discussed. These meetings have paved the way to open communication at the installation level. During each meeting, the Army, U.S. EPA, and state regulators reviewed and discussed the programs in the different Regions to identify issues that required Army, U.S. EPA, or state action to better support the programs at the installations.

Another partnering initiative is taking place in South Carolina. Through aggressive partnering and open communication, the Army has been able to move forward on actions based on oral approval by the state. Such approvals are followed up in writing while actions get under way. The state also is in favor of conducting Interim Remedial Actions when warranted as part of Remedial Investigations and Feasibility Studies instead of waiting until these studies are complete. This step gives the Army greater flexibility in conducting restoration and assures the state that the Army will take immediate action when appropriate.

## Environmental Condition of BRAC Property



At BRAC installations, the Army continues to work with local communities and local reuse authorities to accomplish transfer of property. In FY99, the Army prepared for a \$176 million funding deferral in the BRAC environmental restoration account from FY00 to FY01 to accommodate mission requirements. By working closely with installation and major command staff, the Army was able to ensure that environmental work would continue uninterrupted during FY00. This end was accomplished through various initiatives, including acceleration of work and phasing of actions. The Army also was able to increase environmental funding in the fourth quarter of FY99 by reprogramming funds to carry several projects through FY00.

Because the cost savings associated with ITRs are expected to diminish over time, the BRAC program plans to place greater emphasis on technical assistance and PER workshops to identify more efficient approaches to restoration. These efforts will follow up on previous ITR recommendations to ensure effective implementation and to provide the installations with the tools they need to more effectively plan and execute their projects.

Individual BRAC installations have effectively addressed both ongoing issues and unforeseen developments in FY99, keeping their restoration programs on track and within budget.

- At Fort Monmouth, New Jersey, when mercury contamination was found in sewer lines, initial cost estimates for the cleanup ranged as high as \$17 million. This jeopardized a planned FY99 transfer for educational reuse. To help the installation develop a cost-effective approach to cleanup, the Army convened a technical assistance visit by a team of expert consultants and the U.S. Army Corps of Engineers. The result was a pipe removal methodology that minimized fugitive releases of mercury to adjacent soils that could have greatly increased cleanup costs, and provided input to get an appropriate waste designation for contaminated materials that significantly reduced disposal costs. This effort has resulted in estimated cost-savings of \$15 million.
- The use of land use controls has long been a matter of concern to the local community, BRAC property recipients, and regulators, because of the need to ensure that the controls will be maintained when the Army no longer owns the property. To allay such concerns at the Army Research Laboratory in Watertown, the Army entered into an agreement with the Massachusetts Department of Environmental Protection and U.S. EPA Region 1 to document how land use controls would be maintained after transfer of the property. This agreement helped pave the way for partial deletion of the Army Research Laboratory–Watertown from the National Priorities List (NPL), and occurred on November 22, 1999. The Army is now focusing on the remaining parcel, the River Park, with the goal of total NPL deletion in the next 3 years.
- At Detroit Arsenal, Michigan, cooperative efforts between the installation and the Local Redevelopment Authority (LRA)

were instrumental in securing state government agreement on declaring the Detroit Arsenal site a state renaissance zone, making business entities that locate on the site eligible for state tax deferments for up to 15 years. All revenue generated by the site will be used to continue site development activities. In addition, the Army, in agreement with the state and the LRA, issued an escrow deed (which becomes final on completion of cleanup) for the BRAC property to encourage the LRA and its site development contractor to begin redevelopment. Detroit Arsenal also has issued several right-of-entry permits to the site developer, which have expedited the demolition and disposal of buildings and structures. Approximately 22 acres of transferred property is under construction for reuse by a prominent high technology firm, which plans to occupy the site in calendar year 2000.

## The UXO Challenge

An emerging challenge for the Army is the need to make closed, transferred, and transferring ranges (CTT) safe for current and projected uses. The Army has had an effective program for addressing UXO at FUDS, but the impact of additional base closures, resulting primarily from BRAC legislation, has made the challenge of UXO cleanup even greater. The obvious goal of the Army, local communities, and private entities — making land available for transfer — is particularly difficult to achieve when UXO is involved. Unfortunately, few if any technologies exist to both reliably and rapidly detect, discriminate, and characterize buried UXO. While there are some promising developments (see the FUDS success story on page 135), the time and cost required to make land with UXO safe for reuse remains great. The most commonly used and reliable detection method today combines magnetic detectors and geophysical mapping or flag markers, which are used to detect and mark suspected UXO targets. Due to difficulty in discriminating survey signals, cleanup teams must now dig up non-UXO as well as UXO anomalies. This process is slow, costly, and dangerous. Some recent technological improvements sound promising, but unless this promise is realized and significant technologies for detection, identification, and remediation emerge, the cost of remediating all UXO at CTT ranges will be prohibitive.

The Army has continued to work on developing a DoD Range Rule covering response actions for UXO and other constituents of munitions at CTT ranges. The primary objective of the Range Rule is to ensure that DoD is responding to range cleanup at CTT ranges in a safe, uniform, and efficient manner. The rule will specify procedures to ensure safety and protect human health and the environment, and should result in cost-effective responses. In FY99, the Army Range Rule Team revised the Range Rule in response to comments received from the public, U.S. EPA, and other federal, state, and tribal agencies. The Army remains committed to its August 2000 goal for promulgation of the final Range Rule.

This page intentionally left blank.