

# AIR FORCE RESTORATION STATUS AND PROGRESS

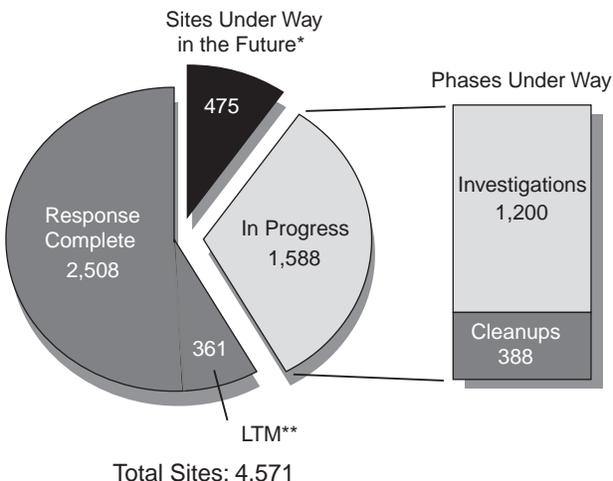
The Air Force has made considerable progress cleaning up past waste disposal sites at our active and BRAC installations. It is an obligation we take seriously and core to our responsibilities of protecting public health and the environment. Success in remediating these sites is a team effort. We continue to work closely with our communities (through Restoration Advisory Boards) and state and federal regulators to ensure responsible restoration of our environment. We continue to build on these strong partnerships as we move into the final phases of our cleanup.



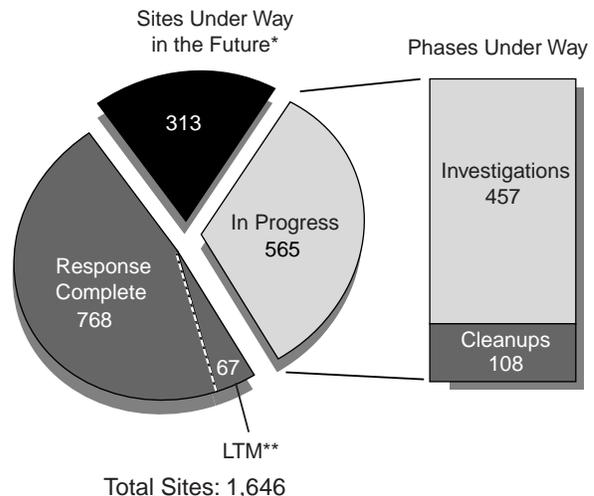
—Terry A. Yonkers,  
Assistant Deputy Assistant Secretary of the Air Force  
(Environment, Safety and Occupational Health)

In Fiscal Year 2000 (FY00), the Air Force made significant progress in its execution of its environmental restoration program at 265 active installations. The Air Force Base Conversion Agency (AFBCA) continued Base Realignment and Closure (BRAC) cleanup at 30 installations. Two BRAC installations do not have any Installation Restoration Program (IRP) sites. Substantial successes were achieved by building on the foundation of the Air Force restoration program—teamwork and strong, effective partnerships with regulators, the community, and other stakeholders. The Air Force is committed to providing the environmental leadership needed to promote safe and cost-effective methods of remediating installation restoration sites and facilitating property reuse.

**Active Site Status**  
(as of September 30, 2000)



**BRAC Site Status**  
(as of September 30, 2000)



\*Includes sites with future preliminary assessment starts planned and cleanup projects that are in between phases.  
\*\*LTM is a subset of Response Complete.

## Air Force Facts

### In FY00...

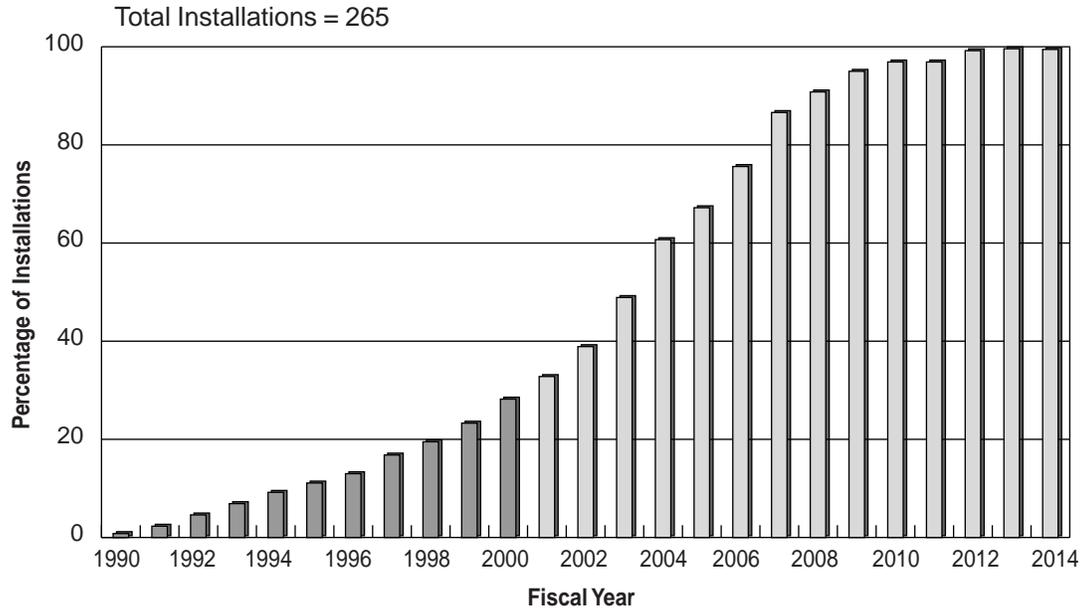
- ◆ Active Air Force had a net increase of 41 sites in its restoration inventory, bringing the Air Force active-installation site total to 4,571.
- ◆ Air Force BRAC had a net increase of 5 sites in its restoration inventory, bringing the BRAC site total to 1,646 at 30 of its 32 installations.
- ◆ Investigations were completed at 213 active-installation sites, and cleanup was completed at 188 active-installation sites.
- ◆ Response Complete (RC) status was achieved for 92 BRAC sites and 188 active sites.
- ◆ Interim actions were completed at 69 BRAC sites.

### Through FY00...

- ◆ No further action (except long-term monitoring (LTM)) is required for 2,508 active-installation sites; 2,063 active-installation sites are either "in progress" (i.e., have work under way) or have future restoration actions planned.
- ◆ Of the sites in progress, 1,254 have investigations under way or planned and 809 have cleanup actions in progress or planned.
- ◆ Two hundred thirty-two active-installation sites are undergoing remedial action operations (RA-O).
- ◆ RC status has been achieved for 768 of the 1,646 BRAC sites. No further action, other than LTM, is required at many of the sites.
- ◆ Air Force has 457 BRAC sites undergoing investigation or awaiting the development or signing of appropriate decision documents. One or more interim actions have been taken at 53 percent of these sites.
- ◆ Overall, Air Force BRAC has completed 700 interim actions at 575 sites; another 430 interim actions are under way at BRAC sites.

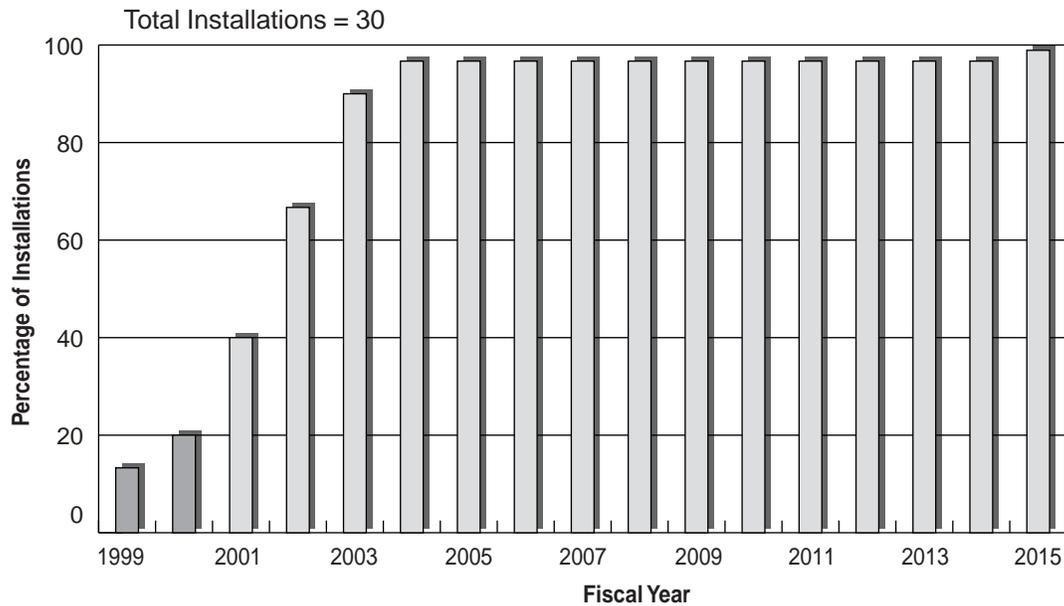


**Active Installations Achieving Final Remedy in Place or Response Complete\***  
(cumulative and projected, FY90 through completion)



\*Does not include installations with unexploded ordnance or building demolition and debris removal.

**BRAC Installations Achieving Final Remedy in Place or Response Complete\***  
(cumulative and projected, FY99 through completion)



\*Does not include two installations that have no Installation Restoration Program sites.

## Program Execution

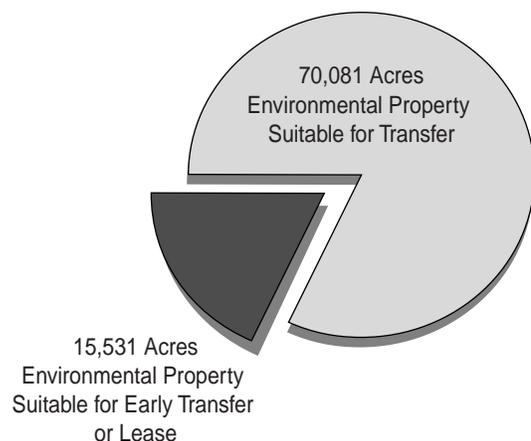
The Air Force's FY00 progress in cleaning up its sites illustrates its commitment to environmental restoration. In the past fiscal year, both Pease Air Force Base, New Hampshire, and Loring Air Force Base, Maine, achieved final Remedy-in-Place status. In addition, more than 85,600 acres at Air Force BRAC installations is scheduled for transfer out of the Department of Defense (DoD). Of the acreage at Air Force BRAC installations that is scheduled for transfer out of DoD, approximately 82 percent is environmentally suitable for transfer. Much of the remaining acreage is impacted by groundwater contamination. Most of the remedial systems needed to address this contamination are in place as interim or final remedies.

Within restoration, the percent of available funds obligated for site cleanup is often an indicator of the overall program progress. In FY00, AFBCA obligated an additional \$100 million for environmental restoration projects, allowing AFBCA to achieve its highest annual percentage of funds (99 percent) obligated for site cleanup to date.

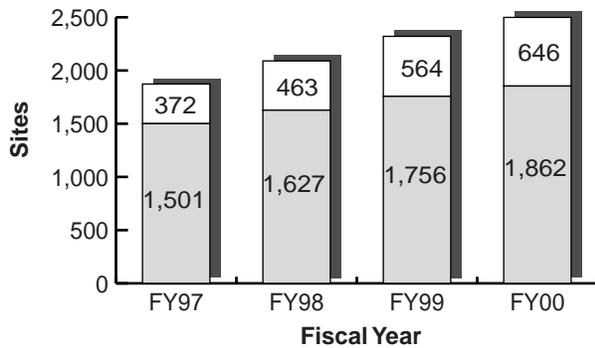
Some Air Force sites within the Defense Environmental Restoration Program (DERP) have not yet been evaluated. There are several reasons for this, the most significant being inadequate field data. These data are needed to answer the key questions of the evaluation process:

- ◆ How much contamination exists?
- ◆ Is the contamination migrating?
- ◆ Are there people or sensitive environments nearby?

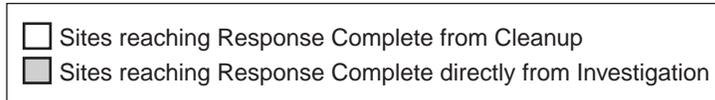
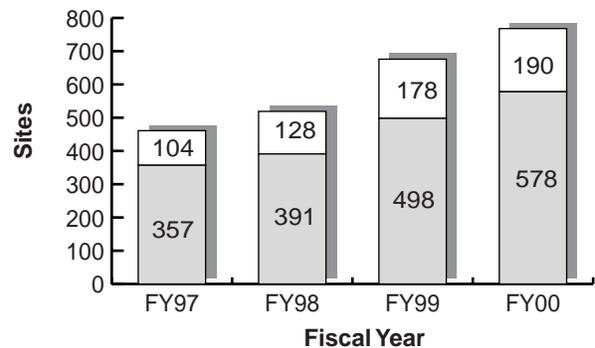
**Environmental Condition of BRAC Property**



**Active Sites with Response Complete\***



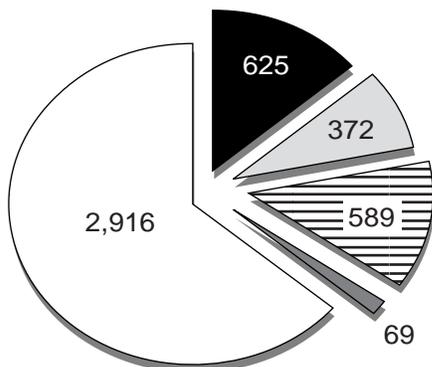
**BRAC Sites with Response Complete\***



\*FY97 through FY99 totals have been updated since the previous Annual Report to reflect new and revised data as of FY00.

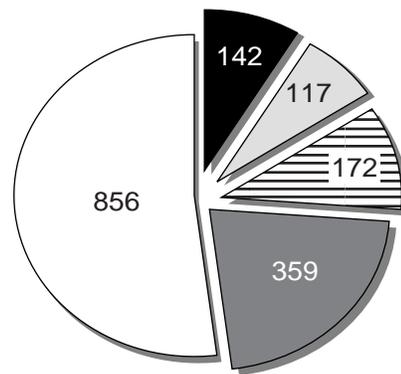
These questions cannot be answered until adequate field investigations have been conducted to determine the type and levels of contaminants, the migration pathways of the contaminants, and the receptors of the contaminants (including soil, aquifers, and private wells). Adequate field data and information on what levels of a contaminant are considered safe and acceptable under federal or state regulations must be available for the performance of a site evaluation to ensure that human health and the environment are protected.

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



Total Sites = 4,571

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



Total Sites = 1,646

## Program Accomplishments

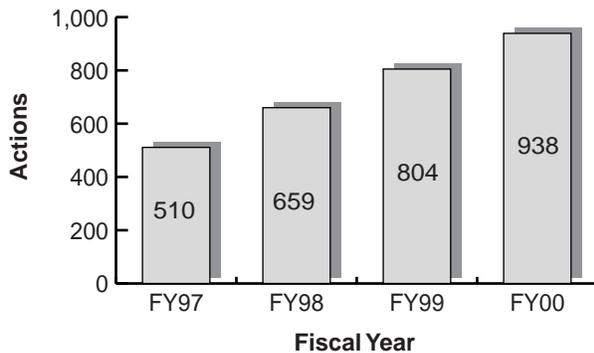
During FY00, the Air Force focused on improving the long-term performance of the environmental restoration program by working on understanding and planning for potential future requirements.

For example, the Air Force made significant progress in FY00 in identifying future requirements for range cleanup. Ranges are a vital component of the Air Force's training infrastructure and are needed to ensure that military personnel maintain the highest possible state of readiness. Many ranges, however, may have unexploded ordnance (UXO). The Air Force is now preparing for the extensive effort of characterizing the presence of UXO to support UXO clearance and environmental restoration efforts.

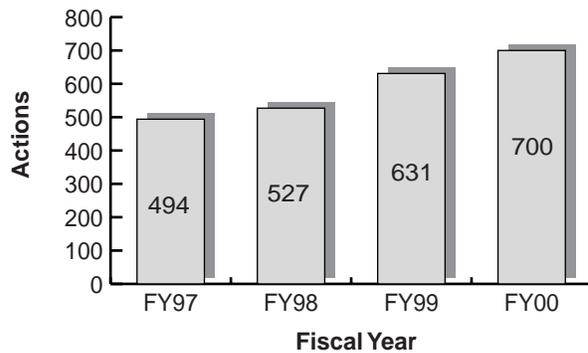
Some of the Air Force's past commitments became successes in FY00.

- ◆ AFBCA received approval of operating properly and successfully designations for five treatment systems at Pease Air Force Base. The U.S. Environmental Protection Agency accepted Air Force's use of treatment technologies, including soil vapor extraction (SVE), natural attenuation, and hydrogeologic containment, as a means of preparing the property for site transfer.
- ◆ The Air National Guard (ANG), in cooperation with the State of Georgia, successfully implemented a time-critical removal action for a surface water treatment system at the Savannah Air National Guard Base in Georgia. As part of a DoD initiative, the ANG also negotiated for a voluntary cleanup agreement with the State of New Jersey.

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



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



\*FY97 through FY99 totals have been updated since the previous Annual Report to reflect new and revised data as of FY00.



- ✦ AFBCA implemented the Alternate Dispute Resolution process at four installations in California: McClellan, Norton, Mather, and March Air Force Bases. At McClellan Air Force Base, two issues were resolved. At Norton Air Force Base, this process enabled settlement of pending land use control and institutional control issues. This allowed Norton to make numerous parcels of land available for transfer earlier than anticipated.
- ✦ In an effort to optimize RA-O and prevent future disputes, AFBCA negotiated SVE start and stop procedures with the State of California for Castle Air Force Base. This process allows the Air Force to use data-driven economic analysis to establish SVE's cost-benefit advantage over other groundwater treatment options. Also under these procedures, once remediation objectives are achieved and contamination is reduced to the point where further cleanup is no longer economically feasible, the Air Force can turn off the treatment process without lengthy reviews. This agreement has optimized the remediation process by preventing highly technical issues from developing into a formal dispute and has shortened the cleanup schedule by more than two years.
- ✦ McClellan Air Force Base reached a milestone of removing one million pounds of contaminants from its sites. This achievement resulted from the use of 12 SVE treatment systems throughout the base, in addition to the main groundwater treatment system. These systems have been operating at McClellan for 15 years.
- ✦ The Clean Sweep program is an Air Force initiative to perform environmental cleanup at 30 remote locations throughout Alaska and demolish unsafe, abandoned facilities under one mobilization effort and one contract to minimize costs. In FY00, the Air Force spent \$7.8 million on Clean Sweep at 18 installations. Much of the work involved surveys to ascertain the quantities and types of hazardous materials at the installations. Work is complete at five installations. The Air Force is aggressively pursuing cleanup at these facilities to protect human health and the environment.

### ***Air Force Receives Project Development Team Excellence Award***

The BRAC Cleanup Team (BCT) at Reese Air Force Base received the FY00 U.S. Army Corps of Engineers' Project Development Team Excellence Award. This prestigious award is presented to illustrate the strong teamwork required to accomplish difficult and complex projects. The Reese BCT received the award due to its ability to establish, track, and bring to completion the complex environmental cleanup projects at Reese Air Force Base.

## Innovative Remediation Projects

The Air Force is committed to exploring innovative ways of expediting cleanup and solving cleanup problems. These innovative methods, including the use of new technologies, help the Air Force execute its cleanup program faster and cheaper while it continues to protect human health and the environment.

One new technology that has helped Air Force achieve these goals is the diffusion sampler. The Air Force has incorporated this technology, developed in U.S. Geological Survey laboratories, into its monitoring wells to reduce the costs associated with LTM. Diffusion samplers have the advantage of being applicable in all types of geologic formations, being able to delineate contaminants in the vertical plane, and being able to easily and accurately define plumes. The Air Force used this technology at several sites in FY00, reducing groundwater well sampling costs by up to 70 percent. For example, McClellan Air Force Base in California realized \$1.1 million in cost avoidance in FY00 through use of the technology. In FY01, the Air Force will deploy diffusion samplers at 20 active and 8 closing Air Force bases.

### *Innovative Cleanup Technologies Yield Positive Results*

The Air Force is using several other new technologies to successfully clean up its contaminated sites. At Travis Air Force Base, California, vacuum dewatering, passive barrier ("iron wall") technology, and phytoremediation (using plants to destroy contaminants) were applied to effect source removal, plume containment, and remediation of groundwater to drinking-water standards. At seven other bases, the Air Force used phytoremediation to contain shallow chlorinated solvent plumes.

At Offutt Air Force Base, Nebraska, the Air Force Center for Environmental Excellence (AFCEE)/Environmental Technology Division (ERT) designed the first successful DoD application of an in situ biowall barrier. This remedy consists of an interception trench filled with bark mulch. Studies have since shown that the barrier reduced solvent levels in the groundwater to below the level set in drinking-water standards, at a small fraction of the cost of any other available technology.

AFCEE/ERT has also used injection of edible oil (or other innocuous compounds promoting biodegradation) to promote the enhanced degradation of chlorinated solvents. This technique has the cost-effectiveness of a biowall barrier with the added advantage that it can be injected and used for plumes too deep to remediate with an interception trench. Positive results were obtained with this technology at three Air Force sites, and three additional injection sites are planned. More projects of this type, and technical protocol development, are planned for FY01.



## Management Initiatives

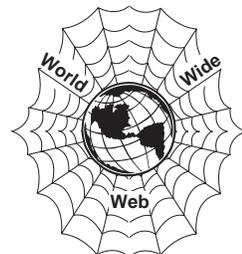
In FY00, the Air Force took aggressive steps in promoting program management awareness. There were improvements in several key areas, including use of program metrics in reporting and achieving program goals. These metrics prompted significant discussions at several environmental restoration workshops, most recently at the Civil Engineering Worldwide Conference.

The Air Force was able to facilitate execution of the DERP through the partnering initiatives of its three Regional Environmental Offices (REOs), located in Atlanta, Dallas, and San Francisco. These REOs advocate Air Force and DoD interests before federal, state, and local regulators, facilitating DoD environmental compliance and improving management throughout the country. The REOs have provided restoration program support in the form of legislative and regulatory review, negotiation assistance, support for partnerships, regional restoration summits, and voluntary cleanup agreements.

The Air Force has led DoD in the use of new contracting methodologies to improve the DERP's cost-effectiveness. One such methodology, performance-based cleanup contracting (PBC2), is being evaluated as a tool for environmental restoration. PBC2 has the potential to offer more flexibility for addressing remediation uncertainties, encouraging improved government-contractor working relationships, and providing incentives to deliver better, faster, and cheaper solutions.

In a separate effort, the Air Force Center for Environmental Excellence (AFCEE) Environmental Technology Division (ERT) addressed systemic inefficiencies in the site remediation process by developing and supporting the Remedial Process Optimization initiative, and using a streamlined, risk-based approach to site cleanup. Under this initiative, ERT performed corrective action assessments at nine Air Force bases with fuel-contaminated groundwater. The initiative's goal was to find the most cost-effective method of reducing risk, combining chemical source reduction, contaminant migration control, and receptor restriction. This effort paid off. The characterization, remediation, and closure processes at the bases were conducted in less than 1 year at an average cost of \$46,600 per site—78 percent less than historical average costs for similar sites.

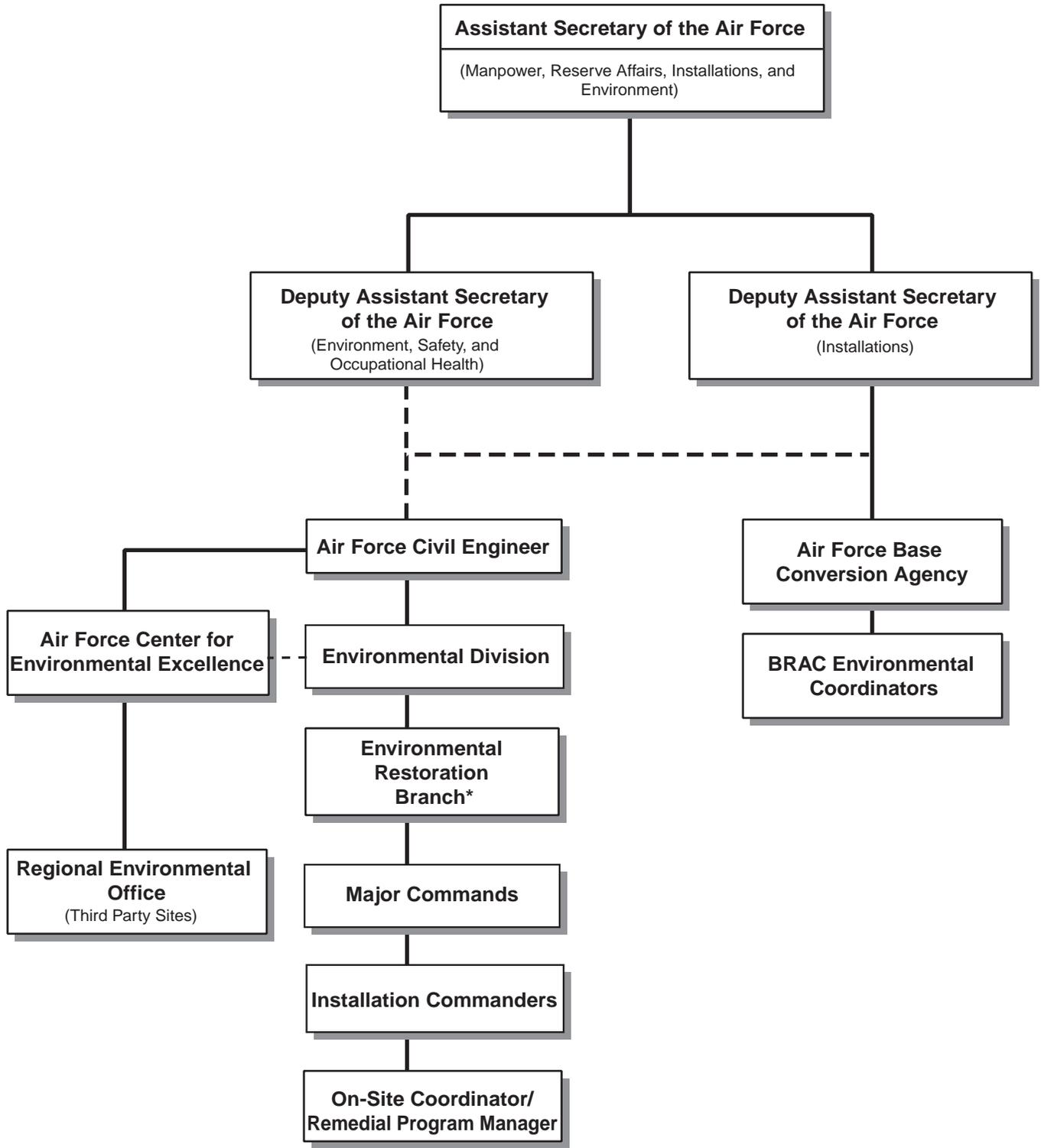
**Air Force Center for  
Environmental  
Excellence**



*http://*

*www.afcee.brooks.af.mil/*

Department of the Air Force



\* In this diagram, all branches above, and including, the Environmental Restoration Branch are responsible for policy, guidance, and oversight. All branches shown below this branch are responsible for program execution.



The Air Force has worked to enhance existing information management systems to improve decision making at all levels. One of its efforts in this regard is the integration of the existing Remedial Action Cost Engineering and Requirements system with the Air Force Restoration Information Management System. The link between these two systems will allow cost information to be updated accurately and instantaneously.

The Air Force is also using geographic information system (GIS) technology to cut costs and enhance its cleanup effort. At Vandenberg Air Force Base, for instance, maximizing the use of the base's GIS system has significantly improved the base's IRP. As the third largest Air Force base in the nation, Vandenberg encompasses 99,100 acres that include prehistoric, historic, and cold war cultural resources; 13 endangered or threatened plant and animal species; and 35 miles of shoreline. The complexity of Vandenberg's environmental mission, with 136 IRP sites and 166 areas of concern, necessitates the need to employ a tool like GIS. A recent application of the system allowed input of conventional longitude and latitude survey data, facilitating the mapping of underground storage tanks that were removed but not necessarily cleaned up. In this way, at minimal cost, base personnel accurately located the remaining contamination and subsequently convinced state regulators to concur with base site closure recommendations. GIS technology also has other applications and associated benefits:

- ✦ Public meetings benefit from the ability to produce custom maps showing site locations, contamination of concern, and other environmental information.
- ✦ Project costs can be calculated more accurately, and with less time, since base personnel can simulate site conditions electronically instead of using costly physical surveys.
- ✦ Use of GIS reduces transition costs when project contractors change.
- ✦ The IRP office can easily access environmental-constraint data when processing a digging permit. Before GIS development, staff had to go through volumes of material to determine whether a proposed project affected an IRP site or area of concern.
- ✦ Air Force personnel and contractors can use GIS to identify cultural resources and leave them undisturbed when placing monitoring wells and performing other restoration work.

## *Langley Air Force Base Shares Cleanup Equipment*

The Air Force is working smarter at Langley Air Force Base (AFB) in Virginia by recycling its environmental cleanup equipment. After using its soil vapor extraction equipment to meet Virginia Department of Environmental Quality's (VDEQ's) requirements for cleaning up contaminated soil, Langley AFB disassembled it and shipped it to Moody AFB, Georgia.

For four years, Langley AFB used its SVE system to extract petroleum vapors from soil near the base gas station. Leaks from an underground storage tank holding fuel or oil had contaminated the soil in the late 1980s. When a leaking tank is discovered, monitoring wells are installed in the area around the tank to determine the extent of contamination, especially in the direction in which groundwater is flowing. The monitoring wells are used to check for oil that may have reached the groundwater and is traveling beyond the immediate tank area. Cleaning up a site includes removing tanks, removing contaminated soil, and monitoring.

Because Langley AFB had met all VDEQ requirements for cleanup around the gas station, the vapor extraction system was shut down in November 1999 and offered for use on other bases. The cost avoidance achieved by sharing expensive equipment for site cleanup at different bases benefits everyone. The transferred system will be used at a fuel storage area on Moody AFB. The Air Force estimates it will avoid about \$75,000 in additional costs through equipment recycling.

## **Outreach and Partnering**

In February 2000, the Pacific Air Forces Command (PACAF) helped sponsor a state-wide Restoration Advisory Board (RAB) meeting in Alaska. This meeting gave RAB community co-chairs a forum for sharing information and making personal contacts. PACAF, in conjunction with AFCEE, is planning another statewide DoD RAB meeting for 2001. In addition, as a way of involving remote Alaska community members in the Air Force cleanup process, the 611th Civil Engineering Squadron holds "solution meetings" at the end of regular RAB meetings. These meetings are low-key forums geared toward maximizing community member participation in developing solutions to common problems.

Regulator and technical issues have provided the biggest challenges in execution of the Air Force Environmental Restoration Program. Air Force has overcome many hurdles by involving AFCEE to work with installations on technical and regulator issues. The result has been more effective communication between Air Force and the field, and a more proactive program.



The Air Force has great success in using a partnership approach to cleanup issues. The benefits of working closely with regulators and the local community include time savings, cost savings, and improved public relations.

The Air Force will save more than \$25 million at Little Rock Air Force Base, Arkansas, from FY00 to FY03 through an initiative that establishes a streamlined process for completing investigation and cleanup at hazardous waste sites. Under this initiative, Little Rock Air Force Base and the Air Education and Training Command worked closely with the State of Arkansas and federal regulators to develop a document known as a consent administrative order (CAO). The CAO combines federal and state environmental requirements, streamlining the state's extensive set of testing requirements and reducing testing and analysis efforts by 53 percent. The agreement has allowed 11 hazardous waste sites at the base to be closed with a No Further Action (NFA) determination. The solutions satisfy state and federal regulations and remain protective of human health and the environment.

A partnering approach also proved beneficial at Eglin Air Force Base in Florida. This base initiated a partnership effort with the Florida Department of Safety, base organizations, contractors, and the Air Force Radioisotope Committee to address low-level radiation material. The unique partnership allowed nine low-level radiation site closures in less than two years, and three sites were categorized as NFA.

### ***Partnering Saves Money at Columbus Air Force Base***

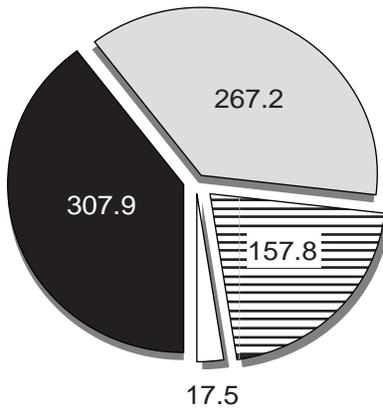
Columbus Air Force Base has worked with Mississippi regulators to reduce unnecessary groundwater sampling and chemical testing. For 5 years, quarterly samples were collected from 60 monitoring wells and 15 active sites. When data results showed no seasonal changes and no significant movement of contaminants, regulators agreed to reduce sampling requirements to once a year. This resulted in a reduction of more than 120 samples per year. In addition, by using the past activities at the sites as a way of determining the types of chemicals likely to be present, the base has eliminated unnecessary shallow groundwater tests. Minimizing unnecessary sampling and testing is expected to save \$90,000 from FY00 to FY02.

## Funding

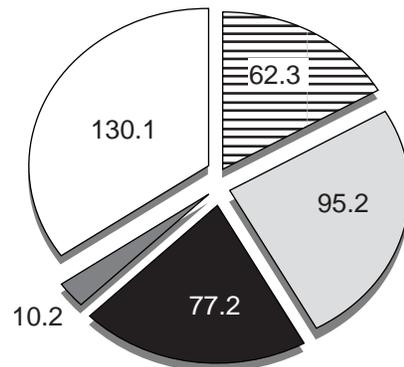
In FY00, Air Force's active installations obligated \$374.9 million in environmental restoration funds. Investments will increase to \$375.4 million in FY01. In FY00, Air Force spent approximately 58 percent of its restoration funds on design work, interim or final cleanup actions, and LTM. This percentage is expected to decrease to 57 percent in FY01 and increase to 72 percent in FY02. Air Force BRAC invested \$125.8 million in environmental activities in FY00. The planned BRAC investment level in FY01 is \$117.7 million, and \$202.0 million in FY02.

**Air Force Environmental Restoration Funding Profile**  
(in millions of dollars)\*\*

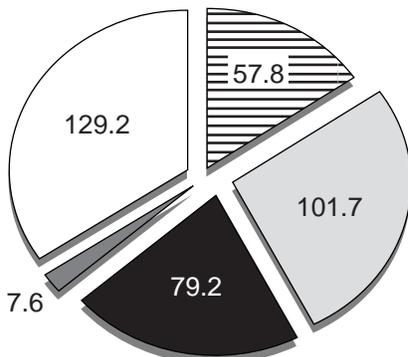
**FY99 Air Force Funds Executed**  
Total = \$371.1 million



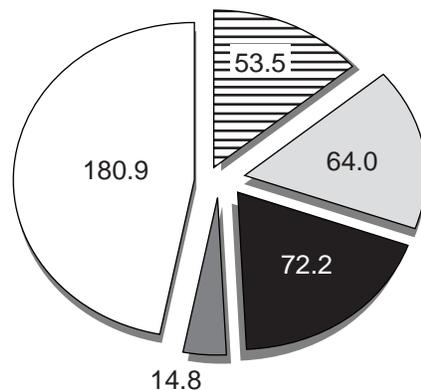
**FY00 Air Force Funds Obligated**  
Total = \$374.9 million



**FY01 Air Force Execution Planned**  
Total = \$375.4 million



**FY02 Air Force Planning Estimate**  
Total = \$385.4 million



\*\*Due to rounding, category subtotals may not equal fiscal year totals.



## *Robins Air Force Base Receives Georgia State Environmental Award*

On February 16, 2000, Robins Air Force Base (AFB) was presented with the Georgia Water and Pollution Control Association's Industrial Pollution Control Award for Groundwater Remediation. Recognized as the best in the state, the Robins AFB groundwater treatment system (GWTS) treats groundwater for the Robins National Priorities List sites, a landfill, the greater base industrial area, and the installation's avionics complex.

The Robins GWTS began operating 24 hours a day in April 2000 and has had no violations of its operating permit. Between March and May 2000, trichloroethylene (TCE) was detected only once in the GWTS outflow, and then at less than 25 micrograms per liter (mg/l), which is well below the permit requirements of 80.7 mg/l. All other test results showed the contaminants in the outflow to be below the allowable limit. During this same period, the concentration of TCE coming into the plant varied from less than 200 to nearly 3,000 mg/l, demonstrating the system's ability to effectively treat widely varying contaminant loads. The quality of the treatment that the plant provides testifies to the sound design of the plant, the efficiency of the system, and the dedication of the plant operators.

A recent \$8 million expansion tripled the capacity of the GWTS from 300 to 900 gallons per minute and expanded its treatment capabilities. During the expansion, the installation added a clarifier; an equalization tank; activated carbon filters; additional pressure filters; and updated, state-of-the-art ultraviolet treatment units. The plant expansion and 4½ miles of new-force main pipe will allow Robins AFB to treat additional groundwater so that other sites can be added to the plant's treatment load in the future. Using a single plant to treat all groundwater at an installation saves maintenance and operating costs and allows groundwater from other sites to be added to the system with a minimum of design effort.



**This building houses Robins' award-winning groundwater treatment system.**

## *Leading the Way in UXO Identification and Safety*

The environmental restoration division at Eglin Air Force Base funded the U.S. Army Corps of Engineers' performance of a UXO archive search concerning Eglin's training sites. This effort included a review of many national archives and various training session reports. The results of the search were used to create a new map that more accurately depicts UXO location zones in proximity to recreation areas. The new map promotes the safety of the approximately 15,000 members of the public who purchase yearly permits for recreation on more than 280,000 acres of Eglin property.

In addition to creating the revised recreation map, Eglin developed a new safety education program for recreation permit holders. This groundbreaking program provides permit holders with a UXO information brochure and requires them to watch a short educational video about UXO identification and safety.

