AIR FORCE RESTORATION STATUS AND PROGRESS

Sustaining and restoring resources is an integral part of the mission. As our resource base becomes smaller the quality of our resources must increase, ensuring all of the air, land, and water resources are capable of supporting our operations and in condition to pass on to future generations. Restoring our environment is a foremost task of meeting the mission requirements, and one for which we intend to redouble our efforts.

— Maureen T. Koetz, Deputy Assistant Secretary of the Air Force (Environment, Safety and Occupational Health)

Each year, the Air Force strives to build on past cleanup successes to demonstrate an enduring commitment to the environmental restoration of its property. The remediation of contamination from past practices is central to the Air Force's ability to defend the nation and protect American interests around the world. By using prior experience and success, the Air Force is able to increase cleanup program efficiency to accelerate the remediation process and reduce management costs, allowing land to be more quickly returned to useful purposes and providing enhanced protection to human health and the environment.

This past year, the Air Force Base Conversion Agency (AFBCA) merged with the Air Force Real Estate Agency to create the Air Force Real Property Agency (AFRPA). Under this transformation, AFRPA will continue the work of executing environmental programs and real and personal property conversion efforts for Air Force bases being closed or realigned under Base Realignment and Closure (BRAC). AFRPA will also be responsible for the acquisition and disposal of all Air Force-controlled property worldwide. The organizational structure of the Air Force's environmental programs is found on page 142.

Focus on the Facts AIR FORCE

IN FY02...

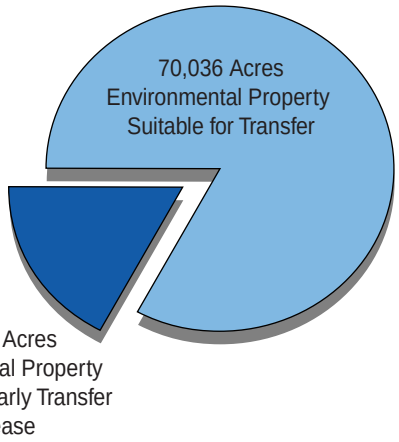
- Investigations were completed at 154 active-installation sites, and response complete (RC) was achieved at 133 active-installation sites.
- Investigations were completed at 37 BRAC sites, and RC was achieved at 173 BRAC sites.
- Remedy in place (RIP)/RC status was achieved at four active installations.
- RIP/RC status was achieved at three BRAC installations.
- Interim actions were completed at 35 BRAC sites.

THROUGH FY02...

- The Active Air Force site total now stands at 4,956 Installation Restoration program (IRP) sites, 241 Military Munitions Response program (MMRP) sites, and 30 Building Demolition/ Debris Removal sites. See the pie charts on page 143 for site status.
- Eighty-four of the 271 active-installations achieved RIP status.
- Twelve of the 30 BRAC installations with IRP sites have achieved final RIP status for all sites.
- RC status has been achieved for 2,762 active-installation sites.
- RC status has been achieved for 967 BRAC sites, and 840 were closed requiring No Further Action (NFA). Long-term management (LTM) is required at 378 sites—63 sites are currently in LTM, and 315 sites will be in the future.
- Restoration actions are either "in progress" (i.e., have work under way) or have been planned for the future at 2,224 active-installation sites and 704 BRAC sites, not including MMRP sites.
- Remedial action cleanups are underway at 82 active-installation sites, and 349 sites are undergoing remedial action operations (RA-O).
- Remedial action cleanups are in progress at 10 BRAC sites, and 127 sites are undergoing RA-O.
- Active Air Force has 1,379 sites in the investigation phase, not including MMRP sites.
- Air Force BRAC has 436 sites in the investigation phase or awaiting the development or signing of appropriate decision documents.
- Overall, Air Force BRAC has completed 783 interim actions at 626 sites; another 390 interim actions are under way.

In fiscal year 2002 (FY02), the Air Force continued to make considerable progress in the execution of its restoration program at 271 active installations and 30 installations in the BRAC program. Both active Air Force and AFBCA helped ensure mission readiness by continuing to build on the foundations of their restoration programs, whose cornerstones include teamwork and strong, effective partnerships with regulators, the community, and other stakeholders. Using successful remediation techniques, the Air Force seeks to identify and promote innovative and cost-effective methods of remediating installation sites, closing out restored sites, and facilitating property reuse. At the end of FY02, the total BRAC installation acreage that was available for transfer was approximately 83 percent and more than 33 percent was leased. Of the 84,568 total acres at Air Force BRAC installations, 47,350 acres have been transferred and 28,050 acres have been leased. The Air Force is committed to providing the environmental leadership needed to address future environmental concerns.

Environmental Condition of BRAC Property

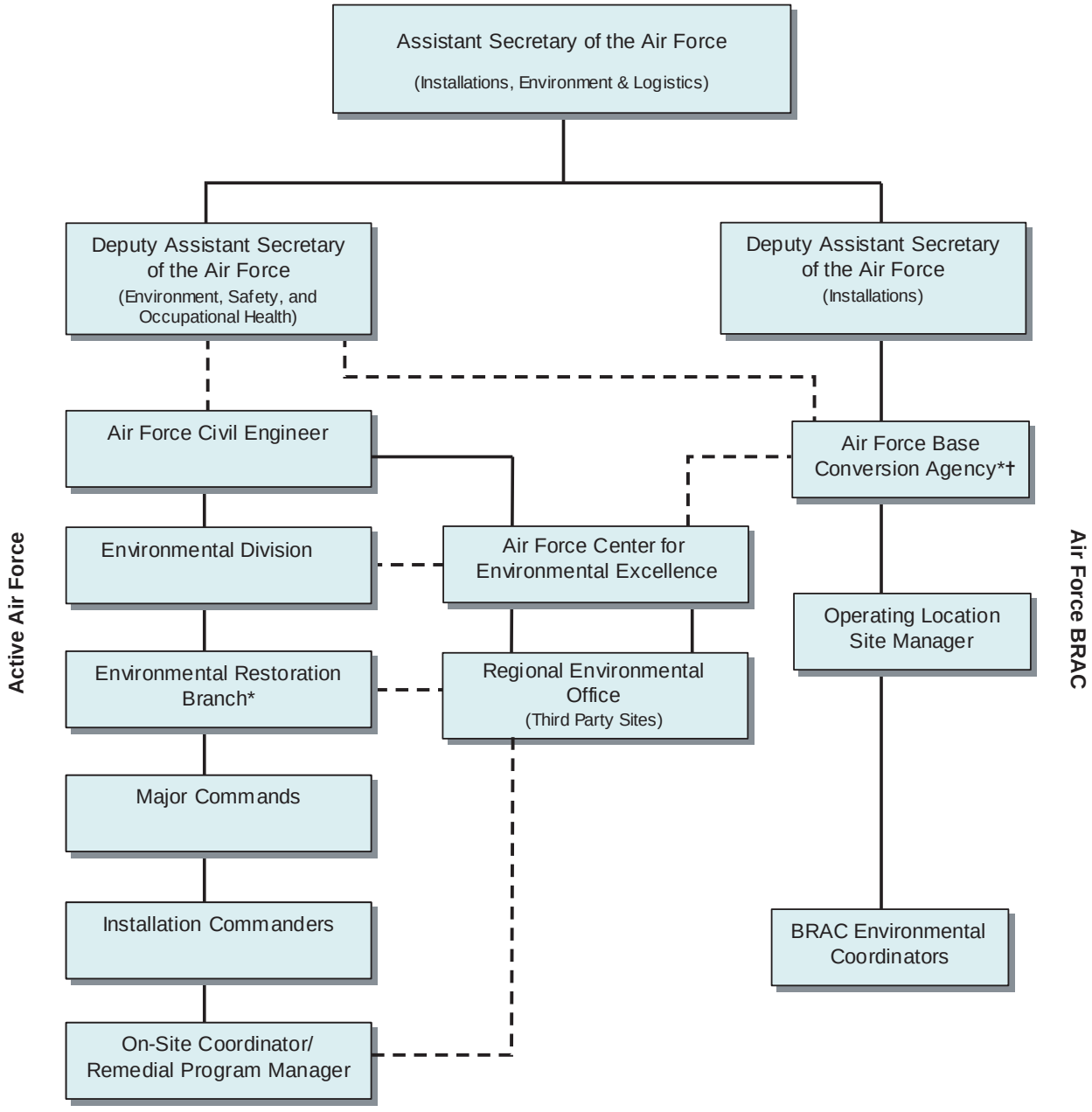


Program Execution

The Air Force is focused on finding ways to accelerate the environmental restoration program, reduce management costs, improve contracting methods, and provide more vigilant oversight.

Level funding allows for maximum flexibility to effectively and efficiently execute the environmental restoration program and to make adjustments as new situations arise during the year. Air Force's commitment to faster, more efficient environmental restoration made it possible to meet the FY02 program goals ahead of schedule. By the end of FY02, Air Force had reduced risk at 60 percent of its active high relative-risk sites.

Department of the Air Force



* In this diagram, all branches above, and including, the Environmental Restoration Branch and Air Force Base Conversion Agency are responsible for policy, guidance, and oversight. All branches shown below these branches are responsible for program execution.

†AFBCA merged with the Air Force Real Estate Agency to create the AFRPA. AFRPA will continue to work on executing environmental programs and real and personal property conversion efforts for Air Force bases being closed or realigned under BRAC.

This percentage is based on a revised DoD methodology using the site level data going back to 1997 vice 1995.

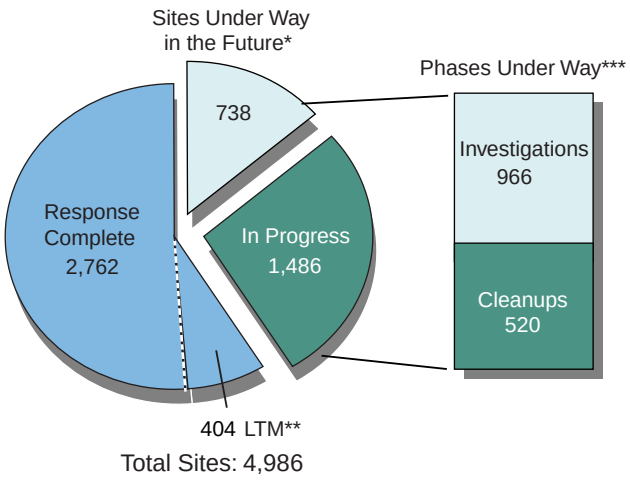
As of FY02, 97 percent of BRAC installations are projected to achieve the goal of having all sites with RIP/RC by the end of FY05. In addition, the BRAC program successfully transferred 7,636 acres in FY02.

Program Accomplishments

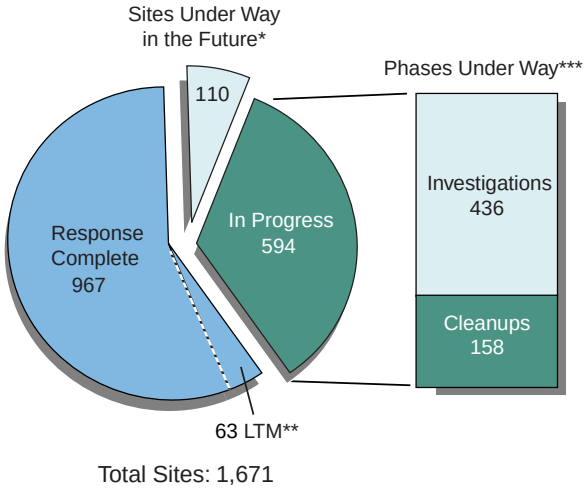
The Air Force continued to make progress toward accomplishing program goals during FY02, as summarized in the relative risk ranking, interim action, and RC charts on pages 144 through 145. In order to improve the long-term performance of its environmental restoration program, the Air Force is:

- Establishing the foundation of a range cleanup program
- Focusing on restoration program improvements and contract performance
- Continuing to implement successful cleanup programs.

Active IRP Site Status
(as of September 30, 2002)

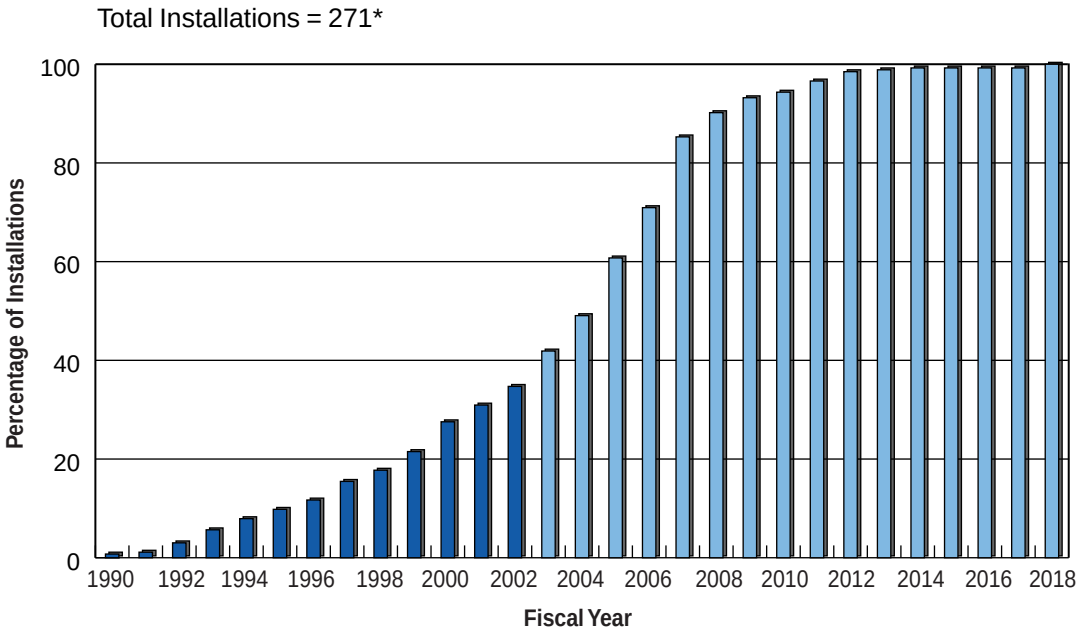


BRAC IRP Site Status
(as of September 30, 2002)



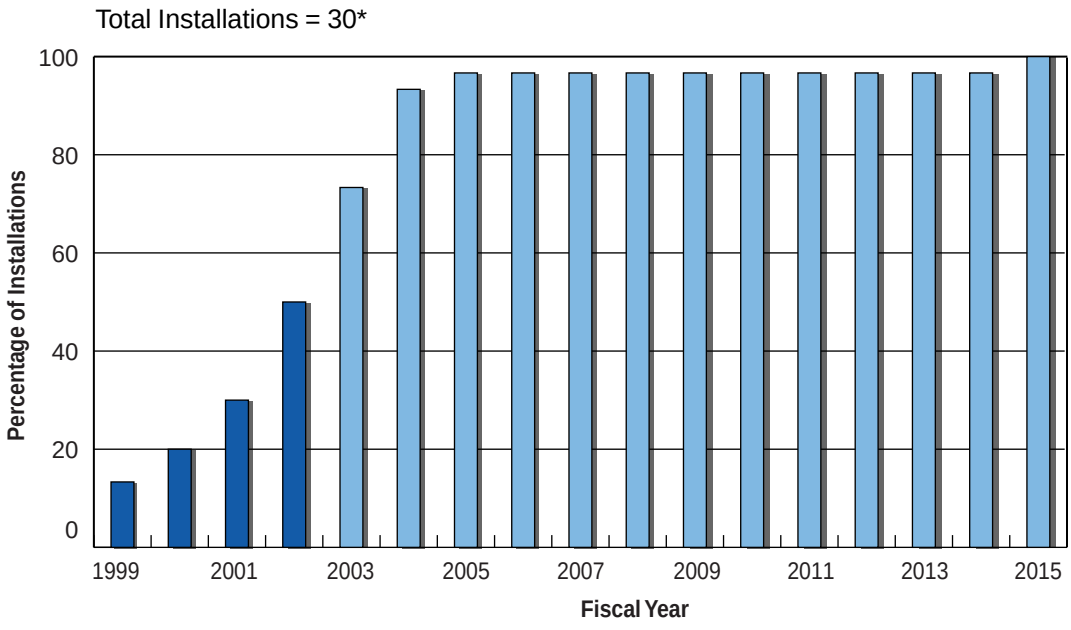
*Includes sites with future preliminary assessment starts planned and cleanup projects that are between phases.
**LTM is a subset of Response Complete.
***Phases Under Way may not add up to Sites in Progress because some sites have multiple phases under way.

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

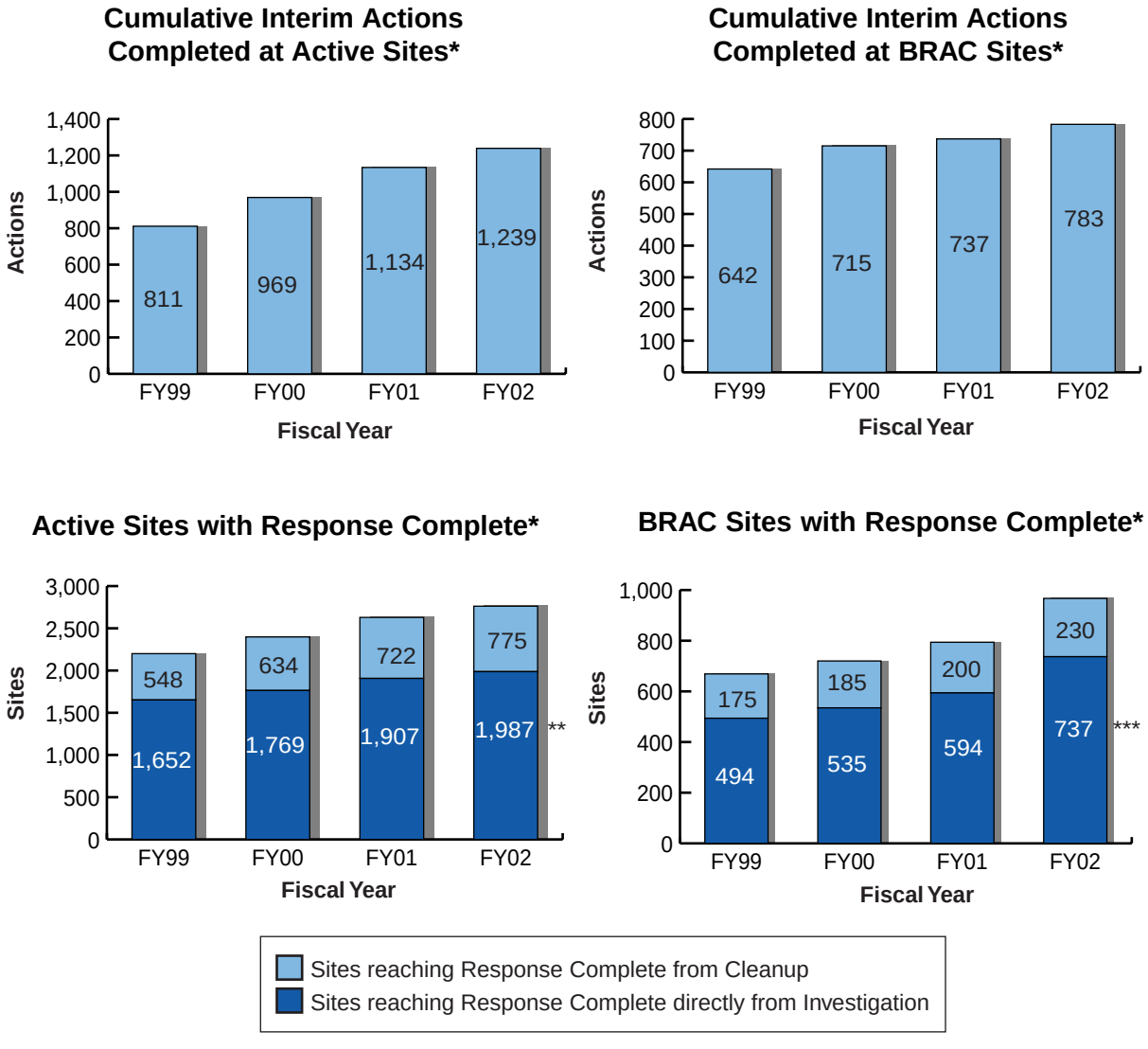


*Excludes MMRP and building demolition/debris removal sites.

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



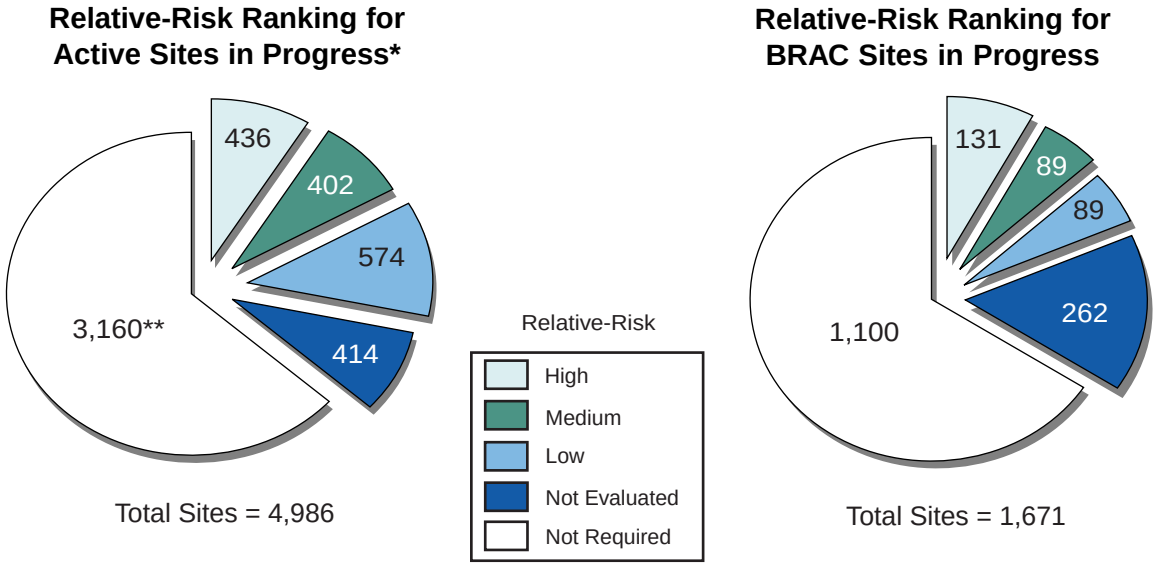
*Excludes locations without environmental restoration sites.



*FY99 through FY01 totals have been updated since the previous Annual Report to reflect new and revised data as of FY02.
**Includes 104 sites that had IRAs conducted prior to the completion of the study.
***Includes 166 sites that had IRAs conducted prior to the completion of the study.

Establishing the Foundation for a Range Cleanup Program

One result of decades of military training and testing of weapons systems is the presence of unexploded ordnance (UXO), discarded military munitions, and munitions constituent (MC) contaminants at other than operational ranges. The presence of these materials may require a military munitions response (i.e., MMRP) to ensure that these areas can be safely put to other uses. Requirements, such as Section 311-313 of 10 U.S.C. 2710, help define the response actions that will form the foundation of the



*Does not include 241 MMRP sites.
**Includes BD/DR sites and sites that have reached Remedy In Place or Response Complete.

MMRP and include the development of a complete inventory of MMRP sites, the assigning of a relative priority for action to each site, and the reporting to Congress of the projected cost estimate for the remediation of the UXO, discarded military munitions, and MCs at MMRP sites. The Air Force has taken several steps in the past year to meet all of these requirements and begin building the MMRP.

As required by the *Management Guidance for the Defense Environmental Restoration Program* (DERP Management Guidance) (Sept 2001), the Air Force completed its inventory of MMRP sites by September 30, 2002. DoD will use this Air Force inventory, along with the Army and Navy inventories, to develop an initial DoD-wide inventory of MMRP sites, as required by Section 311 of 10 U.S.C. 2710.

In an effort to centralize management and reporting functions, the site data from the inventory is being added to the Air Force Restoration Information Management System (AFRIMS), which tracks information on the status and progress of activities at all active installation sites in the DERP. The structure of AFRIMS is in the process of being updated to include a new munitions response module that can store MMRP site data, including—a unique identifier for each munitions response site; a record of the munition response site's location, boundaries, and classification; the type of ordnance present; the extent of known and suspected contamination; and any land use controls

(LUCs) or restrictions. The Air Force has taken action to modify their data collection effort in an attempt to support these new data elements.

During FY02, the Air Force worked with DoD in the development of the munitions response site prioritization protocol, which will be used to assign a relative priority for conducting munitions response activities to each site in the MMRP. After the protocol has been released for public comment and finalized by DoD, the Air Force will apply it to the sites listed in the MMRP inventory.

The Air Force also performed an initial assessment of UXO, discarded military munitions, and MC, which included the calculation of aggregate projected cost estimates for the remediation of Air Force's MMRP sites and operational ranges. The results of this assessment are included in the MMRP chapter of this report.

In addition to satisfying the requirements necessary to start building the MMRP, the Air Force is also in the process of developing several guidance documents that will help shape the MMRP by establishing the programmatic vision and overall goals, setting specific interim goals, and describing the actions necessary to establish the program structure required for success. These documents should be finalized in FY03.

The Air Force is using past success in the IRP to build the framework for a well-structured MMRP, with the vision that this program will make Air Force military munitions response sites safe for reasonably anticipated future use. To achieve this vision, the Air Force has developed and set out a dynamic strategy for satisfying its responsibilities at munitions response sites and will undertake the actions necessary for successful execution of the program in addressing the explosive safety, human health, and environmental hazards presented by these sites.

Focusing on Restoration Program and Contract Performance

In recent years, Air Force has shifted its program focus from concentrating on restoration processes to emphasizing the end result—remediation completion. As such, Air Force has begun to employ the use of performance-oriented tools and techniques, such as performance-based Records of Decision (RODs) and performance-based contracting (PBC).

Shifting Toward Performance-Based Records of Decision

A ROD is a public document that presents the remedial action selected for a site and records the information and rationale used to arrive at the decision. In years past, much attention has been paid to optimizing technical methods used to clean up a site, but the procedural aspects of site cleanup management have often resulted in a net expansion of time and cost to complete. Now, with the focus on increasing program efficiency, the Air Force is exploring the advantages of moving toward performance-based RODs. Performance-based RODs are results-oriented, focusing on achieving a stated level of remediation rather than procedural milestones. This new focus increases efficiency in the overall restoration process, and in FY02 was successfully implemented at Travis and Hanscom Air Force Bases (active installations), and at various Air Force BRAC installations.

Employing Performance-Based Contracting

In its search for the most effective tools for environmental cleanup, the Air Force also looks to the private sector in order to identify industry best practices that may expedite and improve the restoration program. One such tool that has been found to be effective is PBC, in which the Air Force and a private contractor enter into a firm fixed-price contract that is structured so that the regulatory agreement on closure of the site is the contract deliverable. These results-oriented contracts reduce overall cleanup costs, prevent cost overruns for Air Force, and expedite the remediation process by shifting the economic incentive for closure to the contractor, who conducts all environmental restoration services.

In FY02, a PBC was awarded at the former Eaker AFB to close 11 Resource Conservation and Recovery Act (RCRA) sites within 5 years. With this PBC, the Air Force expects a savings in remediation time, as well as reduced manpower requirements for process and document reviews. Also in FY02, the Air Force Center for Environmental Excellence (AFCEE) teamed with Charleston AFB on a PBC to bring a trichloroethylene (TCE) plume and 11 solid waste management units to closure.

In order to continue the effort to increase the efficiency of the restoration program and support the presidential initiative to make greater use of PBC, the Air Force has established a policy that encourages the use of PBC for restoration projects. The policy

establishes the goal of allocating 10 percent of restoration program funds to PBCs in FY03, and 20 percent in FY04.

Continuing Successful Programs

The Clean Sweep Program is an Air Force initiative that performs environmental cleanup and demolishes unsafe, abandoned facilities at Air Force locations throughout Alaska. The Air Force minimizes costs by combining these activities under one mobilization effort and one contract. The program currently includes 29 remote Alaska installations. Clean Sweep work is complete at eight installations and work is in progress at five installations. In FY02, demolition work was completed at Cape Lisburne and Clean Sweep work began at Big Mountain. Additional Clean Sweep work is planned for Cape Lisburne, Big Mountain, and Cape Romanzof in FY03. The Air Force is aggressively pursuing cleanup, building on past successes at the remaining facilities to protect human health and the environment and return the property to useful service to the community.

Delisting Luke Air Force Base from the National Priorities List

Luke AFB in Arizona has the distinction of being the first active Air Force installation to be removed from the National Priorities List (NPL). The NPL was developed to prioritize the nation's hazardous waste sites for cleanup and inform the public about sites that pose the most significant risk to human health, welfare, and the environment.

The base has served as an advanced fighter pilot training station since 1941 and was placed on the NPL in August 1990. Discharges and waste disposal from aircraft maintenance and light industrial operations dating back to World War II resulted in the soil at the base being contaminated with petroleum residues, cleaning solvents, and volatile organic compounds (VOCs).

Taking soil samples from the Luke service station as part of an effort to prevent potential contamination.

In September 1990, the Air Force signed an agreement with federal and state regulators that established the framework required for site investigations and cleanup at Luke. Since then, the Air Force, with U.S. Environmental Protection Agency (EPA) oversight, has treated more than 625 cubic yards of contaminated soil, removed 66,584 gallons of jet fuel that had leaked from underground storage tanks into soil, and established a groundwater monitoring program to detect possible contamination. While no cleanup of groundwater was required, the Air Force is continuing long-term groundwater monitoring to assure that it is not impacted in the future.

During the cleanup process, Air Force made it a priority to ensure that the partnerships established through the agreement remained positive and effective. State and EPA representatives hailed their partnership with the Air Force as a model for how federal and state agencies can work with the military toward successful cleanups. Currently, Arizona and EPA regulators are working with representatives from Luke and the Luke Restoration Advisory Board (RAB) to publish lessons learned from the delisting process, which will be used to assist other Air Force and DoD installations in achieving delisting from the NPL.

The Air Force completed all necessary remedial actions under the Superfund program in 2001 and Luke was officially delisted from the NPL in April 2002, at an overall cost of $19 million. Luke will remain an active Air Force base providing training for F-16 pilots and crew chiefs while providing support for air and space expeditionary forces. The base will be reviewed every five years to ensure that cleanup actions are still protective so that everyone on the base and in the surrounding community lives in a hazard free environment.

Management Initiatives

The Air Force strives to build on restoration program management success by enhancing existing business processes and introducing improved management initiatives. During FY02, the Air Force focused on:

- Implementing sound financial management practices
- Developing policy and guidance documents to meet changing needs and requirements
- Updating information management systems to accommodate new requirements
- Improving the Air Force's internet presence
- Presenting constructive workshops
- Exploring new and alternative technologies to reduce costs and accelerate cleanup.

Implementing Sound Financial Management Practices

Recently, DoD has begun to focus on transforming the way environmental restoration liabilities are tracked in an effort to establish more sound financial management practices. The Air Force strives to develop a better understanding of the status of restoration finances and improve the maintenance of financial documents to avoid inaccurate calculation and unsound financial decisions. As a result, the Air Force is working toward achieving complete disclosure of all of its liability consistent with the DERP Management Guidance, which outlines the requirements for calculating and disclosing environmental liabilities so that financial statements are comprehensive, accurate, and capable of withstanding an audit.

Active Air Force has taken steps to improve the way data is maintained for financial reporting by exploring ways to modify AFRIMS, including the creation of a report that will capture cost-to-complete (CTC) site costs and management costs from the current year through site closeout. Active Air Force Headquarters is also beginning to develop training materials on financial management practices to distribute in the field to ensure that all policies and procedures necessary to meet financial liability requirements are in place.

Similarly, the BRAC program also took steps to meet financial liability requirements, such as conducting training on the use of the Remedial Action Cost Engineering and Requirements (RACER) system. The training gave both installation and headquarters level personnel an enhanced understanding of the RACER system, which will standardize cost assumptions and lead to consistent cost estimates throughout the

Focus on the Field
AIR FORCE

Air Force Captures Five Environmental Awards

The Air Force was a big winner in the Secretary of Defense 2001 Environmental Awards, awarded at the Pentagon on May 1, 2002. Among the honors claimed by the Air Force, including 5 of the 10 awards annually given, were the top pollution prevention program and the best environmental restoration program.

The award for pollution prevention went to the Warner Robins Air Logistics Center at Robins AFB, Georgia, while F.E. Warren AFB, Wyoming, claimed the installation prize for environmental restoration. The individual award for environmental restoration went to Beatrice Kephart of Vandenberg AFB, California. The 45th Space Wing at Patrick AFB, Florida, won in the natural resources conservation category, and the Air Armament Center at Eglin AFB, Florida, won for environmental quality.

"These awards give us a measuring stick for where our environmental programs are within the Department of Defense, and how well we are adhering to DoD directives that are based on public law," said Colonel Jim Holland, Chief, Environmental Division, Office of the Air Force Civil Engineer.

The criteria for the awards are based on what are referred to as the four pillars of environmental policy— natural resources conservation, pollution prevention, restoration and compliance.

Holland stated that the Air Force has adopted a "green" attitude over the past several years, saying that, "one of our main goals is to be a good neighbor. Environmental issues are not only those within the base fence, but outside the base as well. Ultimately we are after the same goal as environmentalists— to be responsible stewards of our environment and natural resources."

Holland stated that in the area of environmental policy, communication plays a major role in giving the Air Force an extra edge. "We communicate very strongly with people and communities around our installations," he said. "We are very proactive and involve them in things we do on the base to keep them fully informed of what we do."

Air Force BRAC program. The agency is working to refine the process and further standardize the supporting documentation and assumptions used for developing future RACER estimates.

Working toward complete liability disclosure has made Air Force even more focused on performance and efficiency not just in their financial management systems, but also throughout the entire restoration program.

Developing Policy and Guidance Documents to Meet Changing Needs or Requirements

During FY02, AFBCA developed a comprehensive management strategy for how it will implement, monitor and enforce Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), institutional controls (ICs) and other LUCs at BRAC Air Force bases. This strategy is designed to respond to DoD's policy concerning the establishment of ICs at closing military installations and the Air Force's own needs in the property transfer process.

AFBCA is requiring each BRAC installation where use of the property is restricted as part of a cleanup decision to develop an IC management plan by December 2003. This management plan is based on a model document which integrates infromation from three submodels—the layering worksheet, communication plan, and the IC tracking model.

The layering worksheet identifies the potential reinforcing mechanisms to ensure the effectiveness of the use restrictions on the property, and the key state and local entities involved in decision-making affecting the property. The communication plan describes how at each base the Air Force will communicate initial and subsequent information about IC requirements to those who own affected property, to the key stakeholders identified in the layering worksheet, and to the community. Using the IC tracking model, AFBCA has created a web-accessible database for each installation on its Web site. This database contains both a real property and environmental identifier, types of use restrictions established, monitoring frequency and status, and other relevant information. The database is meant to be accessed by the public and by regulators.

Focus on the Field
AIR FORCE

Luke Air Force Base Wins Environmental Award

Luke AFB's environmental program was recognized for excellence on June 6, 2002, when the EPA presented it with a 2002 Environmental Achievement Award. Luke, which was the first active Air Force installation to be removed from the NPL, was one of 35 western organizations presented an award by Mr. Wayne Nastri, EPA Regional Administrator, at the fourth annual EPA Region 9 Environmental Awards program in San Francisco, California. The groups and individuals recognized were selected from more than 100 nominations.

"Getting this award is another great example of how Team Luke's dedication and care for the people and the environment lives on to make things better for the future of Luke and the surrounding community," said Brig. Gen. Steve Sargeant, 56th Fighter Wing commander.

Air Force environmental staff were presented the 2002 Environmental Award by EPA staff at EPA Region IX Headquarters in San Francisco.

For three years, Luke has maintained a reclaimed wastewater reuse permit allowing the installation to reuse more than 500,000 gallons of water per day to water the base golf course, base parks, and athletic fields. These uses, in combination with the new base golf course, will allow Luke to become a zero discharge base during the summer months, according to Mr. Charles Rothrock. A lot of solid waste is generated at Luke and is processed daily to help keep the cost down and help the environment.

In addition, the cost of Luke's solid waste program has been reduced by more than a $1 million over the last two years through profits generated by selling recyclable materials, and through cost avoidance resulting from alternatives to landfill disposal. The base has expanded its recycling program for glass, used motor oil, aircraft tires, and plastics, making Luke's glass-recycling program the first of its kind in DoD. "It's a compliment to everyone on-base that recycles, participates in a vanpool, or rides a bike to work, and thinks environmental stewardship in the way they go about their work," Mr. Rothrock said.

"This EPA award validates the accomplishments of Team Luke in the environmental business," Mr. Rothrock said. "It's recognition of a program that not just meets the standards of environmental compliance, but a program that exceeds and sets the benchmark."

The Active Air Force is also working on the development of several new policy documents, including the revised Air Force Environmental Restoration Program Management Guidance. The new Management Guidance will be updated to include sections on military munitions response, military construction, and CTC and financial liability reporting.

Updating Information Management Systems to Accommodate New Requirements

Currently, AFRIMS serves as the primary tool for collecting, storing, tracking, and reporting information on the status and progress of the active Air Force's environmental restoration program. During FY02, efforts were taken to transition to a web-based system. In line with this effort, the Air Force Civil Engineer began to develop the Automated Civil Engineering System Environmental Module (ACES-EM), an integrated information management tool that will be accessible through the internet and will support a full range of installation-level environmental operating responsibilities that could not be done in AFRIMS.

Advantages of the migration from AFRIMS to ACES-EM include:

- ACES-EM will streamline the data collection process and improve data sharing
- ACES-EM will be used as a tool to better manage the program, not merely to track data
- Data will be fully integrated with all other source systems comprising ACES.

RACER serves an important function as the primary tool for preparing programming cost estimates for environmental remediation, which is used to annually update the estimates of all restoration projects.

The latest version of this system, RACER 2002, was released in March 2002. Enhancements to the system included the incorporation of UXO and residual waste management models and updates to several existing technologies. RACER 2002 will also help move the Air Force into compliance with the CFO Act requirements and increase the efficiency of the cost estimating process. The system includes new audit

documentation models, which retain information for items such as the administrative record, 5-year reviews, and site close out.

Improving the Air Force's Internet Presence

One of the most significant additions to the active Air Force Web page in FY02 was the capability to collect some of the information for this report. Installation-level personnel were able to review and edit installation narratives and submit data used in the appendices and this chapter. In future years, additional capabilities will be added to the Web site to make data collection even more efficient and information more readily accessible.

ILEVR
http://www.il.hq.af.mil/ile/ilevr.html

In FY02, several documents were added to the AFBCA Web site to enhance the efficiency of the program and increase access to program information. These documents include multiple AFBCA LUCs/ICs model templates which finalize previous draft guidance to better respond to recent changes and challenges, as well as a summary of the changes in the DERP Management Guidance, and the effect of these changes to the BRAC environmental restoration program. In addition, the AFBCA Web site was used to distribute Annual Report to Congress installation narratives to POCs for review and comment prior to inclusion in this report.

AFBCA
http://www.afrpa.hq.af.mil

Presenting Constructive Workshops

During May of this year the United States Headquarters Air Force Environmental Restoration Branch hosted the Air Force Environmental Restoration (ER) Workshop in New Orleans, Louisiana. The Air Force's ER Workshop brought together members of the restoration community in order to highlight the Air Force's restoration progress, to identify and address any concerns pertaining to the restoration program, to present and promote dialogue on recent and future restoration challenges, and to discuss possible solutions to these challenges.

The 5-day workshop covered topics such as perchlorate, PBC and privatization, and also included breakout sessions that addressed CTC and financial liability, remedial process optimization (RPO), ranges, the Department of Defense and State Memorandum of

Agreement (DSMOA) program, and military construction. Participants used the opportunity to discuss current issues with other Air Force personnel, especially Air Force leadership, and felt the workshop covered extremely relevant and timely issues being faced by people in the field and at the installation level.

The Air Force ER Workshop in New Orleans was a great success.

The Air Force BRAC program held their 2002 Annual AFBCA Workshop in the spring of this year. This 3-day event brought together members of the Air Force BRAC community to discuss current issues and program progress. This year, in addition to the traditional real estate and environmental sessions, the session topics were expanded to include financial management, LUCs, privatization, and alternative contracting methods.

Exploring New and Alternative Technologies to Reduce Costs and Accelerate Cleanup

As the restoration program evolves, the focus has shifted from planning restoration approaches to actually implementing designed remediation actions and operational procedures. One of the most important elements in implementing remediation is the technology used to treat contamination. The Air Force emphasizes low-tech, cost effective technological solutions, such as permeable reactive barriers (PRBs), diffusion samplers, and process improvements, while ensuring remedies remain protective of human health and the environment.

Permeable Reactive Barriers

The Air Force recently installed the longest PRB to date to treat groundwater contamination at the former Carswell AFB, in Fort Worth, Texas. The PRB consists of a trench that measures 2 feet wide, 40 feet deep, and more than 1,100 feet in length and is filled with reactive media made up of a 50-50 mix of iron filings and sand. As the groundwater naturally flows through the barrier, the iron media chemically reacts with the contaminants so that clean water exits the barrier.

This relatively new technology, while not high-tech in nature, has proven highly effective in previous smaller tests, producing cleanup rates greater than 99 percent. Since the PRB is expected to be just as effective at the Carswell site, the Air Force was able to shut down an expensive groundwater pump and treat system that has been in place since 1991, resulting in substantial savings to the Air Force and taxpayers. Other advantages of this technology include little or no maintenance after installation, no energy source requirement to operate, and once installed, the land above the barrier is unobstructed so that it can be used for any purpose.

The Air Force will track the results of this project and issue a report documenting the effectiveness of PRBs to determine if such barriers might be useful at other sites with similar groundwater contamination.

Diffusion Samplers

During FY02, the Air Force continued the demonstration and implementation of passive diffusion bag samplers (PDBSs). The PDBS is an inexpensive, disposable technology that is easy to use and results in lower groundwater sampling costs. Several BRAC installations employed the use of PDBSs, including Wurthsmith AFB, Grissom AFB, Pease AFB, and Cape Canaveral Air Force Station, where regulators approved the technology for conducting long-term monitoring of VOCs in groundwater. Data from PDBSs is being compared with traditional sampling techniques to ensure consistency and validity.

Remedial Process Optimization

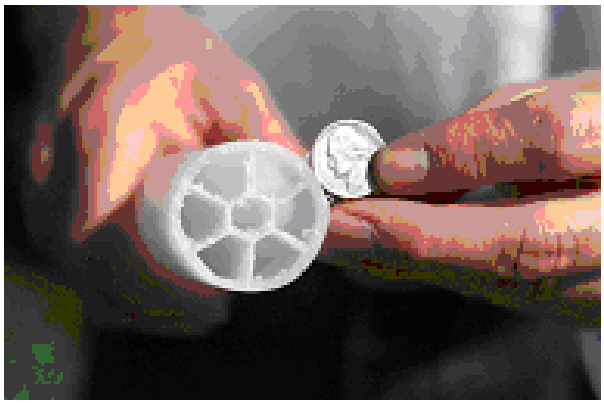
Along with employing the most cost effective and efficient remediation technologies, the Air Force also focuses on improving technologies that are already in place. RPO is the technical evaluation of a cleanup remedy to optimize operation, accelerate contamination reduction, and reduce operating time and costs. The RPO process evaluates the technical aspects of the remediation process with regard to scientific advances and regulator changes.

RPO Handbook
http:// www.afcee.brooks.af.mil/er/rpo.htm

Focus on the Field
AIR FORCE

Multi-Level Monitoring Wells Expedite Site Restoration Activities

A new technology allows monitoring of multiple zones at an environmental restoration site using one well installation. This technology, referred to as multi-level well technology, provides numerous advantages over conventional, "single-interval" wells. One primary advantage is that one multi-level well can replace up to seven individual wells. Multi-level wells require less site disturbance, generate fewer drilling wastes, and less installation time. The reduction in installation time has two positive effects—lowering the rental fees on drill rigs and lowering the labor time requirements for drillers, supervisors, and geologists. As a result of time and labor savings, multi-level wells are a much lower cost option, in some cases being approximately one-fourth the cost of installing seven individual wells.



This cross-section of a typical multi-level well tube shows the seven individual water flow channels and the overall tube size.

Additionally, multi-level wells offer added technical advantages. For example, these wells enable investigators to achieve sampling from narrow discrete subsurface zones instead of the ten-foot zone typical of conventional wells. Narrow characterization zones enable focused examination of groundwater conditions in specific areas. By measuring water levels in individual well channels within a single multi-level well installation, one can determine direction of vertical flow of groundwater in the area of the multi-level well. This information aids in development or refinement of site conceptual models of groundwater contamination and transport.

At Robins AFB, six multi-level monitoring wells have been installed as part of the restoration project at the Horse Pasture site. These six wells are providing the same level of monitoring capability as a conventional installation of 30 single-interval wells would provide.

Time savings on the Horse Pasture project installation were impressive. The six multi-level wells were installed over a 15-day period, whereas conventional wells would have required approximately 45 days. With equipment rental time savings and associated reduced personnel costs, Robins AFB saved approximately $65,000 by applying this innovative technology at the Horse Pasture site.

During FY02, the AFBCA RPO team visited a total of six NPL BRAC bases in California. At McClellan AFB, RPO recommendations resulted in the groundwater treatment plant changing the treatment method and quantity of sampling at the base. The final result of this RPO effort will be the elimination of air pollution as a result of the water treatment process changes, as well as savings in systems operations and management over the life of the system.

Partnering and Outreach

Relationships with regulatory and public stakeholders are a critical part of the Air Force environmental programs and an important step toward sustaining Air Force operations. In order to gain valuable insight and assistance in protecting the environment and supporting military readiness, the Air Force builds productive partnerships with federal, state, and local agencies, and works with the community to foster partnerships characterized by open communication and collaborative problem solving.

Partnering with the Community to Build Cleanup Success

The community has played an important role in site cleanup at the former Kelly AFB in Texas. Most recently, Kelly AFB has endeavored to address public health concerns by building a community-based solution.

To address public health concerns, AFBCA has established a successful collaboration with the City of San Antonio (COSA). Through a recent cooperative agreement (CA) signed between AFBCA and COSA, AFBCA will make money available to the city over a 10-year period. This money will be used to establish and run the Public Center for Environmental Health (PCEH), which will conduct health studies to determine if environmental contaminants may be related to human health concerns in the Kelly community. These health studies will help the Air Force evaluate its environmental cleanup at Kelly with regard to the potential effect on public health.

AFBCA has also created the Kelly Health Information Office (KHIO), which is a central location where the public can get information regarding environmental health issues associated with the former Kelly AFB. KHIO coordinates Air Force health initiatives and studies associated with Kelly, works closely with various health

organizations, and identifies future Air Force environmental health resource and policy needs. KHIO is overseeing the PCEH, and will work closely with the PCEH staff to ensure that their studies will ultimately provide the Air Force with the appropriate data to evaluate cleanup.

Technology-Focused Partnerships

During FY02, the Air Force has continued to partner with others to help accelerate the acceptance and implementation of innovative, cost-saving technologies to expedite cleanup. One example is the establishment of the Diffusion Sampler Information Center Web site that was collaboratively developed in FY02 by the Interstate Technology Regulatory Cooperation, Air Force, Navy, the EPA, U.S. Geological Survey, and private industry. This site is intended to disseminate information on the deployment and appropriate application of PDBSs through technical reports and papers, guidance documents, lessons learned, and presentations.

Diffusion Sampler Information Center

http://diffusionsampler.itrcweb.org/common/default.asp

Internet Outreach

At an awards ceremony in March 2002, AFCEE's Web site received the Air Force's "5-Star Award" for 2001 as the Service's best public Web site of the year. The site was selected for its ease of navigation, design, layout, appeal to the general public, and the relevancy of information to the organization's mission. The home page will now feature the 5-Star Award designation, showing visitors that the site is the Air Force's top public Web site.

Funding

The Air Force's ability to effectively plan and conduct cleanup activities depends on receiving predictable, stable funding from year to year. As a result of several years of stable funding, the Air Force was able to meet its FY02 goals ahead of schedule. Level funding will also be required to meet the next goal since funding variations can disrupt negotiated schedules and result in delays in attaining program goals.

Focus on the Field
AIR FORCE

Hill Air Force Base Partners with Stakeholders to Accomplish Cleanup Goals

One major accomplishment at Hill AFB involves plans to shut down a cleanup system located off-base at Operable Unit 6. An extraction system in place for several years to remediate trichloroethylene (TCE) contamination in a nearby community has proven successful in reducing the contamination to below the drinking water standard of 5 parts-per-billion (ppb). The current average monthly TCE concentration at the site has dropped to 2.2 ppb. Upon site closure, the annual operation and maintenance cost savings for the Air Force will be approximately $50,000.

The Restoration Division Chief for Hill AFB speaks to members of the RAB at an area overlooking Operable Units 1 and 2.

Restoration personnel at the base also implemented a unique approach to contain contaminated groundwater at another site that has proved to be very promising. By using phytoremediation, which involves the use of trees and plants to draw contaminated water from the ground, Hill's environmental staff was able to eliminate a regulatory requirement for a $6.8 million groundwater treatment system.

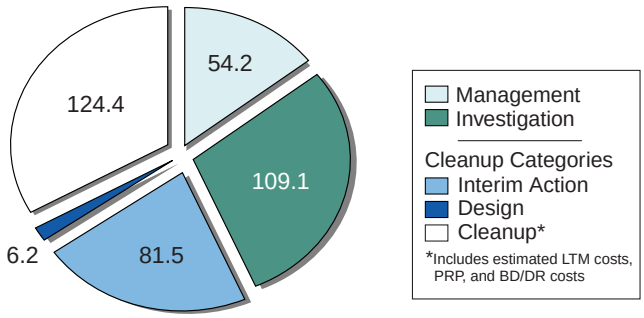
At another site managed by Hill's restoration team, a contractual agreement with a local sewer district averted the high cost off-base groundwater treatment from containment system saving $80,000 a year and $3.8 million over the life of the program.

Restoration and public affairs personnel aggressively worked with the local media and community members to keep them abreast of the various cleanup actions. An unprecedented 20 updates were given to 7 different city councils. In addition, Hill's Restoration Advisory Board (RAB) helped maintain a level of confidence among community members by taking on key roles as community liaisons and keeping citizens informed about complex cleanup issues. RAB members also responded to key issues by being involved in special work groups formed specifically to address concerns such as risk, property values, clean up methods, and outreach.

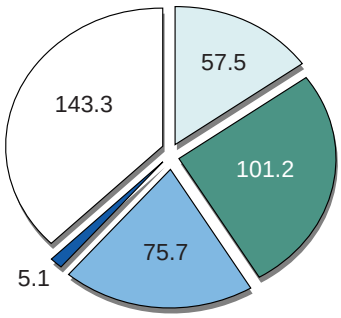
Within the restoration program, the ability to execute available funds for site cleanup is a strong indicator of overall program progress and success. In FY02, the Air Force's active installations obligated $382.8 million in environmental restoration funds (see funding profile on page 163). Investments will increase to $387.7 million in FY03. In

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

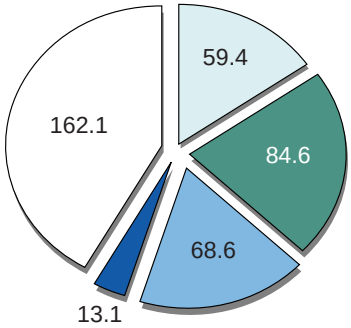
FY01 Air Force Funds Obligated
Total = $375.5 million



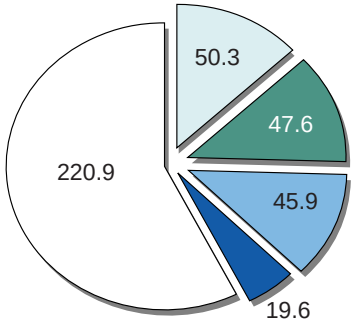
FY02 Air Force Funds Obligated
Total = $382.8 million



FY03 Air Force Execution Planned
Total = $387.7 million

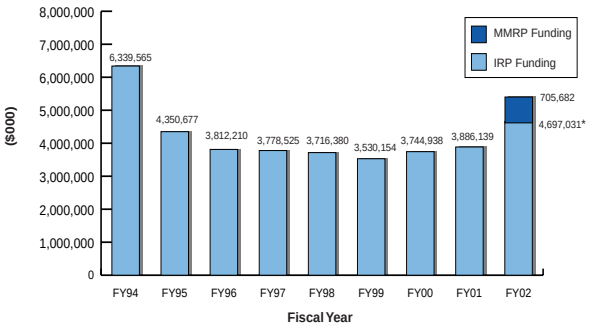


FY04 Air Force Planning Estimate
Total = $384.3 million

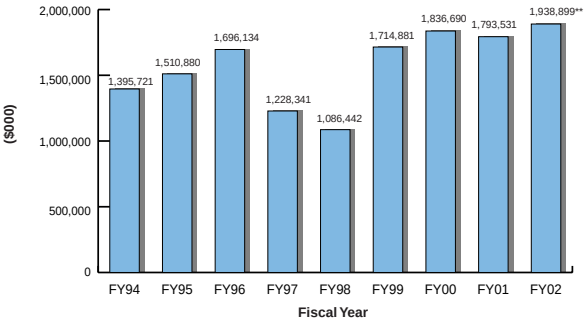


Due to rounding, category subtotals may not equal fiscal year totals.

Air Force ER Cost-to-Complete Trends
(in $000)



Air Force 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.

*127 new sites were added to the program in FY02. RACER estimating and revised LTM projections have increased cost-to-complete. Cost of NE sites reported in previous years in Figure B-3, are included in the FY02 cost-to-complete.

**Additional contamination has been found, the remediation period has lengthened and the use of RACER estimates has provided more accurate figures.

FY02, the Air Force spent approximately 56 percent of its restoration funds on design work, interim or final cleanup actions, and LTM. This percentage is expected to increase to 63 percent in FY03 and 77 percent in FY04.

AFBCA invested $217.0 million in environmental restoration in FY02. The planned investment for FY03 is $124.1 million. Historical totals for both Air Force programs are displayed in the cost to complete trends charts on page 163.

Challenges for the Future

It is clear from the successes of past years that the Air Force's environmental restoration programs have helped and maintained military readiness. The challenges Air Force will face in the future will require innovative solutions based on comprehensive results-oriented management, good business practices, and an informed open dialogue with stakeholders. The Air Force has worked hard to build the successful restoration program that it has today and will continue to work hard to ensure the program will meet future environmental challenges.