

INSTALLATION RESTORATION PROGRAM FY02 STATUS AND PROGRESS



Cleaning up past contamination is critical to sustaining the lands we hold in the public trust.

— **Raymond F. DuBois, Deputy Under Secretary of Defense
(Installations & Environment)**

DoD's well-established Installation Restoration program (IRP) category addresses the environmental impacts of hazardous substances remaining from past practices on Department of Defense (DoD) installations and former properties. The considerable size of the Defense Environmental Restoration Program (DERP), particularly the IRP—in terms of number of sites and time to complete—requires extensive resources, comprehensive planning, and rigorous oversight. To keep the program on track and measure its progress, DoD developed program and performance measures goals for IRP sites and projects. These program goals focus on getting remedies in place and completing needed cleanup requirements at sites. To assess progress in meeting these IRP goals, DoD established performance metrics, called measures of merit. Each year the Department measures and evaluates progress in relative-risk reduction, phase progress, remedy in place (RIP) and response complete (RC) progress, and making acreage at base realignment and closure (BRAC) property environmentally suitable for transfer.

DoD sets program goals for its IRP sites at active installations and formerly used defense sites (FUDS) properties according to site relative-risk categories, DoD's system for prioritizing work and allocating restoration resources. These categories are discussed later in this chapter. At active installations within the IRP, DoD aims to have remedies in place or to achieve RC status at:

- ✦ 50 percent of high relative-risk sites by end of Fiscal Year 2002 (FY02)
- ✦ All high relative-risk sites by end of FY07
- ✦ All medium relative-risk sites by end of FY11
- ✦ All low relative-risk sites by end of FY14.

For FUDS properties, all low relative-risk sites are to be completed by the end of FY20.

DoD was successful in achieving its FY02 goal of RIP or RC at 50 percent of its high relative-risk sites, reducing its inventory of high relative-risk sites by 58 percent. DoD anticipates meeting its FY07 goal through increased regulatory cooperation and more accurate planning, programming, and budgeting.

In fulfilling its cleanup obligations at BRAC installations, DoD considers the planned reuses either within the Department or by other parties. For this reason, BRAC installation goals are different from those for active installations. DoD is working to achieve RIP or RC at 100 percent of its BRAC installations by end of FY05.

DoD classifies BRAC property in seven categories to describe the property's environmental condition. Acreage in Categories 1 through 4 is suitable for transfer under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Acreage in Categories 5 through 7 requires some cleanup or evaluation. Stable, adequate funding is required if DoD is to attain the FY05 program goals. Additional information regarding BRAC acreage is provided in Appendix E of this report.

Focus on the Field



FUDS

Historic Buckley Field Arctic Training Center No Longer Poses Threat to Echo Lake Mountain Park Visitors

A cooperative, multi-agency effort achieved the successful removal of an environmental hazard from Echo Lake Park, one of Colorado's notable scenic and historic areas. During summer 2002, the U.S. Army Corps of Engineers (USACE), the Colorado Department of Public Health and Environment (CDPHE), the City and County of Denver, and the U.S. Environmental Protection Agency worked together to clear the park of contamination from two abandoned World War II-era dump sites.



Debris found in Echo Lake Mountain Park prior to removal actions

Once part of the Buckley Field Arctic Training Center, the abandoned dump sites consisted of two open dump areas located several hundred yards down-slope from a park picnic area. A site investigation completed in 1996 indicated that the dump sites contained potentially hazardous substances, including petroleum chemicals and motor oil. Because the sites were easily accessible to hikers, the CDPHE asked that USACE clean up the area through the Formerly Used Defense Sites program and remove all debris and suspected contaminated soil from the site.



Cleanup and removal actions underway at Echo Lake Park

Cleanup occurred over just three months, and all trash, debris, and contaminated soil were removed from the site. Sampling following cleanup indicated that the area no longer poses a threat to park visitors. The cleanup—with regard to both protection of human health and the environment and multi-agency partnering—is considered a great success.

The Environmental Restoration Process

DoD installations and properties vary greatly in size and function. An installation may encompass thousands of acres and may contain industrial operations, office and commercial buildings, training ranges, runways, housing units, forests, or other pristine locations. These installations and properties generally contain only small areas of localized contamination within their boundaries, with no contamination impacting the remaining land. DoD terms these contaminated areas “sites” (except the FUDS program, which refers to these areas as “projects”). Defining these discrete parcels of land provides the Department with a more effective approach to cleanup through tracking and managing the DERP on a site-by-site basis.

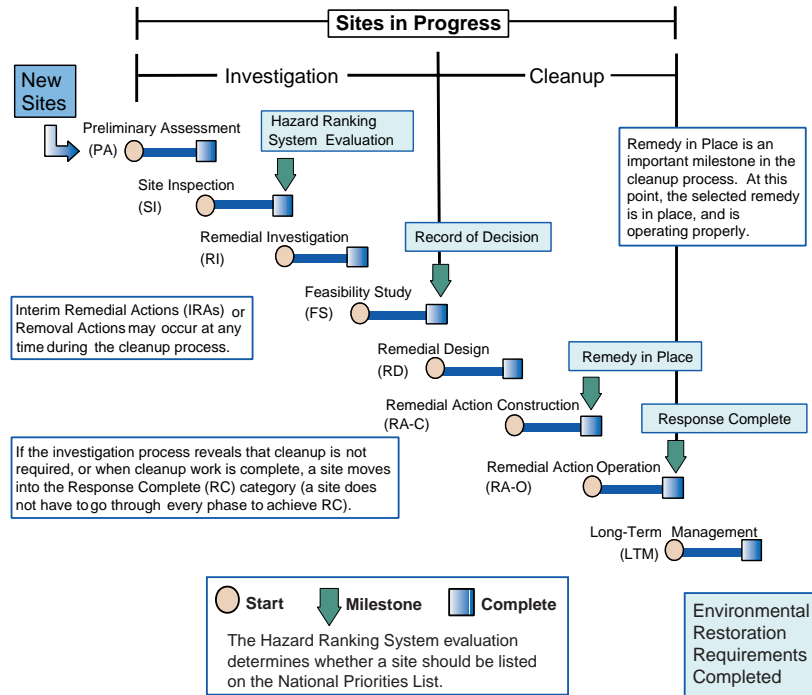
CERCLA, as amended, is the primary legal authority governing cleanup activities at DoD installations and properties. The cleanup actions at each DoD installation and FUDS property, therefore, adhere to the requirements of the response process outlined in CERCLA and its implementing regulation, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This response process consists of several phases, as illustrated in Figure 11. While some phases may overlap or occur concurrently, response activities at DoD sites are generally conducted in the order shown.

Investigation

When the presence of contamination is suspected at a site, DoD begins the investigation process by conducting a preliminary assessment (PA). The PA typically is a limited-scope investigation to determine whether or not a chemical release has occurred, and further investigation is warranted. A PA may include installation or property document reviews, visual site inspections, and interviews with installation or property personnel. The site inspection (SI) generally involves collection of additional information data to help DoD decide whether or not environmental restoration activities are necessary. DoD may determine during the SI that the site poses no risk and requires no further action.

If findings of the PA/SI indicate the site requires additional investigation, DoD will conduct a remedial investigation (RI). The RI involves more comprehensive data collection at the site, such as collection and analysis of soil and groundwater samples.

**Figure 11
Environmental Restoration Process Phases and Milestones**



Using these data, the Department assesses the nature and extent of the potential risks posed by the contamination. DoD then evaluates whether cleanup is required and, if required, examines the merits of various cleanup options and determines the best practical strategy for its cleanup response. This is the feasibility study (FS). The completion of the investigation phase is documented in a Record of Decision (ROD) or equivalent decision document. DoD records the results of its investigation activities, including the selected cleanup strategy and remediation objectives it will reach, in the ROD. The ROD may also document that no further action will be taken, if DoD determines that the site poses no risk to human health or the environment. Under this process, sites reaching a no further action determination are considered to be RC.

Cleanup

If DoD determines that action beyond the investigation portion of the environmental restoration process is required, the cleanup segment begins to implement the chosen remedy for the site. This stage comprises remedial design (RD) and remedial action

construction (RA-C), and may include remedial action operation (RA-O). If required, operation of the remedy continues until the cleanup objectives required by the ROD for that site have been met. Some sites may require a review of the remedial action at least every five years after the remedial action is initiated. These reviews are performed to ensure that the remedy is functioning as designed and that any necessary operation and maintenance activities are taking place.

There are two important DoD environmental restoration milestones in the cleanup portion of the process. The RIP milestone marks the point at which DoD has completed constructing the remedy, and the remedy is in accordance with the cleanup objectives. The RC milestone is reached when all cleanup objectives specified in the site's ROD or decision document have been met. After reaching the RC milestone, a site may require long-term management (LTM) activities to ensure the implemented remedy remains effective. This phase, formerly called long-term monitoring, includes environmental monitoring, review of site conditions, and/or maintenance of a remedial action to ensure that the established remedy continues to meet the objectives prescribed in the ROD. DoD is committed to ensuring human health and the environment are protected at all sites.

Restoring the Environment Measure by Measure

DoD uses several metrics to determine the progress of IRP sites as they advance through the environmental restoration process. Reviewing phase progress—the number of sites that are undergoing investigations or cleanup or that have achieved RC—is one metric DoD uses to determine how well the environmental restoration process is progressing. An increase in the number of sites moving from investigation to cleanup to RC indicates program progress. The overarching DERP goal is for each site to move through the appropriate environmental restoration phases and complete all cleanup requirements.

Figures 12, 13, and 14 highlight the site status of all IRP sites at active installations, BRAC installations, and FUDS properties, respectively. Sites are classified according to their end-of-year FY02 status, and are listed as undergoing investigation or cleanup (i.e., in progress), awaiting future work, or having achieved RC status. DoD has made

significant, continual progress in reaching RC. During FY02, DoD achieved RC at an additional 896 sites and projects, indicating a continuing commitment to fulfilling its environmental restoration goals. As shown in these figures, DoD had achieved RC at 73 percent of active sites, 75 percent of BRAC sites, and 58 percent of FUDS projects by the end of FY02. In total, DoD has achieved RC at 72 percent of IRP sites, an increase of 2 percent from FY01.

Many sites achieve RC directly following investigation activities, when it is determined that the site poses no risk to human health and the environment. As shown in Figures 15, 16 and 17, 77 percent of active installation sites and FUDS projects have achieved the RC milestone through investigation only, while 73 percent of BRAC installation sites achieved RC in this way. Most sites

Figure 12
Active Installations Overall IRP Site Status*
(as of September 30, 2002)

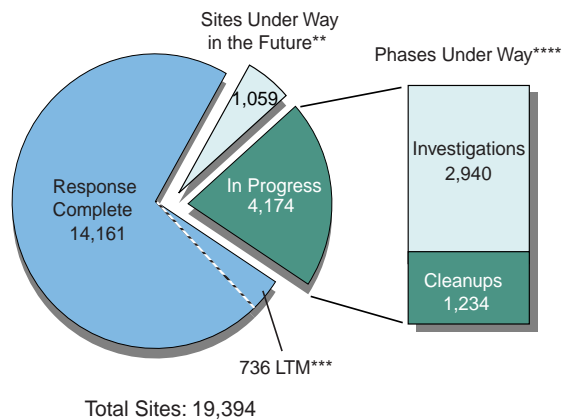


Figure 13
BRAC Installations Overall IRP Site Status*
(as of September 30, 2002)

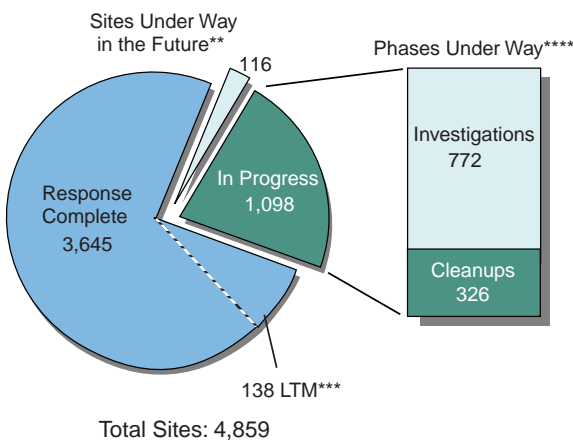
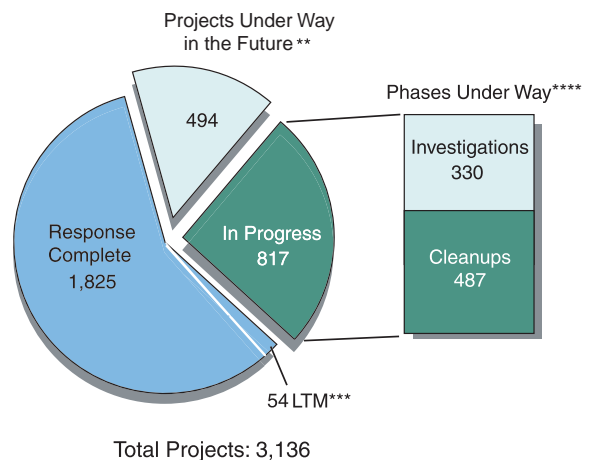


Figure 14
FUDS Properties Overall IRP Project Status*
(as of September 30, 2002)



*Includes incidental munitions work (i.e., non-MMRP)

**Includes sites with future preliminary assessment starts planned and 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.

reach RC through investigation. In recent years, the ratios between RC through investigation versus cleanup have been declining.

Interim actions, which may be either interim remedial or interim removal actions, are vital methods of mitigating immediate risks to human health and

Figure 15
Active IRP Sites with Response Complete*

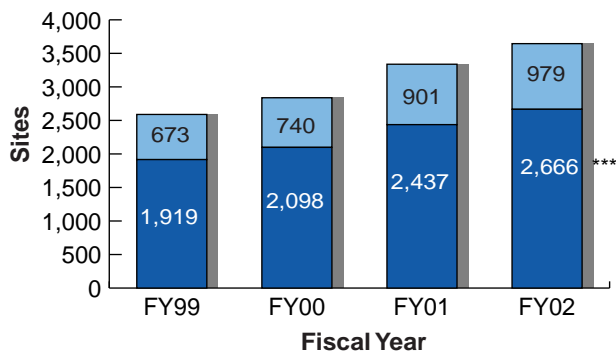
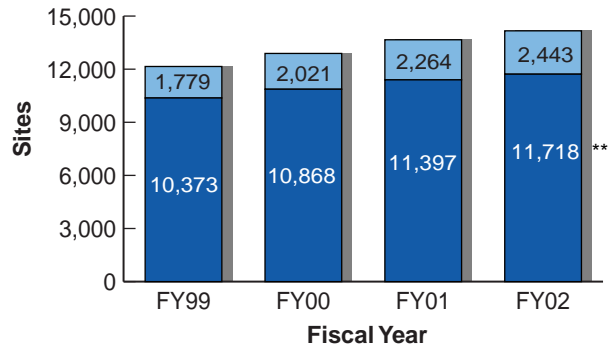
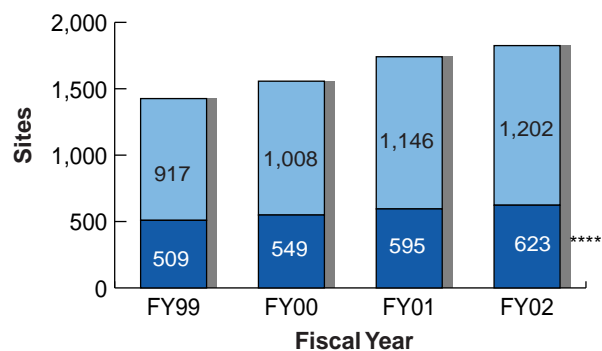


Figure 16
BRAC IRP Sites with Response Complete*

Figure 17
FUDS IRP Projects with Response Complete*



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

*FY99 through FY01 totals have been updated since the previous Annual Report to reflect new and revised data as of FY02.

**Includes 504 sites that had IRAs conducted prior to the completion of the studies.

***Includes 349 sites that had IRAs conducted prior to the completion of the studies.

****Includes 8 projects that had IRAs conducted prior to the completion of the studies.

Focus on the Field

DLA



Defense Distribution Depot San Joaquin-Sharpe Completes Key Milestone Toward Cleanup

Installation personnel at the Defense Distribution Depot San Joaquin (DDJC)-Sharpe have achieved a key soil remediation milestone by using soil vapor extraction (SVE) to remediate soil contaminated with trichloroethylene (TCE), a volatile organic compound. DDJC-Sharpe completed and documented the successful SVE effort in an approved remedial action report published in early 2002. In coordination with the regulatory agency remedial project managers, DDJC-Sharpe environmental managers prepared the installation-wide preliminary closeout report, which documented the closeout of 5 SVE sites, 4 soil removal sites, 1 institutional control area, and 92 no further action sites. The report also documented that all soil remediation required under the federal facility agreement and other activities associated with the soil remedial actions are complete. This achievement is a significant milestone and confirms that the State of California and the Environmental Protection Agency Region IX agree with DDJC-Sharpe's determination that soil cleanup is complete.



Soil contaminated with TCE undergoes remediation through soil vapor extraction

the environment. Interim actions are typically short-term, and can be implemented at any point in the environmental restoration process. In some cases, these quick responses can eliminate or sufficiently reduce risk at the site, so that no further action is needed. Figures 18, 19, and 20 display the number of cumulative interim actions completed at active and BRAC installation IRP sites and FUDS projects. As of the end of FY02, 5,769 interim actions had been completed at DoD sites and FUDS projects to address immediate concerns. Of that amount, 4,076 were implemented at active installation sites, 1,574 were performed at BRAC installation sites, and 119 were completed at FUDS projects.

Another measure DoD uses to monitor its progress is achievement of RIP/RC at the installation and property level. A DoD installation or FUDS property achieves RIP or RC status when every site or project at the installation or property has all remedies in place or has reached RC. By the end of FY02, DoD had achieved RIP or RC at 71 percent of its installations and properties. This represents 76 percent of active

Figure 18
Cumulative Interim Actions Completed at Active IRP Sites*

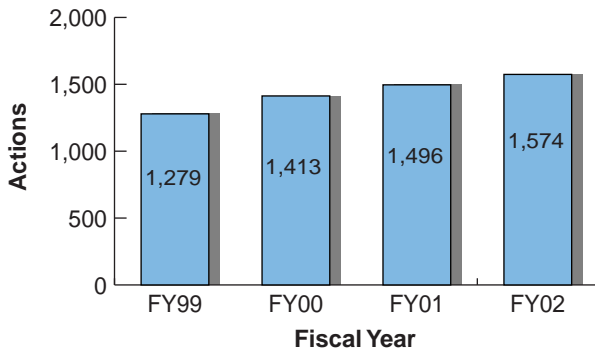
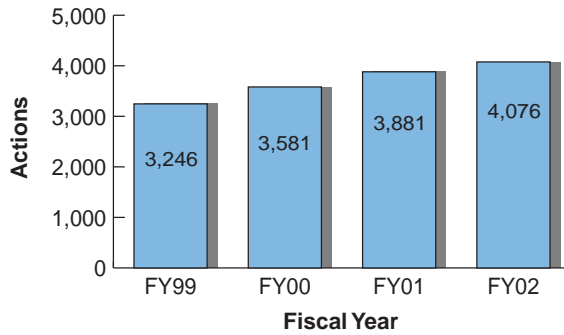
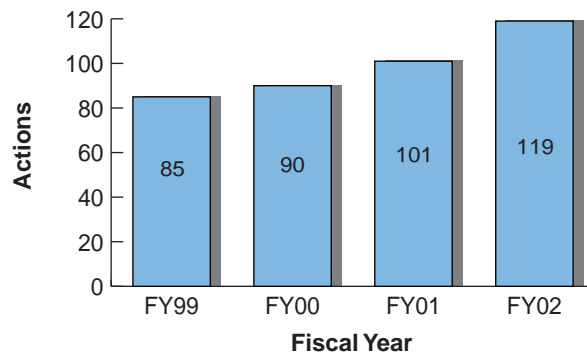


Figure 19
Cumulative Interim Actions Completed at BRAC IRP Sites*

Figure 20
Cumulative Interim Actions Completed at FUDS IRP Projects*



*FY99 through FY01 totals have been updated since the previous Annual Report to reflect new and revised data as of FY02.

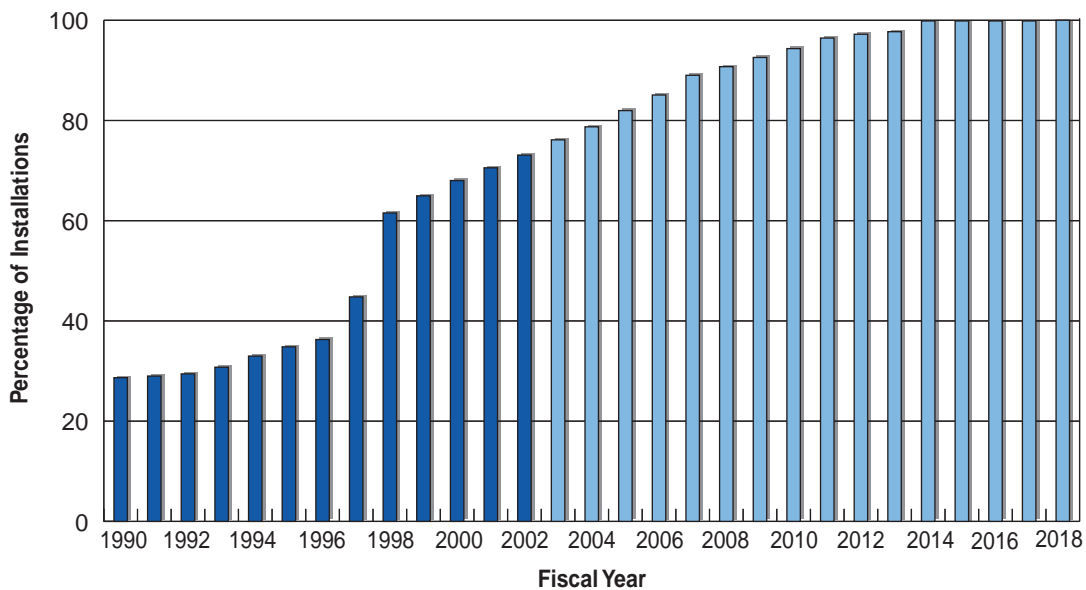
installations, 60 percent of BRAC installations, and 52 percent of FUDS properties. Figures 21, 22, and 23 display DoD’s expected RIP/RC completion trends.

Preparing for the Future

A program that encompasses more than 27,000 IRP sites and projects across the country and U.S. territories requires considerable resources. Not every site can be remediated simultaneously, which means that careful consideration and planning are required to prioritize sites for action. DoD aims to address all sites, but places emphasis on addressing first the sites that pose the greatest risk to human health and the environment.

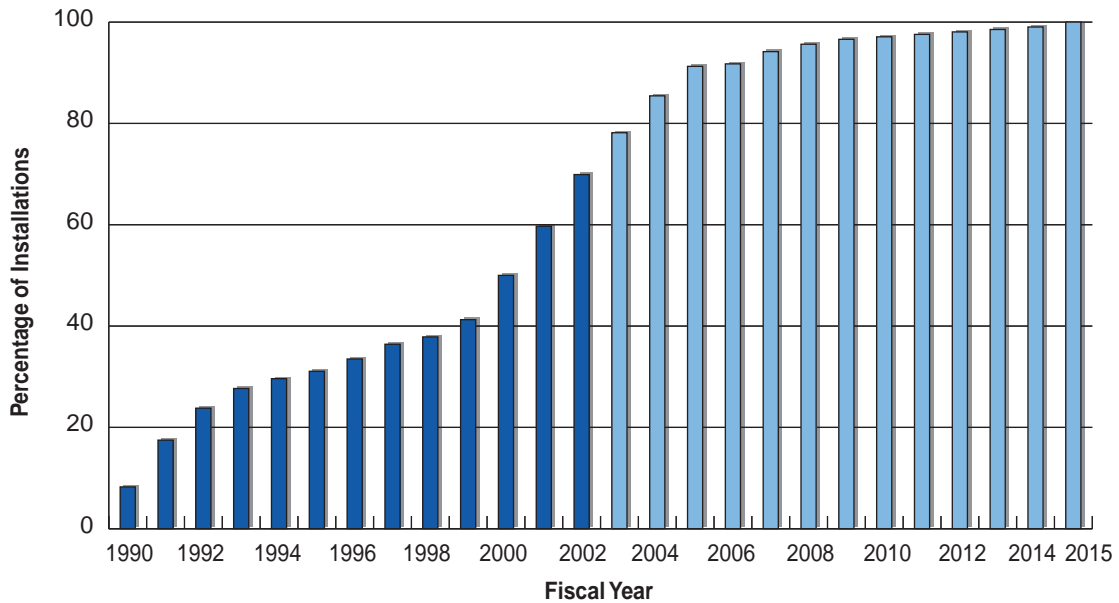
To this end, DoD developed the Relative-Risk Site Evaluation (RRSE) framework, which evaluates the risk posed by each site relative to all other sites within the DERP. The environmental restoration goals of the DERP are directly linked to the RRSE

Figure 21
DoD Active Installations Achieving Final Remedy in Place or Response Complete at All IRP Sites*
 (cumulative and projected, FY90 through completion)



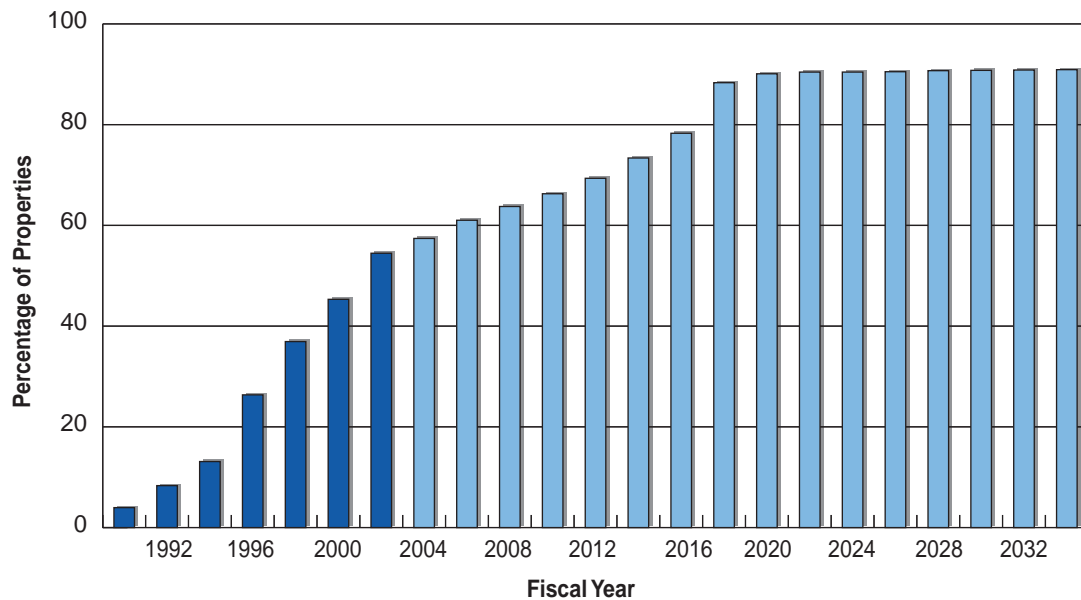
*Does not include MMRP sites or building demolition and debris removal sites.

Figure 22
BRAC Installations Achieving Final Remedy in Place or Response Complete at All IRP Sites*
 (cumulative and projected, FY90 through completion)



*Does not include MMRP sites.

Figure 23
FUDS Properties Achieving Final Remedy in Place or Response Complete at All IRP Sites*
 (cumulative and projected, FY90 through completion)



*This graph does not show FUDS properties as reaching 100 percent RIP or RC because completion dates have not been determined for some properties. This graph does not include MMRP, building demolition and debris removal, potentially responsible party, or No DoD Action Indicated properties or projects.

Focus on the Field**NAVY**

Innovative Technologies Enhance Evaluation of Contamination at Naval Weapons Station Charleston

Innovative technologies applied at the Naval Weapons Station (NWS) Charleston to evaluate the extent and fate of contaminated groundwater provided more detailed site information at a lower cost than traditional investigation techniques, saving the Navy both time and money. The project partnering team, which included representatives from the installation, Naval Facilities Command Southern Division, and the South Carolina Department of Health and Environmental Control, worked together to apply the technologies, helping the Navy to identify cost saving remedies for site cleanup in the process.

A leak in a 500-gallon underground storage tank at Area Solid Waste Management Unit (SWMU) 12 released chlorinated solvents into the groundwater. At high concentrations, these solvents have the potential to form a dense non-aqueous phase liquid (DNAPL). DNAPLs are difficult to clean up due to their tendency to form layers that sink in groundwater. The Navy used techniques such as seismic refraction, tree cores, membrane interface probes, sap meters and vapor diffusion samplers to detect potential zones of DNAPL in the areas affected by the solvent release and to determine if the contamination had migrated downgradient from the release site.

As a result of the technologies applied, the Navy gained significant insight into the source and movement of the contamination. The Navy identified likely contamination at the edge of Building 88 and determined that contaminated groundwater had migrated toward marshes east of the spill site. As a result of their findings, NWS Charleston was able to begin the process for mitigating contamination at Area SWMU 12.

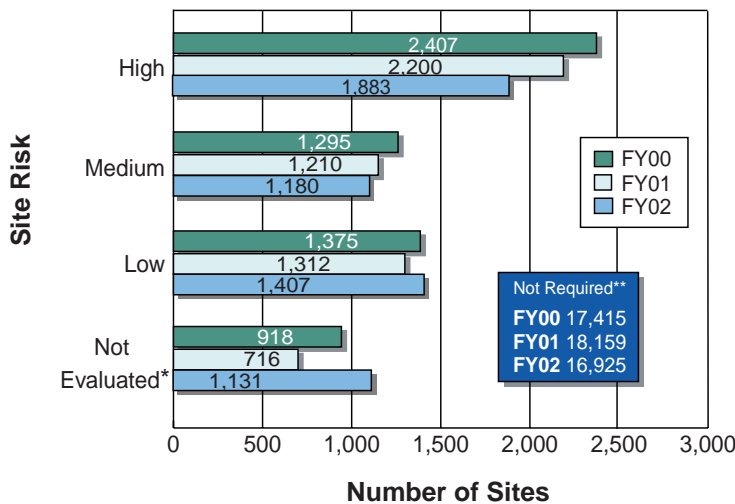
framework. Using the RRSE, DoD evaluates each site based on three factors—the nature and extent of the contaminant, the potential for it to migrate, and receptors that could be impacted by the contamination. Once DoD has assessed this information, the site or project is designated as having high, medium, or low relative-risk. DoD also considers other aspects in sequencing sites for cleanup; these include risk assessments, installation cleanup strategy, program goals, and stakeholder concerns.

In addition to the high, medium, and low relative-risk categories, the RRSE framework contains the designations Not Evaluated (NE) and Not Required (NR). Sites in the NE category have not been investigated thoroughly enough to allow DoD to determine their

relative-risk ranking. Sites may also be categorized as NE if no comparison value is available for the contaminant(s) or the site is not accessible due to safety reasons. DoD is working to reduce the number of sites in the NE category; however, over the past fiscal year this number increased due to the reevaluation of a number of FUDS projects. The NR category includes sites that have already achieved RIP or RC, as well as sites where RRSE does not apply because the site requires only military munitions response, building demolition and debris removal, or potentially responsible party actions. There is no longer a need to apply RRSE to these sites, either because DoD has committed to funding the sites' RA-O and LTM requirements, or because no additional work is planned for the sites.

Reviewing the number of sites in each relative-risk category is another metric to measure progress in the program. Figure 24 shows the number of sites in each relative-risk category, from FY00 through FY02, for active installations and FUDS properties. In

Figure 24
Active Installation and FUDS Property Relative-Risk Site Evaluation Progress



*The Not Evaluated category includes a large number of FUDS projects that are exclusively associated with aboveground and underground storage tanks; these projects' need for Relative-Risk Site Evaluation will be determined after tank removal.

**The Not Required category includes sites that have already achieved RIP or RC, as well as sites where RRSE does not apply because the site requires only military munitions response, building demolition and debris removal, or potentially responsible party actions.

FY02 alone, DoD removed 317 high relative-risk active sites and FUDS projects.

In addition to reducing the number of high relative-risk sites, DoD has also reduced the number of sites ranked as medium relative-risk. As these sites are remediated, the number of sites that no longer require a relative-risk ranking will continue to increase.

As shown in the previous chapter, DoD continues to spend increasing resources on cleanup over investigation, which is

affirmed in Figures 25 and 26. These figures display DoD’s estimated costs for active installations and FUDS properties through the end of the environmental restoration program.

Figures 27 and 28 display DoD’s estimated costs by relative-risk category through program completion. These estimates are consistent with DoD’s program goal of reducing high relative-risk sites by 100 percent by FY07. As the data show, DoD will spend the largest portion of funding on sites in the high relative-risk category through FY07 to meet this program goal. The NR category includes all sites that have achieved RIP or RC or require no further action. The number of sites in this category will continue to increase as sites progress through the environmental restoration process.

Figure 25
Active Installation and FUDS Property IRP Cost-to-Complete Estimates
by Phase Category, FY03-Complete* (in \$000)

Phase	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10-Complete
Investigation	251,460	171,735	138,737	75,134	70,811	162,625	148,037	306,903
IRA	184,067	115,437	111,005	125,555	97,454	66,773	67,517	194,793
RD	45,004	66,092	36,174	29,373	21,070	19,646	10,485	50,145
RA-C	358,526	445,227	519,786	567,253	574,332	423,671	508,351	1,573,516
RA-O	146,932	167,853	190,488	212,739	243,002	359,796	377,616	3,345,628
LTM	39,715	55,299	66,361	79,907	93,744	119,720	103,374	1,584,312
Total	1,025,704	1,021,643	1,062,551	1,089,961	1,100,413	1,152,231	1,215,380	7,055,297

Figure 26
Active Installation and FUDS Property IRP Cost-to-Complete Estimates
by Phase Category and Component, FY03-Complete* (in \$000)

Phase	Army	Navy	Air Force	DLA	FUDS	Total
Investigation	237,898	345,346	364,946	1,255	375,997	1,325,442
IRA	107,685	507,470	335,802	0	11,644	962,601
RD	70,979	41,487	87,180	1,870	76,473	277,989
RA-C	1,535,957	833,452	724,299	35,635	1,841,319	4,970,662
RA-O	748,698	849,894	2,421,386	60,591	963,485	5,044,054
LTM	657,385	179,492	763,418	8,796	533,341	2,142,432
Total	3,358,602	2,757,141	4,697,031	108,147	3,802,259	14,723,180

*Does not include program management, DTRA, other miscellaneous costs, and MMRP funding. MMRP funding is shown in Chapter 4 of this report.

Figure 29 displays DoD's estimated costs for BRAC installations through the end of the environmental restoration program. These data show that funding estimates consistently decrease over time, corresponding with progress toward completing DoD's environmental restoration program requirements. The data presented in Figure 30 show that, similar to restoration activities at active installations, the majority of remaining BRAC funding will be spent on cleanup activities over investigation. The information provided in this chapter and in Appendixes B and C of this report present detailed information on BRAC remediation costs, fulfilling the requirements of the FY02 Military Construction Act (Public Law 107-64, §131).

Figure 27
Active Installation and FUDS Property IRP Cost-to-Complete Estimates
by Relative Risk, FY03-Complete* (in \$000)

Relative-Risk	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10-Complete
High	579,131	620,013	702,387	671,814	630,506	467,388	462,278	3,006,968
Medium	127,963	125,661	96,665	130,888	183,238	327,554	384,745	1,079,082
Low	68,683	71,009	66,012	69,134	87,648	122,513	121,176	747,858
Not Evaluated	28,352	37,037	44,288	38,798	45,190	55,615	42,115	783,106
Not Required	221,575	167,923	153,199	179,327	153,831	179,161	205,066	1,438,283
Total	1,025,704	1,021,643	1,062,551	1,089,961	1,100,413	1,152,231	1,215,380	7,055,297

Figure 28
Active Installation and FUDS Property IRP Cost-to-Complete Estimates
by Relative Risk and Component, FY03-Complete* (in \$000)

Relative-Risk	Army	Navy	Air Force	DLA	FUDS	Total
High	2,024,342	1,689,928	2,115,642	16,773	1,293,800	7,140,485
Medium	687,815	398,838	851,696	17,509	499,938	2,455,796
Low	234,002	248,167	545,468	15,257	311,139	1,354,033
Not Evaluated	8,234	48,615	105,909	1,455	910,288	1,074,501
Not Required	404,209	371,593	1,078,316	57,153	787,094	2,698,365
Total	3,358,602	2,757,141	4,697,031	108,147	3,802,259	14,723,180

*Does not include program management, DTRA, other miscellaneous costs, and MMRP funding. MMRP funding is shown in Chapter 4 of this report.

Figure 29
BRAC Installation IRP Cost-to-Complete Estimates by Phase Category,
FY03-Complete* (in \$000)

Phase	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10- Complete
Investigation	57,442	26,286	3,498	22,300	6,265	1,986	789	35,318
IRA	30,973	16,581	8,940	1,083	1,792	443	138	28,758
RD	7,894	11,108	22,753	5,251	4,079	5,000	2,408	3,868
RA-C	168,631	180,044	48,782	32,168	34,614	50,848	51,771	545,163
RA-O	90,111	80,200	108,983	67,632	62,213	61,056	54,150	865,297
LTM	45,175	20,504	24,604	23,068	18,748	20,680	19,807	329,477
Total	400,226	334,723	217,560	151,502	127,711	140,013	129,063	1,807,881

Figure 30
BRAC Installation IRP Cost-to-Complete Estimates by Phase Category and Component,
FY03-Complete* (in \$000)

Phase	Army	Navy	Air Force	DLA	Total
Investigation	16,185	61,139	76,560	0	153,884
IRA	1,796	78,021	8,891	0	88,708
RD	9,642	13,038	39,670	11	62,361
RA-C	216,454	299,800	592,524	3,243	1,112,021
RA-O	127,407	256,422	982,344	23,469	1,389,642
LTM	118,635	143,193	238,910	1,325	502,063
Total	490,119	851,613	1,938,899	28,048	3,308,679

*Does not include program management, other miscellaneous costs, or MMRP funding.



To measure the effectiveness of the DERP, DoD has developed cleanup performance goals for its installations and properties, which it evaluates through established metrics. Showing progressive program success, DoD has achieved RC status at 73 percent of active sites and 75 percent of BRAC sites. DoD is working to meet its FY05 goal of RIP or RC at 100 percent of its BRAC installations.

DoD has also used the success of its IRP as a foundation in building the Military Munitions Response program (MMRP) category of the DERP. While some munitions response activity has already been addressed under the DERP, particularly at FUDS properties, the MMRP category was formally established through the September 2001 *Management Guidance for the Defense Environmental Restoration Program* to more completely address the risks associated with unexploded ordnance, discarded military munitions,