

February 1995

MILITARY BASES

Environmental Impact at Closing Installations





United States
General Accounting Office
Washington, D.C. 20548

**National Security and
International Affairs Division**

B-256333

February 23, 1995

The Honorable Bill Zeff
Chairman
The Honorable Karen Thurman
Ranking Minority Member
Subcommittee on National Security,
International Affairs, and
Criminal Justice
Committee on Government Reform
and Oversight
House of Representatives

The Honorable George Miller
House of Representatives

This report addresses concerns that environmental cleanup at closing military bases is costly and has significantly affected the Department of Defense's ability to transfer property to nonfederal users. It summarizes the results of our review of the (1) cleanup costs, transferability, and reuse of property and (2) progress, difficulties, and plans to address the problems.

We are sending copies of this report to the Secretaries of Defense, the Air Force, the Army, and the Navy; the Director of the Office of Management and Budget; and other interested parties. We will also make copies available to others on request.

If you have any questions, please call me on (202) 512-8412. Major contributors to this report are listed in appendix V.

Donna M. Heivilin
Director, Defense Management
and NASA Issues

Executive Summary

Purpose

Since 1988, the Department of Defense (DOD) has been closing and realigning military installations. A major problem confronting DOD is the billions of dollars it will cost to clean up the hazardous waste contaminating these installations. Congress has been concerned that this environmental cleanup has significantly affected DOD's ability to transfer property to nonfederal users. Therefore, the former Chairman, Subcommittee on Environment, Energy and Natural Resources, House Committee on Government Operations, and Representative George Miller asked GAO to review the (1) cleanup costs, transferability, and reuse of property by nonfederal users and (2) progress, difficulties, and plans to address the problems.

Background

DOD began the first round of base closures and realignments in 1988, and additional rounds followed in 1991 and 1993. As a result of these efforts, 123 installations and activities¹ have been identified to close and realign. DOD will recommend additional installations for realignment or closure in the 1995 round.

Closed or realigned installations have large amounts of unneeded property, but this property is not automatically sold. Federal property disposal laws require DOD to first screen excess property for possible use by defense agencies and then by other federal agencies. If no federal agency needs the property, it is declared surplus and is made available to nonfederal parties, including state and local agencies and the public. Base closure laws require DOD to comply with environmental laws for disposing of real property. These laws require that all relevant parties agree to the extent of cleanup required before property can be transferred within the federal government and that property be cleaned up before it can be transferred to nonfederal users.

In the 1990 base closure law and DOD's authorization act for fiscal years 1992 and 1993, Congress provided separate accounts to fund cleanup of closing and realigning installations and appropriated \$1.8 billion through fiscal year 1994 for this purpose. In July 1993, the administration expressed concern that closing military installations had been cumbersome and slow, with environmental cleanup and other processes taking many years to complete. At that time, DOD introduced a Fast Track Cleanup program to accelerate cleanup.

¹The 123 includes installations and activities in DOD's base realignment and closure budget justification documents for fiscal year 1995. This number differs from other summary figures for base closures because of the way DOD aggregated these numbers for budget purposes.

Results in Brief

Congress, DOD, and the Environmental Protection Agency (EPA) have taken a number of actions over the past several years to resolve environmental cleanup issues at bases that are being closed and realigned. However, problems still remain with determining accurate cleanup costs, timing appropriations with cleanup needs, prioritizing available cleanup funds, and protecting the government's interests when leasing or transferring property.

Most sites at closing and realigning installations are still being investigated and studied. Thus, the full extent of cleanup actions required may not be known for years. Also, installations may not be cleaned up by the time they close, and major groundwater, landfill, and unexploded ordnance sites will remain contaminated unless new technology is developed. Dissatisfied with the slow pace of cleanup that had occurred, DOD designed the Fast Track Cleanup program in 1993. Although the program has made some progress, improvements could be made in such ways as adding performance measures to gauge progress.

Specifically, GAO's work shows the following:

- DOD's cost estimate for cleaning up 123 closing and realigning bases increased to \$4.0 billion in its fiscal year 1995 budget request. However, later, more comprehensive estimates developed by 84 installations for their April 1994 cleanup plans totaled about \$5.4 billion. GAO found that even these estimates are understated.
- DOD has made all closing and realigning installations eligible for high priority funding. However, most of the property will remain as federal lands and may not have to be cleaned up before reuse. In 1994, DOD received authority to use long-term leases so property could be reused before cleanup is completed, but only a few leases have been signed.
- DOD's cleanup progress has been limited. Most sites at closing and realigning installations are in the earliest stages of investigation and study, and major sites may be 10 years or more away from cleanup. Cleanup technology is often inefficient and not cost-effective. Also, cleanup technology is not available for certain contaminants. Consequently, installations may not be cleaned up by the time they close, and major groundwater, landfill, and unexploded ordnance sites will remain contaminated unless new technology is developed.
- DOD has implemented the Fast Track Cleanup program to address problems and accelerate the cleanup process. Although certain elements in the program have achieved desired results, others have not and opportunities for improvement remain. For example, one initiative

focused on quickly identifying and transferring uncontaminated property. However, although the services identified about 121,200 of about 250,100 acres at 1988 and 1991 closing installations as uncontaminated, the regulators only concurred on 34,499 acres.

Principal Findings

Cleanup Estimates Have Increased and Will Be Higher

DOD's estimate for cleaning up bases identified in the 1988 and 1991 rounds increased by \$400 million from 1993 to 1995, for a total of about \$2.2 billion. When the cost for the 1993 round installations was added in, the estimate in DOD's 1995 budget request for 123 installations and activities in three rounds was almost \$4 billion. However, this estimate is probably understated for three reasons. First, the budget estimates DOD originally submitted were based on preliminary information. Since it originally developed the estimate, DOD has discovered additional sites, the cleanup standards have increased, and new technologies have not materialized as expected. More recent information provided by 84 affected bases in April 1994 shows estimates to be about \$5.4 billion, or \$1.6 billion more than the total estimate for these same installations in the fiscal year 1995 budget request. Second, DOD required more comprehensive estimates of environmental cleanup and compliance costs in the recent information. Third, the 1995 budget estimates are for the 6 years bases have to close, as opposed to the actual cleanup time, which usually takes much longer. For example, the average cleanup for the more serious sites can require 10 years, and with long-term monitoring can extend to 30 years and longer.

Of the nearly \$4 billion identified in the 1995 budget, as of September 1994, \$1.8 billion had been appropriated; of that amount, about \$334 million was unobligated, down from \$813 million unobligated as of June 1994. DOD said that high levels of unobligated funds have occurred because it lacked the expertise needed to develop better estimates and installations were slow to obligate funds.

Efforts to Facilitate Property Transfer Are Affected by Cleanup Issues

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 requires that all property be cleaned up before it is transferred to nonfederal owners for reuse. Consequently, DOD gives a high priority for cleanup to installations scheduled to close and realign in order to allow for quick, nonfederal reuse. DOD also gives high cleanup priority to

sites on the Environmental Protection Agency's National Priorities List, a register of the nation's worst contaminated sites. But most closing and realigning bases are not on this list. For example, of 84 bases that submitted cleanup plans, only 21 are on the National Priorities List. As a result, the need for cleanup funding has been accelerated for many installations that would not have been eligible otherwise. GAO reported in April 1994 that DOD had too many high priority sites, which distracts from cleaning up the worst sites first.

Much of the property at closing bases will be retained by federal agencies and can be made available to federal users before it is cleaned up. For example, DOD is retaining or transferring to federal agencies about 156,700 acres, or 63 percent of the 250,100 acres on installations from the 1988 and 1991 rounds. Some of the property is heavily contaminated with unexploded ordnance. For example, most of the Army's Jefferson Proving Ground, Indiana, is being added to a national wildlife refuge owned by the Department of the Interior's Fish and Wildlife Service.

The Comprehensive Environmental Response, Compensation, and Liability Act prohibits transferring property to nonfederal ownership until the necessary cleanup actions have been taken, but the Community Environmental Response Facilitation Act amended it in 1992 to expedite transfer. This amendment considers cleanup actions "have been taken" if they are in place and operating properly and successfully. Although the amendment allows the property to be transferred to nonfederal users before cleanup is finished, much of the property is in the early stages of the cleanup process and little of it has actually been transferred.

To further facilitate the reuse of property prior to cleanup and ownership transfer, Congress in the National Defense Authorization Act for Fiscal Year 1994 allowed long-term leases of property to nonfederal users. As of January 1995, the Air Force had signed six leases covering 11,169 acres and ranging from 25 to 70 years, and the other services had leasing actions in process. With leases, the government is still potentially liable for any hazardous waste the tenant generates. Other issues affecting leasing are (1) the time and effort required to complete the documents and processes required to satisfy federal and state laws and DOD policies and (2) the obligation of the services to monitor and manage the environmental aspects of the property.

Cleanup Progress Has Been Limited, and Improvements Are Needed

DOD has made limited cleanup progress for several reasons. First, the study and evaluation process is lengthy, and cleanups are complex and, with existing technology, take time. In cleanup plans submitted for 84 installations in April 1994, 51 identified polluted groundwater, 67 identified contaminated landfills, and 25 identified unexploded ordnance contamination among sites to be cleaned up. Second, some of the contaminated sites are just too large or prohibitively expensive to clean up, and some of the cleanup methods are unsure. Decontaminating groundwater is costly, difficult, and sometimes impossible. At Norton Air Force Base, California, for example, groundwater contamination extends from the central base area, southwest in the direction of groundwater flow beneath the base, and continues beyond the base boundary, possibly affecting several community water supply wells. One method, called pump-and-treat, is expensive, can take decades, and still leaves the water contaminated. At landfills, national cleanup standards do not exist, and local standards must be negotiated for each site. Cost-effective technology is not available to clean up unexploded ordnance, and some areas are so large that it is not even feasible to consider cleaning it up. For example, unexploded ordnance covers potentially about 51,000 acres of Jefferson Proving Ground, Indiana, and 7,200 acres of Fort Ord, California. The cleanup plan for Jefferson Proving Ground estimated that cleanup of unexploded ordnance could cost from \$216 million to \$8 billion, depending on reuse. Third, new technology is frequently not a ready option because it may involve unacceptable risks or contractors may prefer other technology based on their past experiences.

Impediments Remain to Quick Cleanups

To try to overcome these obstacles, DOD established the Fast Track Cleanup program in 1993. Although the program has addressed impediments to quick cleanup and transfer of property, certain actions have not achieved the desired or initially planned results. Thus, some significant impediments remain. Progress in the program's five key elements has been as follows:

- Environmental impact statements depend on communities submitting reuse plans, and most of these plans have not been developed.
- Restrictive indemnification language has been clarified.
- Uncontaminated parcels from the 1988 and 1991 closing installations have been identified for transfer, but not as much uncontaminated property has been identified as hoped.

-
- Teams have been established at closing bases to make decisions and develop cleanup plans, but decisions are still made above the base level, and base cleanup plans can be improved.
 - Community cleanup advisory boards that involve the public in the cleanup program have been established, but can be improved.

DOD has not been able to evaluate the effectiveness of the Fast Track Cleanup program because it lacks a baseline and performance measures. Although DOD is developing performance measures, it has not set any milestones for completion. Right now, it is considering two measures. First, identify the percentage of closing bases with a completed environmental impact analysis. However, this is not a problem that needs to be addressed now. Second, cite the percentage of property at closing bases that could be made available for reuse. This does not measure the success of cleanup actions if property is leased. Neither of these measures address other elements of the program.

Recommendations

GAO recommends that the Secretary of Defense (1) develop an environmental program cost estimate that reflects the total financial impact of realignment and closure actions, (2) approve sites for high priority environmental funding only when cleanup or compliance is required or cost-effective for nonfederal reuse to occur, and (3) establish Fast Track Cleanup program standards that will allow DOD to assess the program's progress.

Agency Comments

As requested, GAO did not obtain formal comments on this report. However, GAO discussed its findings with DOD and EPA officials and included their comments where appropriate.

Contents

Executive Summary		2
Chapter 1		10
Introduction	Background	10
	Military Installation Closures in 1988, 1991, and 1993	10
	Environmental Cleanup Requirements	12
	DOD Environmental Cleanup Efforts	14
	Objectives, Scope, and Methodology	14
Chapter 2		16
Significant Cost, Funding Priority, and Reuse Issues Need to Be Addressed	Cleanup Cost Estimates Are Likely to Continue Increasing	16
	Substantial Unobligated Amounts in BRAC Environmental Accounts	19
	High Priority Cleanup Funding Appears Unwarranted for Many Installations	20
	Conclusions	24
	Recommendations	24
Chapter 3		26
Cleanup Progress Is Limited, and Technology and Management Improvements Are Needed	Cleanup Is in the Early Stages of the Process, and New and Better Technology Is Needed	26
	Fast Track Cleanup Program Is Being Implemented but Needs Additional Development	35
	Conclusions	40
	Recommendation	41
Appendixes	Appendix I: Comprehensive Environmental Response, Compensation, and Liability Act Process	42
	Appendix II: Locations and Organizations Visited	43
	Appendix III: NPL Status and Summary of Contaminants as Reported in 79 BRAC Cleanup Plans	44
	Appendix IV: BRAC Cleanup Plan Cost Estimates Beyond the 6-Year Closure Period for 14 BRAC 1988 Installations	47
	Appendix V: Major Contributors to This Report	48
Tables	Table 2.1: Comparison of Total Estimated Cleanup Costs in BRAC Budget and Cleanup Plans	17

Table 2.2: Appropriated and Unobligated BRAC Environmental Funds	19
Table 2.3: BRAC Cleanup Plan Estimates for NPL and Non-NPL Installations	21
Table 2.4: Long-Term Leases at BRAC Air Force Bases	23
Table 3.1: Summary of Uncontaminated Property on 1988 and 1991 Closing Installations	37

Figures

Figure 1.1: Summary of Air Force, Army, and Navy Installations and Activities in 1988, 1991, and 1993 Rounds	12
Figure 3.1: Groundwater Pump-and-Treat Pilot Project, Pease Air Force Base, New Hampshire	28
Figure 3.2: Landfill Excavation and Soil Removal Project, Pease Air Force Base, New Hampshire.	29
Figure 3.3: Portion of the Army's Jefferson Proving Ground Ordnance Range	32
Figure 3.4: Item of Unexploded Ordnance Found Buried on the Army's Jefferson Proving Ground Range	33

Abbreviations

BCP	BRAC cleanup plan
BRAC	Base realignment and closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
DERA	Defense Environmental Restoration Account
DOD	Department of Defense
EPA	Environmental Protection Agency
NPL	National Priorities List
RCRA	Resource Conservation and Recovery Act

Introduction

The Department of Defense (DOD) is in the process of realigning and closing military installations. An initial major round of installation realignments and closures occurred in 1988, subsequent rounds followed in 1991 and 1993, and another round is scheduled for 1995. Congress has expressed concern that environmental cleanup issues related to past activities at these installations are significantly affecting DOD's ability to transfer these properties to local communities. This report focuses on that issue; however, other factors—disagreements between federal agencies, local community interests, and others over reuse plans, as well as revised laws and regulations designed to improve the property disposition process—have also affected property transfers. We have reported separately on these issues for bases closed in the 1988 and 1991 rounds¹ and are reviewing 1993 closing bases now.

Background

For decades, DOD activities and industrial facilities generated, stored, recycled, and disposed of hazardous waste, which often contaminated nearby soil and groundwater. In many instances, these problems predate existing environmental laws and regulations. Hazardous waste contamination can significantly contribute to serious illness or death or pose a hazard to the environment and is extremely expensive to clean up. Types of hazardous waste found at most DOD installations include solvents and corrosives; paint strippers and thinners; metals, such as lead, cadmium, and chromium; and unexploded ordnance. Contamination usually results from disposal, leaks, or spills.

Cleanup goals and strategies are usually site specific and depend upon the cleanup standards, exposure potential, affected population, and nature and extent of contamination. All of these determine the threat to human health and the environment. Cleanup efforts at closing installations are carried out primarily by contractors. DOD gives the highest priority for cleanup to installations on the Environmental Protection Agency's (EPA) National Priorities List (NPL), a register of the nation's worst known hazardous waste sites, and to those scheduled to realign and close.

Military Installation Closures in 1988, 1991, and 1993

The Defense Authorization Amendments and Base Closure and Realignment Act (P.L. 100-526), enacted on October 24, 1988, established a bipartisan commission to make recommendations to Congress and the Secretary of Defense on base closures and realignments and specified the

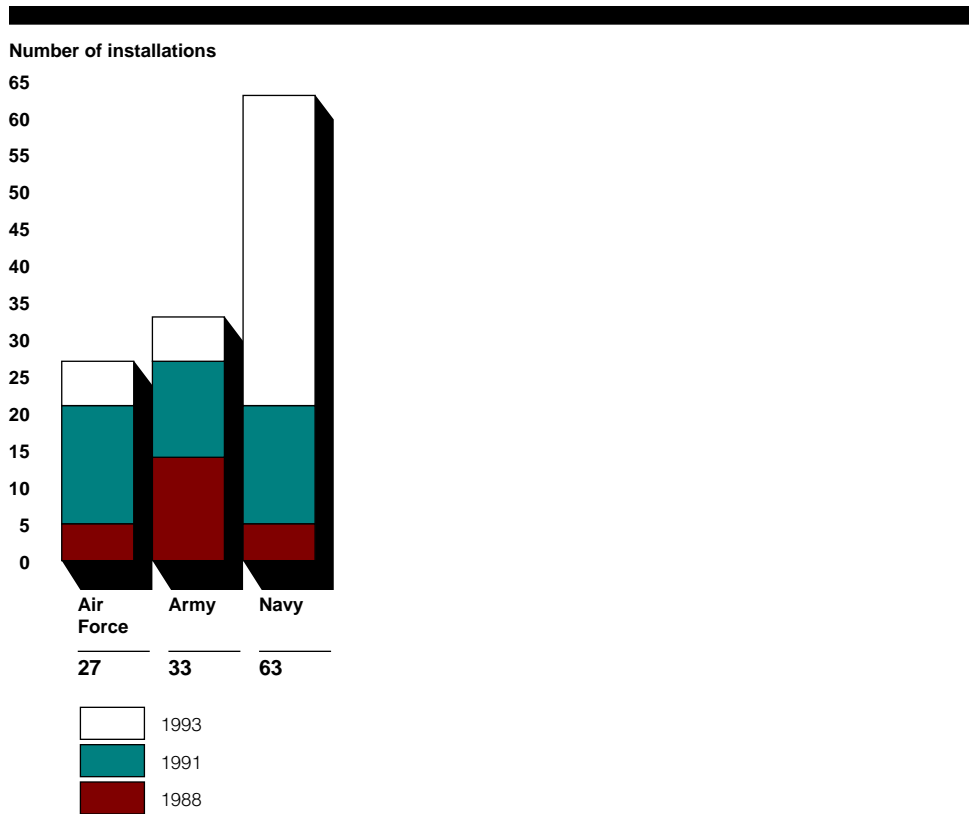
¹Military Bases: Reuse Plans for Selected Bases Closed in 1988 and 1991 (GAO/NSIAD-95-3, Nov. 1, 1994).

conditions and authorities to implement these actions. The Defense Base Closure and Realignment Act of 1990 (Part A of title XXIX of P.L. 101-510) also created an independent commission that would meet during calendar years 1991, 1993, and 1995 to review additional installations DOD recommended for realignment and closure.

DOD is carrying out the approved installation closures and realignments and is reviewing installations to recommend for realignment and closure for the 1995 round. Figure 1.1 summarizes DOD information on installations and activities designated for closure and realignment in 1988, 1991, and 1993. We have reported separately on the recommendations and processes for each of these rounds.²

²Military Bases: An Analysis of the Commission's Realignment and Closure Recommendations (GAO/NSIAD-90-42, Nov. 29, 1989); Military Bases: Observations on the Analysis Supporting Proposed Closures and Realignments (GAO/NSIAD-91-224, May 15, 1991); and Military Bases: Analysis of DOD's Recommendations and Selection Process for Closures and Realignments (GAO/NSIAD-93-173, Apr. 15, 1993).

Figure 1.1: Summary of Air Force, Army, and Navy Installations and Activities in 1988, 1991, and 1993 Rounds



Environmental Cleanup Requirements

Federal property that is no longer needed is not automatically sold. The Federal Property and Administrative Services Act of 1949 requires a screening process to determine if property can be transferred to another government or nonprofit agency. DOD first screens excess property for possible use by other DOD agencies and then by other federal agencies. If no federal agency needs the property, it is declared surplus to the federal government and is made available to nonfederal parties, including state agencies, local agencies, agencies caring for homeless people, public benefit agencies, or the general public.

Also, federal agencies, including DOD, must comply with environmental laws and regulations when disposing of real property. Pertinent environmental laws include the following:

- The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 U.S.C. 9601), also known as Superfund,

authorizes the federal government to respond to spills and other releases or threatened releases of hazardous substances, as well as to leaking hazardous waste dumps. CERCLA provides the framework for responding to contamination problems. It requires that the government warrant that all remedial action necessary to protect human health and the environment has been taken before property is transferred by the United States to any other person or entity, such as communities or private parties.

- The Resource Conservation and Recovery Act of 1976 (RCRA) (42 U.S.C. 6901) was enacted to ensure that solid wastes are managed in an environmentally sound manner.
- The Federal Facilities Compliance Act (42 U.S.C. 6901 note) amended RCRA and provides that federal facilities may be subject to federal, state, and local penalties for environmental violations. It also establishes specific requirements for waste generated by the Department of Energy and DOD.
- The National Environmental Policy Act of 1969 (42 U.S.C. 4321) governs the environmental assessments and impact statement preparation for the disposal and reuse of base closure and realignment installations.

CERCLA and RCRA govern much of the environmental and closure-related activities at base realignment and closure, or BRAC, installations. In compliance with CERCLA, EPA reviews DOD information to determine if the installation should be included on the NPL. The CERCLA process consists of several stages and may apply to any waste source and site containing hazardous substances at BRAC installations. (See app. I.) EPA does not have authority to delegate CERCLA enforcement to the states. However, CERCLA does call for substantial involvement by each state in initiating, developing, and selecting remedial actions to be taken.

RCRA is designed to ensure that solid waste is managed in an environmentally sound manner and establishes a framework for managing hazardous waste. All BRAC installations are subject to RCRA because of practices that generated, stored, treated, or disposed of hazardous waste. RCRA, as amended in 1992 by the Federal Facilities Compliance Act, directed EPA to conduct annual inspections of federal facilities. RCRA allows EPA to authorize states to conduct equivalent state programs; in these cases, they have the primary responsibility for implementing corrective actions at a base that is designated as a treatment, storage, or disposal facility. States with an authorized hazardous waste program may inspect a federal facility to enforce compliance with state hazardous waste programs.

DOD Environmental Cleanup Efforts

DOD established the Installation Restoration Program in 1975 to study and clean up contaminated sites. In 1984, this program was made part of the Defense Environmental Restoration Program, and Congress provided funding through the Defense Environmental Restoration Account (DERA). In the 1990 base closure law (P.L 101-510), Congress began providing separate cleanup funding for closing and realigning installations under the BRAC account.

In May 1993, DOD created the Under Secretary of Defense (Environmental Security) position to oversee cleanup and other environmental efforts. In July 1993, the administration expressed concern that closing military installations had been cumbersome and slow, with environmental cleanup and other processes taking many years to complete. At that time, it announced a five-part program to help accelerate cleanup and community reuse of closing installations.

Objectives, Scope, and Methodology

The former Chairman, Subcommittee on Environment, Energy and Natural Resources, House Committee on Government Operations, and Representative George Miller, California, requested us to review DOD's environmental cleanup efforts at installations being closed under the BRAC process. Specifically, they asked us to review issues related to the (1) cleanup cost, transferability, and reuse of property by nonfederal users and (2) progress, difficulties, and plans to address the problems.

We performed work at the Office of Secretary of Defense, military services headquarters, and EPA. To determine costs being estimated for the program, we reviewed DOD's BRAC budget data, including justification documents submitted to Congress in February 1994. In addition, we observed BRAC cleanup plan (BCP) training sessions held in San Francisco, California, in November 1993. Later, we analyzed cost information in 79 plans prepared by installations with property to be transferred to nonfederal users. (See app. III.) We also visited closing installations and environmental cleanup design and construction management commands to determine how cost data is developed by each of the services. (See app. II.)

To determine transferability and reuse, we reviewed BRAC and environmental laws, DOD and EPA headquarters policies and guidance to the military services, and environmental cleanup and reuse programs at BRAC installations. We also reviewed data developed by the services to identify uncontaminated property that would be available for quick transfer.

We identified progress and plans to address problems during discussions with DOD and EPA headquarters, DOD design and construction management, and closing base officials, as well with EPA regional officials. In addition, we observed training sessions on DOD's Fast Track Cleanup program, reviewed data in installations' BCPS, and visited a number of these installations. Furthermore, we attended meetings of the Defense Environmental Restoration Task Force in Austin, Texas; Philadelphia, Pennsylvania; and Charleston, South Carolina. We also attended several public hearings during visits to installations, including the California Military Base Reuse Task Force, installations' cleanup advisory board meetings, and a hearing on cleanup remedy selection. We visited the California Environmental Protection Agency, Sacramento, California, and discussed specific issues with environmental officials of other states.

As requested, we did not obtain written agency comments. However, we discussed the report's contents with DOD and EPA officials and incorporated their comments where appropriate. We performed the review between February 1994 and January 1995 in accordance with generally accepted government auditing standards.

Significant Cost, Funding Priority, and Reuse Issues Need to Be Addressed

Congress, DOD, and EPA have taken actions over the past several years to address a number of important matters relevant to resolving environmental cleanup issues at bases that are being closed and realigned. However, problems still remain with determining accurate cleanup costs, timing appropriations with cleanup needs, prioritizing available cleanup funds, and protecting the government's interests when leasing or transferring property.

Cleanup Cost Estimates Are Likely to Continue Increasing

As reported in its fiscal year 1995 BRAC budget justification document, DOD's total estimate for cleaning up environmental problems at 123 closing and realigning installations and activities was about \$4 billion. However, more recent data developed by DOD in April 1994 shows that estimates for just 84 installations totaled about \$5.4 billion, and costs are likely to go beyond that amount as more complete data becomes available.

BRAC Budget Estimates for Cleanup Will Continue to Increase

The BRAC accounts were established to be the exclusive source of funds for environmental restoration projects related to base closures. The intent was to preclude the cleanup actions from competing with other sources of funding for environmental cleanup such as the DERA. DOD's BRAC budget estimates for cleanup cover 6-year periods; thus, the estimate for the 1988 round spans fiscal years 1990 through 1995; the estimate for the 1991 round spans fiscal years 1992 through 1997; and the 1993 round spans fiscal years 1994 through 1999. BRAC budget justification documents are to address the total financial impact of realignment and closure actions.

DOD's estimate in the fiscal year 1995 budget for the 1988 and 1991 rounds increased from the fiscal year 1993 estimate by about \$400 million, to about \$2.2 billion. In addition, the 1995 budget estimate included about \$1.8 billion for the 1993 round, raising the total estimate for the first three rounds to almost \$4.0 billion for 123 installations and supporting activities. This estimate represents the total BRAC budget through fiscal year 1999. According to DOD, these estimates increased because they were based on preliminary information, and costs depend on the type of contaminants detected, conditions found, and the cleanup technologies selected.

More Recent Information Increases Estimates

More recent information developed by DOD in cleanup plans on 84 of the 123 installations shows an estimate of about \$5.4 billion. This estimate is likely to increase as more bases are added and all costs are captured.

Chapter 2
Significant Cost, Funding Priority, and
Reuse Issues Need to Be Addressed

In September 1993, as part of its Fast Track Cleanup program to accelerate cleanup and reuse of BRAC installations, DOD required installations with property that could be transferred for nonfederal use to develop comprehensive BRAC cleanup plans and to submit these plans by April 1994. The military services forwarded 79 such plans, covering 84 installations, and the estimated cleanup costs in these plans totaled nearly \$5.4 billion. (See app. III.) This is about \$1.6 billion more than the fiscal year 1995 BRAC budget estimates for these same 84 installations, as summarized in table 2.1.

Table 2.1: Comparison of Total Estimated Cleanup Costs in BRAC Budget and Cleanup Plans

Dollars in millions				
	Number of cleanup plans	Fiscal year 1995 BRAC budget estimates	Cleanup plan estimates	Difference
Air Force	26	\$1,674	\$1,207	(\$467)
Army	19	693	1,268	575
Navy	34	1,356	2,882	1,526
Total	79	\$3,723	\$5,357	\$1,634

Source: DOD BRAC Fiscal Year 1995 Budget Estimates, Justification Data Submitted to Congress (Feb. 1994); BRAC Cleanup Plans (Apr. 1994)

DOD officials told us that the cleanup plans required more comprehensive cost estimates than the BRAC budget estimates. They said that total environmental programs at closing and realigning bases go beyond those costs identified in the BRAC budgets. For example, some cleanup plans for Army installations needed DERA funds in addition to BRAC funds. Also, both the Army and Navy plans identified funding needed for environmental compliance and for the preservation of natural and cultural resources.

Also, BRAC budget estimates cover only the 6-year period that bases are allowed to close. However, the average cleanup can take much longer. The cleanup plans include 14 installations from the 1988 round of closures that estimated they will need \$536 million after the 6-year period. (See app. IV.) For example, the BRAC budget estimate for the Army's Jefferson Proving Ground, Indiana, was about \$11 million. The cleanup plan estimated it would cost \$233 million, including \$789,000 prior to 1989, \$16.1 million in BRAC and other funding between 1990 and 1995, and \$216.1 million in DERA funding after the 6-year period. The cleanup plan shows that this \$216.1-million figure assumed no change in how the base was being used,

and if another reuse option was selected, the total estimated cost for this one base could be \$2 billion per year for fiscal years 1996 to 1999.

Although the cleanup plans provide a more complete view of environmental costs at closing bases, they did not generally capture complete costs. In some cases, long-term monitoring costs may go on for many years beyond the base cleanup plan estimates. For example, Pease Air Force Base, New Hampshire, reported no costs beyond fiscal year 1999, but officials estimated it will cost \$300,000 a year to monitor the groundwater for an indefinite period beyond 1999. Similarly, Norton Air Force Base, California, officials estimated long-term remedial operations will cost \$38.9 million through 2010, but the Air Force's estimate only included monitoring costs through fiscal year 1999.

Furthermore, the cleanup plan estimates did not include some sites that have yet to be investigated at the 84 installations. At its Charleston, South Carolina, complex, consisting of a station, shipyard, and fleet industrial supply center, the Navy is presently investigating 39 waste management sites and has identified 330 potential areas of concern that require further study. Assessments are currently being performed of 118 of the potential areas. The remaining sites were recently identified during a site inspection, and the appropriate investigation approaches are being formulated. The Army Materials Technology Laboratory, Massachusetts, was recently added to the NPL, requiring the Army to address surface water contamination cleanup previously not planned or budgeted. EPA is currently assessing the Army's Jefferson Proving Ground for possible addition to the NPL, and other installations could be considered for NPL status in the future.

The Congressional Budget Office reported in January 1995 on unanticipated cost growth that has occurred for installations scheduled to close. It observed that cost estimates increased for 34 of 49 installations being closed because (1) DOD discovered additional sites and contaminants on its installations and (2) new technologies that could reduce costs have been slow in coming and gaining acceptance. They also said that stricter cleanup standards than planned could significantly add to the costs.³ As part of our review on DOD's Future Years Defense Program, we reported in July 1994 that DOD's environmental costs may be significantly understated.⁴

³Cleaning Up Defense Installations: Issues and Options, Congressional Budget Office (Jan. 1995).

⁴Future Years Defense Program: Optimistic Estimates Lead to Billions in Overprogramming (GAO/NSIAD-94-210, July 29, 1994).

Substantial Unobligated Amounts in BRAC Environmental Accounts

Of the nearly \$4 billion identified for environmental cleanup through fiscal year 1999 in the 1995 BRAC budget estimate, \$1.8 billion had been appropriated through fiscal year 1994. By June 1994, only about 55 percent of \$1.8 billion had been obligated, and about \$813 million was unobligated. However, by September 30, 1994, about \$334 million remained unobligated, as shown in table 2.2.

Table 2.2: Appropriated and Unobligated BRAC Environmental Funds (as of September 30, 1994)

Dollars in millions					
Fiscal year	1991	1992	1993	1994	Total
Total appropriated	\$302.8	\$542.0	\$453.4	\$515.1	\$1,813.3
Amount unobligated					
BRAC 1988	\$27.7	\$33.1	\$62.2	0	\$123.0
BRAC 1991	0	30.7	80.1	\$66.7	\$177.5
BRAC 1993	0	0	0	33.9	\$ 33.9
Total	\$27.7	\$63.8	\$142.3	\$100.6	\$334.4
Percent unobligated	9	12	31	20	18

Source: DOD, Office of the Comptroller

BRAC funds are available to be obligated during the 6-year period bases have to close. According to DOD officials, however, the services' perception is that funds should be obligated in the year appropriated, and high unobligated balances are seen by the services as a failure to execute their programs. For example, in October 1992, the Army increased the BRAC 1991 account for Fort Ord, California, by \$11.8 million for environmental restoration, stating that the Army had to obligate its current funds to receive additional 1991 funds DOD had withheld. Between February and September 1993, \$10.8 million was obligated for an existing contract with provisions that the work would be fully defined and priced later.

In explaining the high levels of unobligated balances, DOD said that it (1) was probably overly optimistic in the funds requested, (2) did not have all the necessary expertise to better estimate requirements and timing, and (3) experienced slow obligation rates by the installations. DOD officials told us that the unobligated balances improved between June and September 1994 because the services entered into cost-reimbursable contracts for the total design and actual cleanup of installations, instead of contracting separately for design and cleanup. As indefinite delivery/indefinite quantity cost-reimbursable contracts, they are higher

risk to the government and will require closer oversight of the contractor's operations.

High Priority Cleanup Funding Appears Unwarranted for Many Installations

DOD gives the highest priority to cleaning up installations on EPA's NPL and installations scheduled to close and realign. For BRAC installations in the 79 BRAC cleanup plans, the cost of cleanup for non-NPL installations is about \$3.4 billion, compared to \$2.0 billion for NPL installations. BRAC installations are given a high priority to facilitate the transfer of property to nonfederal use as soon as possible. However, most BRAC property will stay under federal ownership. Also, until 1992, CERCLA required cleanup before property could be transferred to nonfederal owners, but a 1992 amendment allows for the transfer of property before cleanup is finished under certain stipulations. Furthermore, a 1994 law allows for long-term leases to nonfederal users before cleanup is complete. We reported that DOD will not be able to efficiently institute cleanup efforts until it and EPA evaluate the large number of sites currently on the NPL and at BRAC installations and determine which should be designated as high priority.⁵

High Priority Cleanup Accelerates DOD's Funding Needs

In 1990, Congress designated the BRAC appropriations account to be the exclusive source of funding for environmental restoration at BRAC installations. Congress established this separate cleanup funding because it was concerned that the higher priority being given to closing and realigning installations would exhaust all DERA funding. In the same act, Congress directed that DOD restore any property excess to its needs as a result of closure or realignment as soon as possible. High priority funding was necessary for these installations because CERCLA requires environmental cleanup to be completed before nonfederal ownership transfer and reuse can occur.

Giving all closing and realigning installations the same status as NPL installations has significantly increased the number of priority installations and accelerated the funding DOD needs for high priority cleanup. Of the 84 installations identified in the cleanup plans, 21 are for NPL installations and receive priority cleanup funding consideration regardless of whether they close or realign. (See app. III.) Cleanup estimates in these 21 installations' plans totaled \$2.0 billion. However, the other 63 installations would not have been given high priority status if they were not closing or realigning. Estimated cleanup costs in plans for these installations amounted to

⁵Environmental Cleanup: Too Many High Priority Sites Impede DOD's Program (GAO/NSIAD-94-133, Apr. 21, 1994).

\$3.4 billion, or 63 percent of the nearly \$5.4-billion total estimate. (See table 2.3.) For example, the Long Beach Naval Station and Hospital, California, are not on the NPL. However, these installations add an estimated \$221 million to DOD’s priority requirements.

Were these non-NPL bases not closing or realigning, they would likely receive funds only for essential cleanup and compliance activities. For example, non-NPL installations would likely receive funds to remove underground storage tanks to meet deadlines in the law, but asbestos and lead-based paint surveys not subject to a deadline might be deferred to later years. Army headquarters officials told us there had never been much DERA funding available to clean up non-NPL installations, but funds became available once an installation was identified for closure. Environmental officials at Fort Ord, California, said that before their installation was on the NPL, they had trouble competing for DERA cleanup funding.

Table 2.3: BRAC Cleanup Plan Estimates for NPL and Non-NPL Installations

Dollars in millions			
	NPL	Non-NPL	Total
BRAC 1988	\$257	\$841	\$1,098
BRAC 1991	1,147	874	\$2,021
BRAC 1993	601	1,636	\$2,237
Total	\$2,005	\$3,351	\$5,356

Source: BRAC cleanup plans

DOD officials told us that cleanup priority funding was needed for non-NPL installations because (1) BRAC funding is tied to the 6-year period allowed for bases to close, (2) legal mandates established by state law or the courts exist at some bases, and (3) communities are expecting their installations to be cleaned up as soon as possible.

Property Can Be Transferred to Other Federal Agencies Before Cleanup Is Complete

CERCLA allows DOD to transfer property to another service or federal agency before completing cleanup. However, the proper arrangements for cleanup must be made, and DOD’s potential liability is significant.

As we reported in November 1994, DOD is retaining most of the property or transferring it to other federal agencies.⁶ It is retaining about 156,700 acres, or 63 percent of the 250,100 acres on installations from the

⁶Military Bases: Reuse Plans for Selected Bases Closed in 1988 and 1991 (GAO/NSIAD-95-3, Nov. 1, 1994).

1988 and 1991 rounds. Some of this property is being retained because of extensive unexploded ordnance contamination. For example, at the Army's Jefferson Proving Ground, Indiana, due to long-term hazardous waste contamination and the potential that unexploded ordnance could be found all over the installation, it is impossible to dispose of all the property. The Army was considering retaining all or part of it under a caretaker program. However, the U.S. Department of Interior's Fish and Wildlife Service requested that most of the installation's property be added to a national wildlife refuge.

Even though these installations will not have to be cleaned up before the property is transferred, DOD and the receiving agency must agree on what remedial action will be taken. Consequently, DOD is still held responsible for the cleanup, which ultimately could involve substantial costs. According to DOD officials, DOD is responsible for cleaning up past contamination, regardless of when it is identified, and meeting the requirements of any new federal or state cleanup standards and laws. For example, at the Hamilton Army Airfield, California, ownership of a landfill on property once auctioned to a private developer has reverted to the Army. Due to the presence of contamination, the Army will now pay to contain landfill contaminants and treat the groundwater.

Property Can Be Transferred to Nonfederal Users Before Cleanup Is Finished

About 93,400 (37 percent) of the 250,100 acres at closing 1988 and 1991 installations will potentially be available for transfer to nonfederal users. CERCLA had prohibited DOD property transfers to nonfederal ownership until the necessary cleanup action had been taken, but the Community Environmental Response Facilitation Act (CERFA) amended CERCLA in 1992 to expedite transfer. Under the act, remedial action is considered to have been taken if (1) the construction and installation of an approved remedial design has been completed and (2) the remedy has been demonstrated to EPA to be operating properly and successfully. Thereafter, any long-term pumping and treating or operation and monitoring after the demonstration does not preclude transferring the property.

Although the CERFA amendment could eventually facilitate the transfer and reuse of property under CERCLA, most sites at BRAC installations are in the early investigation and study stages and have not reached the point where remedies are in place. An EPA headquarters official, after checking with EPA regions, told us that data is not being collected, but it is unlikely that much property has been transferred so far where remedies are in place and operating successfully.

Long-Term Leases Allow
 Reuse Before Cleanup

In general, DOD may only lease property that is under its control, not currently needed for public use, and not excess property. A limited exception was available for property found to be excess as a result of closure or realignment, where a military service determined that leasing would facilitate economic reuse. However, leases were subject to limitations, including a term not to exceed 5 years and DOD's right to revoke the lease at will.

As part of the National Defense Authorization Act for Fiscal Year 1994 (P.L. 103-160), Congress authorized the military services to lease property to facilitate state or local economic reuse without limiting the length of a lease. As of January 1995, the Air Force has used the provision to enter into six leases, ranging from 25 to 70 years, for airports and other uses, as shown in table 2.4. The other services had leasing actions in process.

Table 2.4: Long-Term Leases at BRAC Air Force Bases

Air Force base	State	Acres	Years
Bergstrom	TX	2,516	50
Chanute	IL	1,801	Airport - 25 Other - 50
George	CA	2,300	25
Norton	CA	1,289	55
Pease	NH	1,720	55
Rickenbacker	OH	1,543	70
Total		11,169	

Source: Air Force Base Conversion Agency

Although leasing property allows its reuse before cleanup has been completed, DOD is still liable for environmental cleanup costs. Thus, leasing still leaves the question of how the government should be protected from liability for hazardous waste that results from the current tenant's operations. Even though DOD conducts extensive environmental surveys and includes numerous provisions in its leases to limit its liability, DOD nonetheless remains a responsible party under CERCLA. For example, between 1976 and 1986, the Navy leased most of its Hunters Point Annex—a deactivated Navy shipyard listed for closure on the 1991 round—to a commercial business, which subleased many of the buildings to other businesses. The activities conducted were primarily commercial ship repair, and the lessee was later sued by the city of San Francisco for the alleged illegal disposal of large amounts of hazardous waste. The Navy remained the owner of the property and, according to the Navy

environmental coordinator, has included these sites in its BRAC cleanup program.

Other issues affecting leases are (1) the time and effort required to complete the environmental documents and processes necessary to satisfy federal and state laws and DOD policies and (2) the obligation of the services to monitor and manage the property and environmental requirements.

Conclusions

Although various actions have been taken in recent years, Congress, DOD, and local communities still face a number of difficult issues related to (1) obtaining accurate cost estimates for completing cleanup efforts at closing and realigning bases, (2) determining the proper timing of appropriations to meet cleanup needs, (3) determining whether, in view of limited resources and changes in law, all closing and realigning bases should be given priority funding, and (4) facilitating the transfer of property to federal and nonfederal users while ensuring the government's and DOD's interests are protected.

In particular, we believe high priority funding for environmental cleanup at closing and realigning installations needs to be reevaluated because most property will stay under federal ownership, and property that will be available for nonfederal ownership transfer can now be leased or reused before it is entirely clean. It appears that DOD could be more selective and designate priority funding for NPL installations and other sites where cleanup is required for nonfederal reuse. This might reduce DOD's requirements for accelerated funding for nonpriority sites and spread these costs into more appropriate future budget years.

Also, although property remaining as federal lands does not have to be cleaned up before transfer, DOD appears to be retaining much of the responsibility for cleanup. Accordingly, DOD needs to include these potential unfunded liabilities in its total environmental program cost estimate.

Recommendations

We recommend that the Secretary of Defense develop a total environmental program cost estimate of the financial impact of realignment and closure actions that reflects

Chapter 2
Significant Cost, Funding Priority, and
Reuse Issues Need to Be Addressed

-
- a more complete description of the costs as identified in the installations' BRAC cleanup plans, including estimates for compliance, preservation of natural and cultural resources, and long-term costs associated with cleanup and monitoring; and
 - unfunded liabilities where property is being retained by the federal government and cleanup will be deferred.

We also recommend that the Secretary of Defense approve sites for high priority environmental funding only when cleanup or compliance is required or cost-effective for nonfederal reuse to occur.

Cleanup Progress Is Limited, and Technology and Management Improvements Are Needed

Most sites at closing and realigning installations are still being investigated and studied. Thus, the full extent of cleanup actions required may not be known for years. Also, installations may not be cleaned up by the time they close, and major groundwater, landfill, and unexploded ordnance sites will remain contaminated unless new technology is developed.

Dissatisfied with the slow pace of cleanup that had occurred, DOD designed the Fast Track Cleanup program in 1993. Although the program has made some progress, it could be improved in such ways as adding performance measures to gauge progress.

Cleanup Is in the Early Stages of the Process, and New and Better Technology Is Needed

DOD's guidance for preparing cleanup plans called for installations to account for all sites requiring restoration and to summarize their environmental compliance programs. For example, installations identified cleanup requirements, such as fuels, solvents, unexploded ordnance, and other contaminants in training and maintenance areas, landfills, burn pits, fuel stations, wastewater treatment areas, and at other sites. They reported on programs to remove asbestos, radon, and lead-based paint from buildings and other structures as well as inventories of underground storage tanks that held fuel, waste petroleum, and other products.

The 84 installations included in the cleanup plans reported that most environmental cleanup work was still in the early stages. For example, 49 of the installations combined many contaminated sites into "operable units"⁷ for more effective cleanup management. They reported that work on 165 of 239 units, or 69 percent, was in the earliest phases—remedial investigation and feasibility study. The plans estimated that 129 of the 165 units would not complete this phase until fiscal years 1995 to 1998. Most of the work at the remaining installations was still in the remedial investigation and feasibility study phases as well. According to DOD officials, technology exists for the cleanup of many sites, but it needs to be made more efficient and cost-effective. We reported that the CERCLA progress is sluggish because the study and evaluation process is lengthy, cleanups are complex, existing technology takes a long time, and the average cleanup can require about 10 years.⁸

⁷Operable units can be defined in a variety of ways. Examples of typical operable units include areas (1) with similar contamination or waste materials, (2) in a similar geographic location, (3) that can be cleaned up using similar techniques or timeframes, and (4) that can be managed under a single remedial investigation or feasibility study.

⁸Superfund: Progress, Problems, and Reauthorization Issues (GAO/RCED-93-27, Apr. 21, 1993).

Contaminated groundwater, landfills, and unexploded ordnance were identified in many installations' cleanup plans. (See app. III.) Some large contaminated sites cannot be cleaned up because either knowledge and expertise does not exist or has technology or cost limitations. At these sites, interim cleanup actions are being used, and the sites will remain contaminated unless new removal technology is developed. Remedies to contain contamination require significant long-term operation, maintenance, and monitoring efforts as well as further cleanup actions if contamination recurs. A 1990 EPA study showed that containment remedies may initially be less expensive to construct, but the required operation and maintenance and the potential for failure increase their cost in the long run. Containment at BRAC installations for major groundwater, landfill, and unexploded ordnance sites will likely require cleanup efforts over many years.

Cleanup of Groundwater Is a Problem at Most BRAC Installations

Decontaminating polluted groundwater, an issue identified in 51 of the 79 cleanup plans, is costly, difficult, and sometimes impossible. Once contamination is detected, the uneven flow of groundwater and the redistribution of the contaminants make cleanup difficult. According to EPA, the technical challenges of eliminating groundwater contamination are complex and efforts to speed up the process have been expensive and achieved limited success.

For example, one of the most commonly used groundwater cleanup technologies is "pump and treat," where contaminated water is pumped to the surface for treatment. However, this technology can cost millions of dollars, take decades, and still leave groundwater contaminated. Pump-and-treat systems were in place or planned for at least 24 of the installations identified in appendix III. Figure 3.1 shows an example of a pump-and-treat remediation project.

**Figure 3.1: Groundwater
Pump-and-Treat Pilot Project, Pease
Air Force Base, New Hampshire**



Pump-and-treat systems may need to be tested over several years to determine their effectiveness. For example, at two installations we visited, Norton and George Air Force Bases in California, pilot systems were in place, but officials said they were operating at about one-half of the capacity because the groundwater did not flow as expected. They said the number of wells for these systems will need to be increased for sufficient water to flow, and even if successful the systems may need to operate for 30 years or more. At Norton Air Force Base, groundwater contamination extends from the central base area, toward the southwest in the direction of groundwater flow beneath the base, and continues beyond the base boundary. There are several community water wells near the base within the anticipated path of the contaminants.

Furthermore, the pump-and-treat technology does not work on some contaminants, according to EPA. These contaminants include certain organic compounds, such as chlorinated solvents, polychlorinated biphenyls (PCBs), creosote, and some pesticides. They are difficult to locate

and remove and may continue to contaminate groundwater for hundreds of years, despite best efforts to clean them up.

**Landfills Must Be Cleaned
up at Most BRAC
Installations**

Contaminated landfills were identified in 67 of 79 cleanup plans for closing and realigning installations and may pose some major environmental threats, particularly for groundwater. (See app. III.) Although small landfills can be removed and eliminated, it is not practical to remove all waste and contamination from larger ones.

National standards do not exist for cleaning up most contaminants in soil, so DOD, EPA, and state regulators negotiate standards for each site. Large landfills are often treated by placing a protective cap over the site to contain the waste and prevent further contamination of the soil, groundwater, and atmosphere. The groundwater conditions around the landfill must also be assessed to determine whether contamination exists, and, if necessary, identify the cleanup measures. Figure 3.2 shows a landfill excavation and a soil removal project.

**Figure 3.2: Landfill Excavation (below)
and Soil Removal Project (page 30),
Pease Air Force Base, New Hampshire.**



Chapter 3
Cleanup Progress Is Limited, and
Technology and Management Improvements
Are Needed



Landfills that close where waste has not been removed are also subject to EPA requirements for maintenance and groundwater monitoring 30 years after the landfill is closed. These requirements were established because

of the potential for environmental problems after closure. EPA or the state must determine that closed facilities have complied with all regulatory requirements. If not, the facilities must be brought into compliance.

**More Cost-Effective
Technology Needed to
Clean up Unexploded
Ordnance**

Unexploded ordnance is ordnance that has failed to function as designed, has been abandoned or discarded, and is still capable of exploding and causing injury. It results from operations conducted at weapons test and training ranges and contains explosive, petroleum, metal, and other compounds that may contribute to soil and water contamination. If unexploded ordnance is buried below 3 feet, current technology may not be able to detect it, and it can migrate to the surface over time. Consequently, surface cleanup may need to be repeated.

Unexploded ordnance and related waste were identified at 25 closing installations, including some installations where the contaminated areas are so large that cleanup technology is not affordable. For example, unexploded ordnance is potentially present on about 51,000 acres of the Army's Jefferson Proving Ground, Indiana; 7,200 acres of the Army's Fort Ord, California; and an unspecified amount of property at the Navy's Mare Island Shipyard, California. Current removal technology is labor intensive, costly, and unreliable. Figure 3.3 shows a portion of a munitions firing range that contains unexploded ordnance.

**Chapter 3
Cleanup Progress Is Limited, and
Technology and Management Improvements
Are Needed**

Figure 3.3: Portion of the Army's Jefferson Proving Ground Ordnance Range



Note: The smoke in the upper center of the photograph is from the impact of live munitions.

According to Army ordnance and other officials, new and more cost-effective technology needs to be developed for cleaning up the unexploded ordnance. A study at the Army's Jefferson Proving Ground, which has extensive quantities, types, and dispersion of unexploded ordnance, found that the cleanup effort would be labor intensive. For example, the work would require using metal detectors for the majority of

**Chapter 3
Cleanup Progress Is Limited, and
Technology and Management Improvements
Are Needed**

land, mapping the unexploded ordnance, handling or removing it, and disposing of it. Because the installation potentially has 51,000 contaminated acres and is heavily forested, current cleanup technology is not practical or affordable. Although the cleanup plan included \$216 million in estimated costs, the plan noted that costs could run to \$2 billion a year for several years, and officials said other estimates for cleanup have ranged from \$5 billion to \$8 billion in total, depending on how the property is to be reused. Figure 3.4 shows an example of buried unexploded ordnance.

Figure 3.4: Item of Unexploded Ordnance Found Buried on the Army's Jefferson Proving Ground Range



The closure of military installations and extent of unexploded ordnance have intensified the need for DOD and EPA headquarters and states to address many unresolved issues related to unexploded ordnance. These issues concern costs and cleanup requirements, when unexploded ordnance becomes a hazardous material, when DOD turns over control to EPA and states, and which laws apply to cleanup. The 1992 Federal Facilities Compliance Act amending RCRA required EPA to propose, after consulting with the Secretary of Defense and appropriate state officials, regulations identifying when military munitions become hazardous waste and providing for its safe transportation and storage. The deadline for the proposed regulations was October 1994. EPA officials told us in January 1995 they missed that deadline and now plan to propose the guidelines in July 1995.

Developing New Technology Will Take Time

Containing and cleaning up contamination depends on developing new, affordable technologies, but these technologies will take time to develop. We recently reported that the process of choosing a new technology involves many decisionmakers, technical expertise, and competing interests.⁹ The pressure to meet cleanup milestones also influences the technology evaluation process and the solutions accepted. The reasons why new technologies are not adopted faster include the following:

- Conflicting priorities prevent the approval of innovative approaches for cleanup.
- Field officials may associate the newer technologies with unacceptable levels of risk.
- On-site contractors may favor particular technologies on the basis of their own experiences and investments.

In May 1993 testimony, DOD recognized that its environmental program could be improved by directing cleanup efforts to meet potential users' needs. DOD said it intended to (1) target environmental technology to high payback areas, (2) apply research and demonstration funds to real environmental needs, and (3) get support from regulators, states, and the public for testing and fielding innovative technologies.¹⁰ Subsequently, in 1994, DOD began looking at technologies with high potential and ranking

⁹Department of Energy: Management Changes Needed to Expand Use of Innovative Cleanup Technologies (GAO/RCED-94-205, Aug. 10, 1994).

¹⁰Statement of the Deputy Under Secretary of Defense (Environmental Security), before the Subcommittee on Installations and Facilities, Committee on Armed Services, House of Representatives (May 13, 1993).

them according to potential benefits and feasibility. DOD officials said they plan to begin demonstrating technologies and offer them to EPA and state regulators for validation in 1995.

Fast Track Cleanup Program Is Being Implemented but Needs Additional Development

DOD established the Fast Track Cleanup program in July 1993 to accelerate the environmental cleanup at closing installations. The program was initiated under the five-part program the administration designed to expedite the environmental cleanup and economic recovery of communities affected by installation closures.

Progress in the Fast Track Cleanup program's five key elements has been as follows:

- Environmental impact statements depend on communities submitting reuse plans, and most of these plans have not been developed.
- Restrictive indemnification language has been clarified.
- Uncontaminated parcels from the 1988 and 1991 closing installations have been identified for transfer, but not as much uncontaminated property has been identified as hoped.
- Teams have been established at closing bases to make decisions and develop the cleanup plans, but decisions are still made above the base level, and bases' cleanup plans can be improved.
- Community cleanup advisory boards that involve the public in the cleanup program have been established, but can be improved.

The program is not fully implemented, and it is too early to comprehensively judge its effectiveness. However, DOD has made some progress in implementing certain elements of the program, but further development is necessary.

Completing Environmental Impact Statements

The Fast Track Cleanup strategy paper stated that the process for preparing an environmental impact statement typically takes 28 to 48 months. The Fast Track Cleanup program requires the military services to complete the environmental impact statement within 12 months of a community submitting its final reuse plan. However, community reuse plans are not completed for many of the installations submitting cleanup plans. According to service officials, they anticipate being able to complete the statements within the 12 months allowed once reuse plans are received.

Law Covering Indemnification Clarified

The Fast Track Cleanup program concluded that indemnification language in DOD's 1993 appropriations act unintentionally caused DOD to slow down granting interim leases. DOD's authorization and appropriations acts for 1993 contained different provisions regarding the government's liability for the transfer of contaminated property. DOD viewed the provisions of the appropriations act as exposing the government to costly claims because of sweeping DOD indemnification language in the law. In response, DOD stopped entering into any leases or transferring property for fear of future claims. Congress subsequently repealed the appropriations language and let the authorization language stand, which limited DOD's liability to past problems. DOD has proceeded with efforts to lease and transfer property.

Limited Uncontaminated and Desirable Property Identified for Nonfederal Transfer

An issue that arose early in the BRAC process was whether property could be transferred to parties outside the federal government without the entire installation being cleaned up. Subsequently, Congress enacted CERFA in 1992, which allowed an installation to be divided into parcels that could be considered separately for transfer. CERFA directs federal agencies to identify uncontaminated parcels based on the specific requirements set forth in CERFA. For parcels that are on a NPL installation, EPA must concur with the results. For parcels on non-NPL installations, appropriate state officials must concur. The deadline for identifying all parcels on BRAC 1988 and 1991 installations, including EPA or state concurrence, was April 19, 1994.

DOD officials told us that CERFA did not work as expected. Although considerable resources have been spent, the anticipated numbers of uncontaminated parcels available for quick transfer and reuse have not been identified. Furthermore, they said that data was not readily available, but they believed little of the uncontaminated property that was identified had been transferred. They also said the developed land on the installations is often the most desirable for immediate reuse, but this property tends to be contaminated. However, DOD officials commented that one benefit of the CERFA process has been that DOD identified the condition of the property at these installations, and this information will be extremely useful in leasing and later transferring contaminated property.

DOD records showed that of about 250,100 acres at 1988 and 1991 closing installations, the services identified about 121,200 acres as uncontaminated; however, the regulators only concurred that 34,499 acres

**Chapter 3
Cleanup Progress Is Limited, and
Technology and Management Improvements
Are Needed**

were uncontaminated. Table 3.1 shows uncontaminated acreage at closing 1988 and 1991 installations that did receive regulatory concurrence.

Table 3.1: Summary of Uncontaminated Property on 1988 and 1991 Closing Installations

Service	Year	Installation	State	Acreage
Air Force	1988	George Air Force Base	CA	2,330
	1991	England Air Force Base	LA	1,191
	1991	Loring Air Force Base	ME	4,700
	1991	Myrtle Beach Air Force Base	SC	2,126
	1991	Williams Air Force Base	AZ	3,001
	1991	Wurtsmith Air Force Base	MI	2,257
Total - Air Force				15,605
Army	1988	Cameron Station	VA	58
	1988	Coosa River Annex	AL	2,586
	1988	Defense Mapping Agency - Herndon	VA	3
	1988	Fort Des Moines	IA	15
	1988	Fort Sheridan	IL	22
	1988	Hamilton Army Airfield	CA	500
	1988	Presidio of San Francisco	CA	530
	1988	Pontiac Storage Facility	MI	25
	1991	Fort Devens	MA	1,878
	1991	Fort Ord	CA	13,186
	1991	Sacramento Army Depot	CA	51
Total - Army				18,854
Navy	1988	Naval Station New York	NY	26
	1991	Construction Battalion Center Davisville	RI	7
	1988	Naval Air Station Moffett Field	CA	7
Total - Navy				40
Total all installations				34,499

The regulators did not agree that many parcels were uncontaminated because activities related to compliance— asbestos removal, lead-based paint surveys, and resolution of issues related to petroleum—were not completed. Also, state regulators were not willing to concur because of concerns about the state’s potential liability. At Fort Wingate, New Mexico, the Army identified 17,353 of 21,812 total acres as uncontaminated, but the state regulator did not concur on any acreage. Likewise, the Air Force identified 1,323 of 3,216 acres at Bergstrom Air

Force Base, Texas, as uncontaminated, but the state regulator did not concur.

Of the 34,499 uncontaminated acres, about one-half is on property the federal government is retaining and one-half is on property available for transfer to nonfederal users. However, according to DOD, the uncontaminated property is usually undeveloped, remotely located, or linked to contaminated parcels and cannot be used separately. For example, about 7,000 of the uncontaminated acres at Fort Ord are considered unusable because, according to DOD officials, the acreage is in an undeveloped part of the installation that has no access to a usable water supply. Also, at George Air Force Base, environmental officials said much of the property identified as uncontaminated surrounds the runways and cannot be separated from the flightline.

Installation Cleanup Teams in Place but Not Empowered

The Fast Track Cleanup program concluded environmental decisions were taking too long to make and required each installation to establish a team consisting of EPA, DOD, and state representatives that would be empowered to make decisions quickly. Officials at some closing installations we visited told us they already had teams but were not empowered to make decisions at the local level.

EPA issued draft guidance on empowerment to its installation-level team members in March 1994, but did not mandate that it be followed. According to EPA officials in January 1995, EPA has delegated to the regions the necessary authority to make decisions, and the regions have established procedures to ensure that management approval is redelegated or provided to the installations' cleanup teams in a timely manner. The Air Force also issued guidance on empowerment to its installation-level team members in April 1994. This guidance delegated some key decision-making authority to mid-level managers, but not to the installation team members as originally envisioned.

Various DOD and EPA officials told us that their agencies try to avoid legal problems by reviewing and approving decisions made at the local level, and states do the same thing. According to Navy officials, in one case, the state representative for environmental cleanup at the Marine Corps Air Station Tustin, California, decided in a local meeting on a particular action because the state environmental agency had approved a similar remedy at the Presidio of San Francisco, California. However, the state overruled the installation representative.

Cleanup Plans Not Fully Developed

DOD provided guidance and training on the development of BRAC cleanup plans. The plans were to provide a comprehensive and consolidated strategy for expedited environmental cleanup at all BRAC installations. DOD stated that the cleanup plans should support the BRAC budget submission. The cleanup plans developed to date are not of the quality described in the guidance document. DOD officials told us, for example, that sections in some plans were incomplete and had not been thoroughly reviewed, and data was viewed as somewhat unreliable.

A contractor's review of 77 BRAC cleanup plans in June 1994 identified a lack of uniformity in the plans due to (1) different levels of progress among installations based on the year the installation was designated for closure, (2) short time frames for completing the plans, and (3) various installation interpretations of guidance for the plans. At installations we visited while cleanup plans were being compiled—Norton Air Force Base, the Jefferson Proving Ground, and the Army Materials Technology Laboratory—officials said that they did not have time to develop complete plans for expediting cleanup and meet reporting deadlines, so they reported (1) existing information in the cleanup plan format directed by DOD or (2) the information had to be developed and would be provided later.

DOD officials recognized that the time available for the services to develop cleanup plans was not sufficient and now view the April 1994 plans as a first effort. They are considering possible improvements in developing the BRAC cleanup plans, but have not established milestones for the services to submit more complete plans.

Community Cleanup Advisory Boards Still Being Formed

DOD guidance for the Fast Track Cleanup program directed the military services to improve public involvement in the environmental cleanup process. For each installation with property to be transferred or with sufficient community interest, DOD requires the formation of cleanup advisory boards comprised of members of the local community and jointly chaired by a military service representative and a member of the community. DOD's guidance said these advisory boards are key to installations being responsive to community concerns.

DOD's goal of having fully functioning cleanup advisory boards in place may take time. These advisory boards at closing installations are in the early stages of development. According to the contractor's review of 77 cleanup plans, about one-third of the installations had not yet formed

cleanup advisory boards. Also, at installations with boards, only about half of the boards participated in developing the BRAC cleanup plans.

Furthermore, we reported that EPA, in a similar effort to establish advisory boards, had not been able to earn the public's trust due to differing interests, even with the best intentions and community relations outreach.¹¹ On the basis of our observations at some of the BRAC community advisory board meetings we attended and in discussions with DOD officials, it appears that DOD may face similar difficulties.

Performance Measures Not Developed for Fast Track Cleanup

DOD officials recognized that the Fast Track Cleanup program lacked a baseline and performance measures. As a result, they have begun developing measures for the program, but have not set a target date for completing this effort. As of December 1994, just two measures of effectiveness were being considered: (1) the percentage of closing bases with a completed environmental impact analysis and (2) the percentage of property at closing bases that could be made available for reuse.

These measures do not seem to adequately address performance. The first measure addresses an element that is not considered a problem. The second measure does not precisely measure environmental cleanup actions if leases are used. Also, these two measures do not address program elements concerned with timely decisions being made on installations' cleanup, the number of installations with fully developed and effectively implemented cleanup plans, and the extent and effectiveness of public involvement in the cleanup process.

Conclusions

Most sites at closing and realigning installations are in the early stages of the cleanup process. Cleanup is costly, difficult, and sometimes impossible, and technology does not exist or has serious limitations when it comes to cleaning up massive amounts of contaminated groundwater, large landfills, or extensive areas with unexploded ordnance. Furthermore, new technology will take time to develop.

The Fast Track Cleanup program is being implemented and has helped the cleanup process, but some elements of the program need further development. For example, CERFA has not produced the expected results. Expectations that installation cleanup teams could be empowered to make

¹¹Superfund: EPA's Community Relations Efforts Could Be More Effective (GAO/RCED-94-156, Apr. 8, 1994).

**Chapter 3
Cleanup Progress Is Limited, and
Technology and Management Improvements
Are Needed**

decisions were probably unrealistic, as was the deadline for installations to develop base cleanup plans. There is a need to establish standards that will allow DOD to assess the various measures taken to speed up the cleanup process.

Recommendation

We recommend that the Secretary of Defense establish Fast Track Cleanup program standards that will allow DOD to assess the steps taken to accelerate the cleanup process at BRAC installations.

Comprehensive Environmental Response, Compensation, and Liability Act Process

Preliminary Assessment

The initial stage of the cleanup program is an installationwide study to determine if sites are present that pose hazards to public health or the environment. Available information is collected on the source, nature, extent, and magnitude of actual and potential hazardous substance releases at sites on the installation.

Site Inspection

The next step consists of sampling and analysis to determine the existence of actual site contamination. Information gathered is used to evaluate the site and determine the response action needed. Uncontaminated sites do not proceed to later stages of the process.

Remedial Investigation

Remedial investigation may include a variety of site investigative, sampling, and analytical activities to determine the nature, extent, and significance of the contamination. The focus of the evaluation is determining the risk to the general population posed by the contamination.

Feasibility Study

Concurrent with the remedial investigations, feasibility studies are conducted to evaluate remedial action alternatives for the site to determine which would provide the protection required.

Remedial Design

Detailed design plans for the remedial action alternative chosen are prepared.

Remedial Action

The chosen remedial alternative is implemented.

Interim Remedial Action

Remedial actions can be taken at any time during the cleanup process to protect public health or to control contaminant releases to the environment.

Remedy in Place and Functioning as Intended

The remedial action is functioning properly and performing as designed. These include such actions as the operation of pump-and-treat systems that will take decades to complete cleanup.

Locations and Organizations Visited

Air Force

Air Force Center For Environmental Excellence,
Brooks Air Force Base, Texas
George Air Force Base, California
Loring Air Force Base, Maine
Mather Air Force Base, California
Norton Air Force Base, California
Pease Air Force Base, New Hampshire

Army

Army Corps Of Engineers, Sacramento District, California
Army Materials Technology Laboratory, Massachusetts
Fort Ord, California
Jefferson Proving Ground, Indiana

Navy

Marine Corps Air Station, El Toro, California
Marine Corps Air Station, Tustin, California
Naval Facilities Engineering Command, San Diego, California
Naval Air Station, Chase Field, Texas
Naval Complex, Philadelphia, Pennsylvania

Environmental Protection Agency

Region IX, San Francisco California

NPL Status and Summary of Contaminants as Reported in 79 BRAC Cleanup Plans

BRAC cleanup plans	State	NPL	Types of problems		
			Groundwater	Landfills	UXO ^a
Air Force bases					
Chanute	IL			1	
George	CA	1	1	1	1
Mather	CA	1		1	1
Norton	CA	1	1	1	
Pease	NH	1	1	1	
Bergstrom	TX			1	
Carswell	TX		1	1	
Castle	CA	1	1	1	1
Eaker	AR		1	1	1
England	LA			1	1
Grissom	IN		1	1	1
Loring	ME	1	1	1	
Lowry	CO		1	1	
Myrtle Beach	SC		1	1	1
Richards-Gebaur	MO			1	
Rickenbacker Air National Guard Base	OH			1	
Williams	AZ	1	1	1	1
Wurtsmith	MI		1	1	
Gentile Air Force Station	OH		1	1	1
Griffiss	NY	1	1	1	
Homestead	FL	1	1	1	
K.I. Sawyer	MI		1	1	
McDill	FL		1	1	1
March	CA	1	1	1	1
Newark	OH		1	1	
Plattsburgh	NY	1	1	1	1
Subtotal	26	11	20	26	12
Army installations					
Cameron Station	VA		1	1	
Fort Meade	MD		1	1	1
Fort Sheridan	IL			1	1
Fort Wingate Depot Activity	NM			1	1
Hamilton Army Airfield	CA		1	1	
Jefferson Proving Ground	IN			1	1
Lexington Blue Grass Depot	KY		1	1	

(continued)

Appendix III
NPL Status and Summary of Contaminants
as Reported in 79 BRAC Cleanup Plans

BRAC cleanup plans	State	NPL	Types of problems		
			Groundwater	Landfills	UXO ^a
Presidio of San Francisco	CA			1	
Pueblo Depot Activity	CO		1	1	1
Umatilla Depot Activity	OR	1	1	1	1
Army Materials Technology Laboratory	MA	1	1		
Fort Benjamin Harrison	IN			1	1
Fort Devens	MA	1	1	1	
Fort Ord	CA	1	1	1	1
Sacramento Army Depot	CA	1	1		
Woodbridge Research Facility	VA		1	1	
Charles Wood and Evans Area, Fort Monmouth	NJ			1	
Tooele Depot	UT	1	1		
Vint Hill Farms Station	VA			1	
Subtotal	19	6	12	16	8
Navy installations					
Salton Sea Test Base	CA		1	1	
Naval Station New York and Brooklyn Naval Station	NY				
Naval Air Station Treasure Island (Hunters Point Annex)	CA	1	1	1	
Naval Construction Battalion Center, Davisville	RI	1	1	1	
Marine Corps Air Station, Tustin	CA		1	1	
Naval Air Station Moffett Field	CA	1	1	1	
Naval Auxiliary Landing Field, Crows Landing	CA		1	1	
Naval Air Warfare Center, Aircraft Division, Warminster	PA		1	1	
Naval Station Puget Sound, Seattle	WA		1		
Philadelphia Naval Complex	PA			1	1
Naval Station, Naval Hospital and Associated Housing, Long Beach	CA		1	1	
Naval Station Treasure Island	CA		1	1	
Libertyville Training Site, Vernon Hills	IL		1	1	
Marine Corps Air Station, El Toro	CA	1	1	1	
Naval Air Station, Agana	Guam		1	1	

(continued)

**Appendix III
NPL Status and Summary of Contaminants
as Reported in 79 BRAC Cleanup Plans**

BRAC cleanup plans	State	NPL	Types of problems		
			Groundwater	Landfills	UXO ^a
Naval Air Station, Alameda	CA			1	
Naval Air Station, Barbers Point	HI		1	1	1
Naval Air Station, Cecil Field	FL			1	1
Naval Air Station, Dallas	TX			1	
Naval Air Station, Glenview	IL		1	1	
Naval Air Station, Memphis	TN		1	1	
Naval Air Facility, Midway Island			1	1	
Naval Air Warfare Center, Aircraft Division, Trenton	NJ				
Naval Civil Engineering Laboratory, Port Hueneme	CA				
Naval Complex, Charleston	SC			1	
Naval Medical Center, Oakland	CA				
Naval Reserve Center, Pacific Grove	CA				
Naval Reserve Center, Staunton	VA				
Naval Shipyard, Mare Island	CA		1	1	1
Naval Station, Mobile	AL				
Naval Training Center, San Diego	CA			1	1
Naval Radio Transmitting Facility, Driver	VA		1	1	
Department of Defense Housing Facility, Novato	CA				
Naval Training Center, Orlando	FL			1	
Subtotal	34	4	19	25	5
Total	79	21	51	67	25

^aUnexploded ordnance.

BRAC Cleanup Plan Cost Estimates Beyond the 6-Year Closure Period for 14 BRAC 1988 Installations

Dollars in millions			
Service	Installation	State	Cost estimate for 1996 to 1999
Air Force	Chanute Air Force Base	IL	\$23,800
	George Air Force Base	CA	7,600
	Mather Air Force Base	CA	10,000
	Norton Air Force Base	CA	27,400
	Pease Air Force Base	NH	13,000
Total - Air Force			\$81,800
Army	Cameron Station	VA	200
	Fort Meade	MD	830
	Fort Wingate	NM	8,900
	Jefferson Proving Ground	IN	216,100
	Presidio	CA	40,000
	Pueblo Depot	CO	78,140
	Umatilla Depot	OR	9,710
Total - Army			\$353,880
Navy	Salton Sea Test Base	CA	96,540
	Naval Station New York	NY	3,378
Total - Navy			\$99,918
Total - all services			\$535,598

Source: BRAC cleanup plans

Major Contributors to This Report

**National Security and
International Affairs
Division, Washington,
D.C.**

David R. Warren, Associate Director
John J. Klotz, Assistant Director

**Los Angeles Regional
Office**

Lionel C. Cooper, Evaluator-in-Charge
Thaddeus S. Rytel, Jr., Senior Evaluator
Gary W. Kunkle, Senior Evaluator
Nancy A. Merlino, Evaluator

Dallas Regional Office

Charnel F. Harlow, Regional Assignment Manager
John D. Strong, Evaluator

**Office of General
Counsel**

Mark C. Speight, Attorney-Adviser

Ordering Information

The first copy of each GAO report and testimony is free. Additional copies are \$2 each. Orders should be sent to the following address, accompanied by a check or money order made out to the Superintendent of Documents, when necessary. Orders for 100 or more copies to be mailed to a single address are discounted 25 percent.

Orders by mail:

U.S. General Accounting Office
P.O. Box 6015
Gaithersburg, MD 20884-6015

or visit:

Room 1100
700 4th St. NW (corner of 4th and G Sts. NW)
U.S. General Accounting Office
Washington, DC

Orders may also be placed by calling (202) 512-6000 or by using fax number (301) 258-4066, or TDD (301) 413-0006.

Each day, GAO issues a list of newly available reports and testimony. To receive facsimile copies of the daily list or any list from the past 30 days, please call (301) 258-4097 using a touchtone phone. A recorded menu will provide information on how to obtain these lists.

**United States
General Accounting Office
Washington, D.C. 20548-0001**

**Bulk Mail
Postage & Fees Paid
GAO
Permit No. G100**

**Official Business
Penalty for Private Use \$300**

Address Correction Requested



