

CBO PAPERS

**ENVIRONMENTAL CLEANUP ISSUES
ASSOCIATED WITH CLOSING
MILITARY BASES**

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PREFACE

In December 1988, the Commission on Base Realignment and Closure recommended that a number of military installations be closed as a result of changes to national security requirements. In the fall of 1989, the Congress endorsed the Commission's recommendations, and the Department of Defense began the process of closing those bases. At the time of its deliberations, the Commission had limited information concerning the extent of environmental contamination and the potential costs of cleanup at the bases. Since that time, however, the Department of Defense has located and identified significant contamination. This Congressional Budget Office (CBO) paper analyzes the costs and policy issues concerning the environmental cleanup associated with the initial round of base closings. This information may be of assistance to the Congress as it debates the additional base closings that will be considered during the next several years.

The paper was requested by Congressman Bill Hefner, the Chairman of the Subcommittee on Military Construction of the House Committee on Appropriations, and by Congressman Vic Fazio, a member of the Subcommittee. In keeping with CBO's mandate to provide objective and nonpartisan analyses, the paper makes no recommendations.

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INTRODUCTION AND SUMMARY

As a result of reduced international tensions and increased budgetary constraints, real reductions in defense spending have led to fewer military forces and correspondingly lower levels of operations and support. In 1988, the Department of Defense (DoD) began to examine ways to achieve savings by realigning and closing military bases that were costly to operate and no longer needed to meet changing requirements. In December of that year, the Commission on Base Realignment and Closure (BRAC 88) recommended that 86 military installations be closed and that 59 others be partially closed, expanded, or reduced by the relocation of military units. The Secretary of Defense accepted the commission's findings in January 1989, and, with Congressional consent, the process began.

Because the commission was concerned primarily with ensuring that military requirements be met, such factors as the environmental impact of closing bases received less emphasis in its deliberations. The commission concluded, for instance, that it did not need to consider the cost of cleaning up hazardous wastes because, under current law, the government would have to clean up the properties in any event. Consequently, in considering which bases to close, the commission had only preliminary estimates of the extent and nature of environmental contamination.

This paper examines issues related to cleaning up the 86 military installations scheduled to be closed under the Base Closure and Realignment Act (BCRA) of October 1988. The first part of the paper examines issues relating to those specific installations. What is the extent and nature of known contamination? How much progress has been made in cleaning it up? How much time might the cleanup effort ultimately require, and how much might it cost? How do current environmental statutes and regulations limit civilian reuse of bases during the cleanup period?

The paper also identifies and discusses policy choices that will confront DoD and the Congress. Are there Congressional actions that could accelerate the reuse of the bases without undercutting efforts to restore the environment? Are there ways to hold down costs? What priorities should be considered in allocating limited funds? Does BRAC 88 hold lessons for future base closure commissions?

Key Conclusions

DoD has determined that an extensive hazardous waste problem exists at the bases to be closed under the BCRA. As of September 1991, 543 contaminated sites have been identified on the bases scheduled to be closed,

including some that have environmental problems (such as buried ammunition and groundwater contamination) that are very difficult to clean up.

Total cleanup expenses have already grown beyond DoD's early estimates. DoD currently calculates that cleanup will cost about \$900 million during the 1990-1995 period--an increase of about 50 percent in real terms over the budget estimate submitted in February 1991. Costs at some BRAC 88 bases have already increased substantially above initial estimates. Based on experience with civilian cleanup projects, and unless plans and requirements change, it would be prudent to assume that there will also be increases in the total funding required.

The cleanup process is also likely to extend beyond 1995, the date by which BRAC 88 bases must be closed. As of September 1991, about two years after the Congress approved the initial round of base closings, only about 3 percent of the contaminated sites identified on the bases had been completely cleaned up. Much cleanup work remains to be done, and some of it, such as decontaminating groundwater, could take as long as 20 years.

Does that mean that former military bases cannot be reused for civilian purposes until the cleanup of contaminated sites is completed? In some cases, the answer is no. It is possible, for example, that uncontaminated properties,

including those that have been cleaned up, can be reused without significant delay. Under certain circumstances, contaminated property may also be reused.

It may sometimes be difficult, however, to identify the boundaries of "uncontaminated" property. Under such circumstances, reuse could be delayed. Although DoD recently issued guidelines establishing criteria for defining such property, additional direction may be needed in consultation with state environmental agencies and the Environmental Protection Agency (EPA).

Nor is it always easy to define what "cleaned up" means. The Comprehensive Environmental Response, Compensation, and Liability Act requires that "all remedial action necessary to protect human health and the environment with respect to any such (contaminated) substance remaining on the property has been taken" before the property can be deeded to a new owner. "Necessary" actions may take a long time. Moreover, disagreements about whether all of them have been taken could delay the transfer of property. If the property cannot be used in the interim, local economies could suffer serious adverse effects.

The problems associated with cleaning up military bases suggest that future base closure commissions, including those now scheduled to meet in 1993 and 1995, should have more information about environmental issues (including the costs and benefits of cleanup) than was available to BRAC 88. Indeed, the Congress may wish to instruct those future commissions to consider alternative approaches to environmental cleanup in deciding which bases to close and which to retain.

CLEANUP PROBLEMS

A number of problems are associated with cleaning up the bases to be closed under BRAC 88. They include extensive contamination, delays that could extend beyond the currently planned closing dates, and escalating costs.

Extensive Contamination Exists

Until legislation governing the handling and disposal of hazardous waste took effect during the past decade, requirements for managing the disposal of waste on military bases were not nearly as stringent as they are today. Consequently, environmental contamination is widespread, in some cases

constituting a significant potential threat to public health and safety. Of course, many bases or parts of bases are not contaminated or could be easily cleaned up to permit their reuse without significant delay.

On the bases scheduled for BRAC 88 closings, a wide variety of sources of pollution exists: landfills, fuel and paint dumps, buried munitions, polychlorinated biphenyl (PCB) transformers, asbestos, radon, groundwater contamination, and underground storage tanks that have developed leaks. Cleaning up buried munitions and groundwater contamination are among the most difficult, time consuming, and costly of these problems. Among the BRAC 88 bases, DoD has identified seven with buried munitions and at least 10 instances of groundwater contamination. The latter may also exist at numerous additional sites--for example, landfills and underground storage tanks--but final determinations have not yet been made. Other types of cleanup, such as removing PCB transformers, can be relatively simple and require only a short time to complete.

Five of the 86 military installations scheduled to be closed under BRAC 88 are included on the National Priorities List (NPL) of contaminated sites maintained by the EPA.¹ NPL sites are those contaminated areas

1. George, Mather, Norton, and Pease Air Force bases and the Alabama Army Ammunition Plant are currently on the National Priorities List. To date, Pease is the only one of the five to be closed.

determined to be the most hazardous to public health and the environment. They will require the most extensive cleanup effort and, under DoD's "worst-first" policy, are given highest funding priority.

Despite the extensive contamination already uncovered, it is not certain that all contaminated sites have been found. As investigators examine one site, they often come upon additional sites or types of contamination. Thus, although DoD knows more about environmental contamination on military bases than it did in 1988, the full scope of pollution may not yet be known. At Pease Air Force Base, for example, 14 additional sites were identified after the initial assessment was made in 1986. Especially when groundwater is polluted, the full extent of pollution is difficult to detect. According to DoD officials, however, investigators have completed the first phase of their review at all of the BRAC 88 bases and the department is confident that virtually all contaminated sites have been identified.

Cleanup Could Extend Beyond Closing Date

Completing environmental cleanup before a base is closed facilitates its reuse and so minimizes local economic dislocation. If cleanup activities extend beyond the closing date, reuse of the property may be delayed. DoD hopes

to put all necessary cleanup measures into place during the next few years. Empirical data suggest, however, that in some cases it could take a long time to meet the required cleanup standards.

According to the enabling legislation, the designated bases must be closed by September 30, 1995. (See the appendix for the current schedule of closings.) DoD expects to have necessary remedial actions in place for the five bases on the NPL in 1995. The department has not identified dates for taking action at the less contaminated sites. It anticipates, however, that much of the investigative work at those sites will be completed no later than 1993.

Notwithstanding DoD's estimates, it is highly likely that cleaning up some of the contaminated sites will extend beyond the closing dates set for the BRAC 88 bases. Using current technology, for example, it can take more than 20 years to clean up polluted groundwater to meet EPA's standards for safe drinking water.

Other evidence exists that suggests that DoD will be hard pressed to clean up the BRAC 88 NPL sites by the fall of 1995. A RAND study concluded that it has taken the average NPL site--also known as a "Superfund" site--about 12 years to progress from identification to completed

remediation.² Recent EPA data suggest an even longer process: an average of 15 years from discovery to completion of construction of remediation measures--and much longer in some cases to reach cleanup standards.³

It may be possible, of course, to complete cleanup in less time, perhaps even enabling DoD to meet the deadline for closing BRAC 88 bases. But that would require that all interested parties reach an agreement accepting less stringent standards. Such agreements would be difficult to achieve and could conflict with existing policies and legislation governing cleanup standards.

Cleanup Still in Early Stages

The current state of cleanup activities at BRAC 88 bases also suggests that DoD will have trouble completing the task by 1995. More than three years after approval of the closings, DoD remains in the early stages of the cleanup process at most of the 86 bases. The typical cleanup sites are still being investigated and analyzed to determine the nature and extent of

2. Jan Acton, *Understanding Superfund: A Progress Report* (Santa Monica, Cal.: RAND, 1989), p. 16.

3. Testimony of Jan Paul Acton, Assistant Director of the Congressional Budget Office, before the Subcommittee on Investigations and Oversight, House Committee on Public Works and Transportation, October 29, 1991.

contamination. According to DoD data as of September 1991, few sites--about 3 percent of the total number--have actually been completed.

DoD applies EPA guidelines in investigating and remediating contaminated sites. According to the guidelines, the cleanup process is conducted in eight phases (see Box 1).

As of September 1991, almost 60 percent of the contaminated sites were still in the early phases (I and II) of the cleanup process. Only about 15 percent of the sites had entered the last two phases. The status of DoD's cleanup effort for BRAC 88 bases is shown in Table 1.

Cost to Complete the Cleanup Could Grow

Even though BRAC 88 chose to disregard environmental cleanup in calculating the costs and benefits of closing bases, actual cleanup costs create real strains on the diminishing defense budget. Costs have increased since initial estimates were made in 1988, and there is reason to believe that they will continue to grow as more is learned about the nature and scope of contamination and the remediation techniques needed to meet environmental

Box 1.

Phases of EPA's Environmental Cleanup Process

- I. **Preliminary Assessment**--The agency conducts an installationwide study to determine if contaminated sites are present.
- II. **Site Inspection**--Investigators analyze samples to determine the nature and level of contamination. The information is fed into the **Hazardous Ranking System** to determine the relative risks to public health and safety and the environment. Sites with an HRS score of 28.5 or higher are listed on the **National Priorities List**.
- III. **Interagency Agreement**--DoD, EPA, and appropriate state regulatory authorities negotiate an agreement that contains a scheduled work plan and provides for oversight of phase IV.
- IV. **Remedial Investigation/Feasibility Study (RI/FS)**--Further investigations are conducted to determine the risk of contamination to the general population. Alternative remedial actions are evaluated.
- V. **Record of Decision**--Based on the results of the RI/FS, the chosen remedy and its implementation plan are incorporated into a record of decision. Proposed RODs are published for public review and comment.
- VI. **Remedial Design (RD)**--Detailed plans for the cleanup are formulated.
- VII. **Remedial Action**--The RD plans are implemented.
- VIII. **Final Disposition**--A determination is made that cleanup is complete.

standards. Costs could also increase if cleanup activities are accelerated to meet closure deadlines or to permit early reuse of property.

DoD currently estimates that the cost of cleaning up BRAC 88 installations during the 1990-1995 period will total almost \$900 million--an increase of about 50 percent in real terms over DoD's budget estimate submitted in February 1991. Potential for further cost growth exists because most of the cleanup work accomplished thus far consists of investigations and

TABLE 1. STATUS OF CLEANUP OF BRAC 88 BASES

Phase	Number of Sites	Percentage of Total Sites
Preliminary Assessment	105	19
Site Investigation	220	41
Remedial Investigation/ Feasibility Study	119	22
Remedial Design	12	2
Remedial Action	71	13
Final Disposition	17	3

SOURCE: Department of Defense data of September 1991.

NOTE: BRAC 88 = the Commission on Base Realignment and Closure of 1988.

assessments. Little actual cleanup has occurred. Nevertheless, DoD anticipates lower budgetary requirements during the 1993-1995 period, when major cleanup activities are planned to begin. In any event, the costs of cleanup will extend beyond 1995 as DoD works to achieve required standards for those projects not completed by the time an installation is closed.

As the experience at Pease Air Force Base shows, the number of contaminated sites may increase during the course of investigating and evaluating contamination. If the extent of contamination was initially underestimated--as already appears to have been true with many of the BRAC 88 bases--more far-reaching options for remediation will be required, probably at higher cost. In addition, if cleanup standards are stiffened, it will probably cost more to meet them.

If the experience of remediation at Superfund sites is a reliable guide, costs could grow significantly above the initial baseline estimates. At the lower end of the range of estimates, a General Accounting Office study of Superfund sites calculated a modest growth in costs--about 12 percent--over baseline estimates.⁴ GAO's estimates, however, were based only on the costs

4. General Accounting Office, *Superfund: Cost Growth on Remedial Construction Activities* (February 1988), p. 3.

of construction of remediation techniques and did not consider the full range of costs from investigation to completion of the remediation phase.

Other studies have shown considerably greater growth in costs for cleaning up Superfund sites. The Oak Ridge National Laboratory concluded that costs approached 80 percent over estimates made at the record of decision phase--because of serious underestimates of groundwater problems and the volume of contaminated soil.⁵ Another study, which surveyed 40 Superfund sites, estimated that costs for remedial design and construction grew by about 53 percent during the remediation process.⁶

Only a small percentage of the BRAC 88 sites have qualified to date as Superfund sites. Nevertheless, the experience there, coupled with the apparent underestimation of the number and extent of contaminated BRAC 88 sites, suggests that the full cost of cleaning up the DoD bases is likely to be substantially greater than the department has estimated.

The growth in cleanup costs could cause budgetary problems in the future. In 1991, the Congress mandated that environmental cleanup costs for

5. Amelia Crotwell, Caroline Doty, and Curtis Travis, *Cost Growth for Treatment Technologies at NPL Sites* (Oak Ridge, Tenn: Oak Ridge National Laboratory, 1991), p. 2.

6. Brett Schroeder and Ralph Shangraw, "Parametric Tools for Hazardous Waste Cleanup Projects" (paper presented at the 34th annual meeting of the American Association of Cost Engineers, Boston, June 24-27, 1990), p. j-2-2.

DoD bases that are scheduled to close be paid from a Base Closure Account established in 1988 to cover all of the costs of closing and realigning BRAC 88 bases. (Prior to 1991, environmental cleanup of those bases was funded through DoD's Defense Environmental Restoration Account.) If costs of environmental cleanup grow sharply, the Base Closure Account may need additional funds--a difficult prospect in an era of declining defense budgets.

ENVIRONMENTAL CLEANUP AND REUSE OF DEFENSE BASES

Under provisions of the Federal Property and Administrative Services Act of 1949 and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), the requirement to clean up sites will not necessarily impede the reuse of former military bases. According to the statutes, DoD may transfer property among its components or to other federal agencies without requiring that environmental cleanup be completed beforehand. Leasing contaminated property is also permissible, providing that a lease recognizes the government's liability to complete the cleanup and permits operations to that end.

However, CERCLA contains ambiguities with respect to transferring deeds to private individuals or nonfederal entities that could delay the reuse

of property.⁷ Section 120(h)(3), for example, requires that before a deed of transfer may take effect, the government must confirm that "all remedial action necessary to protect human health and the environment...has been taken...." The law does not define "all remedial action necessary," and experts may disagree on the meaning of the phrase. The law also fails to specify cleanup standards "necessary to protect human health and the environment"--standards that are set for individual sites on an ad hoc basis in a record of decision.

Finally, Section 120(h)(3) does not define what it means to have "taken" remedial action. EPA recently determined that action has been taken when construction of a remedy is complete, including a demonstration that the remedy is operating properly. Under that interpretation, it could be possible to transfer contaminated property without having completed any significant remediation. Some have argued, however, that the section requires that all health, safety, and environmental standards be met before the transfer of a deed can take place.

Even under the most stringent interpretation of Section 120(h)(3), not all of the BRAC 88 bases would be barred from reuse. It is legal to transfer

7. CERCLA governs the transfer of federal property on which any hazardous material has been stored for one year or more or is known to have been released or disposed of.

uncontaminated property not governed by CERCLA to nonfederal jurisdictions or private parties, and it is permissible to break such property into parcels in order to transfer it. Much of the property governed by BRAC 88 is wholly or partly uncontaminated and could--at least in theory--be transferred legally and perhaps promptly.

Problems may occur, however, in ensuring that a property or parcel is uncontaminated. DoD recently issued initial guidelines on transferring uncontaminated parcels of land, but criteria for federal regulations have not yet defined "uncontaminated." Developing such criteria under the normal procedures of the regulatory process could take a long time. Defining uncontaminated could be particularly difficult for bases on the National Priorities List and for those bases where significant levels of contamination exist side by side with uncontaminated property.

As indicated above, it is legal to lease contaminated property to nonfederal jurisdictions or private purchasers and thereby avoid the constraints of CERCLA, which only applies to transfers of ownership. Thus, leasing permits base property to be reused quickly. For example, the Air Force has leased a portion of Norton Air Force Base to Lockheed as a rework facility.

Leasing may not be a simple solution to the reuse problem, however, because neither regulation nor law defines the distinction between a long-term lease and de facto ownership and because other relevant regulations sometimes conflict. The practice of the General Services Administration (GSA) has been to require that a lease not exceed a five-year limit before the property must be transferred. In contrast, DoD is discussing long-term leases--for example, 50 years--with potential lessees. That difference in approach could lead to litigation if interested parties feel that a leasing arrangement is being used as a mechanism to avoid cleaning up property. For NPL sites, parties generally sign a Federal Facilities Agreement containing a cleanup plan and schedule that govern the remediation process that would take place under a lease agreement. No similar requirement committing the government to a cleanup plan and timetable exists for non-NPL sites, which comprise the great majority of BRAC 88 bases.

POLICY CHOICES

Over the next several years, DoD and the Congress will need to make important policy choices concerning the cleanup and reuse of BRAC 88 bases and other military installations that are to be closed. The choices involve

ways to facilitate the reuse of property, ensure adequate funding, and establish cleanup priorities.

Ways to Facilitate Reuse

It is possible to reuse former military bases while avoiding the delays generated by the laws governing the cleanup of hazardous wastes. For example, DoD could seek ways to transfer property within the department or to other agencies in the federal government. Such a transfer could take place before cleanup is completed, and it might offset the loss of military income to the community.

Leasing is another method that could permit near-term reuse of former military installations. It is important that leasing arrangements acknowledge DoD's liability to clean up the property and that such activities be permitted to proceed unimpeded. Facility agreements among DoD, EPA, and other jurisdictions that accompany leasing arrangements should incorporate a comprehensive detailed plan and schedule to accomplish an environmental cleanup. To facilitate use of the leasing approach, DoD, EPA, and the GSA may wish to review the policy guidelines to specify the longest lease that would be permissible without requiring actual transfer of the land. The

review would help to avoid the de facto transfer of property through leasing without cleaning it up.

If base property were divided into parcels that allow the transfer of uncontaminated property, the reuse of large portions of former military installations could be accelerated considerably. It may be difficult, however, to determine that property is not contaminated because no federal regulatory criteria on the matter exist. DoD and EPA are reviewing the issue and working on guidelines that would facilitate transfer.

In the future, DoD and EPA could avoid difficulties in transferring uncontaminated property on NPL sites by revising the procedures that permit entire military bases to be listed on the NPL. If listings were limited instead to contaminated areas on bases, uncontaminated property located on NPL installations could be transferred with less difficulty than is now the case. To achieve that objective, DoD and EPA may wish to review policies and procedures governing NPL listing.

Legislation currently before the Congress addresses many of the relevant policy issues. For example, H.R. 4024 would amend certain provisions of CERCLA concerning parceling, leasing, and transferring of deeds.

Meeting Funding Requirements

The Congress has provided funding that meets BRAC 88 cleanup requirements to date. As noted, however, the cleanup effort for BRAC 88 bases remains largely in its early phases, and for most sites the more uncertain and expensive remediation phase lies ahead. Since available evidence indicates that costs are likely to grow considerably during the remediation phase, additional funding beyond current estimates probably will be required. Moreover, since some remediation will require efforts lasting many years, funds will be needed beyond 1995--the year that the Base Closure Account funding the BRAC 88 cleanup is scheduled to expire. The Congress could authorize any balance of the Base Closure Account to be applied to remaining cleanup activities. It could establish a trust account specifically for cleanup, using proceeds from the leasing or sale of property.

DoD may be more likely to meet funding requirements for cleanup if it manages the process in ways to minimize cost growth. Total program costs can be minimized by avoiding unnecessary stretchouts and keeping cleanup projects moving at a productive pace. If experience with purchasing weapon systems applies, such contracting techniques as competition and multiyear

contracts can provide significant savings.⁸ Cost growth can also be minimized, and planning improved, if initial estimates use empirical costs for the same or similar types of work. Some believe that long-range costs could be reduced through investment in the research and development of new, less costly technologies. For example, techniques of bioremediation--using microbes to clean up contamination--promise to be considerably less expensive than current methods of incineration.

If costs escalate sharply and the cleanup program becomes unaffordable within budget limits, DoD and the Congress will have to consider more drastic policy changes. In some cases, the cleanup of a particular site could be postponed indefinitely in order to hold down costs. The site could be fenced off and guarded to insure against inappropriate use. Periodic checks could be required to verify that contamination was not spreading. Such a choice would be reasonable only if contamination was not endangering human life and if there was little or no risk that the contamination would spread (for example, into groundwater).

A decision to postpone cleanup indefinitely would also prevent transfer of the property to nonfederal agencies and could hurt the local economy.

8. Possible savings through multiyear contracting are discussed in Congressional Budget Office, "Alternative Strategies for Increasing Multiyear Procurement," CBO Paper (July 1986).

Indefinite postponements would require exemptions from existing cleanup agreements that specify required completion dates. Moreover, postponements of RI/FS or remedial action beyond six months for NPL sites would require a change to CERCLA.

Altering Funding Priorities

As more cleanup projects approach the remediation phase, priorities will determine which projects are funded in the future. Like the EPA, DoD currently follows a policy of worst-first funding. Sites that are relatively less hazardous may therefore lack the funding necessary for cleanup even though they may have greater potential for economic reuse. As an example, the Air Force recently had to shift funds in order to accelerate the cleanup of a hangar at Pease Air Force Base to meet the demands of a potential purchaser. A higher funding priority for such a project would have obviated the need for reprogramming.

The Congress and DoD might want to review funding priorities for cleanup projects to take into account the economic importance of former military bases. It may be wiser to clean up a site that can quickly be put to a new civilian use than to remediate one that is contaminated more seriously

but does not pose an immediate threat to human life and safety. If policies regarding priorities are changed, the revisions could be incorporated into the Defense Priority Model that guides funding priorities within DoD. (The department would have to coordinate with EPA to ensure that any changes in prioritization comply with existing law.) In addition, the Congress could consider requesting DoD to provide, as part of the budget submission, information concerning the potential economic reuse of properties or parcels and the funding required to clean up any contamination that exists on them.

Environmental Cleanup and Future Base Closings

Because BRAC 88 was primarily concerned with military requirements, it paid little attention to the problems of cleaning up the bases it was reviewing. The commission did not require extensive information on the environment, and only limited initial assessments were provided for BRAC to consider.

Under current law, commissions will meet in 1993 and 1995 to consider closing or realigning additional military bases. Those commissions may recommend sweeping changes in the DoD base structure, and their members would be better equipped to decide which bases to close if they had comprehensive information about environmental contamination and ways to

remediate it. If future BRACs are to be able to consider environmental issues more fully, the information gathering should begin now.

Decisions on the difficult matter of which bases to close must depend primarily on defense requirements. Especially in cases where several bases can meet the needs of the military, however, it may be desirable to consider the costs of environmental cleanup in choosing which ones to keep open.