BASE REALIGNMENT AND CLOSURE

DOD Should Provide Congress More Complete and Transparent Information
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What GAO Did This Study

Since 1988, the department has spent billions of dollars to implement BRAC rounds to reduce excess infrastructure and meet changing force structure needs. DOD initiated five BRAC rounds from 1988 through 2005. DOD is legally obligated to restore its properties, including BRAC sites, to a level that protects human health and the environment.

Senate Report 116-48 directed DOD to prepare a report by November 2019 to provide information on the costs and savings for each BRAC round. It also includes a provision for GAO to review DOD’s 2019 report and other previous reports related to BRAC. In this report, GAO (1) analyzes how BRAC spending compared to initial estimates, (2) evaluates the extent DOD reported complete and transparent estimates for BRAC future costs and end dates, and (3) evaluates the extent DOD’s 2019 BRAC report presented valid findings for realized savings.

GAO examined the information reported to Congress on costs and savings of BRAC, analyzed information from a database on environmental restoration efforts and from a non-generalizable sample of nine bases, and interviewed DOD officials.

What GAO Found

Department of Defense (DOD) expenditures for Base Realignment and Closure (BRAC)-related activities exceeded initial estimates through fiscal year 2020. This was driven in part by environmental restoration costs, which could not be fully captured in initial estimates. According to DOD data, the department has spent in total about $64.5 billion—an increase of $22.8 billion from DOD’s initial budget estimate—in funding for BRAC-related activities, as of September 2020. Of this total, DOD spent $14.8 billion on environmental activities and caretaking of BRAC sites and estimated it will need an additional $7 billion. DOD data show it has closed 7,334 (83 percent) of the total BRAC sites. GAO has previously reported that it can be difficult to accurately predict total costs for environmental restoration without completing investigations into levels of contamination in accordance with land reuse plans. Costs may also change due to new laws and increased contaminant levels after follow-on testing.

DOD reports some future BRAC costs but does not provide complete and transparent information to Congress regarding an end date for all BRAC rounds or details on long-term management costs. DOD’s 2019 BRAC report identifies what it calls end dates for each BRAC round; however, these dates are based on when DOD will complete proposed cleanup actions, not on when sites are closed out and no additional funds will be needed. GAO’s analysis of DOD data shows that 889 of the remaining 1,486 BRAC sites are in or planned to undergo long-term management in perpetuity (i.e., with no definite end date), as of September 2020. DOD also has internally estimated long-term management costs of $1 billion for these sites. However, DOD did not include the number of such sites or related costs in its 2019 report. By reporting to Congress on when sites will reach site closeout and on the number and associated costs of sites that will require long-term management in perpetuity, DOD would provide Congress greater clarity on BRAC costs.

DOD’s estimated annual recurring savings are outdated. The 2019 BRAC report identifies $12 billion in annual savings from the five BRAC rounds, an estimate DOD has previously reported. The report states that the savings amount is an estimate of costs avoided after implementing each round. However, when adjusted for inflation, costs have varied since the initial estimate, potentially offsetting the estimated amount of costs avoided. DOD officials stated they could not justify the resources required to attempt to recalculate the annual recurring savings from BRAC rounds. While investing resources in recalculating potential savings may not be worthwhile, reporting information on the caveats and limitations of the savings estimate would provide Congress greater clarity and insight on the precision and currency of the estimate.

What GAO Recommends

GAO is making two recommendations. When reporting to Congress on BRAC, DOD should (1) identify when sites will reach site closeout and the number and costs of sites estimated to remain in long-term management, and (2) explicitly state the caveats and limitations of its savings estimates. DOD concurred with GAO’s two recommendations.

View GAO-22-105207: For more information, contact Elizabeth A. Field at (202) 512-2775 or FieldE1@gao.gov.
### Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter</td>
<td>1</td>
</tr>
<tr>
<td>Background</td>
<td>4</td>
</tr>
<tr>
<td>BRAC Spending Exceeded Initial Estimates through Fiscal Year 2020</td>
<td>7</td>
</tr>
<tr>
<td>DOD Reports on Some Future Costs but Not on When BRAC Will End or Detail on Long-term Management Costs</td>
<td>10</td>
</tr>
<tr>
<td>DOD’s Savings Estimates Are Outdated</td>
<td>16</td>
</tr>
<tr>
<td>Conclusions</td>
<td>20</td>
</tr>
<tr>
<td>Recommendations for Executive Action</td>
<td>20</td>
</tr>
<tr>
<td>Agency Comments</td>
<td>21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appendix I</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives, Scope, and Methodology</td>
<td>22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appendix II</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Comments from the Department of Defense</td>
<td>25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appendix III</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GAO Contact and Staff Acknowledgments</td>
<td>27</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tables</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1: Initial Cost Estimates and Actual Expenditures for Each Base Realignment and Closure (BRAC) Round, as of September 2020</td>
<td>8</td>
</tr>
<tr>
<td>Table 2: Environmental and Caretaker Expenditures, as of September 2020</td>
<td>10</td>
</tr>
<tr>
<td>Table 3: DOD’s Reported Annual Recurring Savings from Base Realignment and Closure, by Round</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Figures</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1: Major Milestones in the CERCLA Process</td>
<td>6</td>
</tr>
<tr>
<td>Figure 2: BRAC Sites Restoration Status as of September 2020</td>
<td>7</td>
</tr>
<tr>
<td>Figure 3: Future Funding Needed to Complete Prior BRAC Rounds, as of September 2020, Adjusted to Fiscal Year 2022 Dollars</td>
<td>13</td>
</tr>
<tr>
<td>Figure 4: Base Operations Support and Military Personnel Spending for Fiscal Years 2005 through 2021, Fiscal Year 2022 Dollars</td>
<td>19</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
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<td>--------------</td>
<td>-------------</td>
</tr>
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<td>BRAC</td>
<td>Base Realignment and Closure</td>
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<td>CERCLA</td>
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<td>DERP</td>
<td>Defense Environmental Restoration Program</td>
</tr>
<tr>
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<tr>
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<td>Department of Defense Directive</td>
</tr>
<tr>
<td>DODI</td>
<td>Department of Defense Instruction</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>KBCRS</td>
<td>Knowledge-Based Corporate Reporting System</td>
</tr>
<tr>
<td>PFAS</td>
<td>Per- and polyfluoroalkyl substances</td>
</tr>
<tr>
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<td>Perfluorooctanoic acid</td>
</tr>
<tr>
<td>PFAS</td>
<td>Perfluorooctane sulfonate</td>
</tr>
</tbody>
</table>

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September 28, 2022

The Honorable Jack Reed
Chairman
The Honorable James M. Inhofe
Ranking Member
Committee on Armed Services
United States Senate

Since 1988, Base Realignment and Closure (BRAC) Commissions have made five rounds of recommendations as a means to reduce excess infrastructure and realign bases to meet changing force structure needs.¹ The Department of Defense (DOD) has spent billions of dollars to implement these recommendations while also avoiding future costs for maintaining closed bases. The implementation of BRAC has occurred in two phases: (1) one-time actions directly associated with the recommendations, such as moving personnel and equipment, which by law must be completed within 6 years from the President’s approval; and (2) post-implementation actions associated with environmental restoration, property caretaking, and property transfer, which do not have a set deadline for completion.

DOD is legally obligated to ensure that BRAC sites are restored to a level that is protective of human health and the environment.² To do so, DOD initiates restoration actions to address environmental contaminants, such

¹Congress authorized DOD to undertake BRAC rounds in 1988, 1991, 1993, 1995, and 2005. The Defense Base Closure and Realignment Act of 1990, Pub. L. No. 101-510, Title XXIX (codified as amended at 10 U.S.C. § 2687 note) details the statutory process of a BRAC. The BRAC process since 1990 generally proceeded as follows: Congress authorized DOD to begin a BRAC round. DOD prepared recommendations, which were provided to an independent BRAC Commission for review. The BRAC Commission prepared a report for the President. The President prepared a report documenting the approval of the recommendations in the Commission report and sent it to Congress. Congress had a 45-day period in which it could disapprove the recommendations under a joint-resolution process specified in the BRAC statute, without which the recommendations would become binding. Then, DOD began planning actions to implement the recommendations and prepared a budget request to Congress.

²See 10 U.S.C. § 2701, which requires the Secretary of Defense to carry out an environmental restoration program at facilities under the control of the Secretary.
as hazardous substances, and other hazards, such as unexploded ordnance.

In 2017, GAO identified the federal government’s environmental liabilities as a high-risk area because they have been growing for the past 20 years and will likely continue to grow, even as billions are spent each year on cleanup efforts. In our March 2021 high-risk update, we reported that DOD had stalled in its efforts to focus more attention in this area and to fully identify the causes of or develop a formal plan to address its growing environmental liability, which includes BRAC restoration.3

The Senate Armed Services Committee expressed concern in Senate Report 116-48 that DOD is still facing annual BRAC costs for the five previous closure rounds, which date back almost 30 years.4 The committee also stated the need to understand “fully burdened costs”—that is, the total costs for the BRAC rounds—to include how the initial cost estimates align with actual costs incurred, the annual continuing costs associated with each BRAC round, and the actual savings realized. The committee directed the Secretary of Defense to prepare a report by November 2019 to provide information on the costs and savings for each BRAC round since 1988. The report was to include the estimated costs reported to Congress when each BRAC round was requested and approved, a timeline for final spending for each round, and the actual savings realized to date for each BRAC round.5

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5DOD was also directed to include the following in the report: (1) the actual total costs, to date, for each BRAC round, separating out military construction and environmental remediation costs; (2) the current estimated final costs for each BRAC round, including environmental remediation costs, and identifying differences, if any, from the original estimate at time of approval; (3) the annual remaining recurring costs associated with each BRAC round, including, but not limited to, environmental remediation costs, broken down by location; (4) an estimate of when the department will have fully completed the environmental remediation for each BRAC round and no longer requires continued funding; and (5) an assessment, with recommendations as warranted, of whether savings could be realized by paying down continuing BRAC costs at a faster pace than currently planned. For this review, we looked at environmental restoration costs, which include the costs to clean up or remediate environmental contaminants and to restore the site to a level that is protective of human health and the environment. The department will need to complete both before it will no longer require funding.
Additionally, the committee included a provision for GAO to review the methodology and findings of DOD’s 2019 BRAC report and the department’s previous reports on BRAC to assess how the initial cost estimates differ from actual costs, the annual continuing costs associated with each BRAC round, and the realized savings. In our report, we (1) analyze how DOD BRAC spending through fiscal year 2020 compared with the initial BRAC cost estimates, (2) evaluate the extent to which DOD reported complete and transparent estimates for future costs and end dates for BRAC-associated activities, and (3) evaluate the extent to which DOD’s 2019 BRAC report presented valid findings for realized cost savings.

For each of the three objectives, we examined the information reported to Congress on costs and savings during the phases of BRAC, including a detailed examination of post-implementation costs. We obtained and analyzed data from DOD’s database on environmental restoration efforts as of September 2020, the most recent data available.6 We also interviewed officials from the Office of the Assistant Secretary of Defense for Energy, Installations, and Environment (referred to as DOD officials throughout this report) and the military services.7 Additionally, we analyzed information from a non-generalizable sample of nine installations closed under BRAC to obtain examples of factors that contribute to increased timelines and continued funding requests for these locations.8 Appendix I of this report provides a detailed description of our objectives, scope, and methodology.

We conducted this performance audit from May 2021 to September 2022 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that

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6See the background section of this report for more information on this database.

7The military services included within the scope of our review were the Army, Marine Corps, Navy, and Air Force.

8The installations included the following: Adak Naval Air Station, Alaska; Fort Devens Reserve Training Facility, Massachusetts; Fort Ord, California; Galena Forward Operation Location, Alaska; Pueblo Chemical Depot, Colorado; Reese Air Force Base, Texas; Treasure Island, California (included in both the 1991 and 1993 rounds); Willow Grove Naval Air Station, Pennsylvania; and Wurtsmith Air Force Base, Michigan.
the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

**BRAC Cost Reporting**

For each BRAC round, Congress receives two pre-implementation cost estimates—a rough estimate from the BRAC Commission when the BRAC round is recommended for approval and a more robust estimate from DOD in the department’s budget request for the first fiscal year of the implementation of a BRAC round. These estimates do not include all post-implementation costs, such as for environmental restoration, because those costs are not yet fully identified at this stage.

In subsequent budget requests for BRAC, DOD provides estimates for additional BRAC funding, by military service, for all rounds, including costs for environmental restoration and caretaking, as they are identified. DOD reports information on BRAC expenditures and estimated costs, usually by fiscal year, across multiple budget requests, and reports and itemizes expenditures by the phases of the BRAC process. Specifically:

- **Implementation.** During the 6-year implementation phase of each BRAC round, the military services compile expenditures for each round and report them in DOD’s annual BRAC budget requests provided to Congress. These cost displays include budget category line items, such as Military Personnel, Operation and Maintenance, Military Construction, and Environmental.

- **Post-implementation.** During this phase, DOD reports costs related to environmental restoration, property caretaking, and transfer.
  - DOD’s annual BRAC budget request includes fiscal year cost information for a 3-year period (prior-year actual, current-year appropriation, and future-year request) and is not broken out

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9The BRAC statute establishes an independent commission to review the Secretary of Defense’s realignment and closure recommendations, with the authority to change these recommendations in certain circumstances if it determines that the Secretary deviated substantially from the legally mandated selection criteria and a DOD force structure plan.

10DOD is responsible for cleanup at all installations (active, BRAC, and Formerly Used Defense Sites).

11Caretaker services include facility and road maintenance, physical security, utility services, and fire and emergency services at the sites that DOD has yet to transfer.
by BRAC round, but instead by component (i.e., a military service or defense-wide agency).

- In the annual report to Congress on defense environmental programs, DOD includes environmental and compliance fiscal year cost information for BRAC locations for 7 years (5 prior-year actuals, the current-year appropriation, and the future budget-year request), which is broken out by component.\textsuperscript{12} It also includes an appendix with information on program locations, including for BRAC, where DOD obligated environmental restoration funding in the prior year. The appendix displays the change in the total cost estimate for each location from the 2 prior years.\textsuperscript{13}

- The DOD annual financial report presents estimated total environmental liabilities (i.e., future costs) to be incurred for BRAC between the prior year and current year.

### Environmental Restoration Laws and Regulations Applicable to BRAC

DOD must comply with cleanup standards and processes under all applicable environmental laws, regulations, and executive orders when conducting assessments of potential contamination and determining the extent of cleanup required on BRAC installations. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, authorizes cleanup actions at federal facilities where there is a release of hazardous substances or the threat of such a release that can present risks to public health and the environment.\textsuperscript{14} The Superfund Amendments and Reauthorization Act of 1986 added provisions to CERCLA specifically governing the cleanup of federal facilities, including active military installations and those closed under BRAC, and required the Secretary of Defense to carry out an environmental restoration program.\textsuperscript{15}

### DOD's Defense Environmental Restoration Program

The Assistant Secretary of Defense for Energy, Installations, and Environment oversees the Defense Environmental Restoration Program (DERP) under the direction of the Under Secretary of Defense for Acquisition and Sustainment. Through DERP, DOD conducts

\textsuperscript{12}DOD uses the term "compliance" to refer to the cleanup of hazardous waste released after 1986 and of munitions released after 2002.

\textsuperscript{13}DOD commonly refers to this as the "cost-to-complete," defining it as the estimated costs remaining at an environmental site, covering the period beginning October 1 of the upcoming fiscal year through the site closeout milestone.

\textsuperscript{14}42 U.S.C. §§ 9601-9630, at § 9620.

environmental restoration actions at BRAC locations in the United States to address DOD contamination from hazardous substances, pollutants, or contaminants; unexploded ordnance, discarded military munitions, or munitions constituents; or building demolition and debris removal. Types of environmental contaminants found at military installations include solvents and corrosives; fuels; paint strippers and thinners; metals, such as lead, cadmium, and chromium; and unique military substances, such as nerve agents and unexploded ordnance.

The program activities include the identification, investigation, cleanup, and monitoring of contamination or other hazards that create a threat to the public health or environment. DOD completes site-level environmental restoration in accordance with the CERCLA process, as shown in figure 1.

Figure 1: Major Milestones in the CERCLA Process

Once DOD identifies a site, the owner of the site (most often a military service), will begin the process to investigate the potential contamination and to determine the degree of cleanup required. Next, the owner will select remedial actions that can be used to clean up the site. The Environmental Protection Agency and state regulatory agencies are responsible for overseeing cleanup decisions to ensure that applicable requirements are met. As such, the site owner will work with those entities to reach agreement on the proposed cleanup actions; that agreement is
recorded in a decision document for each site. The site owner carries out the actions and, once finished, reaches “response complete.” Some sites may then progress to “site closeout,” the point at which DOD no longer actively manages or monitors the site and no additional funds will be expended at the site. Other sites, however, may require “long-term management,” that is the monitoring of cleanup actions by the site owner for continued effectiveness.

DOD requires the military services to record information twice a year to track progress on defense environmental restoration projects, including at BRAC sites, in the Knowledge-Based Corporate Reporting System (KBCRS). The information recorded includes site-level updates on cost-to-complete estimates, as well actual and estimated dates to complete specific CERCLA milestones. DOD also uses this corporate database to meet its reporting requirements to the Congress and to provide information to the public.

According to data recorded in KBCRS as of September 2020, DOD has identified 8,820 sites at BRAC locations that need investigations to determine restoration requirements. Of these, DOD has closed out 7,334 sites (83.2 percent) and continues to actively investigate, cleanup, or manage the remaining 1,486 sites, as shown in figure 2.

Figure 2: BRAC Sites Restoration Status as of September 2020

DOD expenditures for BRAC-related activities through fiscal year 2020 exceeded initial estimates, as sites underwent environmental restoration activities, the costs for which could not be fully captured in initial estimates. As noted earlier, Congress received two initial cost estimates for each BRAC round—one from the BRAC Commission before approving the recommendations and one from DOD in its budget request.
for the first fiscal year of the implementation of the BRAC round.\(^{16}\) BRAC Commission estimates did not include any environmental costs until the 2005 round when such costs were considered for the sites that were undergoing restoration. DOD’s initial estimates included environmental costs for items associated with the 6-year implementation period, such as baseline surveys and environmental compliance directly connected to an implementation action. In both instances, the initial estimates were not expected to include the full costs of environmental restoration.

Table 1 shows the initial cost estimates from the BRAC Commission reports, DOD’s budget requests, and DOD’s actual expenditures, as of September 2020. According to DOD data, the department had spent about $64.5 billion in funding for BRAC-related activities as of September 2020. This amount exceeds the total initial estimates from the BRAC Commission and DOD by $21.5 and $22.8 billion, respectively. All of the BRAC rounds, with the exception of the 1988 round, have exceeded the initial cost estimates.

<table>
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<th>BRAC Commission estimate</th>
<th>DOD budget request estimate</th>
<th>DOD expenditures</th>
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<tr>
<td>1988</td>
<td>6.9(^{a})</td>
<td>3.6</td>
<td>3.8</td>
</tr>
<tr>
<td>1991</td>
<td>4.1</td>
<td>5.6</td>
<td>7.6</td>
</tr>
<tr>
<td>1993</td>
<td>7.4</td>
<td>8.2</td>
<td>8.7</td>
</tr>
<tr>
<td>1995</td>
<td>3.6</td>
<td>6.1</td>
<td>8.1</td>
</tr>
<tr>
<td>2005</td>
<td>21.0</td>
<td>18.3</td>
<td>35.9</td>
</tr>
<tr>
<td>N/A(^{b})</td>
<td></td>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td>Total</td>
<td>43.0</td>
<td>41.7</td>
<td>64.5</td>
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Source: BRAC Commission reports, DOD’s 2019 BRAC report, and GAO analysis of DOD data. \(^{16}\)GAO-22-105207

Note: Amounts may not total due to rounding.

\(^{a}\)The 1988 BRAC report of the Secretary of Defense’s Commission did not include an initial estimate of the one-time implementation costs for the 1988 round. A cumulative cost estimate was included in the 2005 BRAC Commission report for rounds 1988, 1991, 1993, and 1995, which we used to determine the 1988 estimate.

\(^{b}\)DOD could not link some environmental restoration expenditures to a specific BRAC round.

We have previously reported, as has the 2005 BRAC Commission, and DOD officials have stated, that environmental restoration costs would likely increase total BRAC spending beyond initial estimates, but that predicting accurate total costs to account for environmental restoration prior to a BRAC round’s approval was not feasible.\textsuperscript{17} For example, our prior work has highlighted the challenges in accurately calculating costs associated with environmental restoration at closed installations, as DOD must conduct investigations into levels of contamination and obtain land reuse plans to identify any restoration requirements at environmental sites.\textsuperscript{18} Environmental remedial actions are unique to each site; therefore, DOD must complete its investigation phase to have a better understanding of what is required to cleanup a site, how much the cleanup will likely cost, and approximately how long it will take.

According to DOD financial data from September 2020, the department has spent a total of $14.8 billion on environmental restoration as well as for the management and caretaking of BRAC sites for all five rounds. DOD spent an annual average of $402.5 million for post-implementation BRAC-related actions from fiscal years 2015 through 2020 based on information reported in the BRAC budget materials.

Table 2 shows that DOD has spent the vast majority (over $14 billion or about 95 percent) of these post-implementation costs for environmental activities.\textsuperscript{19} Thus far, the largest environmental expenditures have been for sites from the 1991 and 1995 rounds. The 913 sites from these two rounds comprise over 60 percent of the 1,486 sites from the five BRAC rounds that have not been closed out.\textsuperscript{20}


\textsuperscript{18}For example, see GAO-17-151 and GAO-07-166.

\textsuperscript{19}These activities include environmental cleanup and restoration; program management and support; compliance; and planning.

\textsuperscript{20}The remaining 573 sites that have not been closed out follow by round and percentage are: 1988 (10.4); 1993 (18.8); and 2005 (9.4).
Table 2: Environmental and Caretaker Expenditures, as of September 2020

<table>
<thead>
<tr>
<th>Round</th>
<th>Environmental expenditures</th>
<th>Caretaker expenditures</th>
<th>Total</th>
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<tr>
<td>1988</td>
<td>2,062.8</td>
<td>8.8</td>
<td>2,071.6</td>
</tr>
<tr>
<td>1991</td>
<td>4,119.9</td>
<td>18.1</td>
<td>4,138.0</td>
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<td>1993</td>
<td>2,825.2</td>
<td>2.5</td>
<td>2,827.7</td>
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<tr>
<td>1995</td>
<td>3,645.5</td>
<td>194.3</td>
<td>3,839.8</td>
</tr>
<tr>
<td>2005</td>
<td>1,165.6</td>
<td>286.3</td>
<td>1,451.9</td>
</tr>
<tr>
<td>N/A*</td>
<td>191.1</td>
<td>237.3</td>
<td>428.4</td>
</tr>
<tr>
<td>Total</td>
<td>14,010.0</td>
<td>747.3</td>
<td>14,757.3</td>
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Source: GAO analysis of Department of Defense data. | GAO-22-105207

Note: Amounts may not total due to rounding.

*DOD could not link some Base Realignment and Closure-related expenditures to a specific round.

DOD Reports on Some Future Costs but Not on When BRAC Will End or Detail on Long-term Management Costs

DOD reports to Congress on the estimated future costs for BRAC and provides information on factors that are likely to result in increased amounts. However, we found that DOD does not report complete and transparent information to Congress on when BRAC will end and the extent to which long-term management will contribute to additional federal fiscal exposure.

DOD Reports on Future Estimates and Unknown Factors That May Increase Costs

In various reports to Congress, DOD has estimated the future costs for BRAC based on known requirements and previously unknown factors that may increase amounts. For example, in the 2019 BRAC report, DOD estimated the total remaining BRAC-related costs, based on known requirements, to be $5.1 billion, as of September 2018. In addition, in its annual report, DOD included the year-to-year change in cost-to-complete estimates for environmental restoration activities by DOD installation, which may increase or decrease yearly.

DOD has also reported on a variety of factors that can result in rising costs and delays. These include prolonged negotiations over how to comply with environmental regulations, unexpected increases in contamination levels, and changes to environmental laws. Of the nine
installations that we reviewed, we found that the cost estimate for seven increased from fiscal year 2018 through fiscal year 2020. For example:

- In 2020, the Environmental Protection Agency determined that the remedial actions for several sites at the Fort Devens Reserve Training Facility were inadequate to achieve cleanup goals and ensure long-term protectiveness. The Environmental Protection Agency recommended revisions to the site’s decision documents to improve the protectiveness of a floodplain and drinking and irrigation water, but all stakeholders have not yet reached agreement.

- After a 1997 decision document was signed at Fort Ord, officials monitoring groundwater identified an unexpected increase of the contaminant tetrachloroethylene. This discovery in 2011 led the Army to issue a revised decision document in 2015 to address the increase in contamination. DOD reported in its fiscal year 2016 annual environmental programs report an 11-percent increase in the restoration cost estimate from $205.7 million in fiscal year 2015 to $214 million in fiscal year 2016. This increase was due in part due to the change of scope associated with the added restoration requirements.

- During a 5-year monitoring review of a former Naval Station Treasure Island site, Navy officials responded to new toxicity criteria promulgated by the state of California to address vapor intrusion exposure for four contaminants. In 2020, these officials stated that the remedial goals selected in the decision document would be reevaluated and revised as necessary in response to the new criteria.

Additionally, new environmental regulations to address previously unknown environmental hazards, known as emerging contaminants, can require DOD to add new sites or reopen completed CERCLA milestones.

21According to the Environmental Protection Agency, tetrachloroethylene is a degreasing agent in metal cleaning operations, and short-term inhalation exposure can cause irritation of the upper respiratory tract and eyes, kidney dysfunction, and neurological effects, impairment of coordination, dizziness, headaches, sleepiness, and unconsciousness. Long-term inhalation exposure can cause neurological effects, including impaired cognitive and motor neurobehavioral performance.

22DOD, Defense Environmental Programs Annual Report to Congress for FY 2016 (June 2018).

23According to the Environmental Protection Agency, vapor intrusion occurs when there is a migration of vapor-forming chemicals from any subsurface source into an overlying building.
For example, the Environmental Protection Agency released a lifetime health advisory in 2016 for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) in drinking water.24 PFOA and PFOS are fluorinated organic chemicals that are part of a larger group of chemicals referred to as per- and polyfluoroalkyl substances (PFAS). When we reported in 2021, DOD was taking actions to address PFAS in drinking water at or near installations when PFAS amounts exceeded federal health advisory levels.25 DOD identified, as of March 2021, 115 BRAC locations that would require preliminary assessments and investigations for these contaminants.26

DOD also anticipates additional significant increases in future funding needs due to PFAS. In June 2021, DOD reported that it anticipates restoration actions to address PFAS at BRAC sites will total over $1 billion.27 According to DOD officials, they anticipate that the fiscal year 2022 update to the future costs estimate will show a significant increase in PFAS costs, as the military services complete their investigations and learn more about the extent of remedial actions required. These future costs are likely to further increase as the Environmental Protection Agency issued its updated interim health advisories for PFAS in June 2022. These advisories include lower levels than those recommended in

24Environmental Protection Agency (EPA), Drinking Water Health Advisory for Perfluorooctane Sulfonate (PFOS) (May 2016); EPA, Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA) (May 2016). PFAS are a group of chemicals that include PFOA, PFOS, and many other chemicals. PFOA and PFOS are the two types of PFAS most produced and studied. Both chemicals are persistent in the environment and the human body, which means that they do not break down and can accumulate over time. EPA’s health advisories are nonenforceable and nonregulatory. These advisories provide information on contaminants not subject to drinking water regulations, including those that can cause human health effects and are known or anticipated to occur in drinking water.


27DOD, Perfluorooctane Sulfonate and Perfluorooctanoic Acid at Base Realignment and Closure Locations (June 2021).
According to DOD officials, the department is evaluating changes to its drinking water treatment efforts for the new advisory levels.

Our analysis of the total annual estimate of DOD’s needed funding to complete prior BRAC rounds found the estimated amount has increased, in part due to the factors discussed above. Specifically, DOD’s internal data on the annual cost estimate to complete prior BRAC rounds from fiscal years 2015 through 2020 show that amounts have increased by about 67 percent, from about $4.2 billion in fiscal year 2015 to about $7.0 billion in fiscal year 2020 when adjusted for inflation, as shown in figure 3.

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28EPA, EPA Publication EPA/822/R-22/003, Interim Drinking Water Health Advisory Perfluorooctanic Acid (PFOA) (June 2022) and EPA Publication EPA/822/R-22/004, Interim Drinking Water Health Advisory Perfluorooctane Sulfonic Acid (PFOS) (June 2022). EPA’s interim health advisories, which identify the concentration of chemicals in drinking water at or below which adverse health effects are not anticipated to occur, are: 0.004 nanograms per liter for PFOA and 0.02 nanograms per liter for PFOS. According to the EPA, it is moving forward with proposing a PFAS national drinking water regulation in fall 2022.
DOD’s 2019 BRAC report provides an estimate of when the last BRAC site for each round will reach the response complete milestone; however, the report does not provide estimates of when active management and monitoring at the sites will end and no additional BRAC funds will be needed (i.e., the milestone referred to as site closeout). For example, DOD states that the last site from the 1993 BRAC round will reach the response complete milestone by September 2084. In addition, at the end of fiscal year 2018, DOD reported that response complete had been reached at over 90 percent of sites from the first four BRAC rounds and at 75 percent of sites from the 2005 BRAC round.

However, the response complete milestone is not the last milestone in the environmental restoration process, as some sites may need to undergo long-term management before they reach site closeout or will remain in long-term management in perpetuity (i.e., have no definite end date). DOD provides long-term management at sites where people cannot have “unlimited use and unrestricted exposure” due to remaining contaminants. DOD takes remedial actions, such as land use restrictions, to ensure protective conditions that maintain an acceptable level of risk for users. DOD monitors these sites to ensure the protective conditions remain in effect. For example, DOD determined two sites at Pueblo Chemical Depot will require long-term management in perpetuity. The first site requires landfill cap maintenance and groundwater monitoring, while the other site requires monitoring for nitrate and explosives in the groundwater.

DOD’s 2019 BRAC report does not include information on long-term management, although we found these sites comprise a significant portion of the remaining BRAC sites. Specifically, DOD does not report on the estimated end dates that include long-term management. Based on our analysis of DOD’s Knowledge-Based Corporate Reporting System (KBCRS) data for fiscal year 2020, we determined that 1,093 (about 74 percent) of the remaining 1,486 BRAC sites are or will undergo long-term management. The data show that 913 BRAC sites are currently in long-

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29“Response complete” is reached when the remedial actions at an environmental site are finished, documented, and DOD has sought regulatory agreement.

30DOD states that the last site from the 1991, 1995, and 2005 rounds will reach “response complete” in October 2066, and the last site from the 1988 round will reach “response complete” in September 2077.

31“Unlimited use and unrestricted exposure” is a condition whereby, after DOD completes restoration at a site, it no longer includes a restriction on land or groundwater use to be protective of human health and the environment.
term management, of which 746 sites (or about 82 percent) will remain in the phase into perpetuity. Additionally, DOD plans for an additional 180 sites to undergo long-term management once remedial actions are complete, of which 143 sites (about 79 percent) will remain in the phase into perpetuity.

DOD also does not report any information on the number of sites that are currently in the long-term management status and their associated costs. Our analysis of KBCRS data for fiscal year 2020 found that DOD estimates $1 billion as the future liability for 889 sites previously discussed that are in or planned to undergo long-term management in perpetuity. This amount does not reflect the totality of the federal fiscal exposure, as the cost estimates for long-term management in perpetuity are based on a 30-year period. DOD officials stated that the monitoring required at each site depends largely on the remedial actions taken. They stated that the sites may remain in long-term management without changes in technology or methods to address the conditions that prevent unlimited use and unrestricted exposure.

Senate Report 116-48, which directed DOD to complete the 2019 BRAC report, required the report to include a timeline of each BRAC round through final spending. Further, according to DOD’s DERP manual, the department shall (1) improve its financial management and reporting for environmental liabilities and (2) provide accurate, complete, reliable, timely, and auditable financial information. The DERP manual states that it is intended to be used in conjunction with DOD accounting policy for environmental liability. This policy that states future environmental costs for which there is at least a reasonable possibility that the department will incur a liability must be disclosed in reporting to include (1) the nature of such possible liability and (2) an estimate or range of

32According to DOD’s DERP manual, cost-to-complete estimates for sites in long-term management in perpetuity should include a finite period of 30 years. See DOD Manual 4715.20, Defense Environmental Restoration Program (DERP) Management (March 9, 2012, incorporating Change 1, Aug. 31, 2018).


34DOD Manual 4715.20, Defense Environmental Restoration Program (DERP) Management.
amounts of the possible liability or a statement that such an estimate cannot be made.\textsuperscript{35}

DOD officials stated that they reported on the estimated dates for response complete in the 2019 BRAC report because it is the metric used by DOD to assess performance across its various environmental restoration programs. However, while DOD uses goals and metrics through response complete to assess progress, the DERP manual does not prohibit DOD from providing the requested information to Congress.\textsuperscript{36} Moreover, we found that DOD’s internal database, KBCRS, tracks information on the estimated end date for site closeout and long-term management as well as the associated costs for long-term management, showing that reporting this information to Congress is feasible.

By reporting to Congress on when all BRAC sites are estimated to reach site closeout and on the number and associated costs of sites that are estimated to remain in long-term management, DOD would provide Congress with greater clarity on the full cost implication and total time needed to complete the five BRAC rounds. This information could inform future decision-making related to BRAC.

In its 2019 BRAC report, DOD provided estimates of the annual recurring savings by BRAC round, but these estimates are not current. Specifically, DOD reported how much it estimated each round would save annually after implementation and aggregated the amounts for a total of $12 billion, as shown in table 3.

<table>
<thead>
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<th>Round</th>
<th>Annual recurring savings</th>
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<tbody>
<tr>
<td>1988</td>
<td>1.0</td>
</tr>
<tr>
<td>1991</td>
<td>2.3</td>
</tr>
<tr>
<td>1993</td>
<td>2.7</td>
</tr>
<tr>
<td>1995</td>
<td>1.9</td>
</tr>
</tbody>
</table>


\textsuperscript{36}DOD Manual 4715.20, \textit{Defense Environmental Restoration Program (DERP) Management}. 
In its 2019 BRAC report, DOD details the breakdown of this savings amount by three major budget categories line items: Operation and Maintenance, Military Personnel, and “other,” which includes base-level supply expenses, such as lease and equipment procurement. The Operation and Maintenance and Military Personnel budget categories represent almost 70 to 100 percent of the savings across the five BRAC rounds.

DOD states in the report that these savings represent cost avoidances.37 For instance, closing a base reduces operation and maintenance costs by eliminating utility bills, facility sustainment needs, and maintenance contracts for that location. In the 2019 BRAC report, DOD quotes our 2002 report that net savings should be viewed as a rough approximation of the likely savings and that savings amounts are not precise.38 DOD reports its budget process is focused on prioritizing requirements and obtaining appropriations to meet those priorities and does not specifically track reductions on a dollar-to-dollar basis.

We found that the 2019 BRAC report does not clearly explain how the $12 billion in annual recurring savings were calculated. DOD reiterated in the 2019 BRAC report the $12 billion annual recurring savings amount that it had included from previous DOD testimony and correspondence related to the DOD budget, as early as in 2010.39 In addition, DOD

37DOD defines “cost avoidance” as the reduced need to incur funding increases in the future (above current funding levels) that would otherwise occur if management practices were not changed.


officials told us they did not complete any additional work to validate the currency of reported annual recurring savings. According to our prior work, DOD generates the net annual recurring savings by deducting its estimates of the annual recurring costs from the annual recurring savings that are expected to accrue the year after the BRAC recommendation actions have been implemented.\textsuperscript{40} For example, for the 1993 round, DOD calculated the round’s annual recurring savings in 1999 when the implementation of the round ended.

A savings estimate that was valid during the end of each BRAC round may not be current today. While DOD has avoided the costs of funding bases that have closed in the years since the BRAC actions were implemented, spending within the budget categories that were the basis of the prior savings estimates have changed. In part, because of these spending fluctuations, the amount of $12 billion dollars is not a precise statement of what the department has saved annually since 2010.

For example, our review of the spending in two budget categories that make up the majority of DOD’s savings estimate found that, since fiscal year 2005, costs have varied over time, independent of inflation, as shown below in figure 4. These fluctuations affect the annual recurring savings amount because they demonstrate that a “steady state” of spending did not continue and any changes would offset the recurring value.

According to GAO’s cost guide, assumptions for savings estimates should be documented and the most current cost data should be used, as historic costs can become outdated. When we asked DOD officials why they did not conduct work to assess the currency of the prior savings estimates, they explained that they did not have complete records for the prior calculations, as decades have passed since the last BRAC round. They stated that they could not justify investing the resources that would be required to attempt to recalculate potential annual recurring savings from BRAC rounds. Nevertheless, while investing resources in recalculating potential savings may not be worthwhile, it is unlikely that the savings estimates from previous BRAC rounds remain valid. By reporting to Congress information on the caveats and limitations of the annual recurring savings from BRAC, DOD would provide clarity and insight on the precision and currency of the estimate.

Since 1988, DOD has requested billions of dollars to ensure that BRAC sites are restored to a level that is protective of human health and the environment. DOD has made progress in closing out environmental sites located on property designated during BRAC rounds for ownership transfer. Environmental restoration costs resulted in total spending exceeding the initial estimates and DOD’s estimate of remaining BRAC-related costs have increased substantially recently and are likely to continue increasing. However, DOD does not report complete information to Congress regarding an end date for all BRAC rounds and the extent that long-term management affects future costs. By informing Congress on its estimated BRAC site closeout and the number of sites that will require long-term management with associated costs, DOD would provide Congress with greater clarity on the cost implications of prior BRAC rounds. This information could inform future decision-making related to BRAC.

In addition, although DOD has reported an estimated $12 billion dollars in annual recurring savings from BRAC actions, it has not taken steps to ensure the estimate remains valid. It is unlikely that the savings estimates is currently valid considering that spending has fluctuated in the budget accounts that are the basis for calculation. While DOD’s investing resources in recalculating potential savings may not be worthwhile, including caveats and limitations would provide clarity and insight on the precision and currency of the estimate.

We are making the following two recommendations to the Department of Defense.

The Secretary of Defense should ensure that the Assistant Secretary of Defense for Energy, Installations, and Environment, when reporting to Congress on the status of BRAC rounds, clearly identifies when sites are estimated to reach the site closeout milestone, the number of sites that are estimated to remain in long-term management, and the estimated costs associated with long-term management of these sites. (Recommendation 1)

The Secretary of Defense should ensure that the Assistant Secretary of Defense for Energy, Installations, and Environment, when reporting to Congress on BRAC savings, explicitly states caveats and limitations of DOD’s savings estimates, such as by documenting that the assumptions used in developing the initial estimates have not changed and that no additional work has been done to adjust estimates based on changing cost data. (Recommendation 2)
We provided a draft of this report for review and comment to DOD. In DOD’s written response, reprinted in appendix II, the department concurred with our two recommendations. DOD also provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to the appropriate congressional committees and the Secretary of Defense. In addition, the report is available at no charge on the GAO website at https://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-2775 or FieldE1@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix III.

Elizabeth A. Field
Director, Defense Capabilities and Management
Appendix I: Objectives, Scope, and Methodology

This report (1) analyzes Department of Defense (DOD) Base Realignment and Closure (BRAC) spending through fiscal year 2020 compared with the initial BRAC cost estimates; and evaluates the extent to which (2) DOD reported complete and transparent estimates for future costs and end dates for BRAC-associated activities and (3) DOD’s 2019 BRAC report presented valid findings for realized cost savings.

For each of the three objectives, we examined the information reported to Congress on costs and savings during the phases of BRAC. We also interviewed officials from the Office of the Assistant Secretary of Defense for Energy, Installations, and Environment and military services.

To address our first objective, we reviewed laws that govern BRAC, BRAC Commission reports, DOD’s BRAC budget materials, and the 2019 BRAC report to understand the cost information reported to Congress. We analyzed the initial cost estimates from the BRAC Commission reports and DOD’s budget requests submitted to Congress for the first fiscal year of each BRAC round, and compared those with BRAC spending amounts from financial data reported by DOD as of September 2020.¹

We also reviewed how costs are estimated in the different phases of BRAC to understand how environmental restoration costs were considered in the calculations. We obtained and analyzed the post-implementation expenditures by BRAC round as of September 2020 to determine the amounts spent in each for environmental and caretaking activities.

To address the second objective, we analyzed DOD’s annual estimate of the future costs for BRAC sites for fiscal years 2015 through 2020 to understand the trend in the remaining funds needed. We also reviewed documentation for how changes to environmental regulations, including for newly identified contaminants, such as for per- and polyfluoroalkyl substances (PFAS), have affected both cost estimates and completion timelines at the locations. This included reviewing cost information reported in DOD’s June 2021 report on PFAS at BRAC locations.²


²DOD, Perfluorooctane Sulfonate and Perfluorooctanoic Acid at Base Realignment and Closure Locations (June 2021).
Appendix I: Objectives, Scope, and Methodology

also reviewed BRAC budget justification materials, reports from Defense Environmental programs, and the most recently available installation management action plans for examples of changes that affected cost estimates and timelines at the nine locations discussed below.

We also reviewed DOD’s Defense Environmental Restoration Program (DERP) guidance and reports to Congress for information on the estimated dates when it will no longer require BRAC funding. We obtained data for BRAC sites reported by the military services in DOD’s Knowledge-Based Corporate Reporting System (KBCRS) for fiscal year 2020. Specifically, we analyzed major milestone completion dates and cost estimates. From the data, we identified the status of BRAC sites by milestone and the number of sites that will undergo long-term management indefinitely. We assessed the reliability of these data through interviews, a review of related documentation, and data testing. We found the data to be sufficiently reliable for reporting on milestone status and cost estimates.

To learn more about why environmental restoration costs more and takes longer to complete at some sites, we selected a nongeneralizable sample of nine BRAC installations that included three each from the Army (Fort Devens Reserve Training Facility, Massachusetts; Fort Ord, California; and Pueblo Chemical Depot, Colorado), Navy (Adak Naval Air Station, Alaska; Treasure Island, California; and Willow Grove Naval Air Station, Pennsylvania), and the Air Force (Galena Forward Operation Location, Alaska; Reese Air Force Base, Texas; and Wurtsmith Air Force Base, Michigan). These installations ranked among the top 30 locations with the greatest estimated costs in fiscal year 2021 and beyond, offer geographic diversity based on the Department of Commerce’s Bureau of Economic Analysis regions, represent all five BRAC rounds, and have established environmental sites to investigate the new contaminant known as PFAS. We reviewed cost-to-complete estimates for fiscal years 2021 and


4We selected the installations from the fiscal year 2018 data that were included in appendix I of the 2019 BRAC report. Additionally, we focused on PFAS as it is the first contaminant that DOD established processes to track and report on. We selected installations from six of the Bureau of Economic Analysis’s eight geographic regions, specifically, Far West, Great Lakes, Mideast, New England, Rocky Mountain, and Southwest.
Appendix I: Objectives, Scope, and Methodology

...beyond for the selected installations as of September 2018 and September 2020. We compared the amounts to determine if the September 2020 estimated amount had increased for the fiscal years 2021 and beyond.

To address the third objective, we reviewed the reported savings in DOD’s 2019 BRAC report for all five BRAC rounds and in other reporting to Congress. We also reviewed prior GAO work on BRAC cost savings to identify prior findings related to limitations with DOD’s savings estimation method. Additionally, to understand any changes in the costs that could affect the reported $12 billion in annual recurring BRAC savings, we analyzed spending trends for base operations support within the Operation and Maintenance and for Military Personnel budget categories for fiscal years 2005 through 2021. We compiled spending on the base operations support sub-activity group from the Defense Financial Accounting System 1002 reports. We assessed the reliability of these data through interviews and a review of related documentation. We found the data to be sufficiently reliable for reporting spending for base operations support. We compiled spending on military personnel from the military services’ budget justification materials. We adjusted the amounts to fiscal year 2022 dollars. We reviewed GAO’s cost guide to identify significant principles for reporting savings from federal programs and compared these with DOD’s reporting on savings.

We conducted this performance audit from May 2021 to September 2022 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

5The reports reviewed included BRAC budget justification materials and BRAC budget hearing testimonies.
Appendix II: Comments from the Department of Defense

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
3400 DEFENSE PENTAGON
WASHINGTON, DC 20301-3400

Ms. Elizabeth A. Field
Director, Defense Capabilities and Management
U.S. Government Accountability Office
441 G Street, NW
Washington DC 20548

Dear Ms. Field:


The Department appreciates GAO’s review and recognition of the value of the BRAC process and is grateful for GAO’s efforts to develop sensible recommendations. DoD has provided the attached technical comments and official written concurrence with the recommendations.

Sincerely,

[Signature]

Paul D. Cramer
Performing the Duties of Assistant Secretary of Defense for Energy, Installations, and Environment

Enclosures:
As stated
DEPARTMENT OF DEFENSE COMMENTS TO THE GAO RECOMMENDATIONS

The Secretary of Defense should ensure that the Assistant Secretary of Defense for Energy, Installations, and Environment when reporting to Congress on the status of Base Realignment and Closure (BRAC) rounds, clearly identifies when sites are estimated to reach the close out phase, the number of sites that are estimated to remain in long-term management and the estimated cost associated with long-term management of these sites. (Recommendation 1)

DoD RESPONSE: Concur. When reporting to Congress on the status of BRAC rounds, the Department will identify when sites are estimated to reach the site close out phase, the number of sites anticipated to remain in long-term management and the estimated cost associated with the long-term management of these sites.

The Secretary of Defense should ensure that the Assistant Secretary of Defense for Energy, Installations, and Environment when reporting to Congress on the status of BRAC savings, explicitly states caveats and limitations of DOD’s saving estimates such as by documenting that the assumptions used in developing the initial estimates have not changed and that no additional work has been done to adjust estimates based on changing cost data. (Recommendation 2)

DoD RESPONSE: Concur. The Department will ensure that any reports on the status of savings will document that the savings were initial estimates based upon certain assumptions made at the time and have not been updated since the initial BRAC closure or realignment round was implemented.
Appendix III: GAO Contact and Staff

<table>
<thead>
<tr>
<th>GAO Contact</th>
<th>Elizabeth Field, (202) 512-2775 or <a href="mailto:FieldE1@gao.gov">FieldE1@gao.gov</a></th>
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<tbody>
<tr>
<td>Staff Acknowledgments</td>
<td>In addition to the contact named above, Gina Hoffman (Assistant Director), Susan Langley (Analyst-in-Charge), Pedro Almoguera, Tracy Barnes, Mae Jones, Jason Lee, Amie Lesser, Jennifer Natoli, John Ortiz, Janice Poling, Steve Pruitt, Michael Silver, Geo Venegas, Mary Weiland, Natasha Wilder, made key contributions to this report.</td>
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