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June 2022

# ENVIRONMENTAL LIABILITIES

## Improvements Needed to Measure Progress of Cleanup of Formerly Used Defense Sites

# GAO Highlights

Highlights of [GAO-22-104744](#), a report to the Committee on Armed Services, House of Representatives

## Why GAO Did This Study

The estimated cost to the federal government of cleaning up environmental contamination, referred to as environmental liabilities, was \$613 billion in fiscal year 2021. This is an increase from \$465 billion in fiscal year 2017. DOD's fiscal year 2021 share of environmental liabilities was the second highest among federal agencies, at about \$82 billion. Federal law authorizes DOD to identify, investigate, and clean up contamination from hazardous substances and military munitions that it caused on properties used for military purposes and that were conveyed out of DOD's jurisdiction prior to 1986. These types of contamination can harm both humans and the environment.

House Report 116-120 included a provision for GAO to review the various elements of FUDS. Among other objectives, this report (1) describes the scope and costs of cleaning up FUDS and the reliability of the estimates and (2) examines how DOD selects FUDS for cleanup. GAO reviewed DOD documents, interviewed DOD officials, and analyzed a DOD database containing information on the FUDS program.

## What GAO Recommends

GAO recommends that DOD (1) develop guidance to weigh the relative risk between IRP and MMRP sites and (2) establish a relevant cleanup goal for the FUDS MMRP program. DOD agreed with GAO's recommendations.

View [GAO-22-104744](#). For more information, contact Nathan Anderson at (202) 512-3841 or [andersonn@gao.gov](mailto:andersonn@gao.gov).

June 2022

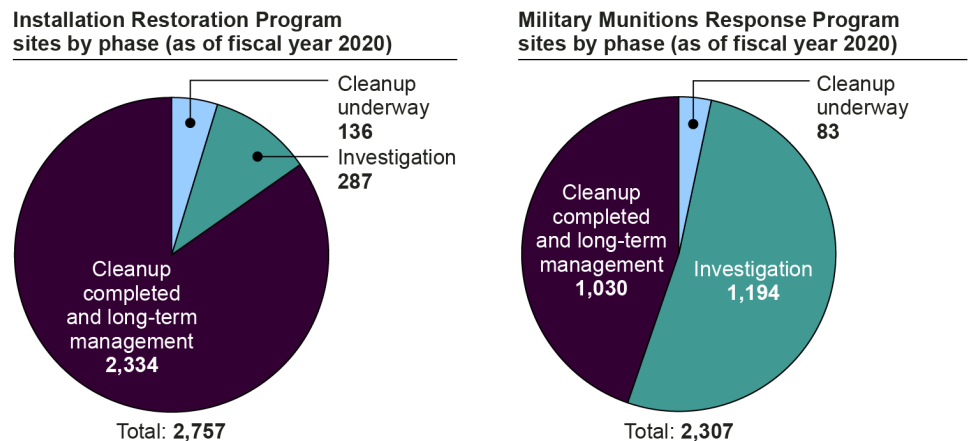
# ENVIRONMENTAL LIABILITIES

## Improvements Needed to Measure Progress of Cleanup of Formerly Used Defense Sites

### What GAO Found

In fiscal year 2020, the Department of Defense (DOD) estimated that it would cost about \$10.2 billion to clean up about 1,700 sites in its Formerly Used Defense Sites (FUDS) program. FUDS consists of two main programs: the Installation Restoration Program (IRP), to address hazardous substances, and the Military Munitions Response Program (MMRP), to address military munitions. Environmental liabilities represent future costs to clean up these sites. FUDS environmental liabilities are about 27 percent for IRP and about 73 percent for MMRP. DOD has obligated over \$1 billion for FUDS between fiscal year 2016 and 2020, split roughly equally between IRP and MMRP sites. Since the inception of the FUDS program, DOD has cleaned up 85 percent of IRP sites and 45 percent of MMRP sites. Some costs of future cleanup efforts are uncertain, in part because nearly 1,200 MMRP sites are under investigation, and cleanup remedies are not yet known (see fig.). DOD's cost estimates for individual sites improve as it completes investigations and identifies specific remedies.

Formerly Used Defense Sites Under Investigation, Compared to Cleanup



Source: GAO analysis of Department of Defense data. | GAO-22-104744

When making decisions to fund FUDS cleanup, DOD primarily selects the sites posing the greatest risk to human health and the environment by assigning risk scores for each site. DOD assigns scores differently for IRP and MMRP sites. However, DOD does not have guidance to weigh the relative risk between IRP and MMRP sites. If DOD developed guidance, it could better ensure that it is consistent and transparent when selecting sites from IRP and MMRP for funding.

Federal law requires that DOD report on progress of its cleanup programs. In 2012, DOD developed a goal for IRP to complete cleanup of at least 95 percent of sites by the end of fiscal year 2021. DOD did not develop a comparable goal for FUDS MMRP, stating, for example, that developing a goal for FUDS MMRP sites was not practical, given the large number of sites. However, DOD developed goals for other non-FUDS cleanup programs with a similar number of sites. If DOD were to develop a cleanup goal for FUDS MMRP, Congress would be better positioned to hold DOD accountable for achieving a reasonable level of cleanup progress, and the public would be better informed.

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# Contents

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Letter		1
	Background	6
	DOD Estimated It Would Cost \$10 Billion to Clean Up at Least 1,700 Sites, but the Large Number of Sites Under Investigation Contribute to Uncertainty in Future Costs	14
	DOD Selects Sites for Cleanup Based on Risk and Other Factors but Has Not Set a Cleanup Goal for MMRP Sites	24
	DOD Faces Two Challenges in Implementing the FUDS Program That Contribute to Uncertainty in Costs	28
	Conclusions	32
	Recommendations for Executive Action	33
	Agency Comments	33
Appendix I	Objectives, Scope, and Methodology	35
Appendix II	Summary of Data on the 15 Formerly Used Defense Sites (FUDS) Properties We Selected	42
Appendix III	Views of Selected State Regulators Regarding the Formerly Used Defense Sites (FUDS) Program	56
Appendix IV	Comments from the Department of Defense	60
Appendix V	GAO Contact and Staff Acknowledgments	61
Tables		
	Table 1: The Department of Defense's (DOD) Estimated Environmental Liabilities for the Formerly Used Defense Sites Program, Fiscal Year 2016 through 2021	15

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Table 2: Department of Defense’s (DOD) Reasons Why It Did Not Establish a Cleanup Goal for the Military Munitions Response Program (MMRP) in the Formerly Used Defense Sites (FUDS) Program, and Our Assessment	27
Table 3: List of 15 Formerly Used Defense Site (FUDS) Properties We Selected for Our Sample and the Four Properties We Selected for Further Review	38
Table 4: Attu Island – Site of World War II Battle and Subsequent Military Activity, 1942 - 1969	42
Table 5: Former Benicia Arsenal – Civil War Era Arsenal and Support of Military in the Pacific, 1849-1964	44
Table 6: Former Camp Luis San Obispo – National Guard and Army Post, 1928 - 1946	46
Table 7: Former Hamilton Army Airfield – Training and Staging Area for Pacific Forces in World War II, 1932 – 1983	46
Table 8: Former Camp Hale – High-Altitude Winter Combat Training, 1942 - 1965	47
Table 9: Former Blaine Naval Ammunition Depot – Military Munitions Production and Disassembly, 1942-1958	49
Table 10: Former Nebraska Ordnance Plant, World War II and Korean Conflict-Era Plant – 1942 - 1959	50
Table 11: Former Sioux Army Depot – World War II Era and Subsequent Missile Facility, 1942 – 1967	51
Table 12: Former Fort Hancock – Defense of New York Harbor, 1857 - 1974	52
Table 13: Former Raritan Arsenal – Supporting U.S. Forces in Europe, 1918 - 1961	52
Table 14: Former Camp Butner – World War II Era, 1942 - 1947	53
Table 15: Former Charlotte Army Missile Plant –Missile Manufacturers, 1941-1967	53
Table 16: Former Camp Croft – World War II Era, 1941 - 1947	54
Table 17: Former Conway Bombing and Gunnery Range – World War II Era, 1942 - 1948	55
Table 18: Former Stark General Hospital – World War II Era, 1941 - 1945	55

---

Figures

Figure 1: Discarded Military Munition Found at the Former Camp Hale in Colorado	2
---	---

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Figure 2: The Department of Defense's Implementation of the Comprehensive Environmental Response, Compensation, and Liability Act Process at Formerly Used Defense Sites (FUDS)	9
Figure 3: Department of Defense (DOD) Removal of Rusting and Leaking Barrels and Above-Ground Storage Tanks Threatening Migratory Birds on Attu Island	10
Figure 4: Technicians Demonstrate How They Search for Buried Military Munitions at the Former Camp Croft in South Carolina in 2020	11
Figure 5: Number of Sites and the Department of Defense's (DOD) Estimated Environmental Liabilities of Formerly Used Defense Sites Program, by Division, in Fiscal Year 2020	16
Figure 6: The Department of Defense's (DOD) Environmental Liabilities and Obligations for the Installation Restoration Program and the Military Munitions Response Program, Fiscal Year 2020	17
Figure 7: Proportion of Formerly Used Defense Sites in Fiscal Year 2020 in the Investigation Phase versus Cleanup Complete	19
Figure 8: The Department of Defense (DOD) Generally Adds New Sites to Its Inventory of Formerly Used Defense Sites (FUDS) by Three Methods	21
Figure 9: Time Line of Cleanup for the Former Camp Butner, North Carolina, a Formerly Used Defense Site	30
Figure 10: Map of Alaska and the Aleutian Islands	43
Figure 11: Former Enlisted Men's Barracks at Benicia Arsenal in California	45
Figure 12: Photograph of Land-Use Control Signage Damaged by Visitor to Former Camp Hale	48

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### Abbreviations

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Corps	U.S. Army Corps of Engineers
DERP	Defense Environmental Restoration Program
DOD	Department of Defense
DOJ	Department of Justice
EPA	Environmental Protection Agency
FUDS	Formerly Used Defense Sites
IRP	Installation Restoration Program
MMRP	Military Munitions Response Program
PFAS	per- and polyfluoroalkyl substances

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June 16, 2022

The Honorable Adam Smith  
Chairman  
The Honorable Mike Rogers  
Ranking Member  
Committee on Armed Services  
House of Representatives

The Department of Defense (DOD) is responsible for the environmental restoration of Formerly Used Defense Sites (FUDS). FUDS are sites located on properties that were once under DOD's jurisdiction and owned, leased, or otherwise possessed by the United States at the time of the actions leading to contamination but were conveyed out of DOD's jurisdiction prior to 1986.<sup>1</sup> The military used FUDS for defense purposes, such as training, ammunition production and storage, and missile defense. They are now used for nonmilitary purposes, such as farming, residential or commercial development, and recreation. DOD contamination of these sites can include hazardous substances, pollutants or contaminants, petroleum, and military munitions that could cause death, adverse health effects, or harm to the environment. Figure 1 shows a discarded military munition found at the former Camp Hale, a FUDS property in Colorado.

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<sup>1</sup>Other DOD programs investigate and cleanup properties transferred by DOD after 1986.

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**Figure 1: Discarded Military Munition Found at the Former Camp Hale in Colorado**



Source: Department of Defense. | GAO-22-104744

The FUDS program primarily consists of two DOD-wide programs. Each one addresses a different type of contamination and hazard. The Installation Restoration Program (IRP) generally addresses hazardous substances, pollutants, and contaminants. The Military Munitions Response Program (MMRP) generally addresses military munitions.<sup>2</sup> DOD designated the Secretary of the Army as the lead agent for the FUDS program, and the U.S. Army Corps of Engineers (Corps) executes FUDS cleanup on behalf of the Army.<sup>3</sup>

The FUDS program is one of several programs that feed into DOD's overall environmental liability. DOD's environmental liabilities represent

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<sup>2</sup>We did not include a smaller FUDS program, called the Building Demolition and Debris Removal program, in our review. We focused our audit work on IRP and MMRP because these programs represent the bulk of FUDS cleanup. Specifically, cleanup under the Building Demolition and Debris Removal program accounts for about 7 percent of total FUDS cleanup, or 367 out of 5,431 sites.

<sup>3</sup>In DOD's chain of command, the Assistant Secretary of Defense for Energy, Installations, and Environment has responsibility for all of DOD's environmental restoration programs, including the FUDS program. We use the term "DOD" to refer collectively to all three entities in the chain of command, and we refer to a specific entity when we describe a unique responsibility.



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future costs to clean up areas contaminated by defense activities. Under federal accounting standards, DOD is required to estimate and report on its environmental liability.<sup>4</sup> The federal government's environmental liabilities have been growing for the past 20 years and will likely continue to grow even as federal agencies spend billions each year on cleanup efforts.<sup>5</sup> In 2017, GAO identified the federal government's environmental liabilities as a high-risk area.<sup>6</sup> From fiscal year 2017 through 2021, the federal government's environmental liabilities increased about 32 percent, from \$465 billion to \$613 billion. DOD's environmental liabilities in fiscal year 2021 were about \$82 billion, the second highest among federal agencies, representing about 13 percent of the government's total environmental liabilities.<sup>7</sup>

In 2021, the environmental liability for the FUDS program constituted about 15 percent of DOD's total environmental liability—\$11.9 billion. Estimates of future liabilities may vary from year to year based on the stage of cleanup. Specifically, the FUDS inventory is dynamic, with some sites having very rough cost estimates at the beginning of cleanup and other sites having more mature cost estimates further along the cleanup

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<sup>4</sup>Federal accounting standards define liability as a probable future outflow or other sacrifice of resources as a result of past transactions or events. See Federal Accounting Standards Advisory Board, *FASAB Handbook of Federal Accounting Standards and Other Pronouncements, as Amended* (Washington, D.C.: June 30, 2017).

<sup>5</sup>Federal agencies are required by accounting standards to estimate future cleanup and waste disposal costs and to report such costs as environmental liabilities in their annual financial statements.

<sup>6</sup>GAO, *High-Risk Series: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others*, [GAO-17-317](#) (Washington, D.C.: Feb. 15, 2017). GAO's High-Risk Series identifies federal programs and operations that are high risk because of their vulnerabilities to fraud, waste, abuse, and mismanagement or that need transformation. We updated the High-Risk Series in March 2021. See GAO, *High-Risk Series: Dedicated Leadership Needed to Address Limited Progress in Most High-Risk Areas*, [GAO-21-119SP](#) (Washington, D.C.: Mar. 2, 2021).

<sup>7</sup>The Department of Energy had the highest reported environmental liabilities in fiscal year 2021, at about \$516 billion, representing about 85 percent of the total federal government liability. See Department of the Treasury, *Financial Report of the United States Government, FY21* (Washington, D.C.: Feb. 17, 2022).

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process.<sup>8</sup> This variability introduces some uncertainty in future cost estimates. Federal accounting standards and DOD policy require that DOD make its best estimate of future costs at the different stages of cleanup based on available information.

House Report 116-120 included a provision for GAO to review various elements of DOD's FUDS program, including program progress and priorities.<sup>9</sup> This report (1) describes the scope and costs of cleaning up FUDS and the reliability of environmental liabilities estimates; (2) examines how DOD selects FUDS for cleanup; and (3) identifies the challenges, if any, with the FUDS program that contribute to uncertainty in costs.

For each of the three objectives, we reviewed documents and data on environmental liabilities for both IRP and MMRP from fiscal year 2016 through 2020, and we interviewed DOD officials. Fiscal year 2021 environmental liabilities information was not available until we concluded most of our audit work, but we included it in this report for context, where appropriate.

For each of the three objectives, we also analyzed data from DOD's Knowledge-Based Corporate Reporting System, a database that DOD uses to report on all of its defense environmental restoration projects, including FUDS. DOD reports the cost to complete projects in its corporate database, which differs slightly from the environmental liabilities reported in its annual agency financial statements for two reasons. First, DOD's annual financial statement includes unliquidated obligations—or amounts that have been obligated but not yet spent, but DOD's corporate database does not report these unliquidated obligations.<sup>10</sup> Second, DOD's annual financial statement reports current-year dollars, but DOD's corporate database reports out-year inflation. Unless otherwise stated,

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<sup>8</sup>According to DOD, a site is a distinct area of a property containing one or more releases or threatened releases of hazardous substances. Sites, which are the same as FUDS projects, can be treated as discrete entities or can be consolidated into a group based on response purposes.

<sup>9</sup>H.R. Rep. No. 116-120, pt. 1, at 112-13 (accompanying H.R. 2500, a bill for the National Defense Authorization Act for Fiscal Year 2020).

<sup>10</sup>Unliquidated obligations are those obligations that have not yet been paid or are no longer needed to pay for goods and services. For example, unliquidated obligations can result from delays in a contractor submitting an invoice for the cost of goods and services provided to the government.

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when we refer to DOD's environmental liability, we use the estimate in DOD's corporate database, which generally is lower than the environmental liabilities in DOD's annual agency financial statements.

We assessed the reliability of DOD's corporate database by (1) performing electronic testing, (2) reviewing existing information about the data and the system that produced them, and (3) interviewing agency officials and financial auditors knowledgeable about the data. We also reviewed recent reports from DOD financial auditors to assess whether their findings cast doubt on the reliability of the data. We determined that the data were sufficiently reliable for the purposes of this report.

To gather more-detailed examples related to each of our three objectives, we selected a nongeneralizable sample of 15 FUDS properties, which constituted 139 sites. We used DOD's Knowledge-Based Corporate Reporting System to select the properties. For our first two objectives, we used criteria such as risk level for the individual sites, stage of cleanup, and estimated cost and selected properties that reflected a range of these criteria. For example, we selected the former Camp Croft in South Carolina because it has a medium MMRP risk, and we selected the former Nebraska Ordnance Plant because it had one of the top 10 highest estimated costs for IRP sites.

For each of these 15 properties selected, we reviewed publicly available documents, such as consent decrees, decision documents, third-party reports, and the minutes from public meetings. In addition, from this list of 15 properties, we selected a sample of four properties for an in-depth review. We selected these four because they met additional criteria regarding location, type of cleanup, and inclusion on the National Priorities List.<sup>11</sup> For example, we selected Attu Island because of its remote location in the Aleutian Archipelago. We collected and assessed documents and interviewed representatives from DOD, state regulatory agencies,<sup>12</sup> state and tribal entities, and local FUDS advisory boards about these four properties. Findings from our review of the sample of

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<sup>11</sup>The National Priorities List is a list of sites of national priority among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The Environmental Protection Agency (EPA) manages the National Priorities List under the Superfund program.

<sup>12</sup>We interviewed regulators from each of our states we selected for further review. We also interviewed state regulators representing the Federal Facilities Subcommittee leadership team of the Association of State and Territorial Solid Waste Management.

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properties cannot be generalized to all properties. (See app. I for more information.)

We conducted this performance audit from February 2021 to June 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.

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## Background

FUDS properties range from the Civil War era to more recent facilities, such as intercontinental ballistic missile defense system stations. They can be located in rural, urban, and suburban areas and may consist of just a few acres up to hundreds of thousands of acres. A single FUDS property may have several sites on it for cleanup, particularly properties that have both hazardous substance contamination and military munitions. Since the inception of the FUDS program in 1986, DOD has evaluated more than 10,000 properties and determined that about 5,400 sites are eligible for the program. As of the end of fiscal year 2019, DOD had cleaned up about 3,700 sites, leaving approximately 1,700 eligible sites to be addressed.

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## Federal Environmental Liabilities and Accounting Standards

Federal accounting standards require agencies to report environmental liabilities in their annual financial statements. According to federal accounting standards, costs for cleanup work must be included in environmental liabilities estimates when they are both probable and reasonably estimable.<sup>13</sup> In determining whether an agency's environmental cleanup responsibilities meet the probable criterion, the agency must establish its legal liability or financial responsibility for the project and determine that it is more likely than not that it will have to conduct the cleanup. For projects that do not meet the level of probable—that is, where there is a less than 50 percent chance that a financial liability will be incurred—federal accounting standards do not require reporting of associated costs in the agency's environmental liabilities estimate. Agencies can, however, disclose these costs in the notes of its financial statement.

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<sup>13</sup>“Probable” relates to whether a future outflow of resources will be required—specifically, that it is “more likely than not” that the agency will incur a financial liability. “Reasonably estimable” relates to the ability to reliably quantify in monetary terms the outflow of resources that will be required.

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### GAO's High-Risk Update

We reported in our March 2021 high-risk update about significant problems with the Department of Defense's (DOD) environmental liabilities reported in its annual financial statement. Specifically, we reported that the DOD Inspector General's 2020 financial audit found that DOD had not implemented a department-wide calculation methodology to report on its environmental liability. For example, DOD has not effectively reconciled current listings of property and equipment with estimated future environmental cleanup costs. We reported that DOD estimates it will have a corrected environmental liability estimate in 2025. This weakness does not directly relate to the Formerly Used Defense Sites (FUDS) program, since DOD no longer owns FUDS.

Source: GAO | GAO-22-104744

Once the federal accounting standards' probable criterion is met, agencies are to determine whether cleanup costs are reasonably estimable. In determining whether costs are reasonably estimable, agencies are to consider a completed study—such as a remedial investigation/feasibility study—or prior experience with a similar site or similar site conditions. Assuming a study has been completed, or the agency has experience with a similar site or similar site conditions, then the agency is to make its best effort to estimate liability for financial statement purposes, provided technology exists to remediate the site. When reasonable estimates cannot be generated, such as cleanup costs at sites where no feasible remedy exists, then environmental liabilities estimates do not include cost estimates for that work.

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## Legal Framework Governing the FUDS Program

DOD's authorization to identify, investigate, and clean up FUDS comes from the Defense Environmental Restoration Program (DERP), which Congress established in the Superfund Amendments and Reauthorization Act of 1986.<sup>14</sup> The goals of DERP include identifying, investigating, and cleaning up hazardous substances, pollutants, and contaminants, and correcting environmental damage caused by DOD activities, including detection and disposal of unexploded ordnance. It is DOD policy to facilitate the development of and transition to cost-effective, innovative technologies to aid in cleanup efforts at these sites.<sup>15</sup>

In executing the FUDS program, DOD generally follows the process established for cleanup actions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLA, commonly known as Superfund, authorizes the federal government to respond to releases or threatened releases of hazardous substances, pollutants, or contaminants. There are a number of activities in the typical CERCLA process. For the purposes of this report, we grouped most of these activities into three high-level phases: investigation; decision-

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<sup>14</sup>The Superfund Amendments and Reauthorization Act of 1986 amended the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).

<sup>15</sup>DOD Instruction 4715.07, Defense Environmental Restoration Program (May 21, 2013) (Incorporating Change 2, Aug. 31, 2018).

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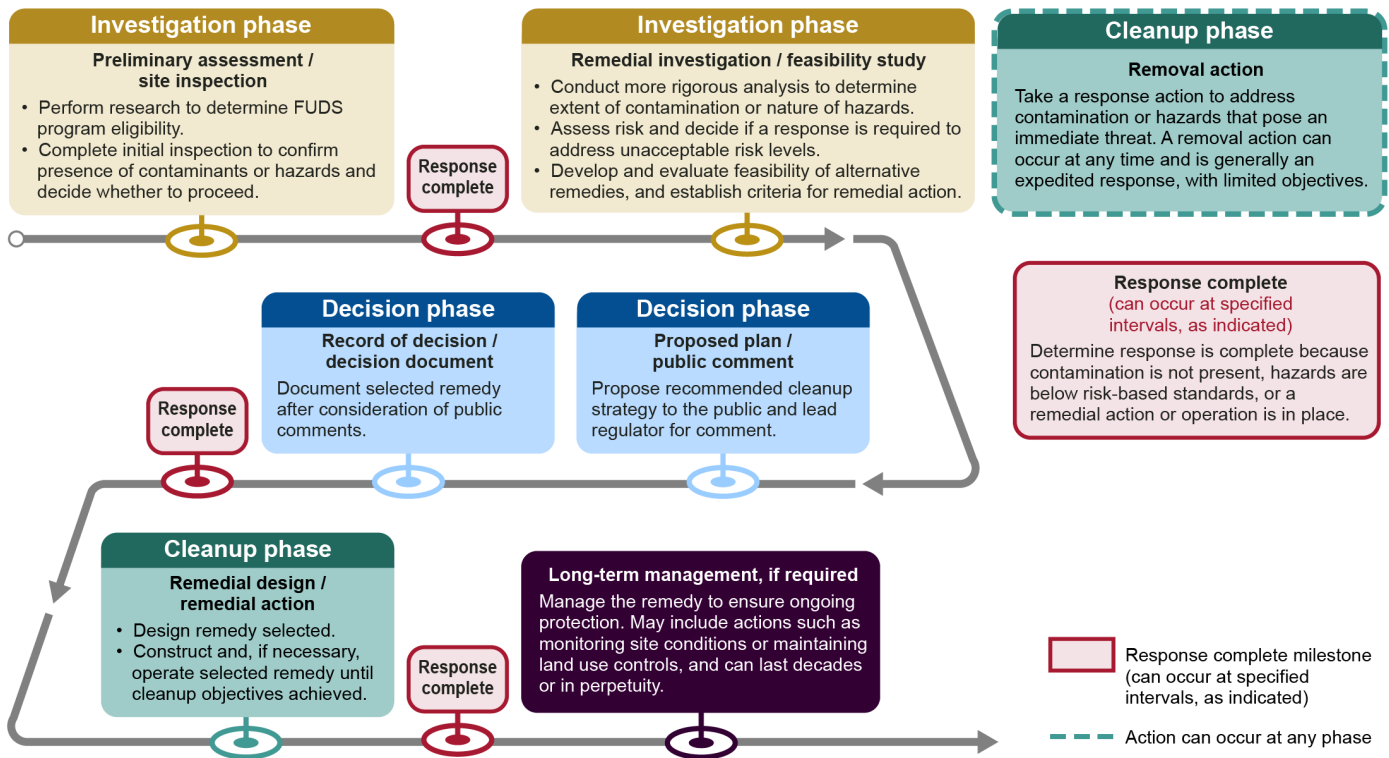
making; and cleanup. Some activities involving long-term management could continue after cleanup objectives are met.

- Investigation involves first identifying the problems through an initial look, with a preliminary assessment and site inspection. Then it involves a closer evaluation, with a remedial investigation and feasibility study.
- Decision-making involves developing solutions based on the evaluation and includes input from the public and the regulator.
- Cleanup involves implementing the solution developed through remedial design and action.

In some cases, DOD may determine that long-term management may be required to monitor long-term protectiveness of the remedy, particularly when the cleanup actions do not allow unrestricted use of the property. Long-term management could be required for decades or even in perpetuity.

In addition, there are two other activities that can occur out of sequence of the three key phases. First, DOD sometimes engages in a removal action, which is a cleanup activity, after site inspection or remedial investigation, but it could occur at any time. Second, DOD can determine that its cleanup response is complete for certain reasons after key activities: after completing its initial site inspection; during its decision-making process on whether remedial action is needed; and after completing remedial action. For example, after DOD's initial inspection, if DOD finds that contamination is not present, then it may determine that its response is complete. Similarly, after seeking public and regulator input on a remedial investigation, DOD may determine that no further action is required. Finally, after completing a remedial action that does not require long-term management, DOD may determine that its response is complete. Site closeout cannot occur until after DOD determines that its response is complete. Figure 2 illustrates DOD's application of the CERCLA process in implementing the FUDS program.

**Figure 2: The Department of Defense’s Implementation of the Comprehensive Environmental Response, Compensation, and Liability Act Process at Formerly Used Defense Sites (FUDS)**



Source: GAO analysis of Department of Defense data. | GAO-22-104744

Data collected during the preliminary assessment and site inspection activities are used to determine if there is a need for further investigation or action at a site. If DOD determines that the site poses no threat to public health or the environment, DOD can eliminate that site from further consideration and does not need to consider a response action. If other parties are responsible for contamination of FUDS, even if that contamination is co-located with DOD contamination, DOD works to settle its liability with the other responsible parties, who then take needed response actions. In instances where DOD determines that a response action is appropriate, DOD can select one or both of two types of response actions: removal and remediation.

- **Removal action.** In general, removal actions are shorter-term or emergency actions taken to mitigate an imminent threat to human health, safety, or the environment. Removal actions can occur at any time during the CERCLA process. If a removal action is sufficient to

ensure that there is no threat to public health or the environment, then no additional response action may be required. Figure 3 shows a removal action of rusting and leaking barrels and above-ground storage tanks on Attu Island, the westernmost island in the Alaskan Aleutian Islands and site of the first U.S. offensive operations in the Pacific Ocean during World War II. The sidebar describes the origin of pollution on Attu Island.

#### Attu Island's War-Time History

Attu Island is a mountainous volcanic island over 1,000 miles from the Alaskan mainland and 750 miles from the Japanese Kurile Islands. The Unangan (Aleut) inhabited Attu Island for about 3,000 years until the Japanese invaded in June 1942. The Japanese interred the local inhabitants in Japan for the duration of the war, and the U.S. government repatriated the survivors—nearly one-half of the interred inhabitants died—to a different Aleutian island. The United States began naval and aerial attacks to reclaim Attu Island in June 1942 but failed to dislodge the Japanese until U.S. forces landed on Attu Island in May 1943 and recaptured it in a nearly month-long battle. The United States used the island for various purposes until the last occupant of the island, the Coast Guard, departed in 2010, leaving the island uninhabited. As a result of the battle and subsequent military activities on the island, it has been contaminated with hazardous chemicals and petroleum, and military munitions.

Sources: National Park Service, Fish and Wildlife Service, and the Department of Defense. | GAO-22-104744

**Figure 3: Department of Defense (DOD) Removal of Rusting and Leaking Barrels and Above-Ground Storage Tanks Threatening Migratory Birds on Attu Island**



Source: DOD. | GAO-22-104744

Note: Access to Attu Island is very difficult because of its location in the chain of Alaskan Aleutian Islands and the weather, restricting the amount of work DOD can complete during a site visit. During its cleanup action in the summer of 2016, DOD reported that it removed about 10,000 tons of petroleum, oil, and lubricant-contaminated soil; 70 tons of tar drums, and 52 above-ground storage tanks to address physical entrapment and bird mortality. Some of DOD's next planned steps include evaluating hazardous substance contamination and military munitions contamination through remedial investigations and feasibility studies.



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- **Remedial action.** Remedial actions typically are longer-term cleanups that involve a more extensive analysis to give the protection and permanence that a removal action does not provide. DOD plans remedial actions to permanently prevent or minimize the release of hazardous substances so that they do not endanger present or future public health or welfare or the environment. Remedial actions generally involve input from state regulators and the public before DOD makes a decision on a specific remedy. Remedies typically involve the attainment of applicable or relevant and appropriate federal or state standards, or a combination of both. Figure 4 shows technicians demonstrating an electromagnetic metal detector that is being used to identify underground military munitions as part of a remedial action at the former Camp Croft.

**Figure 4: Technicians Demonstrate How They Search for Buried Military Munitions at the Former Camp Croft in South Carolina in 2020**



Source: Department of Defense. | GAO-22-104744

Under CERCLA’s National Contingency Plan—which establishes procedures needed to respond to releases and threatened releases of hazardous substances—federal agencies, including DOD, must consider certain criteria when selecting cleanup remedies at their sites. CERCLA cleanup remedies must meet two “threshold criteria” to be considered for selection. Specifically, (1) they must provide overall protection of human health and the environment; and (2) they must comply with “applicable or

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relevant and appropriate requirements,” which may include federal or state standards for cleanup.

DOD policy states that DOD must take into account at least three alternatives when considering remediation. These include (1) no action; (2) action that remediates the site but requires land-use restrictions for protection; and (3) action that remediates the site to unlimited use and unrestricted exposure. Some sites cannot be cleaned to a condition that permits unlimited use and unrestricted exposure. In these cases, DOD can select land-use restrictions, also referred to as land-use controls, as part of a remedy that is protective of human health and the environment. Land-use controls include physical, legal, or administrative restrictions on use of the land, such as fencing and signage warning people of danger.<sup>16</sup>

In certain cases, DOD investigates and cleans up FUDS outside the CERCLA process, generally relying on the Resource Conservation and Recovery Act or a state mandate to address contamination and hazards at a site.<sup>17</sup> According to DOD, the most common situation in which this occurs involves the remediation of petroleum contamination. CERCLA contains a petroleum exclusion, so generally it may not be used to remediate petroleum releases at FUDS or other sites. For example, when DOD needs to clean up underground storage tanks containing petroleum at a FUDS, the department will adhere to the Resource Conservation and Recovery Act regulations for addressing releases of petroleum from underground storage tanks.<sup>18</sup>

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<sup>16</sup>In addition to fences and signs, legal mechanisms can include restrictive covenants and deed notices, and administrative mechanisms can include adopted local land-use plans and ordinances, construction permitting, and other land-use management systems.

<sup>17</sup>Under the Resource Conservation and Recovery Act, EPA may authorize a state to implement its own hazardous waste management program in lieu of the federal program, so long as the state program is at least as stringent. State programs may be more stringent than the federal program. DOD has 407 sites, typically underground petroleum storage tanks, in its FUDS inventory being addressed under the Resource Conservation and Recovery Act. As of fiscal year 2020, of the 407 sites, 13 are in the investigation and cleanup phases, and the rest have achieved the response complete milestone or are being closed. It is possible that future FUDS projects may fall under the Resource Conservation and Recovery Act. According to DOD, the Corps has 922 sites in its FUDS inventory in which it is relying on a state mandate as the cleanup mechanism. Of the 922 sites, 64 are in the investigation and cleanup phases, and the rest have achieved the response complete milestone or are being closed.

<sup>18</sup>The Corps may seek to operate outside the CERCLA framework in other instances but must obtain concurrence and specific approvals up the chain of command to do so.

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## DOD Assigns Risk Scores to Each FUDS

DOD regulation and policy requires that each FUDS be assigned a risk score based on a site's risk to human health, safety, or the environment. These risk scores are assigned differently for IRP and MMRP based on relevant factors to each program.

- **Installation Restoration Program.** The IRP risk score is based on three evaluations: sources of contamination, pathways through which the contamination can move, and potential for people to be exposed to contamination. DOD then assigns each site a score of high risk, medium risk, or low risk.
- **Military Munitions Response Program.** The MMRP risk score is based on evaluations of three types of hazards: explosive, chemical warfare materiel, and health. DOD then assigns each site a score from 01 to 08, with 01 being the highest risk. In order for a site to have a risk of 01, it must have chemical warfare materiel present.

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## Organizational Responsibilities for the FUDS Program

DOD—under the authority of the Deputy Assistant Secretary of Defense for Environment and Energy Resilience—has responsibility for all environmental restoration activities under DERP. DOD has delegated responsibilities of the FUDS program to the Secretary of the Army, who has delegated mission execution to the Corps.

DOD is required to report annually to Congress on various elements of the FUDS program under DERP, such as changes to the programs and program progress. According to DOD, to respond to this requirement, the Corps provides input to DOD from its FUDS Management Information System, which it uses to execute the FUDS program. DOD uses this information to meet its reporting requirements to Congress, as well as to provide information to the public. As of February 2022, DOD had not yet issued its fiscal year 2020 annual report to Congress.

Congress established an environmental restoration account in DOD for appropriating funding for the FUDS program. The Office of the Deputy Assistant Secretary of Defense for Environment and Energy Resilience plans, programs, and budgets for the FUDS program, and the Deputy Assistant Secretary of the Army (Environment, Safety, and Occupational Health) approves the final allocations for the FUDS program, including how much money goes to IRP and MMRP.

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**DOD Estimated It Would Cost \$10 Billion to Clean Up at Least 1,700 Sites, but the Large Number of Sites Under Investigation Contribute to Uncertainty in Future Costs**

In fiscal year 2020, DOD estimated it would cost about \$10 billion to clean up about 1,700 sites in the FUDS inventory.<sup>19</sup> DOD has made some progress in addressing FUDS and spent over \$1 billion for site investigation and cleanup over the past 5 years. But incomplete data contribute to uncertainty in liabilities estimates because (1) DOD has over 1,000 sites in the investigation phase where liabilities will likely be refined after the initial cost estimates and (2) DOD's FUDS records may be incomplete for existing properties and projects.

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**DOD Estimated an Average of about \$10 Billion Each Year in Environmental Liabilities to Clean Up at Least 1,700 Sites and Spent Over \$1 Billion in Recent Years for Site Investigation and Cleanup**

DOD estimated an average of about \$10 billion each year in FUDS environmental liabilities from fiscal year 2016 through fiscal year 2020. However, as discussed below, the composition of sites in the FUDS inventory is dynamic, with sites in various stages of cleanup under CERCLA. This introduces uncertainties in cost estimates, particularly for those sites in the early stages of cost estimating compared to sites further along the CERCLA cleanup process. From fiscal year 2016 through 2020, IRP sites accounted for an average environmental liabilities estimate of about \$2.7 billion each year, while MMRP sites accounted for an average environmental liabilities estimate of \$7.3 billion. Table 1 shows DOD's estimated environmental liabilities for the FUDS IRP and MMRP from fiscal year 2016 through 2021. Figure 5 shows the number of sites and DOD's estimated environmental liabilities of the FUDS program, by division.

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<sup>19</sup>The \$10 billion estimate comes from DOD's corporate database, meaning it is a cost-to-complete estimate, which differs slightly from the environmental liabilities reported in its annual agency financial statements. Additionally, this estimate does not include DOD's Building Demolition and Debris Removal program, which is included as environmental liabilities in DOD's annual financial reports.

**Table 1: The Department of Defense's (DOD) Estimated Environmental Liabilities for the Formerly Used Defense Sites Program, Fiscal Year 2016 through 2021**

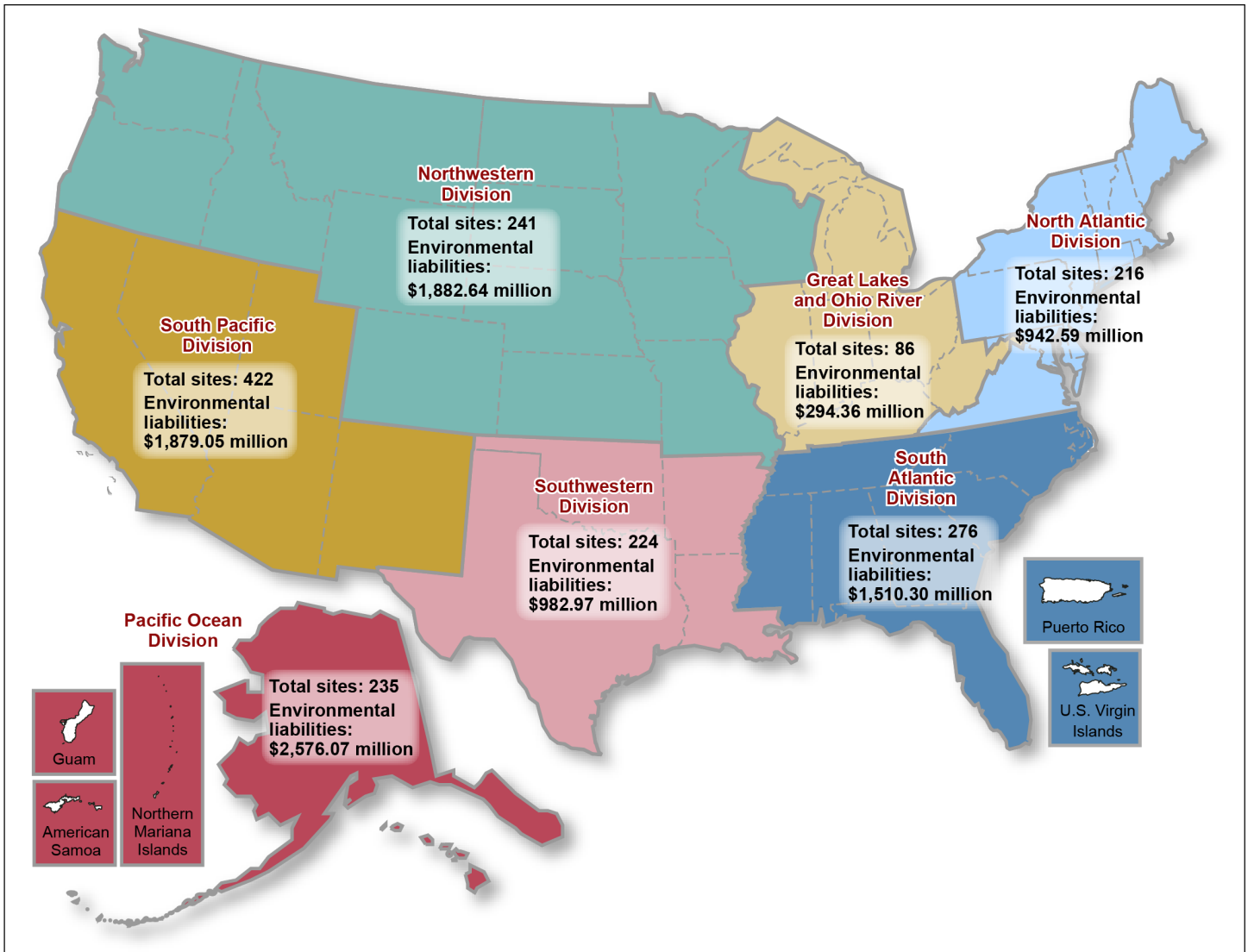
Dollars in billions

Program	Environmental liabilities by fiscal year					
	2016	2017	2018	2019	2020	2021
Installation Restoration Program	2.7	2.7	2.6	2.5	2.8	3.1
Military Munitions Response Program	7.3	7.5	7.1	7.3	7.4	8.3
<b>Total</b>	<b>10.0</b>	<b>10.1</b>	<b>9.7</b>	<b>9.8</b>	<b>10.2</b>	<b>11.4</b>

Source: GAO analysis of DOD data | GAO-22-104744d

Note: GAO created this table based on data from DOD's Knowledge-Based Corporate Reporting System. These estimates differ slightly from the environmental liabilities reported in DOD's annual financial statements because they do not include unliquidated obligations and do include out-year inflation. Additionally, these estimates do not include DOD's Building Demolition and Debris Removal program, which is included as environmental liabilities in DOD's annual financial reports.

**Figure 5: Number of Sites and the Department of Defense's (DOD) Estimated Environmental Liabilities of Formerly Used Defense Sites Program, by Division, in Fiscal Year 2020**



Sources: GAO analysis of DOD and U.S. Army Corps of Engineers data; Map Resources (map). | GAO-22-104744

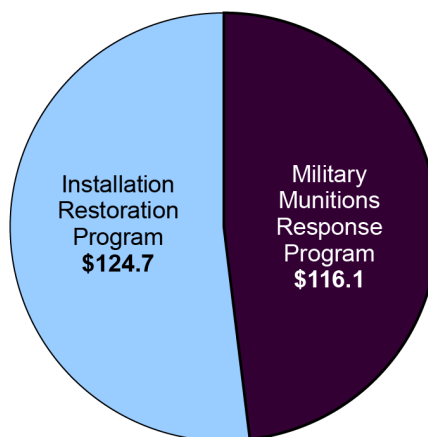
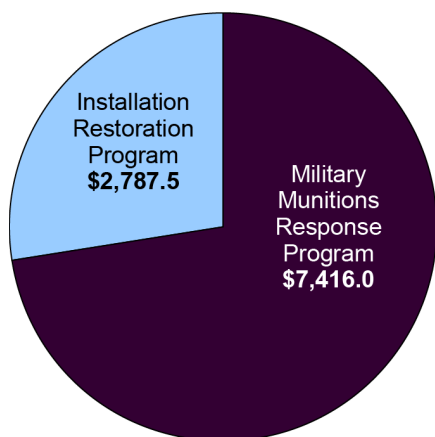
Note: The dollar amounts are DOD's cost-to-complete estimates for FUDS for each division, as reported in the Department's Knowledge-Based Corporate Reporting System. These amounts differ slightly from the environmental liabilities reported in DOD's annual financial statement because they do not include unliquidated obligations and do include out-year inflation. Additionally, these estimates do not include DOD's Building Demolition and Debris Removal program, which is included as environmental liabilities in DOD's annual financial reports.

DOD obligated over \$1 billion on FUDS IRP and MMRP projects from fiscal year 2016 through 2020, an average of \$222 million per year. DOD obligated slightly more funding for the cleanup of IRP sites than MMRP sites, on average. Specifically, DOD annually obligated about \$123 million for IRP cleanup and about \$99 million for MMRP cleanup. Figure 6 illustrates that MMRP accounted for the bulk of DOD’s estimated environmental liabilities for the FUDS program and received slightly less in terms of obligations, compared to IRP.

**Figure 6: The Department of Defense’s (DOD) Environmental Liabilities and Obligations for the Installation Restoration Program and the Military Munitions Response Program, Fiscal Year 2020**

Liabilities in fiscal year 2020 (dollars in millions)

Obligations in fiscal year 2020 (dollars in millions)



Source: GAO analysis of DOD data. | GAO-22-104744

Note: The estimates come from DOD’s Knowledge-Based Corporate Reporting System, meaning they are cost-to-complete estimates, which differ slightly from the environmental liabilities reported in its annual agency financial statements for two reasons. First, DOD’s annual financial statement includes unliquidated obligations, but DOD’s corporate database does not report these unliquidated obligations. Second, DOD’s annual financial statement reports current-year dollars, but DOD’s corporate database reports out-year inflation. Additionally, these estimates do not include DOD’s Building Demolition and Debris Removal program, which is included as environmental liabilities in DOD’s annual financial reports.

DOD’s estimated liabilities for the MMRP program are higher, in part, because there are a larger number of MMRP sites than IRP sites remaining in the FUDS inventory. Specifically, as of fiscal year 2020, there were about 400 IRP sites and 1,300 MMRP sites that remain to be addressed. Since the inception of the FUDS program, DOD has made more progress completing cleanup at IRP (2,334 sites, or 85 percent of the total) than MMRP sites (1,030 sites, or 45 percent of the total). From fiscal year 2016 through 2020, DOD closed 72.6 sites a year, on average, of which about 52.2 were IRP and 20.4 were MMRP sites.

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DOD's fiscal year 2021 estimated liabilities for IRP and MMRP grew to about \$11.4 billion, an increase of about \$1.2 billion. MMRP sites accounted for about \$872 million, or nearly 74 percent of this increase.<sup>20</sup> According to DOD officials, the \$1.2 billion increase in environmental liabilities was primarily the result of new project information from later investigation phases. For example, DOD increased its estimate for the former Camp Hale in Colorado by about \$87 million in fiscal year 2021 because the feasibility study recommended adding subsurface removal of military munitions and nearly doubled the acreage for surface removal of military munitions.

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### The Large Number of MMRP Sites Under Investigation and Incomplete Data May Contribute to Uncertainty in Environmental Liabilities Estimates

The large number of MMRP sites in the investigation phase may contribute to uncertainty in DOD's future environmental liability estimates. During the inspection of a site, DOD looks at large areas of land with varying military munitions levels. Then, DOD calculates the initial liability estimate based on modeling, historical information, and comparisons to other sites containing similar military munitions and acreage.

Later, during the remedial investigation and feasibility study, which are conducted during the investigation phase, DOD refines its estimates as it better understands (1) what specific remedies, if any, are needed to clean up sites identified within the area inspected; and (2) if applicable, the most practical way to divide the large area initially inspected into smaller, more manageable sites as part of a process known as delineation.

As of fiscal year 2020, DOD had 1,194 MMRP sites in the investigation phase, which is more than half of the FUDS MMRP inventory. Given the large number of MMRP sites in the investigation phase, it will take DOD decades to calculate more refined environmental liability estimates, which contributes to the uncertainty. For example, DOD first investigated the former Camp Croft in 1984 but did not complete the investigation phase until 2015. Of the 1,194 MMRP sites, 929 have not begun the investigation phase. Figure 7 shows the number of IRP and MMRP sites in the investigation phase.

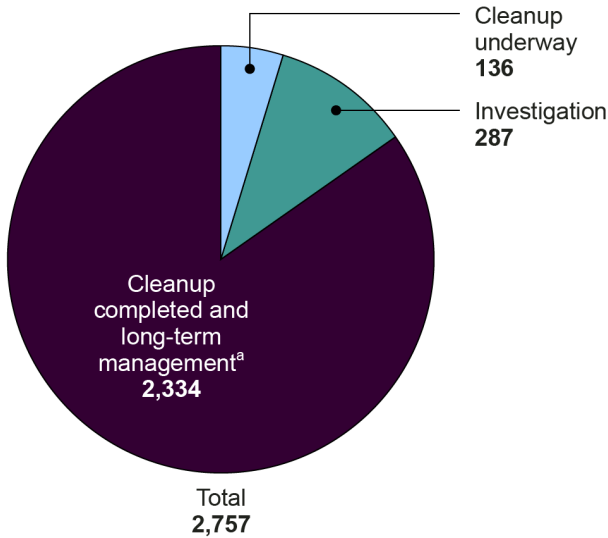
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<sup>20</sup>DOD officials said that new information from four IRP projects and three MMRP projects accounted for most of the increase in estimated costs and that the Building Demolition and Debris Removal program accounted for a small amount.

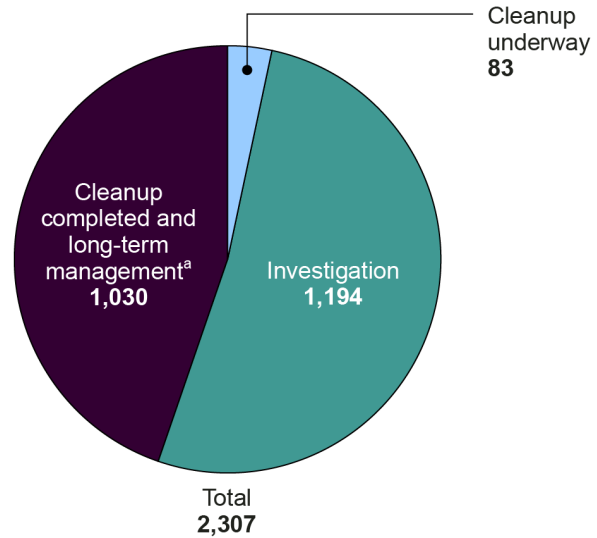


**Figure 7: Proportion of Formerly Used Defense Sites in Fiscal Year 2020 in the Investigation Phase versus Cleanup Complete**

**Installation Restoration Program sites by phase  
(as of fiscal year 2020)**



**Military Munitions Response Program sites by phase  
(as of fiscal year 2020)**



Source: GAO analysis of Department of Defense data. | GAO-22-104744

Note: For the purposes of this report, the investigation phase consists of a preliminary assessment and site inspection, and, if needed, a closer evaluation with a remedial investigation and feasibility study.

<sup>a</sup>Cleanup completed and long-term management include sites that have achieved the response complete milestone, are undergoing long-term management, or have achieved site closeout.

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DOD officials said that they could not predict how much their initial liability estimates might change after they investigate the sites further. In some cases, liability estimates might decrease, but in some cases, liabilities might increase.<sup>21</sup> For example, according to our review of DOD data, from fiscal year 2019 to fiscal year 2020, in the investigation phase, the liability increased by over 10 percent at 176 sites, while it decreased by over 10 percent at 188 sites.<sup>22</sup>

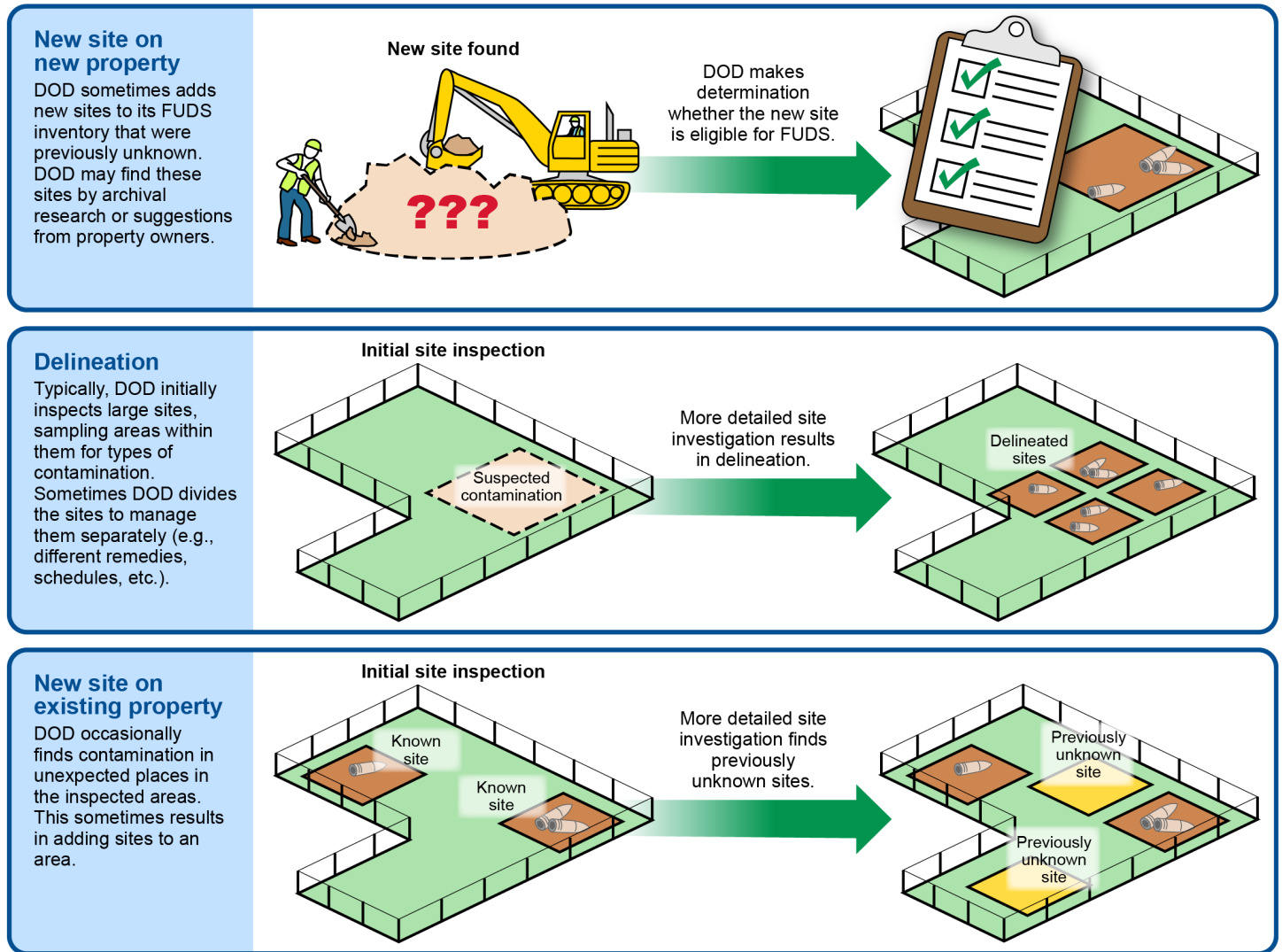
In addition, a potential increase in the total number of FUDS also adds to uncertainty in DOD's environmental liabilities. There are three ways DOD may add new sites to the inventory: (1) identification of new sites not previously listed in the FUDS inventory through archival research or other mechanisms; (2) delineation, or the dividing of a current site into multiple smaller sites for better project management; and (3) finding contamination in unexpected places when inspecting or investigating a known site, resulting in adding new sites to the already existing property. According to DOD officials, DOD added about 81 sites per year, on average, from fiscal year 2016 through 2020, with the majority of these new sites added through delineation. Figure 8 illustrates the ways in which DOD can add new sites to the FUDS inventory.

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<sup>21</sup>The Army's agency financial statement for fiscal year 2020 describes the difficulty of estimating future costs and states that future cost estimates require certain professional judgments and assumptions that are believed to be reasonable based upon information available to the Army at the time of estimation but that the estimates could change as more information becomes available. U.S. Army, *Fiscal Year 2020 United States Army Annual Financial Report* (Washington, D.C.: Nov. 10, 2020).

<sup>22</sup>The reasons for decreases in liability estimates at sites vary. For example, liabilities might decrease because of cleanup progress, new technologies, or revisions in the estimating process itself.

**Figure 8: The Department of Defense (DOD) Generally Adds New Sites to Its Inventory of Formerly Used Defense Sites (FUDS) by Three Methods**



Source: GAO analysis of DOD data. | GAO-22-104744

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The discovery of new sites can add to the liability estimate. For example, in January 1993, a construction contractor digging a utility trench for a home in Washington, D.C. discovered buried military munitions. DOD was alerted and initiated a removal action in February 1993. Later, DOD began investigating to characterize the nature and extent of the waste at the site, called Spring Valley, and this cleanup is ongoing.<sup>23</sup> Total liabilities for Spring Valley in fiscal year 2020 were \$12.5 million, a decrease from fiscal year 2016, when liabilities totaled \$33.1 million. On average, from fiscal year 2016 through 2020, about 26 new sites were added each year, either from new discoveries or finding new sites on existing properties.

The addition of sites through delineation can also increase environmental liabilities estimates because it reflects DOD's gain of knowledge about the existing contamination and the actions required to clean it up. For example, at the former Camp Butner Training Camp in North Carolina, DOD inspected the site as two IRP sites and a single large MMRP site. After sampling and subsequent investigation, DOD delineated the single MMRP site, increasing the number of MMRP sites to eight to better manage each land use category, geographic location, and military munitions type. For example, the military munitions that DOD found included different types of rockets, mortars, projectiles, and grenades. The type of military munitions often determines its expected depth in the ground, with different depths requiring different cleanup methods. The liability at the site increased from about \$12.4 million in fiscal year 2016 to \$291 million in fiscal year 2020 as the single MMRP site was delineated into eight sites.

In addition to the uncertainty related to the number of MMRP sites under investigation, DOD's Inspector General reported to DOD in fiscal year 2021 in a Notice of Finding and Recommendation that DOD lacked some documentation on FUDS eligibility and, therefore, the FUDS environmental liability may be understated. Specifically, on the basis of reviews from fiscal year 2019 through 2021, the Inspector General reported that the database used by the Corps may have mistakenly

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<sup>23</sup>After the initial discovery, DOD expanded its investigation and found burial pits containing military munitions items and laboratory glassware, some of which contained traces of hazardous chemicals. The FUDS property included the South Korean Ambassador's residence.

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excluded certain FUDS.<sup>24</sup> DOD concurred with the Inspector General's findings, implemented corrective action plans, and is currently developing another corrective action plan to improve the database. DOD officials said they do not expect these measures to significantly affect their liability estimate.

We also identified data errors in DOD's corporate database related to tracking the reasons for major increases or decreases in a site's environmental liabilities. The errors do not affect DOD's environmental liability estimate but have contributed to erroneous information being reported to Congress and the public regarding key drivers of cost increases or decreases. DOD is required by law to report on the amount expended over the previous 4 years, the amount DOD proposes to spend in the current and following year, and provide reasons for any significant change in the amounts during the period covered. Each year, DOD requires the service components, including the Corps, to transfer data from their own databases to DOD's corporate database for reporting to Congress. DOD officials told us that the Corps' transfer of cost-driver data from its FUDS Management Information System to DOD's corporate database contained a formulaic error, rendering information on drivers for cost increases and decreases unreliable in DOD's corporate database. As a result, we could not use DOD's corporate database to assess what factors caused increases or decreases in environmental liabilities. We alerted DOD to its error in reporting. As of February 2022, DOD was taking steps to correct the formulaic error and plans to submit correct information in the fiscal years 2020 and 2021 reports to Congress.<sup>25</sup>

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<sup>24</sup>The DOD Inspector General told us that the FUDS database was generally reliable. The DOD Inspector General tested 122 FUDS for completeness. It found 10 instances of incomplete supporting documentation of certain eligibility approval, such as inappropriately categorizing sites or not approving sites in a timely manner for inclusion in the correct fiscal year. The Notice of Finding and Recommendation is an internal audit document prepared by the DOD Inspector General.

<sup>25</sup>As of May 2022, DOD had not yet posted the fiscal years 2020 and 2021 reports on its website listing the most recent annual reports to Congress. See <https://denix.osd.mil/arc/>.

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## DOD Selects Sites for Cleanup Based on Risk and Other Factors but Has Not Set a Cleanup Goal for MMRP Sites

DOD selects sites for cleanup based on an assigned risk score and other factors. However, DOD does not have guidance to weigh the relative risk or other factors between IRP and MMRP programs. Additionally, although DOD has goals against which it measures progress of cleanup at IRP sites to report to Congress, it has not set a comparable goal for FUDS MMRP sites.

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## DOD Selects Sites for Cleanup Based on Risk and Other Factors but Has No Guidance to Weigh Relative Risk or Other Factors between IRP and MMRP Sites

DOD selects the order in which sites are cleaned up as funding becomes available.<sup>26</sup> According to regulation and policy, DOD should primarily select sites that pose the greatest risk to human health, safety, or the environment. In order to identify the greatest risk sites, DOD assigns a risk score to IRP and MMRP sites. These risk scores are assigned differently for IRP and MMRP sites based on relevant factors to each program. In addition, DOD can consider other relevant factors when selecting sites, such as stakeholder input, future land use, and environmental justice. Regulations and DOD policy state that certain stakeholders, including EPA and state regulators, are to be consulted in these selection decisions.

Our review of DOD's corporate database showed that DOD generally selects to clean up FUDS that DOD ranked as higher risk within each program (IRP or MMRP). In fiscal year 2020, of the 24 IRP sites undergoing cleanup, 13 were high risk (54 percent), six were medium risk (25 percent), and five were low risk (21 percent).<sup>27</sup> Of the 61 MMRP sites undergoing cleanup, 40 were in the high-risk range (about 66 percent), 20 were in the medium-risk range (about 33 percent), and one was in the low-risk range (about 2 percent).<sup>28</sup> Additionally, in fiscal year 2020, DOD

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<sup>26</sup>The order in which DOD places sites in a queue for environmental restoration is known as "sequencing."

<sup>27</sup>There were a total of 136 IRP sites undergoing cleanup in 2020. However, 112 sites do not have a risk score because they have not been evaluated yet (30 sites), or an evaluation is not required (82 sites). DOD is not required to determine a risk score for a site when it (1) has achieved the remedy in place or the response complete milestone or (2) is a potentially responsible party site (meaning someone else could be liable for the cleanup).

<sup>28</sup>There were a total of 83 MMRP sites undergoing cleanup in 2020. However, 22 sites do not have a risk score because the evaluation is pending.

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allotted funding to more high-risk IRP and MMRP sites than medium- or low-risk sites.

In addition to risk, DOD also considers other factors when selecting sites for cleanup, including stakeholder input. Stakeholders may include state regulators, tribal entities, and community groups. For example, according to DOD, the agency chose to clean up the former Frankford Arsenal in Pennsylvania before other sites even though it had a lower risk score, because state regulators wanted to support the construction of a shopping center at the site to promote economic development. DOD officials said they develop Statewide Management Action Plans for addressing FUDS and invite state regulators and other entities, as appropriate, to contribute to the plans. For example, according to DOD, the Statewide Management Action Plan for Kansas was developed with input from the Kansas Department of Health and Environment and the EPA, Region 7.

State regulators from all four states in our case studies told us that DOD provided a list of MMRP sites for them to comment on. Of the states we reviewed, Alaska was the only state that also provided input on IRP site selection. The Association of State and Territorial Solid Waste Management Officials, which supports environmental agencies of states and territories, developed a document stating that it is important for state regulators to be part of the decision-making process that involves prioritizing FUDS sites for funding.<sup>29</sup> State regulators from the four states in our case studies had varied levels of satisfaction with DOD's coordination with them regarding the selection process. Specifically, of the regulators from the states we selected for case studies, two were generally satisfied with the selection process, and one was generally dissatisfied because, according to state regulators, they were not able to provide input on selecting IRP sites, and the selection process lacked transparency. The fourth state regulator said that while it was generally satisfied with the selection process, DOD could make improvements regarding transparency and the lead time given the regulators to provide input.

Under federal regulations and DOD policy, DOD should also offer tribal governments the opportunity to participate in the selection process. Federal, state, and tribal stakeholders from Alaska said that DOD had

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<sup>29</sup>Association of State and Territorial Solid Waste Management Officials, *Federal Facilities Issues Paper Final Report* (Washington, D.C.: May 2020).

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improved its outreach to tribal groups in the state in recent years. However, they also said that more effort was needed to include their input. Appendix III provides information on additional views about the FUDS program raised by state regulators, including the Association of State and Territorial Solid Waste Management Officials.

According to DOD guidance, DOD's fundamental premise to determine which sites to fund next is based on the "worst first," meaning that it will address the sites that pose the greatest potential risk to public safety, human health, or the environment. DOD policy also allows consideration of other factors. According to DOD, when deciding which FUDS to fund, DOD cleanup teams use risk assessment tools, stakeholder input, and professional judgment to allocate funds between IRP and MMRP sites. DOD has guidance on assigning risk scores for sites within each program (IRP and MMRP) and on assessing other factors within each specific program. However, DOD does not have guidance for how to weigh the relative risk or assess other factors between IRP and MMRP sites when making funding decisions, according to DOD officials. If DOD developed such guidance, it could better weigh the relative risk and assess other factors when making decisions about which IRP and MMRP sites to fund and could better ensure that its selection process is more consistent and transparent to stakeholders.

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## DOD Has Not Set a Cleanup Goal for the FUDS MMRP

In 2012, DOD updated its goals for the entire DERP, including for FUDS.<sup>30</sup> Specifically, DOD set a goal to meet the response complete milestone at 95 percent of FUDS IRP sites by the end of fiscal year 2021.<sup>31</sup> According to DOD, if a site investigation determines that cleanup is not required, or when cleanup work is complete, a site achieves the response complete milestone. A site does not have to go through every CERCLA phase to achieve response complete, and long-term management may be ongoing. In 2010, we reported that DOD had not yet developed a remedy-in-place or response complete performance goal for the FUDS MMRP, as required under the fiscal year 2007 National Defense Authorization Act.<sup>32</sup> At the time, DOD officials told us that it was not feasible to set such a goal for FUDS MMRP sites because so many

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<sup>30</sup>Defense Environmental Restoration Program (DERP) Management Manual, Number 4715.20 (Mar. 9, 2012).

<sup>31</sup>DOD did not meet the 95 percent response complete goal, reaching 89 percent at the end of fiscal year 2021. DOD expects to meet 90 percent in fiscal year 2022.

<sup>32</sup>For our 2010 report, see GAO, *Military Munitions Response Program: Opportunities Exist to Improve Program Management*, [GAO-10-384](#) (Washington, D.C.: Apr. 9, 2010).



were in the early stage of inspection, and DOD did not have enough information about the sites to set a goal. In that 2010 report, we recommended that DOD develop a goal, as required by law, to achieve a remedy-in-place or response complete for the FUDS MMRP. A remedy-in-place milestone is achieved when cleanup systems are constructed and operational. A response complete milestone is achieved when an investigation determines that cleanup is not required or when cleanup work is complete. DOD said that it planned to develop a goal for FUDS MMRP at the end of fiscal year 2010, when it expected to have completed initial inspections of MMRP sites.

As of April 2022, DOD has not yet set a goal for FUDS MMRP progress. DOD officials provided several reasons why setting response complete metrics for the FUDS MMRP was not practical. DOD's reasons and our assessment of them are summarized in table 2.

**Table 2: Department of Defense's (DOD) Reasons Why It Did Not Establish a Cleanup Goal for the Military Munitions Response Program (MMRP) in the Formerly Used Defense Sites (FUDS) Program, and Our Assessment**

DOD's reason for not establishing a goal	Our assessment
The program is less mature. FUDS Installation Restoration Program (IRP) warranted a goal because it is more mature than the FUDS MMRP. Specifically, DOD began cleanup under IRP in 1975, while it did not begin cleanup under MMRP until 2001.	DOD set goals for all other non-FUDS MMRP sites, which have similar levels of maturity.
There are too many sites. There are many more MMRP sites than IRP sites in FUDS.	DOD set goals for other Defense Environmental Restoration Program programs that had a similar number of total sites in the inventory, such as Base Realignment and Closure (BRAC). BRAC IRP sites had a 95 percent response complete goal. There were 2,110 BRAC IRP sites as of fiscal year 2019, compared to 2,307 FUDS MMRP sites as of fiscal year 2020.
Sites are not owned by DOD. DOD could not readily implement land-use controls at FUDS as active bases can because DOD does not own FUDS MMRP sites.	DOD selects land-use controls as remedies for FUDS MMRP sites as it does for FUDS IRP sites, when warranted. DOD does not own FUDS IRP sites. However, DOD has set metrics for FUDS IRP sites.

Source: GAO analysis of DOD data. | GAO-22-104744

Federal law requires that DOD annually report to Congress on its defense environmental programs, including the total number of sites in the program; the number of sites that have reached certain stages in the cleanup process, including the response complete stage; and the progress of the program. In addition, standards for internal control for the federal government state that management should define goals clearly to enable the identification of risks and to define risk tolerances. In doing so, management defines goals that can be understood and clearly define what is to be achieved. Without clearly stating a goal that identifies what

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is to be achieved, DOD will not be able to assess the degree to which FUDS MMRP cleanup is achieving desired results.

Although a remedy-in-place or response complete goal may not be appropriate for FUDS MMRP, by not having any cleanup goal, DOD's reporting on FUDS MMRP lacks a comparative measure against which DOD can be held accountable for cleanup progress. For example, goals could be set related to other stages in the CERCLA process, such as completing certain investigations or decision documents. If DOD were to develop a goal for FUDS MMRP, Congress would be better positioned to hold DOD accountable for achieving a reasonable level of cleanup progress, and the public would be better informed.

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## DOD Faces Two Challenges in Implementing the FUDS Program That Contribute to Uncertainty in Costs

On the basis of our review of 15 FUDS properties, review of relevant documents, and interviews with DOD and state regulatory officials and other stakeholders, we identified two important challenges facing DOD that contribute to uncertainty in its environmental liabilities. First, some property owners have denied DOD right of entry to their properties, requiring DOD to monitor the properties until access rights are granted. Second, DOD faces complex litigation in cases where defense and nondefense contamination are commingled. Both of these factors create cost uncertainty.

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### Property Owners' Denials of Right of Entry Create Uncertainty in DOD's Environmental Liabilities because DOD Cannot Assess Those Sites

Some owners of FUDS deny DOD right of entry to their properties. DOD officials said that denial of the right of entry does not absolve them of responsibility for investigating the sites for cleanup, requiring DOD to monitor those properties until such time when they do gain access rights. Although DOD officials said they include cost estimates for investigating and cleaning sites to which they do not have access, the costs generally are based on initial inspection without being refined by a remedial investigation or a feasibility study and, therefore, are uncertain. DOD officials cannot know when, or if, access rights to certain properties will be granted, resulting in long-term monitoring of the property. In addition, costs for investigating and cleaning up properties may change over time, becoming less expensive as new technologies develop or more expensive as costs for supplies and labor increase.

DOD does not track the number of properties to which it has been denied access for ongoing work. But DOD reported that as of September 30, 2020, it continues to monitor 36 sites on FUDS properties where work either could not begin or was halted because of right-of-entry denial. DOD officials said that these owners are contacted again and new requests are made at least every five years after denial. In addition, if these properties

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change owners, DOD officials said they plan to reach out to the new owners to request access rights to the property.

Property owners may have different reasons to deny right of entry to DOD. Distrust of DOD and concern over the loss of property value were two reasons that emerged during our review of documents from, and interviews with, DOD, restoration advisory boards,<sup>33</sup> and state regulatory entities.

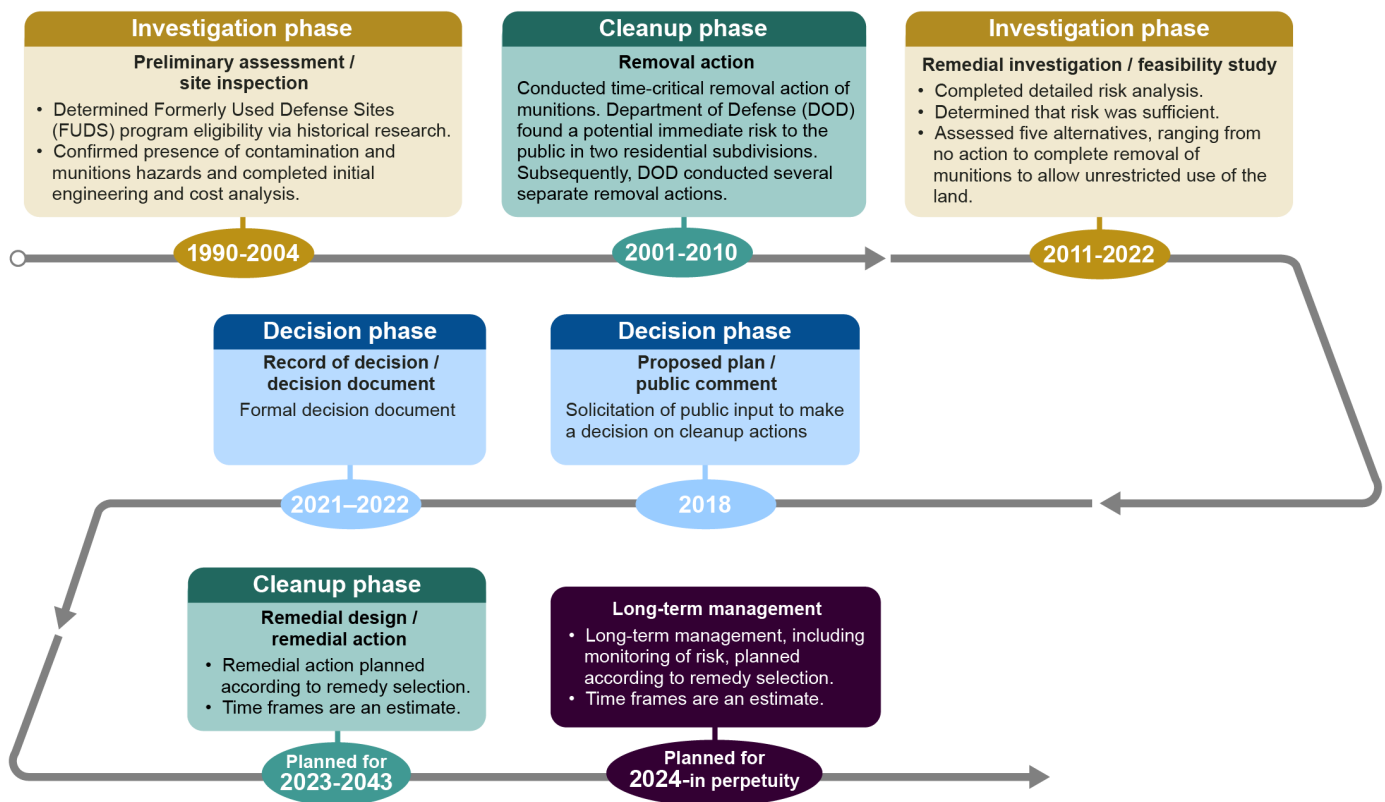
- **Distrust of DOD.** According to state regulators and a restoration advisory board, some property owners do not trust DOD, particularly since DOD was responsible for the potential contamination of the property. In some cases, property owners might distrust DOD's intention of following through with cleanup to a level expected by the property owner. In other cases, property owners fear that DOD's budget will not be sufficient to complete cleanup to the level expected. For example, state regulators from Nebraska said that there is a legacy of distrust among some property owners at the former Nebraska Ordnance Plant, where some property owners still complain about how the U.S. government took property from their grandparents and returned it with contamination.
- **Concern over loss of property value.** According to state regulators and a restoration advisory board, some property owners fear that if DOD finds contamination on their property, their property will lose value and, considering the sometimes lengthy time required for cleanup, they might not regain value in their property for decades. For example, a representative of the restoration advisory board for the former Camp Croft said that some local residents want to pass their property to their children but are concerned that they will die before the property is cleaned, leaving them uncertain of the property value their heirs will inherit. DOD's website on the FUDS program states that it has no authority to study property values but that if a property is found with no contamination or is cleaned up, then property values may benefit. Figure 9 illustrates the time line DOD estimates it will take to complete remedial actions at the former Camp Butner in North Carolina from when the site was first determined to be eligible for the FUDS program in 1990. Even after DOD completes remedial action,

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<sup>33</sup>According to DOD, it can organize a restoration advisory board for a FUDS property to provide an opportunity for stakeholders to actively give input to decision makers and participate in the review of technical comments and restoration progress. Not all FUDS properties have a restoration advisory board. Stakeholders can include DOD, state and local government officials, tribal governments, and local community members.

DOD plans long-term management of the site in perpetuity. Not all FUDS require long-term management, nor do they all take as long to clean up, but DOD projects some FUDS to take longer. The former Camp Butner is not atypical of FUDS that are contaminated with both hazardous substances and military munitions.

**Figure 9: Time Line of Cleanup for the Former Camp Butner, North Carolina, a Formerly Used Defense Site**



Source: GAO analysis of DOD data. | GAO-22-104744

Note: This time line reflected for the former Camp Butner is not atypical for a FUDS property cleanup with both hazardous substance and munitions contamination.

## Litigation Creates Challenges for DOD in Understanding the Full Cost of Cleanup

Lawsuits against and litigation risk for DOD create uncertainty regarding the full cost of cleanup because the amount of litigation or its outcome is not known. The cost of FUDS-related litigation, settlements, and judgments against DOD are borne by the federal government and, ultimately, U.S. taxpayers. The Department of Justice (DOJ) defends DOD in these lawsuits and, if money is awarded or a monetary settlement is reached, such costs are paid out of the Department of the Treasury's

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Judgment Fund.<sup>34</sup> The litigation costs for DOJ and the funds paid out from the Judgment Fund are not included in DOD's environmental liabilities, but they are a cost borne by the federal government related to FUDS. DOD officials said they do not track these costs. Even though these costs are not recorded in DOD's liabilities, they expose the federal government to financial liabilities as a cost that must be borne by the taxpayer.

Litigation can be very complex when defense-origin and non-defense-origin contamination are commingled on a FUDS property. Either before or after a FUDS was conveyed out of DOD's jurisdiction, the land may have been used for purposes such as economic development, sometimes resulting in non-defense-origin contamination at a site. Other times, contamination from an adjacent property may have leaked onto the FUDS property.

When DOD finds that other parties may be responsible for contamination at a FUDS, it is to work with DOJ to settle any DOD CERCLA liabilities arising from the site. In these situations, DOD policy states that it is DOD's goal to negotiate a fair settlement with other parties responsible for the contamination, who will then take the response action needed at a FUDS. When DOD has already undertaken a response action at a site that contained nondefense contamination, DOD will also, in appropriate cases, seek to obtain recovery of costs that DOD expended to address contamination for which other parties were responsible.<sup>35</sup> As a general matter, when non-defense-origin contamination is found on a FUDS property, it is not always clear who caused the contamination, how to divide responsibility for cleaning the contamination, or how to pay for it. Nonetheless, in situations when commingled defense and nondefense contamination complicate and prolong site cleanup, DOD may be vulnerable to lawsuits related to FUDS contamination.

For example, the former Benicia Arsenal, situated near the San Francisco Bay area in California, is a FUDS property that served as a military arsenal between 1849 and 1963. After the government transferred the property to the City of Benicia, the city encouraged development of the former arsenal and attracted a refinery and other industries, such as

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<sup>34</sup>U.S. taxpayers finance the Judgment Fund, and payments out of the fund have no effect on DOD's budget. The Judgment Fund is a permanent, indefinite appropriation for the payment of judgments against the United States. See 31 U.S.C. § 1304.

<sup>35</sup>DOD policy states that it should seek cost recovery in instances when response costs appear to be potentially cost effective.

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manufacturing, distribution, and shipping, to the site. Some of the industries that located at the arsenal caused contamination of the soil and groundwater. DOD issued a report investigating the arsenal as a FUDS property in 1990. DOD found defense-origin and non-defense-origin contamination at two areas. Some of the same hazardous substances were used by both DOD and industry, making the origin of contamination difficult to determine. According to DOD, in one area, a developer elected to independently conduct the work needed to redevelop the parcel and settled with the federal government to cover remediation costs. In the other area, DOD initiated an investigation involving other potentially responsible parties and, as part of litigation brought by the California state regulator—the California Department of Toxic Substances Control—reached a settlement to pay for certain cleanup costs of the area.

Another example involves the former Conway Bombing and Gunnery Range near Myrtle Beach in South Carolina. There, several companies involved in real estate development near the property hired private entities to clean up DOD contamination and military munitions from their properties. While DOD planned to clean these properties under the FUDS program, the companies moved forward with the cleanup without waiting for DOD to remediate the sites because DOD's multidecade cleanup plan would not have allowed the companies to reap the economic benefits of land ownership associated with the then-current real estate market. The companies cleaned up their portions of the former range, then sued DOD for cost recovery and contribution under CERCLA. According to DOD, the United States settled for about \$12 million to be paid from the Department of Treasury's Judgment Fund.

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## Conclusions

The federal government's environmental liabilities have been growing for the past 20 years and will likely continue to grow even as billions are spent each year on cleanup efforts. DOD had the second-highest environmental liability in the federal government in fiscal year 2021, at \$82 billion, contributing about 13 percent of the total environmental liability of the federal government. There are many uncertainties in DOD's cost estimates for the FUDS program and, with 1,700 sites remaining to be cleaned up, more than half of which have yet to be investigated, the estimate is likely to change as it is refined over time.

When making decisions on which FUDS to fund first, DOD generally prioritizes sites for cleanup based on risk scores, with the presumption of funding the worst first. DOD has different processes for assigning risk scores for IRP and MMRP sites. However, DOD has no guidance to weigh the relative risk or other factors between IRP and MMRP sites in

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determining the queue for funding. If DOD developed guidance, it could better ensure that it is consistent and transparent when making decisions on which sites—whether they be IRP or MMRP—should be funded first.

In addition, federal law requires that DOD annually report to Congress on its defense environmental programs. In 2010, we reported that DOD had not yet developed a performance goal for the FUDS MMRP, as required by federal law, nor had it developed such a goal as of April 2022. DOD had developed a cleanup goal for FUDS IRP and updated it in 2012, but it has not developed a comparable goal for FUDS MMRP. If DOD developed a cleanup goal for FUDS MMRP, Congress would be better positioned to hold DOD accountable for achieving a reasonable level of cleanup progress, and the public would be better informed.

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## Recommendations for Executive Action

We are making the following two recommendations to DOD:

The Secretary of Defense should ensure that the Assistant Secretary of Defense for Energy, Installations, and Environment develops guidance to weigh the relative risk or other factors between IRP and MMRP sites when selecting sites for funding. (Recommendation 1)

The Secretary of Defense should ensure that the Assistant Secretary of Defense for Energy, Installations, and Environment establishes a relevant cleanup goal for the FUDS MMRP. (Recommendation 2)

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## Agency Comments

We provided a draft of this report to DOD for review and comment. In its comments, reproduced in appendix IV, DOD stated that it concurred with both of our recommendations. DOD also provided technical comments, which we incorporated as appropriate. We also provided relevant portions of our draft report to the regulators in the states where the properties in our sample were located and to the Federal Facilities Subcommittee of the Association of State and Territorial Solid Waste Management Officials for review and comment. We incorporated their technical comments as appropriate.

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We are sending copies of this report to the appropriate congressional committees; the Secretary of Defense; and the Assistant Secretary of Defense for Energy, Installations, and the Environment. In addition, this report will be available at no charge on GAO's website at <https://www.gao.gov>.

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If you or your staff have any questions about this report, please contact me at (202) 512-3841 or [andersonn@gao.gov](mailto:andersonn@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 V.

A handwritten signature in black ink that reads "Nathan Anderson". The signature is written in a cursive style with a long horizontal stroke across the middle.

Nathan Anderson  
Director, National Resources and Environment



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# Appendix I: Objectives, Scope, and Methodology

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House Report 116-120 included a provision for GAO to review various elements of the Department of Defense's (DOD) Formerly Used Defense Sites (FUDS) program, including program progress and priorities.<sup>1</sup> The objectives of our review were to (1) describe the scope and costs of cleaning up FUDS and the reliability of environmental liabilities estimates; (2) examine how DOD selects FUDS for cleanup; and (3) identify the challenges, if any, with the FUDS program that contribute to uncertainty in costs.

For the purposes of this review, we assessed the environmental restoration of DOD's Installation Restoration Program (IRP) and Military Munitions Response Program (MMRP) from fiscal year 2016 through 2020.<sup>2</sup> For our audit work in all three objectives, we used a DOD database called the Knowledge-Based Corporate Reporting System, a database that DOD uses to report on all its defense environmental restoration projects, including FUDS.<sup>3</sup> We assessed the reliability of DOD's corporate database by (1) performing electronic testing, (2) reviewing existing information about the data and the system that produced them, and (3) interviewing agency officials knowledgeable about the data. While we determined that the underlying data were sufficiently reliable for the purposes of assessing current cost estimates of FUDS in their various stages of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, we did

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<sup>1</sup>H.R. Rep. No. 116-120, pt. 1, at 112-13 (accompanying H.R. 2500, a bill for the National Defense Authorization Act for Fiscal Year 2020).

<sup>2</sup>Fiscal year 2021 environmental liabilities information was not available when we conducted our audit work, but it became available near the completion of our audit work, and we added it for context in our report, where appropriate.

<sup>3</sup>DOD's corporate database contains information from each service component, including the U.S. Army Corps of Engineers (Corps), the implementing entity of the FUDS program. The Corps maintains its own FUDS Management Information System for managing the FUDS program. DOD's Office of Inspector General has separately reviewed the reliability of the Corps' FUDS database and found it generally reliable. The transfer of Corps' FUDS data to DOD's corporate database results in site-level data that have single-point data fields. Examples of some fields include phase of cleanup, type of contamination of the site, site location, acreage, obligations, liabilities, and risk level. The records that DOD provided to us at our request included nearly 100 different fields for the 5,431 sites that DOD still has to address.

find some uncertainties in future estimates, which we describe in the findings.<sup>4</sup>

The costs in DOD's Knowledge-Based Corporate Reporting System differ slightly from the liabilities reported in its annual financial statement for two reasons. First, DOD's annual financial statement includes unliquidated obligations—or amounts that have been obligated but not yet spent, but DOD's corporate database does not report these unliquidated obligations.<sup>5</sup> Second, DOD's annual financial statement reports current-year dollars, but DOD's corporate database reports out-year inflation. In addition, DOD includes a smaller FUDS environmental restoration program, called the Building Demolition and Debris Removal program, in its reporting of IRP environmental liabilities. We excluded the environmental liabilities from the Building Demolition and Debris Removal program because it constituted about 7 percent of FUDS, or 367 out of 5,431 sites and because it has different risks and different processes than IRP and MMRP.

Also for the purposes of this review, we identified 15 FUDS properties on which to collect detailed information. We used DOD's Knowledge-Based Corporate Reporting System to select the nongeneralizable selection of properties. DOD has to address about 1,700 sites on 1,000 FUDS properties. The number of sites on FUDS properties range from one to 20. Our review of the 15 properties included 139 sites. We reviewed publicly available documents directly relevant to our objectives for the 15 properties. For example, we reviewed documents from DOD, state regulators, state and tribal entities, and local FUDS advisory boards that included documents such as consent decrees, decision documents, third-party reports, and the minutes from public meetings. Our selection of properties is nongeneralizable, but we used specific criteria in our selection to help us illustrate the descriptions and findings in our report.

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<sup>4</sup>We did identify data errors in DOD's corporate database related to tracking the reasons for major increases or decreases in the environmental liabilities related to specific FUDS projects. DOD officials told us the errors resulted from formulas in the transmission of data and were restricted to the major increases or decreases in environmental liabilities. As a result, we did not use this information from DOD's corporate database in our audit work. As we reported, DOD is taking steps to correct the errors.

<sup>5</sup>Unliquidated obligations are those obligations that have not yet been paid or are no longer needed to pay for goods and services. For example, unliquidated obligations can result from delays in a contractor submitting an invoice for the cost of goods and services provided to the government.

For example, we used criteria such as location, cost, and risk as factors to consider when selecting properties.

From this list of 15 properties, we selected a nongeneralizable sample of four properties for further review, which included reviewing additional documentation and interviewing officials from DOD, the U.S. Army Corps of Engineers (Corps), state regulators, state and tribal entities, and local FUDS advisory boards. We interviewed state regulators from the states where the four properties were located: Alaska, Nebraska, New Jersey, and South Carolina. In addition, we interviewed state regulators representing the leadership team of the Federal Facilities Subcommittee of the Association of State and Territorial Solid Waste Management Officials.<sup>6</sup> Findings from our review of the sample of properties cannot be generalized to those we did not select and include in our review. Table 3 lists 15 properties in our sample and provides the reason why we selected the property. It also identifies the four properties we selected for further review and our reason for doing so. See appendix II for a summary of data on the 15 FUDS properties we selected for further review.

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<sup>6</sup>The state regulators on the Federal Facilities Subcommittee of the Association of State and Territorial Solid Waste Management Officials that we spoke with were from Alaska, Arkansas, Colorado, Florida, Hawaii, Louisiana, Missouri, New York, Virginia, and West Virginia.

Appendix I: Objectives, Scope, and Methodology

**Table 3: List of 15 Formerly Used Defense Site (FUDS) Properties We Selected for Our Sample and the Four Properties We Selected for Further Review**

	<b>FUDS property</b>	<b>Location</b>	<b>Reason for selection</b>
1	Attu Island	Alaska	Decrease in Military Munitions Response Program (MMRP) liability <sup>a</sup> <b>Selected for further review:</b> Remoteness Has Installation Restoration Program (IRP) and MMRP <sup>a</sup>
2	Benicia Arsenal	California	Increase in IRP liability High IRP risk
3	Blaine Naval Ammunition Depot	Nebraska	Low-medium MMRP risk Long-term monitoring
4	Camp Butner	North Carolina	One of highest-cost MMRP sites Increase in MMRP liability
5	Camp Croft	South Carolina	Medium MMRP risk <b>Selected for further review:</b> Documented rights-of-entry issues Restoration Advisory Board <sup>b</sup>
6	Camp Hale	Colorado	Increase in IRP liability One of highest-cost MMRP sites Increase in MMRP liability High MMRP risk
7	Camp San Luis Obispo	California	High MMRP risk
8	Charlotte Army Missile Plant	North Carolina	Decrease in IRP liability
9	Conway Bombing and Gunnery Range	South Carolina	High MMRP risk Long-term monitoring
10	Nebraska Ordnance Plant	Nebraska	One of highest-cost IRP sites Decrease in IRP liability High MMRP risk <b>Selected for further review:</b> On the National Priorities List <sup>c</sup> Has IRP and MMRP
11	Fort Hancock	New Jersey	High MMRP risk Medium IRP risk
12	Hamilton Army Field	California	Potential per- and polyfluoroalkyl substance (PFAS) contamination <sup>d</sup>
13	Raritan Arsenal	New Jersey	Low IRP risk <b>Selected for further review:</b> Proximity to large population Has IRP and MMRP

**Appendix I: Objectives, Scope, and Methodology**

	<b>FUDS property</b>	<b>Location</b>	<b>Reason for selection</b>
14	Sioux Ammunition Depot	Nebraska	IRP response complete and site closeout Decrease in environmental liability
15	Stark General Hospital	South Carolina	Medium IRP risk

Source: GAO analysis of Department of Defense (DOD) data. | GAO-22-104744

Note: GAO’s selection of sites are not generalizable to other FUDS properties.

<sup>a</sup>The Department of Defense’s Installations Restoration Program (IRP) addresses contamination from hazardous substances, and its MMRP addresses contamination from military munitions.

<sup>b</sup>According to DOD, it can organize a Restoration Advisory Board for a FUDS property to provide an opportunity for stakeholders to actively provide input to decision makers and participate in the review of technical comments and restoration progress.

<sup>c</sup>The National Priorities List is a list of sites of national priority among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The Environmental Protection Agency manages the National Priorities List under the Superfund program.

<sup>d</sup>Developed and used heavily over the past few decades in many consumer and industrial products, including certain firefighting foams, PFAS is a class of many heat- and stain-resistant chemicals, some of which are believed to persist for decades in the environment and are suspected of causing adverse health effects.

To describe the scope and costs of cleaning up FUDS, we reviewed relevant documents and interviewed officials from DOD. We also analyzed data from DOD’s corporate database, tabulating different fields to summarize data and identify any patterns or trends in the scope and costs of cleaning up FUDS. For example, we tabulated environmental liabilities for each site for each of the fiscal years in our scope. We looked for cost increases or decreases from year to year to identify any patterns that could affect liabilities, such as annual obligations, National Priorities List status, and risk level. We also assessed differences among these factors in both the IRP and MMRP to determine if there were differences between the two programs. We did similar assessments to determine the liabilities of sites in different phases and whether there were differences in funding levels or progression of sites in both the IRP and MMRP.

To describe the reliability of environmental liabilities estimates, we performed our data reliability assessment, described above. In addition to those steps, we also reviewed relevant documents provided to us by the Office of Inspector General and its contractor, KPMG, on their assessment of the reliability of the Corps’ FUDS database, called the FUDS Management Information System, which underlies DOD’s corporate database. We also interviewed the DOD Office of Inspector General about the work it had performed on the reliability of DOD’s environmental liabilities, on the Corps’ FUDS database.

To examine how DOD selects FUDS for cleanup, we reviewed relevant DOD policy, planning, and implementation documents, and we interviewed DOD officials. We also reviewed documents from state entities and interviewed state regulators on their roles and viewpoints regarding the selection process. We interviewed state regulators from each of the four states that we selected for further review. We also interviewed state regulators who made up leadership on the Federal Facilities Subcommittee of the Association of State and Territorial Solid Waste Management Officials who represented Alaska, Arkansas, Colorado, Florida, Hawaii, Louisiana, Missouri, New York, Virginia, and West Virginia. We used DOD's corporate database to identify risk levels of sites, and we ran various tabulations to identify any patterns in how DOD selected FUDS for cleanup.<sup>7</sup> For example, we reviewed the data to see if there was an apparent relationship between risk level and funding based on our descriptive analysis and to ascertain how many high-risk IRP and MMRP sites were selected above lower-risk IRP and MMRP sites.

To identify any challenges that DOD faces in implementing the FUDS program, we reviewed relevant DOD documents and interviewed DOD officials about the general challenges they face in implementing the FUDS program. We reviewed state regulator documents and interviewed state regulators (see above prior paragraph identifying state regulators) about the challenges they perceived with DOD's implementation of the FUDS program. In our nongeneralizable sample of 15 FUDS properties, we reviewed relevant publicly available documents on challenges to implementation of the FUDS program, including those available from DOD, state regulators, and local governments and entities. In our sample of four FUDS properties for which we conducted more in-depth work, we reviewed relevant documents and interviewed officials and representatives from DOD, the Corps, state regulators, and restoration advisory boards associated with those properties about the challenges in implementing the FUDS program.

We conducted this performance audit from February 2021 to June 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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<sup>7</sup>We also used DOD's corporate database and Census data to describe the socioeconomic characteristics of communities near FUDS properties to see if any patterns emerged regarding environmental justice. Our initial tabulations did not show any patterns.

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**Appendix I: Objectives, Scope, and  
Methodology**

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the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

# Appendix II: Summary of Data on the 15 Formerly Used Defense Sites (FUDS) Properties We Selected

For the purposes of this review, we identified 15 FUDS properties on which to collect detailed information related to our objectives. The Department of Defense (DOD) has to address over 1,700 sites on about 1,000 FUDS properties. Our review of the 15 properties included 139 sites. We reviewed publicly available documents for the 15 properties. For example, we reviewed documents from DOD, state regulators, state and tribal entities, and local FUDS advisory boards. Our selection of properties is nongeneralizable, but we selected properties to obtain a range of specific criteria, such as risk level for the individual sites, location, and estimated cost. See appendix I for a list of the specific reasons why we selected each site. Tables 4 through 18 present a summary of data on the 15 FUDS properties we selected for further review.

## Properties in Alaska

**Table 4: Attu Island – Site of World War II Battle and Subsequent Military Activity, 1942 - 1969**

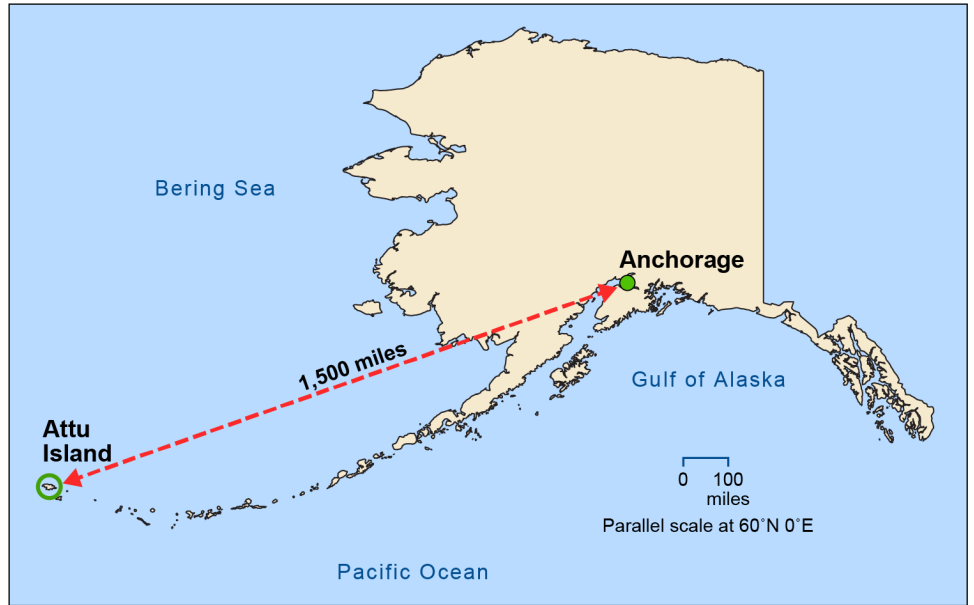
Fiscal year 2020 obligations: \$0			
Fiscal year 2020 environmental liabilities: \$192 million			
Percent change in liabilities since fiscal year 2019: 7 percent decrease			
Total sites	9	Description	Challenges
<b>Installation Restoration Program sites</b>	<b>5</b>	Attu Island is the western-most island in the Aleutian Archipelago, about 1,500 miles from Anchorage. The Japanese invaded Attu Island in 1942, and the United States recaptured it in 1943. The U.S. military maintained a presence there until 1969. The majority of contamination on Attu Island originated from World War II activities. Alaska Native Unangan inhabited Attu Island for thousands of years. The few dozen Attuans who were living on the island were interred by the Japanese and, after World War II, the U.S. government repatriated the few survivors to another Aleutian island. The U.S. Fish and Wildlife Service has administered Attu Island since it became part of the Alaska Maritime National Wildlife Refuge in 1980.	<ul style="list-style-type: none"> <li>The site is extremely remote and accessible only a few months of the year because of inclement weather.</li> <li>All equipment must be brought in by air or sea, and equipment and any contamination must also be removed by air and sea.</li> </ul>
Investigation	2		
Response Complete	3		
<b>Military Munitions Response Program sites</b>	<b>4</b>		
Investigation	4		

Source: GAO analysis of data from the Department of Defense, U.S. Fish and Wildlife Service, and U.S. National Park Service. | GAO-22-104744



Appendix II: Summary of Data on the 15 Formerly Used Defense Sites (FUDS) Properties We Selected

Figure 10: Map of Alaska and the Aleutian Islands



Source: Map Resources. | GAO-22-104744

**Appendix II: Summary of Data on the 15  
Formerly Used Defense Sites (FUDS)  
Properties We Selected**

**Properties in California**

**Table 5: Former Benicia Arsenal – Civil War Era Arsenal and Support of Military in the Pacific, 1849-1964**

Fiscal year 2020 obligations: \$258,000 Fiscal year 2020 environmental liabilities: \$22.2 million Percent change in liabilities since fiscal year 2019: 419 percent increase			
<b>Total sites</b>	<b>4</b>	<b>Description</b>	<b>Challenges</b>
<b>Installation Restoration Program sites</b>	<b>2</b>	The U.S. government created the Benicia Arsenal in 1849 and expanded it to include a military reservation in 1862. It served as a staging area during the Civil War for Union troops throughout the West and as a depot for ordnance, issuance of supplies, and ammunition; the testing of military equipment; and vehicle maintenance for the Division of the Pacific until its closure in 1964. The city of Benicia is transforming the arsenal into a historic district filled with art studios, professional offices, and light industry. Other sites on the arsenal are used for commercial and residential purposes. The city of Benicia also retains ownership of several historically significant buildings, including the Camel Barns, where some of the U.S. military's camels were housed until 1864.	<ul style="list-style-type: none"> <li>The Department of Defense's (DOD)'s inspections found commingled defense-origin and non-defense-origin contamination, which became the subject of litigation with the California state regulator. The state regulator and DOD reached a settlement on the contaminated sites. DOD is working on a number of sites for which there is only defense-origin contamination.</li> <li>DOD has had delays in investigating some sites because property owners have denied DOD right of entry.</li> </ul>
Investigation	1		
Response Complete	1		
<b>Military Munitions Response Program sites</b>	<b>2</b>		
Investigation	1		
Response Complete	1		

Source: GAO analysis of data from the California Department of Toxic Substances Control, the City of Benicia, DOD, and the United States District Court for the Eastern District of California. | GAO-22-104744

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**Appendix II: Summary of Data on the 15  
Formerly Used Defense Sites (FUDS)  
Properties We Selected**

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**Figure 11: Former Enlisted Men's Barracks at Benicia Arsenal in California**



Source: Department of Defense. | GAO-22-104744

Note: The site currently involves commercial and residential use and may contain metals and petroleum contamination.

**Appendix II: Summary of Data on the 15  
Formerly Used Defense Sites (FUDS)  
Properties We Selected**

**Table 6: Former Camp Luis San Obispo – National Guard and Army Post, 1928 - 1946**

Fiscal year 2020 obligations: \$173,000  
Fiscal year 2020 environmental liabilities: \$64.8 million  
Percent change in liabilities since fiscal year 2019: 49 percent increase

Total sites	8	Description	Challenges
<b>Installation Restoration Program sites</b>	<b>4</b>	The U.S. government established the former Camp San Luis Obispo as a National Guard post in 1928 and developed the base as an Army post from 1943 to 1946. It has been inactive since 1946. This property is known or suspected to contain military munitions and unexploded ordnance and, therefore, may present an explosive hazard. Currently, some uses of the property includes El Chorro Regional Park, which has a golf course, a botanical garden, a campground, and Cuesta College. In addition, according to a U.S. Army Corps of Engineers' document, a portion of the land currently owned by the California Department of Fish and Wildlife would revert back to the United States if needed for national defense.	<ul style="list-style-type: none"> <li>The threatened red-legged frog inhabits part of the property that the Department of Defense (DOD) needs to clean up. However, DOD states that it can implement measures to avoid the species.</li> </ul>
Response Complete	4		
<b>Military Munitions Response Program sites</b>	<b>4</b>		
Investigation	1		
Cleanup	2		
Response Complete	1		

Source: GAO analysis of data from DOD, San Luis Obispo County, and U.S. Fish and Wildlife Service. | GAO-22-104744

**Table 7: Former Hamilton Army Airfield – Training and Staging Area for Pacific Forces in World War II, 1932 – 1983**

Fiscal year 2020 obligations: \$933,000  
Fiscal year 2020 environmental liabilities: \$29.3 million  
Percent change in liabilities since fiscal year 2019: 1 percent increase

Total sites	8	Description	Challenges
<b>Installation Restoration Program sites</b>	<b>7</b>	Hamilton Army Airfield began operations in December 1932 as a base for fighter, bomber, and transportation aircraft. The base served as a training field and staging area for Pacific operations during World War II. During the mid-1940s, the base hospital served as an acute care and rehabilitation facility that cared for thousands of war casualties. Part of the property was also used as an antenna field, rifle range, and fire training area. The site is currently occupied by housing developments; the Novato School District; the U.S. Coast Guard; industrial and commercial businesses; and the California Coastal Commission land, consisting of coastal salt marshes.	<ul style="list-style-type: none"> <li>According to the Department of Defense (DOD), this property is being investigated for the presence of per- and polyfluoroalkyl substances (PFAS), emerging contaminants that were used in fire extinguishing foams. These chemicals break down slowly and can build up in people, animals, and the environment over time.</li> </ul>
Investigation	1		
Response Complete	6		
<b>Military Munitions Response Program sites</b>	<b>1</b>		
Response Complete	1		

Source: GAO analysis of data from the DOD and the U.S. Environmental Protection Agency. | GAO-22-104744

**Appendix II: Summary of Data on the 15  
Formerly Used Defense Sites (FUDS)  
Properties We Selected**

**Properties in Colorado**

**Table 8: Former Camp Hale – High-Altitude Winter Combat Training, 1942 - 1965**

Fiscal year 2020 obligations: \$396,000			
Fiscal year 2020 environmental liabilities: \$186 million			
Percent change in liabilities since fiscal year 2019: 33 percent increase			
<b>Total sites</b>	<b>14</b>	<b>Description</b>	<b>Challenges</b>
<b>Installation Restoration Program sites</b>	<b>2</b>	Evidence of prehistoric people in the area surrounding Camp Hale goes back 10,000 years. Mining camps sprung up in the area with the discovery of gold in the late 1800s and, in 1922, the area became part of what is now known as the White River National Forest. At an elevation of 9,200 feet, Camp Hale was established by the Army to train soldiers in high-altitude subzero temperature survival skills for World War II. Camp Hale became the home of the 10th Mountain Division, and soldiers from Fort Carson in Colorado trained for winter and mountain warfare until 1965. The Army tested a variety of weapons and equipment at Camp Hale. From 1959 through 1965, the Central Intelligence Agency also secretly trained Tibetan soldiers at Camp Hale. The Army turned Camp Hale over to the U.S. Forest Service in 1966. Because of its setting in the Colorado mountains and its rich history, including the famed 10th Mountain Division—many veterans of which helped start the ski industry in Colorado—the area is heavily frequented. History buffs and outdoor enthusiasts use the area for activities like snowmobiling, all-terrain vehicle riding, hiking, fishing, camping, rock-climbing, and sight-seeing.	The White River National Forest, where Camp Hale is situated, receives significant winter snows, making cleanup efforts challenging during winter months.
Investigation	2		
<b>Military Munitions Response Program sites</b>	<b>12</b>		
Investigation	9		
Response Complete	3		

Source: GAO analysis of data from the Colorado Trail Foundation, Colorado Department of Public Health and Environment, Department of Agriculture Forest Service, DOD, and the National Forest Foundation. | GAO-22-104744

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**Appendix II: Summary of Data on the 15  
Formerly Used Defense Sites (FUDS)  
Properties We Selected**

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**Figure 12: Photograph of Land-Use Control Signage Damaged by Visitor to Former  
Camp Hale**



Signs must be periodically monitored for damage and replacement.

Source: GAO. | GAO-22-104744

**Appendix II: Summary of Data on the 15  
Formerly Used Defense Sites (FUDS)  
Properties We Selected**

**Properties in Nebraska**

**Table 9: Former Blaine Naval Ammunition Depot – Military Munitions Production and Disassembly, 1942-1958**

Fiscal year 2020 obligations: \$5.9 million			
Fiscal year 2020 environmental liabilities: \$179 million			
Percent change in liabilities since fiscal year 2019: 2 percent increase			
<b>Total sites</b>	<b>16</b>	<b>Description</b>	<b>Challenges</b>
<b>Installation Restoration Program sites</b>	<b>7</b>	The former Blaine Naval Ammunition Depot is one of seven subsites of the Hastings Groundwater Contamination Site, which is on the National Priorities List. <sup>a</sup> The U.S. government produced or disassembled military munitions at this location from 1942 to 1958. These munitions may present an explosive hazard and have contaminated groundwater. The property was decommissioned from 1958 through 1966, and part of the land now is used by the U.S. Department of Agriculture as a Meat Animal Research Center, the U.S. Forest Service for tree research, and private owners for residential uses and agriculture.	<ul style="list-style-type: none"> <li>According to the Department of Defense (DOD), DOD’s final decision on cleaning up the site was delayed because of a dispute with the Environmental Protection Agency (EPA). EPA reported that DOD did not clearly describe what the Army would do regarding land-use controls. Specifically, EPA had no assurance of the short- or long-term effectiveness of the land-use controls and EPA stated there were limitations in its ability to implement and report on controls over land use. DOD reported that it has since resolved the dispute.</li> </ul>
Cleanup	1		
Response Complete	6		
<b>Military Munitions Response Program sites</b>	<b>9</b>		
Investigation	7		
Response Complete	2		

Source: GAO analysis of data from EPA and DOD. | GAO-22-104744

<sup>a</sup>The National Priorities List is a list of sites of national priority among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories.

**Appendix II: Summary of Data on the 15  
Formerly Used Defense Sites (FUDS)  
Properties We Selected**

**Table 10: Former Nebraska Ordnance Plant, World War II and Korean Conflict-Era Plant – 1942 - 1959**

Fiscal year 2020 obligations: \$5.1 million			
Fiscal year 2020 environmental liabilities: \$236 million			
Percent change in liabilities since fiscal year 2019: 8 percent decrease			
Total sites	12	Description	Challenges
<b>Installation Restoration Program sites</b>	<b>8</b>	The U.S. government established the Nebraska Ordnance Plant, about 30 miles west of Omaha, at the beginning of World War II. The plant manufactured explosives, including bombs ranging from 90 pounds to 22,000 pounds. The Army temporarily suspended plant activities at the end of World War II but restarted bomb production during the Korean War. The Army declared the plant to be excess in 1959 and transferred part of the property to the U.S. Air Force for an Atlas missile site and the rest to the General Services Administration. In 1962, the University of Nebraska purchased about 9,500 acres of the original 17,250 acres for an agricultural research site. In 1964, the Air Force shuttered the missile site. Portions of the plant are owned by the Nebraska National Guard, the Air Force, and the Army Reserves. Some private pasture, crop production, and light industry exist on the property.	<ul style="list-style-type: none"> <li>The Nebraska Ordnance Plant has significant groundwater contamination that threatens local drinking water supplies. The property is on the National Priorities List.<sup>a</sup></li> <li>As a result of the groundwater contamination, The Department of Defense (DOD) provides bottled water and carbon filtration to nearby landowners.</li> </ul>
Investigation	1		
Cleanup	1		
Response Complete	6		
<b>Military Munitions Response Program sites</b>	<b>4</b>		
Investigation	2		
Response Complete	2		

Source: GAO analysis of data from DOD. | GAO-22-104744

<sup>a</sup>The National Priorities List is a list of sites of national priority among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories.



**Appendix II: Summary of Data on the 15  
Formerly Used Defense Sites (FUDS)  
Properties We Selected**

**Table 11: Former Sioux Army Depot – World War II Era and Subsequent Missile Facility, 1942 – 1967**

Fiscal year 2020 obligations: \$2.8 million			
Fiscal year 2020 environmental liabilities: \$21 million			
Percent change in liabilities since fiscal year 2019: 9 percent increase			
<b>Total sites</b>	<b>5</b>	<b>Description</b>	<b>Challenges</b>
<b>Installation Restoration Program sites</b>	<b>5</b>	The U.S. government built the Sioux Army Depot in 1942 to receive, store, and issue Army ammunition, ammunition components, and general supplies. The depot later became home to three Minuteman I missile silos and a launch control facility in 1964, until replacement by the Minuteman II system was announced in 1965. The depot fulfilled its mission until closure in June 1967. The property now is owned by state and private owners, with some commercial and industrial uses.	<ul style="list-style-type: none"> <li>The Department of Defense (DOD) stopped all operations regarding MMRP sites at this property because DOD believed language in the deed for the property absolved it from cleanup duties. State regulators disagreed and filed a letter of nonconcurrence. As of yet, this issue has not been resolved, and the liabilities of those sites are not included in DOD's estimates.</li> </ul>
Investigation	3		
Response Complete	2		
<b>Military Munitions Response Program (MMRP) sites</b>	<b>0</b>		

Source: GAO analysis of data from DOD and the Nebraska Department of Environment and Energy. | GAO-22-104744

**Appendix II: Summary of Data on the 15  
Formerly Used Defense Sites (FUDS)  
Properties We Selected**

**Properties in New Jersey**

**Table 12: Former Fort Hancock – Defense of New York Harbor, 1857 - 1974**

Fiscal year 2020 obligations: \$219,000			
Fiscal year 2020 environmental liabilities: \$11 million			
Percent change in liabilities since fiscal year 2019: 8 percent increase			
Total sites	7	Description	Challenges
<b>Installation Restoration Program sites</b>	<b>2</b>	Fort Hancock was constructed in 1857 in order to defend the New York harbor. A proving ground operated there between 1876 and 1919. Housing and other facilities were built during World Wars I and II. During the 1950s, a Nike battery installation was constructed at the site. In 1974, Fort Hancock was deactivated. The National Park Service and the U.S. Coast Guard are the present owners of the site, and there is a coastal classroom that annually serves approximately 20,000 school children and 500 educators through its K-12 education programs.	<ul style="list-style-type: none"> <li>There are sensitive environmental and historic resource concerns, including the coastal dune ecosystem, endangered species, and archaeological artifacts.</li> </ul>
Cleanup	1		
Response Complete	1		
<b>Military Munitions Response Program sites</b>	<b>5</b>		
Investigation	4		
Response Complete	1		

Source: GAO analysis of data from the Department of Defense. | GAO-22-104744

**Table 13: Former Raritan Arsenal – Supporting U.S. Forces in Europe, 1918 - 1961**

Fiscal year 2020 obligations: \$864,000			
Fiscal year 2020 environmental liabilities: \$16 million			
Percent change in liabilities since fiscal year 2019: 46 percent increase			
Total sites	17	Description	Challenges
<b>Installation Restoration Program sites</b>	<b>15</b>	From 1918 to 1961, the Army used Raritan Arsenal as a storage point for supplies, munitions, and equipment for U.S. Forces in Europe. The arsenal was also used to assemble automobiles, cannons, and tanks; and to provide technical training, repair, and maintenance of ordnance material. Now, the property houses Middlesex Community College, a park, government buildings, offices, and warehouses.	<ul style="list-style-type: none"> <li>State regulators did not concur with the Department of Defense's (DOD) determination of No Further Action at some sites because of the presence of contaminants that exceed state standards. However, DOD officials said that DOD cannot legally spend money on sites that are below the level of risk under the Comprehensive Environmental Response, Compensation, and Liability Act.</li> </ul>
Investigation	4		
Cleanup	1		
Response Complete	10		
<b>Military Munitions Response Program sites</b>	<b>2</b>		
Investigation	1		
Response Complete	1		

Source: GAO analysis of data from DOD and the New Jersey Department of Environmental Protection. | GAO-22-104744

**Appendix II: Summary of Data on the 15  
Formerly Used Defense Sites (FUDS)  
Properties We Selected**

**Properties in North  
Carolina**

**Table 14: Former Camp Butner – World War II Era, 1942 - 1947**

Fiscal year 2020 obligations: \$196,000  
Fiscal year 2020 environmental liabilities: \$291 million  
Percent change in liabilities since fiscal year 2019: 39 percent increase

<b>Total sites</b>	<b>11</b>	<b>Description</b>	<b>Challenges</b>
<b>Installation</b>	b	The U.S. War Department established Camp Butner in 1942 to train troops for World War II. Camp Butner consisted of 40,384 acres, of which 23,000 acres were for live-fire artillery ranges. The property had ranges for flamethrowers, hand grenades, and firing ranges. The land is currently used by the town of Butner; state and federal prisons, hospitals, and research facilities; local residential areas and farms; timber lands; and a training area for the North Carolina National Guard.	<ul style="list-style-type: none"> <li>The Department of Defense (DOD) has not obtained rights of entry to investigate some potentially contaminated areas.</li> </ul>
<b>Restoration Program sites</b>			
Response Complete	2		
<b>Military Munitions Response Program sites</b>	9		
Investigation	9		

Source: GAO analysis of data from DOD and the town of Butner. | GAO-22-104744

**Table 15: Former Charlotte Army Missile Plant –Missile Manufacturers, 1941-1967**

Fiscal year 2020 obligations: \$1.4 million  
Fiscal year 2020 environmental liabilities: \$138 million  
Percent change in liabilities since fiscal year 2019: 30 percent decrease

<b>Total sites</b>	<b>1</b>	<b>Description</b>	<b>Challenges</b>
<b>Installation</b>	1	The U.S. government used the Charlotte Army Missile Plant, located in downtown Charlotte, North Carolina, for a variety of purposes. Originally a Model T factory, the property was acquired by the Army in 1941. The Army built warehouses and other support buildings, as the depot managed supplies for posts, camps, and stations in surrounding states. After World War II, one of the warehouses was used to receive and transport deceased World War II service members to their families. In 1954, the Army redesignated the post as the Charlotte Army Missile plant and manufactured Nike Ajax and Nike Hercules missiles, as well as Honest John Rockets. Through the mid-1960s, manufacturing was slowly phased out; the property was sold in 1967 to a private developer for commercial use.	<ul style="list-style-type: none"> <li>According to the Department of Defense (DOD), using a 2014 feasibility study, the U.S. Army Corps of Engineers (Corps) was unable to secure funds for a costly remediation effort because of concerns with the Corps' previous sampling efforts. As a result, DOD conducted more sampling and performed groundwater modeling, leading to a revised feasibility study in 2014. DOD continued groundwater sampling in 2018.</li> </ul>
<b>Restoration Program sites</b>			
Investigation	1		
<b>Military Munitions Response Program sites</b>	0		

Source: GAO analysis of DOD data. | GAO-22-104744

**Properties in South  
Carolina**

**Appendix II: Summary of Data on the 15  
Formerly Used Defense Sites (FUDS)  
Properties We Selected**

**Table 16: Former Camp Croft – World War II Era, 1941 - 1947**

Fiscal year 2020 obligations: \$16.6 million			
Fiscal year 2020 environmental liabilities: \$197 million			
Percent change in liabilities since fiscal year 2019: 9 percent increase			
Total sites	12	Description	Challenges
<b>Installation Restoration Program sites</b>	<b>2</b>	Camp Croft was originally acquired between 1941 and 1944. Army units trained at the property for advanced offensive combat operations during World War II. Training took place across numerous ranges and through the wooded terrain. In 1947, Camp Croft was declared to be excess, and the U.S. government conveyed the property in pieces to organizations, businesses, and former owners. Today, most of the property consists of the Croft State Natural Area, with the remainder of the property being used for residential, light industrial, and commercial purposes.	<ul style="list-style-type: none"> <li>• The Department of Defense’s (DOD) community relations plan reported in 2016 that, over the past 15 years, the local community has expressed frustration with the perceived lack of cleanup progress. Some meetings with local stakeholders reflect distrust of DOD, such as stories of property damage or concern about granting DOD right of entry.</li> <li>• DOD officials said that they devoted considerable resources to resolving stakeholder concerns and that since the final decision documents were released in the past couple of years, stakeholders have been more satisfied with DOD’s progress. Nevertheless, some property owners have refused DOD right of entry to investigate or to place signage on their property. DOD continues to work with these property owners.</li> <li>• Cultural sensitivity at local homesteads and graveyards has required additional planning by DOD to avoid potential damage.</li> </ul>
Response Complete	2		
<b>Military Munitions Response Program sites</b>	<b>10</b>		
Investigation	5		
Cleanup	4		
Response Complete	1		

Source: GAO analysis of data from DOD and the South Carolina Department of Parks, Recreation, and Tourism. | GAO-22-104744

**Appendix II: Summary of Data on the 15  
Formerly Used Defense Sites (FUDS)  
Properties We Selected**

**Table 17: Former Conway Bombing and Gunnery Range – World War II Era, 1942 - 1948**

Fiscal year 2020 obligations: \$34,000			
Fiscal year 2020 environmental liabilities: \$9.6 million			
Percent change in liabilities since fiscal year 2019: 81 percent decrease			
<b>Total sites</b>	<b>9</b>	<b>Description</b>	<b>Challenges</b>
<b>Installation Restoration Program sites</b>	<b>1</b>	The U.S. Army Air Force used the property from 1942 until 1948 as an aerial bombing and gunnery range for the Myrtle Beach Army Air Field. The property contained three practice bombing target ranges, one moving ground machine gun range, one pattern bombing range, one rifle range, two machine gun ranges, turret ranges, and skip bombing ranges. The U.S. government returned the property to the original landowners after the bombing and gunnery range closed. The Conway Bombing and Gunnery Range is located near Myrtle Beach in South Carolina, where property values have soared in recent years.	<ul style="list-style-type: none"> <li>Real estate companies hired private entities to clean up the contamination because the Department of Defense's (DOD) multidecade cleanup plan would not have allowed the companies to reap the economic benefits of land ownership associated with the then-current real estate market near Myrtle Beach. The companies cleaned up their portions of the former range, then sued DOD for cost recovery. According to DOD, it eventually settled the lawsuit for about \$12 million.</li> </ul>
Response Complete	1		
<b>Military Munitions Response Program sites</b>	<b>8</b>		
Investigation	4		
Response Complete	4		

Source: GAO analysis of data from DOD, documents cited in litigation in the United States District Court District of South Carolina, and publicly available real estate documents. | GAO-22-104744

**Table 18: Former Stark General Hospital – World War II Era, 1941 - 1945**

Fiscal year 2020 obligations: \$59,000			
Fiscal year 2020 environmental liabilities: \$1 million			
Percent change in liabilities since fiscal year 2019: 42 percent decrease			
<b>Total sites</b>	<b>2</b>	<b>Description</b>	<b>Challenges</b>
<b>Installation Restoration Program sites</b>	<b>2</b>	Stark General Hospital operated from 1941 through October 1945. It received wounded soldiers from World War II, specializing in general and orthopedic surgery but became a fully functional debarkation hospital for casualties and sick soldiers arriving at the Port of Charleston, South Carolina. The site is currently owned by local county and private entities.	<ul style="list-style-type: none"> <li>None identified.</li> </ul>
Investigation	1		
Response Complete	1		
<b>Military Munitions Response Program sites</b>	<b>0</b>		

Source: GAO analysis of Department of Defense data. | GAO-22-104744

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# Appendix III: Views of Selected State Regulators Regarding the Formerly Used Defense Sites (FUDS) Program

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## Consideration of State Standards for Cleanup

State regulators representing the Federal Facilities Subcommittee of the Association of State and Territorial Solid Waste Management Officials and two states from our case studies expressed concerns about the Department of Defense's (DOD) preliminary assessments that sometimes have led to decisions to not undertake cleanup work on FUDS properties with contamination that the regulators felt were in excess of state standards.<sup>1</sup> Officials from the Federal Facilities Subcommittee of the Association and two state regulators said that they have sometimes disagreed with DOD decisions not to pursue cleanup at some sites when DOD determined there was not a threat to the public or the environment when the states believed DOD should pursue cleanup under state or federal standards. One state regulator said this leads to sites receiving no further action under CERCLA, precluding review using stricter state standards. Another state regulator said it also disagreed with DOD's determination that no further cleanup was required after a removal action. DOD officials reported that the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires them to assess the risk at a site during a preliminary assessment or after a removal action to determine if cleanup is required and, if it is required, that they evaluate state standards to select a remedy.<sup>2</sup> Moreover, the Federal Facilities Subcommittee of the Association reported that DOD does not always provide a rationale for the rejection of state standards. DOD officials said that, under CERCLA regulations, they must eliminate from further review sites that pose no threat to public health or the environment after they assess risk.

State regulators representing the Federal Facilities Subcommittee of the Association and two states from our case studies said that in cases where

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<sup>1</sup>According to the Federal Facilities Subcommittee of the Association, its mission is to enhance and promote effective state and territorial programs and to effect relevant national policies for waste and materials management, environmentally sustainable practices, and environmental restoration. Some stated goals of the Federal Facilities Subcommittee of the Association regarding the FUDS program include facilitating information exchange by and between states, territories, and federal agencies; reviewing and commenting on federal regulation and policy development; and working with DOD and other federal agencies on a variety of federal facilities issues and forums. See Association of State and Territorial Solid Waste Management Officials, *Federal Facilities Issues Paper: Final Report* (Washington, D.C.: May 2020).

<sup>2</sup>Cleanups must meet standards that are legally applicable or relevant and appropriate. Legally applicable and appropriate standards include standards promulgated under any federal environmental law, in addition to standards promulgated under certain state laws or regulations that are more stringent than federal law and are identified to the entity conducting the cleanup in a timely manner.

DOD does not consider more stringent state standards and requirements when assessing the need to clean up a site, state regulators' only option—outside of litigation—is to issue letters of nonconurrence with DOD's decision to close a site without further action.<sup>3</sup> State regulators told us that CERCLA generally prohibits states from suing DOD to challenge cleanup decisions at a particular site before the cleanup is complete. They said that requiring property owners to clean up their properties to the state standards is not a feasible alternative because most property owners do not have the resources for the cleanup or for a lawsuit against DOD to obtain cost recovery. For example, DOD determined that no further action was needed at Area 10 at the former Raritan Arsenal in New Jersey because DOD found that there was no unacceptable risk to public health and the environment from DOD-related substances. The New Jersey Department of Environmental Protection, the state regulator, reported that contamination at the site exceeded state standards and that DOD had not sufficiently investigated the site. New Jersey state regulatory officials said that their only option was to write a letter of nonconurrence.

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### DOD's Selection and Implementation of Land- Use Controls

Both DOD and state regulators generally agree that it is not feasible to find and remove all military munitions because of the terrain, location, and depth of the military munitions. However, the Association of State and Territorial Solid Waste Management Officials and regulators from two states in our case studies expressed concern about DOD ending cleanup of Military Munitions Response Program (MMRP) sites even if there are potential military munitions remaining. DOD officials said that they could use land-use controls as a remedy for some MMRP sites that may not be fully cleared of military munitions. Land-use controls include administrative and legal restrictions on the use of the land, as well as physical mechanisms, such as fencing and signage warning people of danger. However, DOD said that it does not have authority to implement or maintain all types of land-use controls on non-DOD property and that its authority to implement some land-use controls is limited. The officials said that DOD would only select a remedy that it has authority to implement.<sup>4</sup> For example, DOD's September 2018 final decision document for the range complex site on the former Camp Croft property

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<sup>3</sup>DOD consults with the local community and seeks concurrence from state regulators before closing a site but is not bound by state nonconurrence.

<sup>4</sup>According to a DOD policy document, the authority for certain legal restrictions on land use, such as land-use planning, permitting, and zoning, resides with local governments.

in South Carolina reported public education as the final remedy.<sup>5</sup> DOD officials acknowledged that they had difficulty obtaining rights of entry from many local property owners and that they were limited in their ability to place signage on private property for which they had no right of entry. However, the decision document reported that public education would protect human health because military munitions awareness signs could be posted on government-owned property, and public education materials could be distributed. In addition, public education materials could be distributed with building and construction permits, at local restoration advisory board meetings, and through annual mailings to affected property owners and special interest groups identified in DOD's community relations plan. Nevertheless, officials from the Association of State and Territorial Solid Waste Management Officials said that sometimes DOD selects land-use controls as remedies and then is not able to implement them. They provided documentation of discussions from a land-use controls workgroup with DOD in which state regulators raised examples of land-use controls that DOD was not implementing.

Under CERCLA, if DOD selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at a FUDS, DOD must review the remedial action at least every 5 years after the remedy is initiated to assure that the remedy remains protective of human health and the environment. Federal law requires that DOD conduct reviews every 5 years on remedies that do not permit unlimited use of and unrestricted exposure to a site, including remedies that involve land-use controls. However, 5-year reviews are required for CERCLA remedial actions but are not required for removal actions or for any cleanup action undertaken outside of CERCLA.

The Association of State and Territorial Solid Waste Management Officials documents and state regulators we spoke with reported that they were concerned about property owners, or state and federal land managers, who might be apprehensive about the burdens of land-use controls over long periods of time or in perpetuity. For example, property owners could change their minds about granting DOD right of entry or a change in ownership could alter DOD rights of entry. The documents and state regulators said that they could not be assured that the remedy would remain protective of human health and the environment. Moreover,

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<sup>5</sup>DOD's final decision document considered four alternatives: (1) no action, (2) public education, (3) analog surface and subsurface removal of military munitions and public education, and (4) digital advanced surface and subsurface removal of military munitions to return the land to unlimited use and unrestricted exposure.



an Association of State and Territorial Solid Waste Management Officials document expressed concern that stakeholders' roles and responsibilities regarding implementing, maintaining, monitoring, and reporting on land-use controls are often undefined or misunderstood and that the roles and responsibilities become even more uncertain as original stakeholders are succeeded or replaced.<sup>6</sup> State regulators also reported that in instances where 5-year reviews were not required and the state regulator disagreed with DOD's determination as to the level of risk, they did not have the resources to follow up and be assured that there was no risk over the long term to human health and the environment.

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### State Regulator and DOD Meetings

DOD and state regulators meet regularly to discuss these types of concerns. For example, DOD has established the FUDS Forum to provide a mechanism to discuss issues among DOD and state regulators. DOD has organized the forums by two tiers, one at the state and district level to discuss site-specific issues and one at the national level to discuss national issues. For example, the Arizona Department of Environmental Quality reports that it meets annually with DOD in a state-level FUDS Forum to discuss FUDS issues in Arizona. DOD and state regulators have also met in various forums to discuss their differences on issues such as state standards and land-use controls.

Both DOD and state regulatory officials reported that these concerns had been raised during the forums but that no agreement on resolutions to some of these state concerns has been reached to date, and state officials have expressed concerns about the length of time some of these issues have remained unresolved. Nevertheless, both DOD officials and state regulators reported that they continue to work to resolve their differences in the FUDS Forums.

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<sup>6</sup>Association of State and Territorial Solid Waste Management Officials, *Federal Facilities Issues Paper Final Report* (Washington, D.C.: May 2020).

# Appendix IV: Comments from the Department of Defense



ENERGY, INSTALLATIONS,  
AND ENVIRONMENT

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

May 31, 2022

Mr. Nathan Anderson  
Director, Natural Resources and Environment  
U.S. Government Accountability Office  
441 G Street, NW  
Washington, DC 20548

Dear Mr. Anderson:

This is the Department of Defense (DoD) response to the GAO Draft Report, GAO-22-104744, "ENVIRONMENTAL LIABILITIES: Improvements Needed to Measure Progress of Cleanup of Formerly Used Defense Sites," dated May 2, 2022 (GAO Code 104744). DoD appreciates the opportunity to review and comment on the draft report.

DoD is in support of the conclusions and representations made in the report and has one general comment and three specific comments that are provided in enclosure 1.

GAO provided two recommendations in the report. The Department concurs with both recommendations and provides further information on implementation of the recommendations in enclosure 2.

The Department appreciates the opportunity to review and comment on the draft report. If you have any questions, please contact the primary action officer, Ms. Alexandria Long, Office of the Deputy Assistant Secretary of Defense for Environment and Energy Resilience, at 703-571-9061 or via email at alexandria.dlong.civ@mail.mil.

Sincerely,

CRAMER, PAUL D. Digitally signed by  
CRAMER, PAUL D. DN: cn=PAUL D. CRAMER,  
o=DoD, ou=32020521, email=pa.d.cramer@do.d.mil  
AVID.1146906539

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

Enclosure:  
As stated

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# Appendix V: GAO Contact and Staff Acknowledgments

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## GAO Contact

Nathan Anderson, (202) 512-3841 or [andersonn@gao.gov](mailto:andersonn@gao.gov)

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## Staff Acknowledgments

In addition to the individual named above, the following individuals made key contributions to this report: Janice Poling (Assistant Director), Robert Sánchez (Analyst-in-Charge), Adrian Apodaca, Colson Campbell, Antoinette Capaccio, Breanne Cave, Suellen Foth, Cindy Gilbert, Claudia Hadjigeorgiou, Corinna Nicolaou, Dan Royer, and Maria Storts.

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A. Nicole Clowers, Managing Director, [ClowersA@gao.gov](mailto:ClowersA@gao.gov), (202) 512-4400, U.S. Government Accountability Office, 441 G Street NW, Room 7125, Washington, DC 20548

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## Public Affairs

Chuck Young, Managing Director, [youngc1@gao.gov](mailto:youngc1@gao.gov), (202) 512-4800  
U.S. Government Accountability Office, 441 G Street NW, Room 7149  
Washington, DC 20548

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## Strategic Planning and External Liaison

Stephen J. Sanford, Managing Director, [spel@gao.gov](mailto:spel@gao.gov), (202) 512-4707  
U.S. Government Accountability Office, 441 G Street NW, Room 7814,  
Washington, DC 20548

