



August 2023

DOE NUCLEAR CLEANUP

Clear Guidance on Categorizing Activities and an Assessment of Contract Cost Effectiveness Needed

Accessible Version

GAO Highlights

Highlights of [GAO-23-106081](#), a report to congressional requesters

Why GAO Did This Study

EM is responsible for cleaning up a nationwide complex of 15 sites contaminated by radioactive and hazardous materials resulting from decades of nuclear weapons production and nuclear energy research. Annually, EM officials develop a budget request for each site, which includes both base operations and progress activities. In fiscal year 2022, EM's annual budget request for base operations across all of its sites totaled \$3.1 billion, or 41 percent, of EM's budget request of almost \$7.6 billion.

GAO was asked to review the costs for base operations at EM sites. This report examines (1) the extent to which EM sites vary in how they categorize their activities as base operations and progress and (2) EM's mechanisms to incentivize contractors to manage base operations in a cost-effective manner.

GAO reviewed EM guidance and interviewed officials at each EM site and headquarters regarding efforts to collect consistent information on annual base operations costs. GAO also reviewed contracts that covered base operations to identify efforts to manage these costs.

What GAO Recommends

GAO is recommending that EM (1) develop budget guidance that clearly defines base operations and progress activities and (2) assess whether its contract-based approach is improving the cost-effective performance of base operations at major cleanup sites. EM concurred with both recommendations.

View [GAO-23-106081](#). For more information, contact Nathan Anderson at (202) 512-3841 or andersonn@gao.gov.

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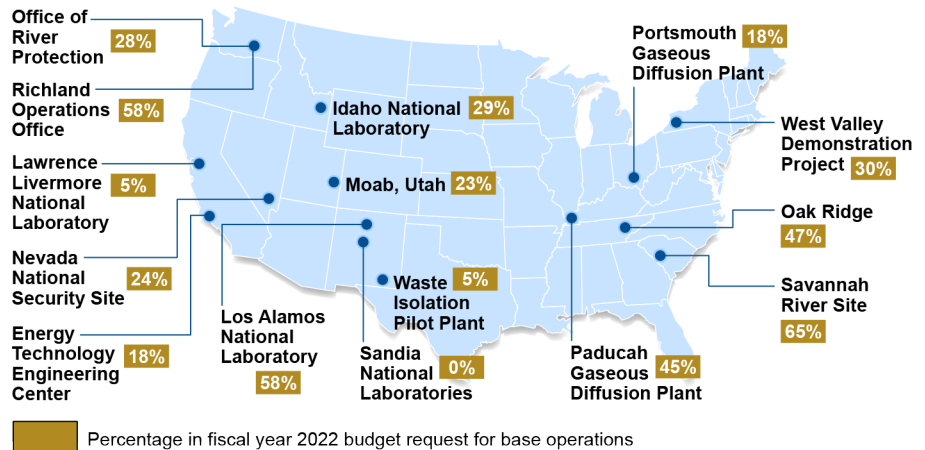
DOE NUCLEAR CLEANUP

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What GAO Found

Officials at the 15 sites operated by the Department of Energy's (DOE) Office of Environmental Management (EM) are responsible for categorizing site activities during budget formulation. For this process, EM generally divides activities into two categories: (1) those that do not advance the cleanup mission, which GAO refers to as "base operations"; and (2) those that advance the cleanup mission, which are referred to as "progress." The figure below shows the percentage of base operations for each site in the fiscal year 2022 budget request. EM officials use these data to inform decisions on how to prioritize activities for funding. However, EM sites vary in how they categorize activities. Specifically, several sites placed similar activities in different categories because guidance did not include clear definitions. According to officials in EM's budget office, EM has issued guidance in the past for a more uniform definition of base operations, but EM sites have expressed concern, citing the unique aspects of each site's activities. By providing guidance that includes clear definitions, EM management could better weigh options for prioritizing funding.

Base Operations as a Percentage of the Fiscal Year 2022 Budget Request for Department of Energy Office of Environmental Management Cleanup Sites



Sources: GAO analysis of Department of Energy information; Map Resources (map). | GAO-23-106081

Accessible Data for Base Operations as a Percentage of the Fiscal Year 2022 Budget Request for Department of Energy Office of Environmental Management Cleanup Sites

Site	Percentage that is base operations
Savannah River Site	65%
Office of River Protection	28%
Richland Operations Office	58%
Oak Ridge	47%
Portsmouth Gaseous Diffusion Plant	18%
Idaho National Laboratory	29%
Waste Isolation Pilot Plant	5%

Site	Percentage that is base operations
Paducah Gaseous Diffusion Plant	45%
Los Alamos National Laboratory	58%
West Valley Demonstration Project	30%
Nevada National Security Site	24%
Moab, Utah	23%
Lawrence Livermore National Laboratory	5%
Energy Technology Engineering Center	18%
Sandia National Laboratories	0%

Sources: GAO analysis of Department of Energy information; Map Resources (map). | GAO-23-106081

According to senior EM officials, EM relies primarily on contract-based approaches to ensure that base operations are performed in a cost-effective manner. EM issued guidance that states that performance evaluation plans for contracts with incentives should incentivize efficiencies in base operations costs. However, at several sites, certain base operations are performed under firm-fixed-price contracts, a type of contract that does not typically include performance incentives. Federal internal control standards call for management to design control activities to achieve objectives and respond to risks. Yet EM has not assessed whether its contract-based approach is achieving the desired results. Without assessing whether the current approach is improving the cost-effectiveness of base operations, EM management does not have a clear understanding of whether its reliance on contract mechanisms is achieving the intended results.

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Abbreviations

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
DOE	Department of Energy
EM	Office of Environmental Management
IPL	Integrated Priorities List
OMB	Office of Management and Budget
PEMP	Performance Evaluation and Measurement Plan
RCRA	Resource Conservation and Recovery Act of 1976

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August 31, 2023

Congressional Requesters

The Department of Energy's (DOE) Office of Environmental Management (EM) is responsible for cleaning up a nationwide complex of 15 sites contaminated by radioactive and hazardous materials resulting from decades of nuclear weapons production and nuclear energy research. This cleanup responsibility is currently estimated to be the most costly of all anticipated cleanup efforts across the federal government. Specifically, as of 2022, DOE is responsible for about 83 percent, or \$520 billion, of the federal government's total estimated future environmental cleanup and waste disposal costs, known as the federal government's environmental liability. Of that \$520 billion in estimated liability, EM accounted for \$406 billion.

To execute its cleanup mission, EM contracts with companies to conduct a wide range of activities. As part of its budgeting process, EM typically categorizes anticipated work as either (1) necessary to support the operations of the sites but do not directly advance cleanup progress or (2) directly advancing the cleanup mission. For the purpose of this report, we refer to activities conducted at EM sites that do not directly advance the cleanup mission as "base operations." We refer to those activities that directly advance the cleanup mission as "progress."¹

Base operations at EM's sites require considerable financial resources. We reported in 2019 that base operations make up 30 to 60 percent of individual sites' budgets.² For fiscal year 2022, the annual budget request

¹EM generally categorizes work as either "minimum safe" operations or "progress" as part of its budgeting process. We use the term base operations instead of minimum safe because the term minimum safe can be defined differently by EM sites when discussing activities that are outside of the budgeting process. For example, EM contracting officials use a narrower definition for minimum safe activities that includes only activities required during a condition in which the site is temporarily shut down and using minimal personnel to maintain the site in a safe and secure condition. Our base operations term is intended to encompass the same activities that fall within the minimum safe category used during EM's budgeting process.

²GAO, *Nuclear Waste Cleanup: DOE Could Improve Program and Project Management by Better Classifying Work and Following Leading Practices*, [GAO-19-223](#) (Washington, D.C.: Feb. 19, 2019).

for base operations across all 15 sites totaled \$3.1 billion, or 42 percent, of the approximately \$7.5 billion EM budget request.

According to EM officials, if improvements can be made to the cost effectiveness of base operations, reductions in such costs could be used to put more funds toward accelerating progress activities. This could directly contribute to lowering DOE's environmental liability. The federal government's environmental liability has been on the GAO High Risk List since 2017.³ In our 2023 high-risk update, we reported that DOE improved how it monitors progress in addressing its environmental liability.⁴ However, this high-risk area continues to warrant significant attention.

You asked us to review the costs for base operations at EM sites and identify any ways in which these costs could be better managed. This report examines (1) the extent to which EM sites vary in how they categorize their activities as base operations or progress during the budget formulation process and (2) EM's mechanisms to incentivize contractors to manage base operations in a cost-effective manner.

To address both objectives, we analyzed EM's budget data on the estimated costs for planned base operations and progress activities from fiscal years 2018-2022 for all 15 EM cleanup sites.⁵ We selected these years because EM headquarters officials identified 2018 as the year that the last significant changes were made to budget guidance for categorizing base operations activities. We assessed the reliability of the data by having sites review the relevant portions to identify discrepancies and interviewed officials about their data input and management practices. We determined that the data are sufficiently reliable for describing each EM site's estimated base operations costs based on

³GAO's High-Risk List identifies federal programs and operations that are high risk because of their vulnerabilities to fraud, waste, abuse, and mismanagement or that need transformation. 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).

⁴GAO, *High-Risk Series: Efforts Made to Achieve Progress Need to Be Maintained and Expanded to Fully Address All Areas*, [GAO-23-106203](#) (Washington, D.C.: Apr. 2023).

⁵Fiscal year 2022 was the most recent fiscal year with complete data at the time of our review.

current practices for categorizing activities.⁶ In addition, we took the following steps:

- To examine the extent to which EM sites vary in how they categorize their activities as base operations or progress during the budget formulation process, we reviewed guidance documents issued by EM headquarters pertaining to budget formulation. We also interviewed officials at each EM site and headquarters regarding their efforts to collect consistent information on annual estimated base operations costs.
- To examine EM's mechanisms to incentivize contractors to manage base operations in a cost-effective manner, we reviewed documents and interviewed EM officials and contractor representatives for the contractors that perform base operations to learn about specific efforts to manage the costs of base operations and any barriers that EM and contractors face in doing so. To identify contract incentives for cost-effective performance, we reviewed contracts covering base operations for each of the 15 EM sites. See appendix I for more information on our objectives, scope, and methodology.

We conducted this performance audit from June 2022 to August 2023 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.

Background

EM's 15 Cleanup Sites

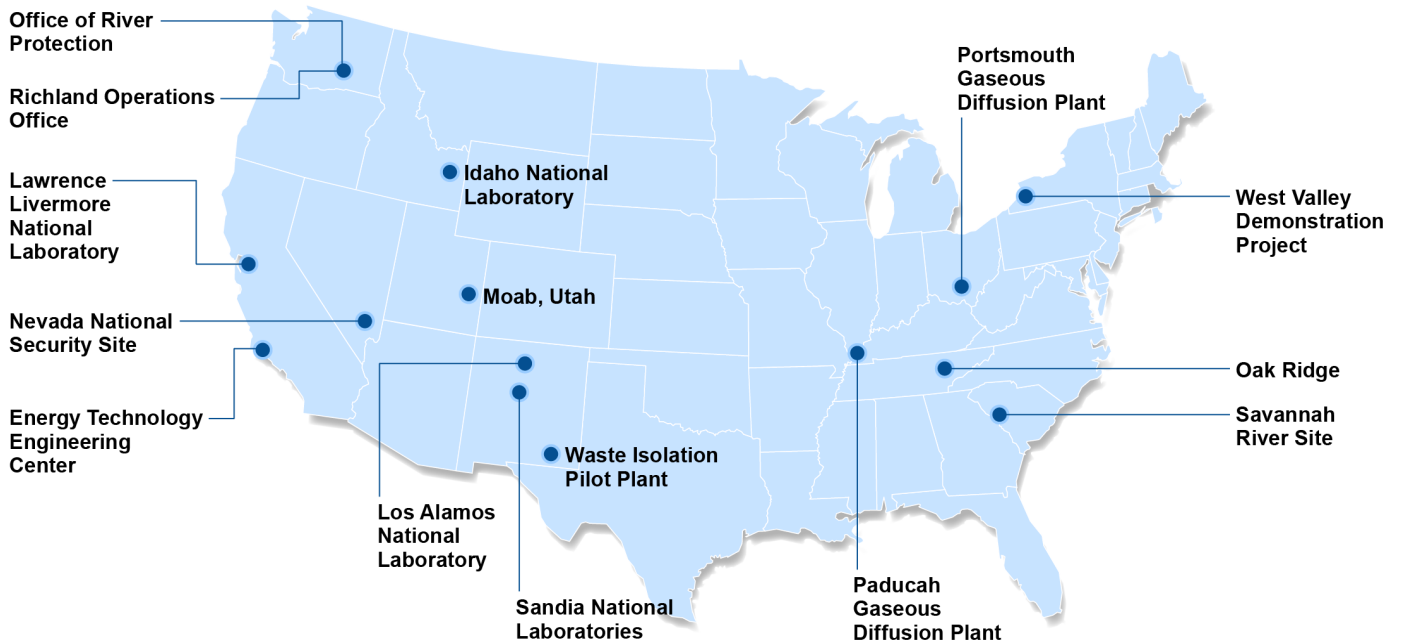
EM performs a wide range of cleanup activities at its 15 sites, including deactivating and decommissioning contaminated buildings; remediating

⁶For this report, we rely on information from EM budget requests, as opposed to actual expenditures, as a means of assessing EM's base operations costs. EM generally categorizes its anticipated activities as base operations or progress during budget formulation. According to EM officials, actual costs for activities are not tracked in a way that breaks down whether an expenditure is for base operations or progress or that would allow for direct comparison with the estimates from budget formulation. Nonetheless, according to EM officials, historical cost information is used in developing the estimates for base operations used in budget formulation.

contaminated soil and groundwater; and designing, constructing, and operating facilities to treat millions of gallons of radioactive liquid waste (see fig. 1). These activities are governed in part by federal laws—including the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA); the Resource Conservation and Recovery Act of 1976, as amended (RCRA); and the Atomic Energy Act of 1954, as amended. Dozens of agreements, which DOE negotiated with various regulatory entities, also govern cleanup activities. These agreements establish hundreds of milestones that specify actions that EM must take as it carries out its cleanup work.

The amount of time to complete the remaining cleanup work at each site varies substantially. Sites such as Sandia National Laboratories and Moab, Utah, estimate that work will be completed in the 2030s, while others, such as Hanford’s Office of River Protection and the Paducah Gaseous Diffusion Plant, estimate that the work at their sites will require many more decades, according to DOE data.

Figure 1: Department of Energy Office of Environmental Management’s 15 Active Cleanup Sites



Sources: GAO analysis of Department of Energy information; Map Resources (map). | GAO-23-106081

Accessible Data for Figure 1: Department of Energy Office of Environmental Management's 15 Active Cleanup Sites

Site
Savannah River Site
Office of River Protection
Richland Operations Office
Oak Ridge
Portsmouth Gaseous Diffusion Plant
Idaho National Laboratory
Waste Isolation Pilot Plant
Paducah Gaseous Diffusion Plant
Los Alamos National Laboratory
West Valley Demonstration Project
Nevada National Security Site
Moab, Utah
Lawrence Livermore National Laboratory
Energy Technology Engineering Center
Sandia National Laboratories

Sources: GAO analysis of Department of Energy information; Map Resources (map). | GAO-23-106081

Note: Hanford contains two sites—the Office of River Protection and the Richland Operations Office.

Process for Categorizing Activities as Base Operations During Budget Formulation

Each year, EM's budget office works with each of its 15 sites to develop a budget request for the upcoming fiscal year that will be submitted to Congress as part of the President's budget proposal.⁷ According to EM officials, this process begins at each site, with the site's budget officials working with program managers and contractors to develop a list of activities that they estimate they could perform during the future fiscal year under consideration. Officials then prioritize these activities, using a variety of considerations, including legal agreements, regulatory milestones, and safety requirements. The result is referred to as the Integrated Priorities List (IPL). The activities in a site's IPL are typically placed into one of two categories—minimum safe (what we refer to as base operations) or progress—depending on whether the activity will make progress in the cleanup of the site. According to EM officials, the

⁷According to EM officials, the budget that begins development each year is for 2 fiscal years in the future. Therefore, planning for the fiscal year 2024 budget began in fiscal year 2022.

purpose of the base operations and progress designations is to understand what activities are contributing to progressing the cleanup of the sites and what activities are not. These officials stated that this information is used to assist in balancing competing demands for funding. For example, the IPLs submitted by sites include information on lower-priority activities that the site would perform if additional funding were to be provided during the budget process, which EM officials consider as part of their budget decision-making process. Furthermore, EM officials use this information to consider the potential impact on future base operations costs when considering program changes at the sites.

After developing the IPL, EM headquarters provides guidance to each site that includes an estimate of the amount of funding that the site can expect for the fiscal year under consideration. Site officials then identify what activities on the IPL likely can and cannot be funded based on that guidance. EM officials at headquarters and multiple sites stated that there are frequent discussions throughout the budget formulation process to address any issues that may arise.

For fiscal year 2018, EM issued budget development guidance to assist sites in determining what activities should be categorized as base operations on a site's IPL.⁸ The fiscal year 2018 guidance included descriptions of what activities should be categorized as base operations from (1) operating facilities, (2) facilities with scheduled outages and surplus facilities, and (3) nonfacility essential site services. For fiscal year 2021, EM budget guidance introduced an additional category of activities for the IPL—"landlord and support"—in addition to the categories of "minimum safe" (i.e., base operations) and "making progress." This new category was to include activities beyond what would be needed to maintain continuity of operations at a site (e.g., performance of essential government functions in the case of an emergency or government shutdown) but that would not advance the cleanup mission. According to EM officials, this new guidance was in place for 1 fiscal year, and the following year, for fiscal year 2022, EM reverted to providing the sites with a limited version of the 2018 guidance, which excluded the landlord and support category.

⁸In the 2018 guidance, these activities are referred to as minimum safe and essential services.

EM Contracting Types and Terms

EM sites generally execute base operations and progress activities through one or more contracts. These contracts come in a number of different types, including

- **cost-plus-award-fee contracts.** The contractor recovers actual allowable costs incurred for completed work and may be awarded an additional fee based on the government's judgmental evaluation of the contractor's performance. Under the Federal Acquisition Regulation, all contracts providing for an award fee must be supported by an award fee plan that specifies criteria tied to the acquisition objectives, against which the contractor will be evaluated to determine the award fee. For this contract type, EM develops a Performance Evaluation and Measurement Plan (PEMP) that establishes expectations for contractor performance and describes how the responsible DOE office will evaluate and measure performance against those expectations;⁹ and
- **firm-fixed-price contracts.** The contractor delivers their services at a specified price, fixed at the time of the contract award and not subject to any adjustment. EM does not typically develop a PEMP for a standard firm-fixed-price contract, as there are not usually performance incentives that require one. However, there are variations of the standard firm-fixed-price contract where financial incentives are included as part of the contract, so long as those incentives are tied solely to factors other than cost.

One way in which these contract types differ is in the way they incentivize contractor performance. Specifically, cost-plus-award-fee contracts are intended to incentivize excellence by providing for the payment of additional fees based on performance, while standard firm-fixed-price contracts (i.e., those without incentives) do not provide additional fees based on performance.¹⁰

⁹PEMPs govern assessment of contractor performance and typically describe performance expectations, roles and responsibilities, and the process by which contractor performance will be evaluated for the purposes of determining any award fees earned by the contractor.

¹⁰A single EM contract may include line items or task orders that comprise distinct contract types. For example, a single contract may include firm-fixed-price task orders and cost-plus-award-fee task orders, each of which function in keeping with the descriptions above.

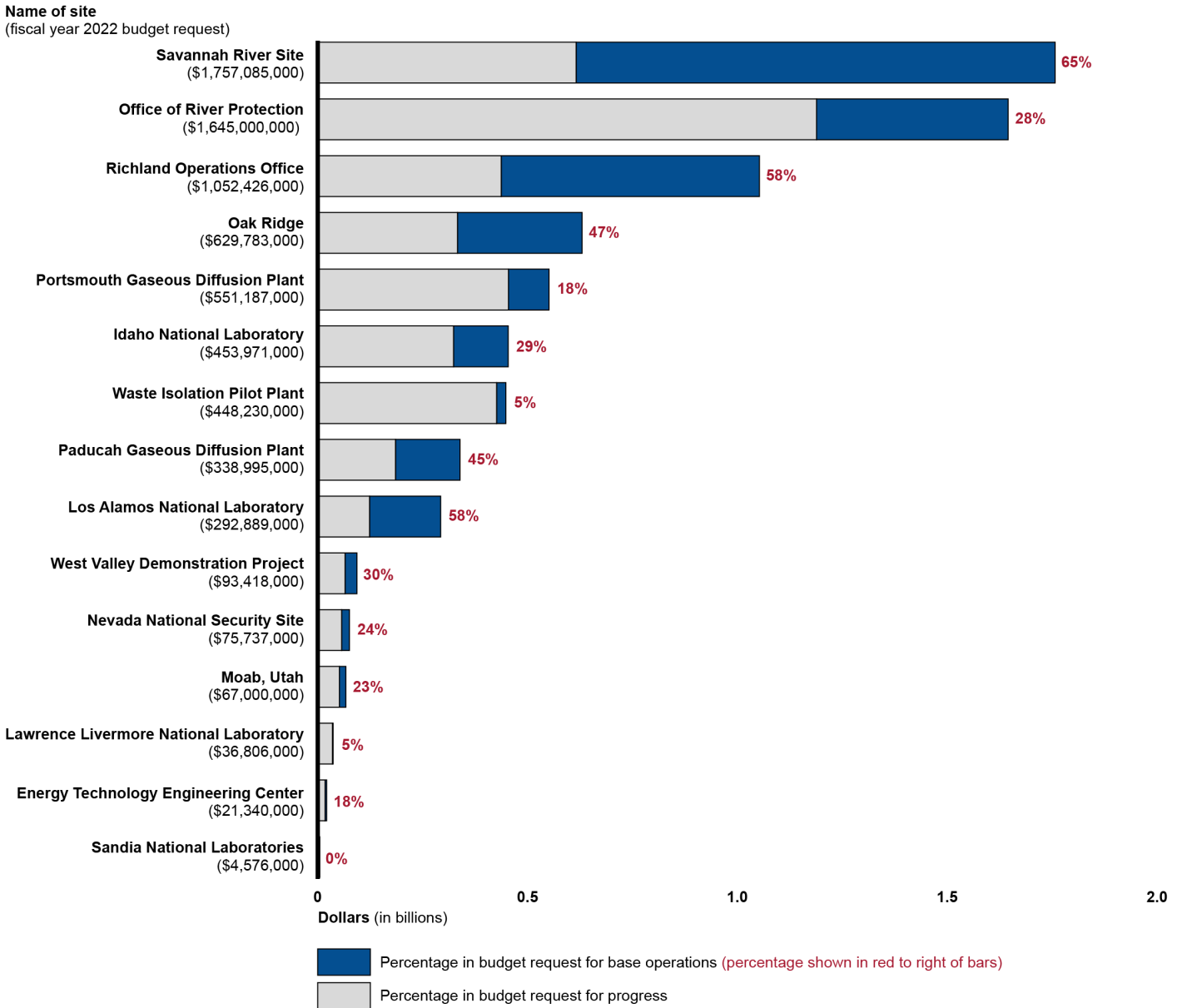
EM Sites Varied in How They Categorized Activities as Base Operations or Progress, in Part Due to Limitations in Guidance

Across the 15 EM sites, there was variance in the percentage of a site's budget categorized as base operations and in how sites categorized activities as base operations or progress during the budget formulation process. The variation in the categorizing of activities is due in part to limitations in EM's guidance, including inconsistent definitions.

Budget Request Estimates for Base Operations Varied Across EM Sites

EM sites varied substantially in how much of their respective budget request was categorized as base operations (see fig. 2).

Figure 2: Categorization of Activities for Fiscal Year 2022 Budget Formulation at 15 Department of Energy Office of Environmental Management Sites



Source: Department of Energy Office of Environmental Management information. | GAO-23-106081

Accessible Data for Figure 2: Categorization of Activities for Fiscal Year 2022 Budget Formulation at 15 Department of Energy Office of Environmental Management Sites

Site	Base Operations (in billions)	Progress (in billions)	Percentage that is base operations	Percentage that is Progress
Savannah River Site	1.141386	0.615699	65%	35%
Office of River Protection	0.456242	1.188758	28%	72%
Richland Operations Office	0.615115	0.437311	58%	42%
Oak Ridge	0.296762	0.333021	47%	53%
Portsmouth Gaseous Diffusion Plant	0.096772	0.454415	18%	82%
Idaho National Laboratory	0.130227	0.323744	29%	71%
Waste Isolation Pilot Plant	0.022019	0.426211	5%	95%
Paducah Gaseous Diffusion Plant	0.153501	0.185494	45%	55%
Los Alamos National Laboratory	0.169246	0.123643	58%	42%
West Valley Demonstration Project	0.028268	0.065150	30%	70%
Nevada National Security Site	0.018549	0.057188	24%	76%
Moab, Utah	0.015383	0.051617	23%	77%
Lawrence Livermore National Laboratory	0.001806	0.035000	5%	95%
Energy Technology Engineering Center	0.003915	0.017425	18%	82%
Sandia National Laboratories	0.000000	0.004576	0%	100%

Source: Department of Energy Office of Environmental Management information. | GAO-23-106081

Note: Base operations refers to activities at Office of Environmental Management sites that are necessary to support the operations of the sites but do not directly advance cleanup progress. Progress refers to activities that directly advance the cleanup mission.

According to EM site officials, the two main drivers that increase base operations costs are (1) regulatory requirements, safety standards, and other mandates; and (2) workforce capacity issues.

Regulatory requirements, safety standards, and other mandates.

Several EM site officials cited regulatory requirements, safety standards, and other federal mandates that were put into place without additional agency funding, as cost drivers for base operations. For example, officials from the Oak Ridge Site stated that state and federal regulators were applying stricter limits to radionuclide-contaminated wastewater discharges from the new on-site waste disposal site, compared with the standards in place at the existing disposal site. These officials also said that if similar limits were applied more broadly, it could add millions of dollars in annual operating costs across the sites. Further, officials from Hanford stated that they have a significant number of state and local requirements, and the costs to comply with those requirements drive base operations costs. For example, EM has implemented new safety features and procedures for managing tank vapor risks based on a settlement

agreement with Washington State and other entities. In addition, officials from several sites stated that several federal mandates related to cybersecurity and zero-emission vehicles have also increased costs. For example, according to EM data, in fiscal year 2022, it spent \$42 million on cyber-related activities and \$2 million on green technologies, such as ordering electric vehicles and installing electric charging ports.

Workforce issues. Several EM site officials we interviewed cited workforce capacity issues as base operations cost drivers. For example, officials at Idaho noted that base operations are being driven up by inflation in labor and nonlabor costs, staff turnover, and skilled labor availability issues.¹¹ In addition, staff turnover increases the need for training for new employees. Officials from the Savannah River Site stated that personnel costs make up the majority of the base operations costs at their site, and this is partly because trained personnel sufficient to meet technical safety requirements are needed to ensure continuity of operations. These base operations personnel costs, they said, compel management to shift personnel working on certain base operations between projects, as needed, to try to keep costs down.

EM Sites Varied in How They Categorized Similar Activities

During the budget formulation process, EM officials generally categorize activities performed at EM sites as base operations or progress, depending on whether the activity directly contributes to cleanup progress. Through our analysis of EM budget data and interviews with site officials, we found that base operations can be further divided into two categories, for a total of three categories. We developed these categories because they help explain how sites differ in which activities they include as part of base operations.¹²

- **Progress activities** directly contribute to cleanup progress. Progress activities may include processing waste, treating contaminated groundwater, or demolishing excess facilities.

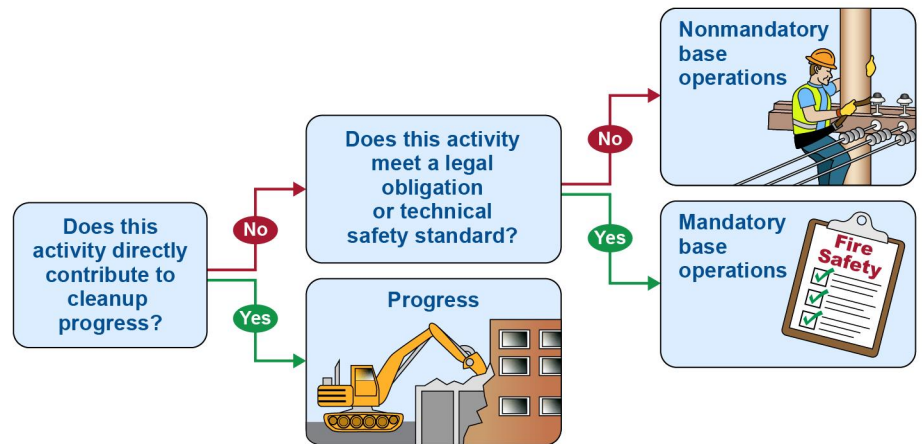
¹¹We reported in 2021 on the need to improve workforce planning at EM. See GAO, *Department of Energy: Improvements Needed to Strengthen Strategic Planning for the Acquisition Workforce*, [GAO-22-103854](#) (Washington, D.C.: Nov. 2021).

¹²We identified these categories based on our analysis of IPL data and how budget officials at the 15 sites described their processes. These categories are not included in EM guidance for budget formulation.

- **Mandatory base operations activities** are required to meet a legal obligation or technical safety standard but do not directly contribute to cleanup progress. Mandatory base operations may include monitoring air quality, performing required maintenance on safety systems, and conducting security operations.
- **Nonmandatory base operations activities** are not required to meet a legal obligation or technical safety standard, and they also do not directly contribute to cleanup progress. Nonmandatory base operations can include maintenance of roads and grounds, maintenance of utilities, and personnel costs for site administration.

Figure 3 is a decision tree, based on our analysis, showing the different ways that EM sites' activities could be categorized using the three categories we identified above.

Figure 3: Decision Tree for Categorizing Office of Environmental Management Activities as Progress or Mandatory or Nonmandatory Base Operations, Based on GAO Analysis



Source: GAO analysis of Department of Energy information. | GAO-23-106081

When categorizing activities during the budget formulation process, sites varied in what activities they included as part of the base operations. Specifically, EM officials at the 15 sites described following one of three approaches to determine under what category—base operations or progress—activities fall. According to interviews with site officials,

- nine sites categorized all activities that did not contribute to cleanup progress, including both mandatory and nonmandatory activities, as base operations during budget formulation;

- four sites included only those activities needed to meet a legal obligation or technical safety standard (i.e., mandatory base operations) as base operations; and
- two sites categorized all activities that did not contribute to progress as base operations but also included certain progress activities as base operations because these activities were tied to regulatory milestones (see table 1).¹³

Table 1: Activities Included in Office of Environmental Management (EM) Site Budget Requests for Base Operations

EM sites	Base operations includes activities we define as mandatory	Base operations includes activities we define as nonmandatory	Base operations includes activities we define as progress
Richland Operations Office, Office of River Protection, Los Alamos, Nevada, Oak Ridge, West Valley, Moab, Energy Technology Engineering Center, Sandia	sites include these activities	sites include these activities	sites do not include these activities
Idaho, Portsmouth, Paducah, Waste Isolation Pilot Plant	sites include these activities	sites do not include these activities	sites do not include these activities
Savannah River Site, Lawrence Livermore National Laboratory	sites include these activities	sites include these activities	sites include these activities

Legend: X: Sites include these activities in their base operations category. —: Sites do not include these activities in their base operations category.

Source: GAO analysis of Office of Environmental Management budget request information. | GAO-23-106081

Note: In this report, we use the following definitions: (1) progress activities directly contribute to cleanup progress, (2) mandatory base operations activities are required to meet a legal obligation or technical safety standard but do not directly contribute to the cleanup progress, and (3) nonmandatory base operations activities are not required to meet a legal obligation or technical safety standard and do not directly contribute to cleanup progress. We relied on site officials to denote whether certain activities included in a site’s budget are required to meet legal obligations or technical safety standards.

These different approaches for categorizing activities as base operations have resulted in similar activities at nearly half the sites being categorized differently across the sites. For example, officials at Sandia categorize their efforts to collect data from groundwater monitoring wells and to prepare reports for regulators as a progress activity. However, groundwater monitoring activities at Lawrence Livermore that EM officials stated were very similar in scope were categorized as base operations, though some of the same officials were involved in the budget formulation process for both sites. According to these officials, they categorized these activities differently, in part, because they are the only activities that EM is conducting at Sandia, while they are one of several components of the overall scope of work at Lawrence Livermore.

¹³We relied on site officials to denote whether certain activities included on the IPLs are required to meet legal obligations or technical safety standards.

EM's Guidance on Categorizing Activities Is Not Consistent or Comprehensive

We found that EM's guidance on categorizing base operations is not consistent or comprehensive. Specifically, EM's guidance has undergone several changes, and terms are not defined consistently across offices and sites. Additionally, the guidance is not comprehensive because it does not include a clear definition of base operations, address the complete scope of work under the EM mission, or identify areas where professional judgment may be necessary and appropriate to categorize activities during budget formulation.

Inconsistent guidance for base operations. After the issuance of the updated guidance in 2018, EM site officials told us that several additional changes were made to the guidance in the years following that resulted in recategorizing activities. For example, according to officials at the Portsmouth/Paducah Project Office, they interpreted language in the fiscal year 2018 budget development guidance as defining base operations to include all the activities needed prior to the start of cleanup operations. Then officials stated that, in fiscal years 2019 and 2020, this language was removed from the guidance. In fiscal year 2021, guidance stated that sites should add "landlord and support" activities as a third category on the IPL, which was meant to include activities like site access control and record management. The fiscal year 2022 guidance for base operations entries on the IPL, however, made no mention of a "landlord and support" category separate from base operations.

EM officials stated that guidance for categorizing activities as base operations in the budget formulation process is, in part, influenced by EM's top leader. According to EM officials, different leaders have requested that sites provide different levels of detail when reporting base operations, which has contributed to guidance that is inconsistent and often changes. For instance, EM officials told us that the 2018 budget guidance for categorizing base operations was developed at the request of the newly appointed head of EM during that time.¹⁴

Because of changes in the guidance over time, EM sites have changed how they categorize certain activities, though the scope of those activities

¹⁴We reported on the impact of changing leadership in EM in 2022. See GAO, *Nuclear Waste: DOE Needs Greater Leadership Stability and Commitment to Accomplish Cleanup Mission*, [GAO-22-104805](#) (Washington, D.C.: May 2022).

did not significantly change. From fiscal years 2018 through 2022, eight of 15 sites reported that they inconsistently categorized certain activities as either base operations or progress. The seven remaining sites reported that they did not make changes to the categories of their activities during this period. Of those eight sites that reported changes in categorizing certain activities, six reported that they changed how activities were categorized in response to new guidance from headquarters. For example, officials at Oak Ridge stated that, in 2019, they updated the baseline for their life cycle cost and schedule estimate for completion of work to incorporate the fiscal year 2018 budget development guidance on base operations. This updated baseline included a number of changes to the categorization of activities. The two remaining sites changed how activities were categorized as a result of internal site deliberations. Further, officials at the Richland Operations Office at Hanford reported that they changed how soil and groundwater activities were categorized first in fiscal year 2020 in response to guidance from EM headquarters and then again in both fiscal years 2021 and 2022. Officials stated that the later adjustments were made because too much scope had been categorized as progress in fiscal year 2020 and that some of these activities should have been categorized as base operations.

Changes in EM's budget guidance over relatively short periods may contribute to inconsistencies in how sites categorize activities. These inconsistencies limit EM's ability to analyze trends over time. By providing guidance that is consistent over time, EM will be better able to analyze trends in estimated base operations costs over time.

Inconsistent terminology. EM's budget office uses terms in its guidance for categorizing activities that are inconsistent with how other EM offices use the same terms. Specifically, EM uses the term "minimum safe" to reference the scope of work that our report refers to as base operations. According to EM budget officials, minimum safe is a budget categorization term for nonprogress activities. However, an official from EM's Office of Acquisition and Project Management, the office responsible for overseeing its contracting process, stated that their office uses a narrower definition for minimum safe activities that includes only activities required during a condition in which the site is temporarily shut down and only using personnel to maintain the site in a safe and secure condition. Further, officials at the Defense Nuclear Facilities Safety Board, who regularly interact with officials at EM sites, said that they define the

term minimum safe as a specific condition, where technical safety requirements at a given facility are met at the minimum level.¹⁵

Officials may experience confusion when determining how to categorize activities due to inconsistencies in how minimum safe (i.e., base operations) is defined in EM's budget guidance over time and inconsistencies in how the term minimum safe is used by different EM offices. As a result, some sites include different activities in base operations and in progress, as we have shown in table 1. According to officials in EM's budget office, there have been past attempts to issue guidance with a more uniform definition of base operations during the budget formulation process. However, these officials stated that most EM sites have resisted these attempts, citing the unique aspects of each site's activities, and requested that the site be given exemptions that provide more flexibility in categorizing its activities.

Guidance is not comprehensive. EM's budget guidance on categorizing activities is limited, in part, because it does not clearly define what activities fall into the base operations category. As a result, sites place similar activities in different categories. For example, both Hanford and Savannah River conduct tank waste management activities, though Hanford categorizes them as progress, and Savannah River categorizes some of them as base operations. Further, officials at both sites stated that they categorized activities in this way because these activities are subject to state regulatory requirements. EM budget guidance for fiscal year 2021 included detailed definitions and examples for categorizing activities as either base operations, landlord and support, or making progress. However, this guidance was discontinued for fiscal year 2022 after receiving pushback from site budget officials, according to senior EM budget officials, and replaced by guidance with limited detail regarding the base operations category.

Additionally, EM's guidance on base operations does not provide clarity on when site officials' professional judgment may be necessary when categorizing activities as base operations versus progress. For example, EM headquarters officials stated that sites frequently need to rely on professional judgment to determine whether their groundwater management programs are progress or base operations. Specifically,

¹⁵The Defense Nuclear Facilities Safety Board was established by statute in 1988 to provide independent analysis, advice, and recommendations to the Secretary of Energy regarding the adequate protection of public health and safety from DOE's activities conducted at defense nuclear facilities.

groundwater management programs can employ passive monitoring that may or may not contribute to the future cleanup of the site, rather than a system that actively removes potential contaminants. However, there are other activities, such as monitoring liquid radioactive waste in tanks based on regulatory requirements and technical safety guidelines, where professional judgment would not be necessary to categorize the activity as a base operation.

The Office of Management and Budget (OMB) Circular No. A-11, which is updated annually and provides guidance on agency budget preparation and execution, states that agencies should strengthen the use of evidence and data to drive better decision-making and more effectively deliver on mission and that OMB expects that agencies' budget requests will draw on the full range of existing evidence.¹⁶ Further, our *Standards for Internal Control in the Federal Government* state that management should use quality information to achieve the entities' objectives.¹⁷ Specifically, management should obtain relevant data from reliable internal and external sources in a timely manner based on the identified information requirements. EM officials told us that they require information about how funding provided to sites is expected to be used, including whether activities are expected to progress the cleanup mission, so that they can balance competing demands for funding at the sites.

As a result of the resistance from sites cited above, EM management stated that they chose not to offer comprehensive guidance on categorizing base operations because sites would continually ask for additional flexibility in the categorization process. However, by providing comprehensive guidance that includes clear definitions and identifies where professional judgement is necessary, EM officials would be able to identify areas where flexibility is warranted and have a clearer understanding of what activities are directly contributing to progressing its cleanup mission. Improving the consistency and comprehensiveness of its guidance can enhance the quality of EM's information and allow EM to better weigh options for prioritizing future funding and analyze trends in estimated base operations costs. EM could also gain clarity on what

¹⁶Office of Management and Budget, *Circular No. A-11: Preparation, Submission, and Execution of the Budget* (Washington, D.C.: Aug. 2022).

¹⁷GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: Sept. 2014).

portion of its budget is expected to directly advance the cleanup of the sites.

EM Relies on Contract Mechanisms to Ensure That Base Operations Are Cost Effective but Has Not Assessed the Effectiveness of Those Mechanisms

According to EM officials, EM relies primarily on particular contract types, contract terms, and performance evaluations as the mechanisms to promote cost-effective execution of base operations. EM officials told us that they do not have a process for evaluating whether their contracting approach is successfully making base operations more cost effective.

Regarding contract types, at three sites—Moab, Paducah, and Portsmouth—officials stated that they manage certain portions of their base operations costs by employing the firm-fixed-price contract type.¹⁸ A standard firm-fixed-price contract is designed to manage costs by ensuring that the contractor takes on all of the risk of cost increases, and not the government. If the contractor were to improve the cost effectiveness of base operations under this contract type, the subsequent savings would be kept by the contractor—not the government—as the government has already agreed to a set, unchangeable price for the contracted services.

In our reviews of contract documentation and interviews with site officials, we found that some sites, including Hanford and the Savannah River Site, use the cost-plus-award-fee contract type to manage certain base operations and that those contracts include terms meant to encourage cost-effective base operations performance. Under this contract type, the government pays the contractor's actual allowable costs, as prescribed by the contract for work performed, meaning that reducing the cost of base operations can result in less money being paid by the government. Through this contract type, contractors can be incentivized to reduce costs because the cost effectiveness of base operations can be included

¹⁸According to site officials, most of the Moab Site's base operations activities fall under the Moab Remedial Action Contract, while portions of base operations at the Paducah and Portsmouth Sites are performed under the Paducah Infrastructure Support Services and Portsmouth Infrastructure Support Services contracts, respectively. According to DOE, these contracts include cost reimbursement, as well as fixed-price task orders.

in both objective and subjective performance evaluations that may result in an additional award fee for the contractor.

At the Hanford Site, for example, officials stated that the contract covering most of their base operations includes cost-effectiveness provisions and that the contractor is tasked with providing cost-effective site services and identifying opportunities to improve service delivery.¹⁹ Specifically, the Hanford Mission Essential Services contract—which is valued at approximately \$4 billion and runs through August 16, 2025—covers a range of base operations, such as utilities, sanitary waste disposal, roads and grounds, and railroad services. This contract states: “The Contractor shall maintain services and equipment required to support the Hanford Site environmental cleanup mission and ensure safe, compliant, cost-effective, and energy-efficient alignment with projects that are integral to the Hanford Site mission. The Contractor shall, when appropriate and cost-effective, replace fixed and system related utilities with temporary or permanent services from off-grid power sources. When DOE or the Contractor determines services and/or equipment are no longer required or cost-effective, the Contractor shall propose actions for elimination or removal.”

For contracts with incentives, including cost-plus-award-fee contracts, EM officials told us that they rely in part on contractor performance evaluations to incentivize efficient management of base operations. For example, annual performance evaluations under the Hanford Mission Essential Services contract include defined objective performance outcomes—such as responding to fire and emergency medical incidents within 8 minutes—and subjective performance outcomes—such as developing and implementing innovative solutions to improve work efficiencies—against which the contractor is evaluated to determine the award fee. For fiscal year 2023, the Hanford Mission Essential Services contract included a possible award fee of approximately \$21 million, with 60 percent of that fee tied to objective criteria and 40 percent to subjective criteria. Officials at the Hanford Site explained that these incentives have resulted in multiple efficiencies, such as the building of a new fire station, helping the site avoid maintenance costs of an old and poorly located fire station.

¹⁹According to site officials, most of the Hanford Site’s base operations fall under the Hanford Mission Essential Services contract, which is a cost-plus-award-fee contract.

Further, the Savannah River Site Management and Operation contract at the Savannah River Site—which is valued at approximately \$28.5 billion and runs through September 2026—is a cost-plus-award-fee contract that covers certain base operations activities, such as real property management. The fiscal year 2023 performance evaluation plan for the Savannah River Site Management and Operation contract includes objective and subjective award fee criteria. The available award fee for this contract is approximately \$29 million for fiscal year 2023, with 67 percent tied to objective criteria and 33 percent tied to subjective criteria. Officials at the Savannah River Site explained that the Management and Operation performance evaluation plan includes objective criteria that incentivize the contractor to identify new efficiencies. Officials at the Savannah River Site stated that these incentives have resulted in multiple

Environmental Management (EM) Base Operations at Sites Managed by Other Department of Energy (DOE) Entities

At certain sites where EM is performing cleanup work, another DOE organization is responsible for managing the site. For example, EM performs work at the Idaho National Laboratory and Nevada National Security Site, but these sites are managed by the Office of Nuclear Energy and the National Nuclear Security Administration, respectively. These other DOE organizations may have a contractor perform some base operations at the site for which EM provides reimbursement for its responsible share. As a result of this arrangement, EM officials at those sites may have limited involvement in setting any performance incentives or evaluating contractor performance of base operations if the contract covering these activities is held by another DOE organization. For example, EM provides funding to a contractor working for DOE's Office of Nuclear Energy to perform several base operations at the Idaho Site. EM site officials told us that they have a limited role in setting the terms of the contract or providing performance feedback on the contractor, including regarding cost-effective performance of base operations.



Source: Department of Energy (DOE). | GAO-23-106081

efficiencies, such as the redeployment of resources to support progress activities and installation of a camera system in one of the site's facility control rooms. The camera system allows remote monitoring of critical facility operating parameters, reducing the amount of staff needed by half and results in \$1 million cost savings annually.

According to EM officials, to ensure that contracts promote the cost-effective execution of base operations, EM issued guidance that states that the performance evaluation for contracts with incentives, the PEMP, should incentivize the contractor to optimize efficiencies in base operations. According to the guidance, these incentives should aim to (1) not affect overall mission performance and success; (2) improve cost effectiveness; and (3) maintain equivalent levels of safety, quality, and security. Certain contracts, such as the firm-fixed-price contracts discussed above, do not have a PEMP and, therefore, this guidance does not apply.

EM officials told us that they have a recent contracting framework initiative to improve their contracting approach that includes a focus on cost effectiveness for contracts. However, officials said that this initiative addresses all contracted activities and does not specifically evaluate the extent to which relying on contract types, terms, and performance evaluations to promote cost-effective management of base operations is achieving the desired results. Further, EM officials stated that relatively minor costs for base operations at its smaller sites, such as Sandia and Moab, would make such evaluation at these sites less likely to produce useful results. However, officials agreed that an evaluation of larger sites, such as Hanford and Savannah River, may yield useful results. Our *Standards for Internal Control in the Federal Government* call for management to design control activities to achieve objectives and respond to risks, such as reviews where management compares actual performance with planned or expected results.²⁰ Without assessing whether the current approach is sufficient to ensure or improve the cost effectiveness of base operations, EM management does not have a clear understanding of whether its current approach is achieving the intended results. By conducting an assessment of whether the current contract-based approach is improving cost-effective management of base operations, EM officials could determine the extent to which their approach is working and whether corrective action is needed.

²⁰[GAO-14-704G](#).

Conclusions

The cleanup of EM's remaining sites is estimated to cost over \$400 billion and will take decades to complete. A significant portion of these estimated costs will likely be for activities that do not directly contribute to cleanup progress. EM does not have a full understanding of these estimated costs because sites vary in how they categorize activities as either base operations or progress during the budget formulation process. Improving the consistency and comprehensiveness of EM's budget guidance, such as by including clear definitions for categories of activities, would help provide a clearer picture of what activities are expected to contribute to cleanup progress and what activities are not. These improvements would allow EM to better weigh options for prioritizing funding and analyzing trends in base operations budgets.

Additionally, EM is currently relying on a contract-based approach as a means of ensuring that base operations are performed in a cost-effective manner. EM guidance states that Performance Evaluation and Measurement Plans, or PEMP, should include incentives for the contractor to optimize efficiencies in base operations, but this guidance does not apply to all contracts that cover base operations activities at EM sites. Further, EM has not assessed whether its current approach is, in fact, effectively managing base operations costs across sites. By assessing whether its contract-based approach is improving the cost effectiveness of base operations at its key sites, EM management would know whether changes are needed in their current approach in order to achieve further efficiencies that could allow for acceleration of cleanup progress.

Recommendations for Executive Action

We are making the following two recommendations to EM:

The Secretary of Energy should direct the Assistant Secretary for Environmental Management to develop budget guidance that includes clear definitions for the categories of activities and avoids using the term "minimum safe" when referring to activities that are not progressing the cleanup mission to limit confusion regarding category definitions.

(Recommendation 1)

The Secretary of Energy should direct the Assistant Secretary for Environmental Management to conduct an assessment of whether current contract types, terms, and performance evaluations are improving the cost effectiveness of base operations at major cleanup sites, and to implement any improvements that the assessment identifies.

(Recommendation 2)

Agency Comments

We provided a draft of this report to EM for review and comment. In its comments, reproduced in appendix II, EM concurred with both of our recommendations.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to the appropriate congressional committees, the Secretary of Energy, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or 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 significant contributions to this report are listed in appendix III.



Nathan Anderson
Director, Natural Resources and Environment

List of Requesters

The Honorable Cathy McMorris Rodgers
Chair

The Honorable Frank Pallone, Jr.
Ranking Member
Committee on Energy and Commerce
House of Representatives

The Honorable Diana DeGette
Ranking Member
Subcommittee on Energy, Climate, and Grid Security
Committee on Energy and Commerce
House of Representatives

The Honorable Morgan Griffith
Chair
Subcommittee on Oversight and Investigations
Committee on Energy and Commerce
House of Representatives

Appendix I: Objectives, Scope, and Methodology

Our report examines (1) the extent to which the Office of Environmental Management (EM) sites vary in how they categorize their activities as base operations or progress during the budget formulation process and (2) EM's actions to incentivize contractors to manage base operations in a cost-effective manner.

To address both objectives, we analyzed EM's budget request data on the estimated costs for planned base operations and progress activities from fiscal years 2018 to 2022 for all 15 EM cleanup sites.¹ We selected these years because EM headquarters officials identified 2018 as the year that the last significant changes were made to budget guidance for categorizing base operations activities. We assessed the reliability of these data by taking several steps. In particular, we interviewed officials at EM's budget office who are responsible for managing the data regarding their data management practices. These budget officials indicated that budget data change throughout the budget process. The data we received represent the most current information they had as of August 2022, when they transmitted the data to us. During our interviews with each site, we also discussed the process they follow to develop the budget data, how site management reviews the data, and how the data are checked for errors or omissions. In these interviews, we also requested information on specific elements of the data to understand the reasons for changes in the data over time and to validate whether the data we had were accurate.

After taking these steps, we determined that the budget request data are sufficiently reliable for describing EM site estimated base operations costs based on current practices for categorizing activities. We did not use cost data because, according to EM officials, the actual costs for performing work at its sites are not tracked in a way that identifies whether the costs are for base operations or progress activities.

¹According to EM officials, this information came from Integrated Priorities Lists from each site that were entered into EM's Integrated Planning, Accountability, and Budgeting System.

We also conducted site visits to Hanford, the Savannah River Site, Paducah, and the Oak Ridge Reservation.² At these site visits, we interviewed agency and contractor officials and observed site operations. We selected these sites because they are among the sites with the highest total estimated base operations costs, and they represent a broad spectrum of activities performed by EM at its 15 cleanup sites. For all other EM cleanup sites, we conducted phone interviews and addressed the same topics as we did when interviewing officials during our site visits.

To examine the extent to which EM sites vary in how they categorize their activities as base operations or progress during the budget formulation process, we reviewed guidance documents issued by EM headquarters pertaining to budget formulation. We interviewed officials in EM's Office of Acquisition and Project Management and at the Defense Nuclear Facilities Safety Board to understand how these offices use the terms base operations and minimum safe operations in their work. We also interviewed officials at each EM site and headquarters regarding their process for categorizing activities during the development of their Integrated Priorities Lists. Based on our analysis of site data and the interviews with site officials, we grouped sites on the basis of what activities they categorized as base operations and progress.

To examine EM's actions to incentivize contractors to manage base operations in a cost-effective manner, we reviewed documents and interviewed EM officials and contractor representatives to learn about specific efforts to manage base operations costs and any barriers that EM and contractors face in doing so. To identify contract incentives for cost-effective performance, we reviewed contracts from each EM site that covered the execution of base operations. Further, we requested and reviewed statements and contract documentation from EM site officials related to how EM incentivizes cost-effective performance. Further, we interviewed EM officials related to how they incentivize contractors to execute base operations in a cost-effective manner. We also interviewed EM headquarters officials about their analysis of base operations budget data to identify how they use this information and whether they track changes to base operations costs and identify trends.

²The Hanford Site comprises two sites—the Richland Operations Office and the Office of River Protection.

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

We conducted this performance audit from June 2022 to August 2023 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.

Appendix II: Comments from the Department of Energy

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of Energy**



Department of Energy

Washington, DC 20585
August 23, 2023

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

Dear Mr. Anderson:

This letter provides the Department of Energy (DOE) Office of Environmental Management's (EM) response to the Government Accountability Office's (GAO) Draft Report titled, *GAO-23-106081, DOE NUCLEAR CLEANUP: Clear Guidance on Categorizing Activities and an Assessment of Contract Cost Effectiveness Needed*.

EM remains committed to completing the EM cleanup mission in a safe and cost-effective manner, and base operations activities are key to protecting DOE workers, communities, and the environment. Base operations activities also remain critical to supporting completion of cleanup activities at sites across the nation but can be managed more cost effectively.

As part of its strategic planning efforts, EM continually seeks ways to accelerate cleanup, while protecting human health and the environment. Accelerating cleanup shortens the length of time for which base operations activities are needed, thus resulting in cost savings. To incentivize its contractors to accelerate cleanup and increase the cost-effectiveness of activities, EM has implemented stronger contract mechanisms, including the end-state contracting model. EM will assess the effectiveness of these new contracts at major sites and continue to seek opportunities to clarify the definition of base operations in budget guidance.

Therefore, DOE concurs with GAO's recommendations. Implementing these recommendations in addition to EM's ongoing actions will better enable EM to weigh options when prioritizing funding; analyze trends in base operations activity costs; and identify opportunities for improved cost effectiveness.

Thank you for the opportunity to review this report. If you have any questions, please contact me or Mr. Dae Y. Chung, Associate Principal Deputy Assistant Secretary for Corporate Services, at (202) 586-9636.

Sincerely,

A handwritten signature in blue ink, appearing to read "William I. White".

William I. White
Senior Advisor for Environmental Management

Enclosures

Enclosure

Management Response to Recommendations
GAO-23-106081
GAO Report, DOE NUCLEAR CLEANUP: Clear Guidance on Categorizing
Activities and an Assessment of Contract Cost Effectiveness Needed

Recommendation 1: The Secretary of Energy should direct the Assistant Secretary for Environmental Management to develop budget guidance that includes clear definitions for the categories of activities and avoids using the term “minimum safe” when referring to activities that are not progressing the cleanup mission to limit confusion regarding category definitions.

Management Response: Concur.

The Office of Environmental Management (EM) will clarify the definitions for categories of activities in the fiscal year 2026 EM budget guidance. EM will also avoid using the term “minimum safe” when referring to activities that are not progressing the EM cleanup mission.

Estimated Completion Date: April 30, 2024

Recommendation 2: The Secretary of Energy should direct the Assistant Secretary for Environmental Management to conduct an assessment of whether current contract types, terms, and performance evaluations are improving the cost effectiveness of base operations at major cleanup sites, and to implement any improvements that the assessment identifies.

Management Response: Concur.

The current EM contract types, terms, and performance evaluations are designed to incentivize the cost effectiveness of EM activities, including base operations; however, EM recognizes there may be opportunities for improvement. EM will conduct a limited assessment of the contract types, terms, and performance evaluations at major cleanup sites to identify potential improvements for EM to consider and potentially implement regarding the cost effectiveness of base operations.

Estimated Completion Date: September 30, 2024

Accessible Text for Appendix II: Comments from the Department of Energy

August 23, 2023

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Director
Natural Resources and Environment
U.S. Government Accountability Office
Washington, DC 20548

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William I. White
Senior Advisor for Environmental Management

Enclosures

Enclosure

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GAO Report, DOE NUCLEAR CLEANUP: Clear Guidance on Categorizing Activities
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conduct a limited assessment of the contract types, terms, and performance evaluations at major cleanup sites to identify potential improvements for EM to consider and potentially implement regarding the cost effectiveness of base operations.

Estimated Completion Date: September 30, 2024

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Nathan Anderson at (202) 512-3841 or andersonn@gao.gov

Staff Acknowledgments

In addition to the contact named above, Wyatt R. Hundrup (Assistant Director), Eli Lewine (Analyst in Charge), Mary Kubinski, and Sulayman Njie made key contributions to this report. Also contributing to this report were Claudia Hadjigeorgiou, Cindy Gilbert, Dan C. Royer, and Caitlin Scoville.

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