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Report to the Subcommittee on Strategic Forces, Committee on Armed Services, U.S. Senate

February 2019

# NUCLEAR WASTE

# DOE Should Take Actions to Improve Oversight of Cleanup Milestones

GAO-19-207

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GAO Highlights

Highlights of GAO-19-207, a report to the Subcommittee on Strategic Forces, Committee on Armed Services, U.S. Senate

### Why GAO Did This Study

EM manages DOE's radioactive and hazardous waste cleanup program using compliance agreements negotiated between DOE and other federal and state agencies. Within the agreements, milestones outline cleanup work to be accomplished by specific deadlines. EM's cleanup program faces nearly $500 billion in future environmental liability, which has grown substantially.

GAO was asked to review DOE's cleanup agreements. This report examines the extent to which EM (1) tracks the milestones in cleanup agreements for EM's cleanup sites; (2) has met, missed, or postponed cleanup-related milestones at selected sites and how EM reports information; and (3) has analyzed why milestones are missed or postponed and how EM considers those reasons when renegotiating milestones.

GAO reviewed agreements and milestones at EM's 16 cleanup sites and compared information tracked by EM headquarters and these sites; interviewed officials from four selected sites (chosen for variation in location and scope of cleanup, among other factors); and reviewed EM guidance related to milestone negotiations.

### What GAO Recommends

GAO is making four recommendations, including that EM establish a standard definition of milestones across the cleanup sites, track and report original and renegotiated milestone dates, and identify the root causes of why milestones are missed or postponed. In commenting on a draft of this report, DOE agreed with three of the recommendations and partially agreed with a fourth.

View GAO-19-207. For more information, contact David C. Trimble at (202) 512-3841 or TrimbleD@gao.gov.

### What GAO Found

The cleanup process at the 16 sites overseen by the Department of Energy's (DOE) Office of Environmental Management (EM) is governed by 72 agreements and hundreds of milestones specifying actions EM is to take as it carries out its cleanup work. However, EM headquarters and site officials do not consistently track data on the milestones. EM headquarters and site officials provided GAO with different totals on the number of milestones in place at the four sites GAO selected for review. These discrepancies result from how headquarters and selected sites define and track milestones. First, not all sites make the same distinction between major (i.e., related to on-the-ground cleanup) and non-major milestones and, as a result, are not consistently reporting the same milestones to EM headquarters. Second, sites do not consistently provide EM headquarters with the most up-to-date information on the status of milestones at each site. These inconsistencies limit EM's ability to use milestones to manage the cleanup mission and monitor its progress.

EM does not accurately track met, missed, or postponed cleanup-related milestones at the four selected sites, and EM's milestone reporting to Congress is incomplete. EM sites renegotiate milestone dates before they are missed, and EM does not track the history of these changes. This is because once milestones change, sites are not required to maintain or track the original milestone dates. GAO has previously found that without a documented and consistently-applied schedule change control process, program staff may continually revise the schedule to match performance, hindering management's insight into the true performance of the project. Further, since 2011, EM has not consistently reported to Congress on the status of the milestones each year, as required, and the information it has reported is incomplete. EM reports the most recently renegotiated milestone dates with no indication of whether or how often those milestones have been missed or postponed. Since neither EM headquarters nor the sites track renegotiated milestones and their baseline dates at the sites, milestones do not provide a reliable measure of program performance.

EM officials at headquarters and selected sites have not conducted root cause analyses on missed or postponed milestones; thus, such analyses are not part of milestone negotiations. Specifically, EM has not done a complex-wide analysis of the reasons for missed or postponed milestones. Similarly, officials GAO interviewed at the four selected sites said that they were not aware of any site-wide review of why milestones were missed or postponed. Best practices for project and program management outlined in GAO's Cost Estimating and Assessment Guide note the importance of identifying root causes of problems that lead to schedule delays. Additionally, in a 2015 directive, DOE emphasized the importance of conducting such analysis. Analyzing the root causes of missed or postponed milestones would better position EM to address systemic problems and consider those problems when renegotiating milestones with regulators. Without such analysis, EM and its cleanup regulators lack information to set more realistic and achievable milestones and, as a result, future milestones are likely to continue to be pushed back, further delaying the cleanup work. As GAO has reported previously, these delays lead to increases in the overall cost of the cleanup.

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## Abbreviations

| | |
|---|---|
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act of 1980 |
| DOE | Department of Energy |
| EM | Office of Environmental Management |
| EPA | U.S. Environmental Protection Agency |
| RCRA | Resource Conservation and Recovery Act of 1976 |

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The Honorable Deb Fischer
Chairman
The Honorable Martin Heinrich
Ranking Member
Subcommittee on Strategic Forces
Committee on Armed Services
United States Senate

The Department of Energy (DOE) faces nearly $500 billion in future environmental liabilities related to the cleanup of nuclear and hazardous waste at its 16 sites around the country. These liabilities have grown substantially despite DOE spending roughly $6 billion annually on its cleanup program.[1] The waste is primarily a result of decades of producing material for the nation's nuclear weapons program and can pose risks to human health and the environment. The waste consists of millions of gallons of radioactive waste in underground storage tanks, thousands of tons of spent (used) nuclear fuel and special nuclear material, large volumes of transuranic and mixed low level waste, and huge quantities of contaminated soil and water. At many of its sites, DOE has had difficulty making significant progress on the cleanup, particularly for the most dangerous wastes and at sites with the most challenging cleanup work. Because of the large and expanding estimated costs of cleaning up these sites, in 2017, we designated the federal government's environmental liabilities—more than 80 percent of which pertain to DOE—as a new high-risk area.[2] In January 2019, we noted that the estimated cost to complete the cleanup was likely to increase.[3]

[1]The federal government is financially liable for cleaning up areas where federal activities have contaminated the environment. Various federal and state laws, agreements with states, and court decisions require the federal government to clean up environmental hazards at federal sites and facilities—such as nuclear weapons production facilities and military installations. Federal accounting standards require agencies responsible for cleaning up contamination to estimate future cleanup and waste disposal costs and to report such costs as environmental liabilities in their annual financial statements.

[2]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).

[3]GAO, *Department of Energy: A Program-Wide Strategy and Better Reporting Needed to Address Growing Environmental Cleanup Liability*, GAO-19-28 (Washington, D.C.: Jan. 29 2019).

DOE's Office of Environmental Management (EM) is responsible for managing DOE's cleanup program and overseeing the contractors that carry out the cleanup work at EM's sites. 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—govern cleanup at these sites. EM's cleanup work has been implemented under cleanup agreements negotiated between DOE sites and federal and state regulatory agencies, such as the U.S. Environmental Protection Agency (EPA) and state environmental protection agencies.[4] EM uses milestones—dates by which certain tasks are to be completed—as a tool for managing and tracking progress on site cleanup, along with earned value management systems and performance metrics.[5] EM also reports to Congress on the status of these milestones and bases its annual request for cleanup funding in part on the need to meet site milestones. However, in 1995 and 2002, for example, we reported that milestones, as developed and used by DOE, were not a good measure of EM's cleanup progress and recommended that DOE set national cleanup priorities and renegotiate milestones based on those priorities.[6] In 2015, an independent review found that the use of cleanup agreements negotiated by individual EM sites, rather than a more centralized approach, sometimes caused EM to focus its scarce resources on outdated milestones and lower-priority risks to human health and the environment.[7]

[4]We use the term agreements in this report to refer to all enforceable documents governing the cleanup even though not all of the documents that contain milestones are agreements. For example, the March 2016 Amended Consent Decree at the Hanford Site was issued by a court and the milestones were established by the court, not by agreement of the parties.

[5]Earned value management systems measure the value of work accomplished in a given period and compare it to the planned value of work scheduled for that period and the actual cost of work accomplished. Performance metrics include such things as the number of radioactive liquid waste tanks that are closed. See Department of Energy, Office of Environmental Management, O*perations Activities Protocol* (February 28, 2012).

[6]GAO, *Department of Energy: National Priorities Needed for Meeting Environmental Agreements*, RCED-95-1 (Washington, D.C.: Mar. 3, 1995); and *Waste Cleanup: Status and Implications of DOE's Compliance Agreements,* GAO-02-567 (Washington, D.C.: May 30, 2002).

[7]DOE requested the Consortium for Risk Evaluation with Stakeholder Participation, an independent multidisciplinary consortium of universities led by Vanderbilt University, to organize a review in response to congressional direction accompanying the Consolidated Appropriations Act, 2014.

You asked us to review EM's cleanup agreements that set requirements and milestones for EM's cleanup approach at its 16 sites and how EM has performed in meeting those milestones historically. This report examines the extent to which EM (1) tracks the milestones in cleanup agreements in place at EM's cleanup sites; (2) has met, missed, or postponed cleanup-related milestones at selected sites and how EM reports that information; and (3) has analyzed why milestones are missed or postponed and how, if at all, EM considers those reasons when renegotiating milestones with regulators.

To review and summarize the number of cleanup agreements and corresponding milestones in place at EM's cleanup sites, we collected and examined all of the cleanup agreements for EM's 16 active cleanup sites. We also collected EM's publicly reported lists of cleanup milestones—as found in DOE's Future-Years Plans submitted to Congress in 2012 and 2017—as well as updated lists that we obtained from EM headquarters.[8] In addition, we gathered lists of milestones from some of the sites, as described below. We compared information provided by EM headquarters and the sites to identify discrepancies, if any, regarding the number and status of the milestones. We also compared EM's approach to tracking milestones against GAO's standards for internal control in the federal government.[9]

To analyze the extent to which EM has met, missed, or postponed cleanup-related milestones at selected sites and how EM reports that information, we selected a nongeneralizable sample of four sites—Idaho National Laboratory in Idaho; Savannah River Site in South Carolina; Los Alamos National Laboratory in New Mexico; and the Hanford Site in Washington—for in-depth review. We selected these sites to ensure diversity in (1) geographic location, (2) the responsible DOE agency (EM is responsible for the cleanup at the 16 sites, but the National Nuclear Security Administration oversees five of the sites), (3) the size of the annual cleanup budget (selecting both large and small budgets), and (4) the size of the total environmental liability (selecting both large and small liabilities). Findings from these sites cannot be generalized to sites that we did not include in our review. From each of the selected sites, we

[8]Department of Energy, *Future-Years Defense Environmental Management Plan*, (Washington, D.C.: September 2012); and *Future-Years Defense Environmental Management Plan: FY 2018 to FY 2070*, (Washington, D.C.: August 2017).

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

collected EM's public reports on historical and current data on the number and status of milestones and reviewed, analyzed, and summarized this information. We reviewed DOE's 2017 cleanup policy and associated policies and procedures and met with officials from each of the sites in the sample to find out more about site efforts to track how often milestones had been met, missed, or postponed.[10] To evaluate how EM reported this information, we compared DOE's 2012 and 2017 reports to Congress and EM's internal milestone reporting systems at headquarters and the sites. We also compared EM's reporting against the requirement to report to Congress and best practices for project schedules.[11]

To evaluate the extent to which EM has analyzed why milestones are missed or postponed, we interviewed EM headquarters and site officials. To analyze the extent to which EM considers those reasons when renegotiating milestones, we reviewed EM's orders and guidance that govern the process of negotiating cleanup milestones with regulators. We compared this guidance against best practices in project and program management.[12]

We conducted this performance audit from May 2017 to February 2019 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 oversees a nationwide complex of 16 sites. A majority of the sites were created during World War II and the Cold War to research, produce, and test nuclear weapons (see figure 1).[13] Much of the complex is no longer in productive use but still contains vast quantities of radioactive

[10]Department of Energy, *Requirements for Management of the Office of Environmental Management's Cleanup Program*, (Washington, D.C.: July 2017).

[11]GAO, *Schedule Assessment Guide: Best Practices for Project Schedules,* GAO-16-89G (Washington, D.C.: Dec. 22, 2015).

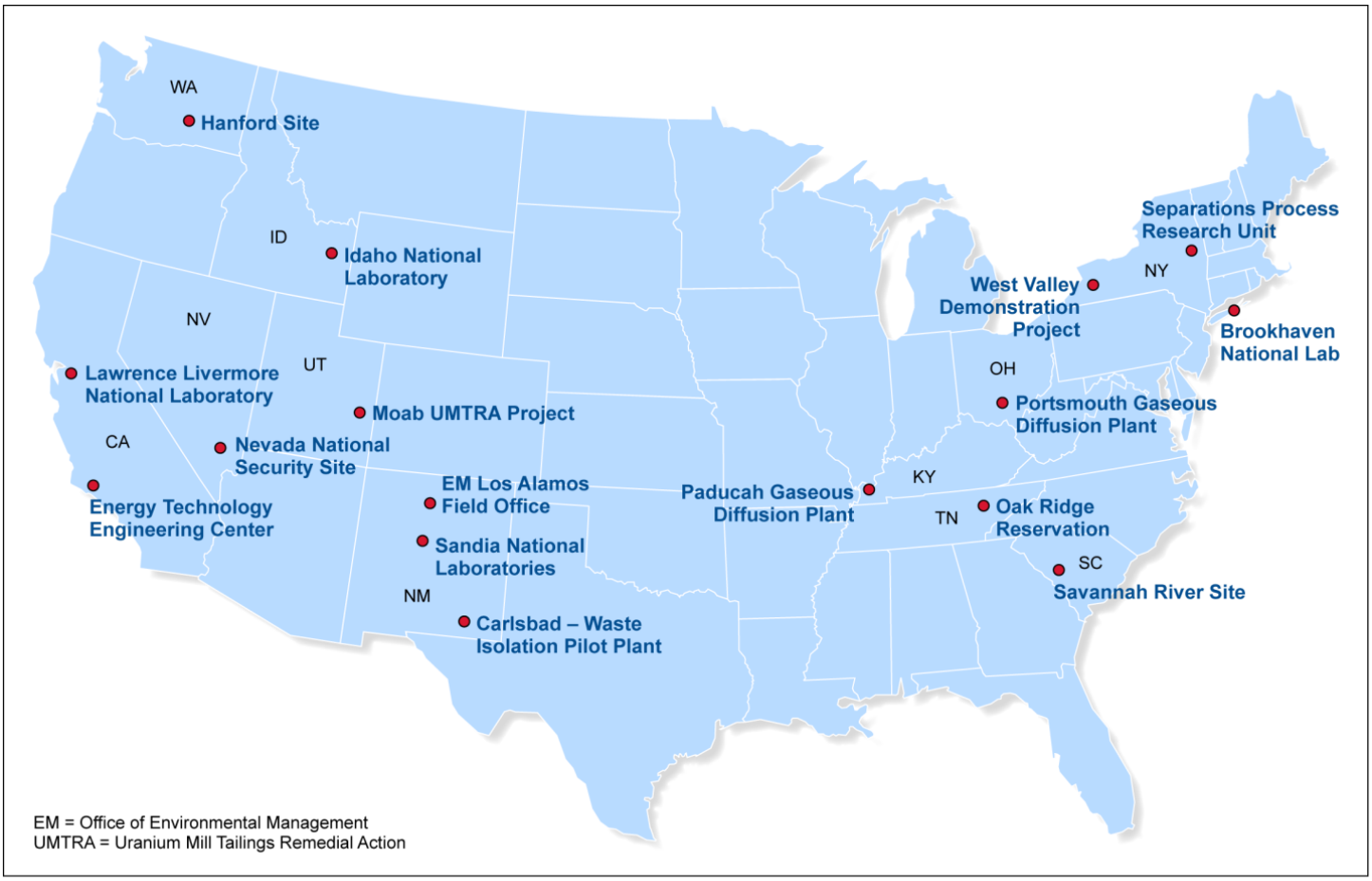
[12]GAO, *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs,* GAO-09-3SP (Washington, D.C.: March 2009).

[13]For a detailed list of the cleanup activities at the sites we examined for this review, see appendix I.

and hazardous materials related to the production of nuclear weapons. In 1989, EM began carrying out activities around the complex to clean up, contain, safely store, and dispose of these materials.[14] Starting at about the same time, DOE documents indicate that EM and state and federal regulators entered into numerous cleanup agreements that defined the scope of cleanup work and established dates for coming into compliance with applicable environmental laws. EM has spent more than $170 billion since it began its cleanup program, but its most challenging and costly cleanup work remains, according to EM documents.

[14]In the fall of 1989, DOE established the Office of Environmental Restoration and Waste Management, which was later renamed the Office of Environmental Management.

**Figure 1: Department of Energy Office of Environmental Management Sites Where Cleanup Remains**




Sources: GAO analysis of Department of Energy information; Map Resources (map). | GAO-19-207

The processes that govern the cleanup at EM's nuclear waste sites are complicated, involving multiple laws, agencies, and administrative steps. EM's cleanup responsibilities derive from different laws, including CERCLA, RCRA, the Atomic Energy Act, and state hazardous waste laws. Federal facility agreements, compliance orders, and other compliance agreements also govern this cleanup.

Federal facility agreements are generally enforceable agreements that DOE enters into with EPA and affected states under CERCLA and applicable state laws. For each federal facility listed on the National Priorities List, EPA's list of seriously contaminated sites, section 120 of

CERCLA requires the relevant federal agency to enter into an interagency agreement with EPA for the completion of all necessary cleanup actions at the facility. The interagency agreement must include, among other things, the selection of the cleanup action and schedule for its completion. Interagency agreement provisions can be renegotiated, as necessary, to incorporate new information, adjust schedules, and address changing conditions.[15]

States generally issue federal facility compliance orders to DOE under RCRA and the Federal Facilities Compliance Act. RCRA prohibits the treatment, storage or disposal of hazardous waste without a permit from EPA or a state that EPA has authorized to implement and enforce a hazardous waste management program. Under the Federal Facilities Compliance Act, federal agencies are subject to state hazardous waste laws and state enforcement actions, including compliance orders. RCRA regulations establish detailed and often waste-specific requirements for the management and disposal of hazardous wastes, including the hazardous waste component of mixed waste.[16] Tri-party agreements among DOE, EPA, and the relevant state often serve as both a federal facility agreement and a compliance order.

In addition to federal facility agreements, other types of agreements governing cleanup at specific sites may also be in place, including administrative compliance orders, court-ordered agreements, and settlement agreements. Administrative compliance orders are orders from state agencies enforcing state hazardous waste management laws. Court-ordered agreements result from lawsuits initiated primarily by states. Settlement agreements are agreements between parties that end a legal dispute.

[15]CERCLA does not itself establish regulatory standards for the cleanup of specific substances, but it requires that remedial actions—which are long-term cleanups—comply with "applicable or relevant and appropriate requirements." Applicable or relevant and appropriate requirements include standards promulgated under any federal environmental law, in addition to standards promulgated under certain state laws or regulations that are more stringent than corresponding federal law and are identified to the entity leading the cleanup in a timely manner. 42 U.S.C. § 9621(d)(1). The federal agency must afford to relevant state and local officials the opportunity to participate in the planning and selection of the remedial action. 42 U.S.C. § 9620(f).

[16]The term "mixed waste" means waste that contains both (1) hazardous waste subject to the Resource Conservation and Recovery Act or authorized state programs that operate in lieu of the federal program; and (2) radioactive waste subject to the Atomic Energy Act of 1954. Under RCRA or authorized state hazardous waste programs, a state does not have authority over the radioactive waste component of the mixed waste.

These agreements may include milestones—dates by which DOE commits to plan and carry out its cleanup work at the sites. DOE has identified two different types of milestones: enforceable and planning milestones. Generally, an enforceable milestone has a fixed, mandatory due date, subject to the availability of appropriated funds, whereas a planning milestone is not enforceable and usually represents a placeholder or shorter term of work. In this report, we are examining any enforceable milestone that derives from either federal facility agreements or other compliance agreements.

EM manages its cleanup program based on internal guidance, on milestone commitments to regulators, and in consultation with a variety of stakeholders. First, according to EM officials, EM manages cleanup activities based on requirements listed in a cleanup policy that it issued in July 2017 along with guidance listed in standard operating policies and procedures associated with this policy. The 2017 cleanup policy states that EM will apply DOE's project management principles described in Order 413.3B to its operations activities in a tailored way.[17] Second, EM's budget requests are explicit regarding the role the milestones play in the cleanup effort. For example, in its fiscal year 2019 request to Congress, EM stated that the request addresses cleanup "governed through enforceable regulatory milestones."[18] Third, in addition to the milestone commitments to EPA and state environmental agencies, other stakeholders involved include county and local governmental agencies, citizen groups, and other organizations. These stakeholders advocate their views through various public involvement processes, including site-specific advisory boards.

[17]Department of Energy, *Program and Project Management for the Acquisition of Capital Assets*, DOE Order 413.3B (Washington, D.C.: April 12, 2018). GAO has ongoing work examining DOE's implementation of the 2017 cleanup policy.

[18]Department of Energy, *Department of Energy FY 2019 Congressional Budget Request, Volume 5, Environmental Management* (Washington, D.C.: March 2018).

## At EM's 16 Cleanup Sites, Cleanup Is Governed by 72 Agreements, but EM Headquarters and Sites Do Not Consistently Define or Track Milestones

At EM's 16 cleanup sites, cleanup is governed by 72 agreements and hundreds of cleanup milestones. These agreements include federal facility agreements generally negotiated between DOE, the state, and EPA, and compliance orders from state regulators. These agreements may impose penalties for missing milestones and may amend or modify earlier agreements, including extending or eliminating milestone dates. Within the agreements, hundreds of milestones outline deadlines for specific actions to be taken by EM as it carries out its cleanup work. However, because EM lacks a standard definition of milestones, some sites track milestones differently than EM headquarters, limiting EM's ability to monitor performance.

### At EM's 16 Cleanup Sites, Cleanup Is Governed by 72 Agreements, Most of Which Include Cleanup Milestones

In total, DOE has entered into 72 cleanup agreements at EM's 16 cleanup sites. The agreements were initially signed between 1985 and 2009 (see table 1). With the exception of the Moab Uranium Mill Tailings Remedial Action Project in Utah and the Waste Isolation Pilot Plant in New Mexico, each site is governed by at least one cleanup agreement. Twelve are governed by multiple agreements (up to as many as 17 at the Savannah River Site, for example).

**Table 1: Cleanup Agreements at 16 Environmental Management (EM) Cleanup Sites**

| EM cleanup site | Total number of agreements | Year first agreement was signed |
|---|---|---|
| Brookhaven National Laboratory, NY | 1 | 1992 |
| Energy Technology Engineering Center, CA | 3 | 1995[a] |
| Hanford Site, WA | 6 | 1989 |
| Idaho National Laboratory, ID | 8 | 1991 |
| Lawrence Livermore National Laboratory, CA | 3 | 1988 |
| Los Alamos National Laboratory, NM | 4 | 1993 |
| Moab Uranium Mill Tailings Remedial Action Project, UT | 0 | N/A[b] |
| Nevada National Security Site, NV | 4 | 1992 |
| Oak Ridge Reservation, TN | 4 | 1991[c] |
| Paducah Gaseous Diffusion Plant, KY | 5 | 1992 |
| Portsmouth Gaseous Diffusion Plant, OH | 9 | 1989 |
| Sandia National Laboratories, NM | 2 | 2004 |
| Savannah River Site, SC | 17 | 1985 |
| Separations Process Research Unit, NY | 3 | 2009 |
| Waste Isolation Pilot Plant, NM | 0 | N/A[d] |

| EM cleanup site | Total number of agreements | Year first agreement was signed |
|---|---|---|
| West Valley Demonstration Project, NY | 3 | 1992 |
| | **72** | |

Source: GAO analysis of Department of Energy (DOE) agreements. | GAO-19-207

[a]California's Department of Toxic Substances Control issued a consent order to DOE in 1995 that governed the operation and closure of approximately 10 cubic meters of mixed waste at the site.

[b]Cleanup at the Moab Project is governed by the Uranium Mill Tailings Radiation Control Act, which does not require a federal facility agreement.

[c]According to DOE officials, the Oak Ridge agreement was signed in 1991 but became effective upon the Environmental Protection Agency's notification to the parties, which occurred in 1992.

[d]Any necessary cleanup activities at the Waste Isolation Pilot Plant are governed primarily by the Waste Isolation Pilot Plant Land Withdrawal Act and the Resource Conservation and Recovery Act of 1976, as amended, permit issued by the state.

Twelve sites are governed by federal facility agreements, generally with the relevant state and EPA. These agreements generally set out a sequence for accomplishing the work, tend to cover a relatively large number of cleanup activities, and include milestones that DOE must meet. All of the 12 sites with federal facility agreements are also governed by additional compliance agreements that have been negotiated at each site subsequent to the initial federal facility agreement or other agreement with the state. These agreements may impose penalties for missing milestones and may amend or modify earlier agreements, including extending or eliminating milestone dates. For example, the Hanford Site is subject to three consent decrees that resulted from litigation in which the state of Washington sued DOE for failing to meet certain cleanup milestones.

## EM Headquarters and Selected Cleanup Sites Do Not Consistently Define or Track Milestones

EM headquarters and cleanup site officials provided us with different totals on the number of milestones in place at the four sites we selected for further review. Both federal facility agreements and other compliance agreements contain milestones with which EM must comply and, according to EM officials and our review of the agreements, these agreements collectively contain hundreds of milestones.[19] However, milestone information that EM headquarters and site officials shared with us was not consistent. For example, for milestones due in fiscal years 2018 through 2020, officials at EM headquarters identified 135

[19]Several factors can influence the number of milestones in an agreement, including the extent of environmental contamination and the preferences of the regulators.

enforceable cleanup milestones at the four selected sites, which was less than half of the number of such milestones officials at those sites reported to us (see table 2).

**Table 2: Number of Enforceable[a] Cleanup Milestones Due in Fiscal Years 2018 through 2020 at Selected Environmental Management (EM) Sites**

| Selected Site | Total milestones reported by EM headquarters | Total milestones according to sites |
|---|---|---|
| Hanford Site | 57 | 178 |
| Idaho National Laboratory | 11 | 12 |
| Los Alamos National Laboratory | 24 | 38 |
| Savannah River Site | 43 | 79 |
| **Total** | **135** | **307** |

Source: GAO analysis of Department of Energy milestone information. | GAO-19-207

[a]Generally, an enforceable milestone has a fixed, mandatory due date, subject to the availability of appropriated funds.

These discrepancies result from how headquarters and selected sites define and track milestones.

- **Milestone definitions.** EM headquarters officials said that they are primarily concerned with milestones related to on-the-ground cleanup; that is, cleanup activities that actually result in waste being removed, treated, or disposed of. EM officials said they consider these to be major milestones. However, not all sites make the same distinction between major and non-major milestones and, as a result, are not consistently reporting the same types of milestones to EM headquarters. For example, officials at the Savannah River Site track milestones in a federal facility agreement that lists 79 milestones due in fiscal years 2018 through 2020. This agreement makes no distinction between major and non-major milestones and includes administrative activities, such as revisions to cleanup reports, in its milestone totals. EM headquarters officials, on the other hand, do not include these activities as major milestones and list only 43 milestones due in the same time frame. Similarly, Hanford officials do not distinguish between major or other milestones in their internal tracking. As a result, Hanford officials are tracking 178 milestones due in fiscal years 2018 through 2020, whereas EM headquarters officials are tracking 57 for the same time frame at Hanford.
- **Requirements for updating milestones.** Sites do not consistently provide EM headquarters with the most up-to-date information on the status of milestones at each site. This is because EM requirements

governing the submission of milestone information do not specify when or how often sites are to update this information, so sites have the discretion to choose when to send updated milestone data to headquarters. As a result, the information on the list of milestones used to track cleanup performance by EM headquarters may differ from the more up-to-date information kept by the sites. For example, officials at each of the four sites we examined stated that they try to send updated information on the status of milestones to headquarters on an annual basis, though they sometimes send it less frequently. Officials at EM headquarters acknowledged that their list of milestones is not always up-to-date because of the lag between when a milestone changes at the site and when sites update that information in the EM headquarters' database.

In addition to inconsistencies in tracking and defining milestones, lists of milestones maintained by EM headquarters and the four selected sites may not include all cleanup milestones governing the cleanup work at the site. We found two cases in which permits at two sites included milestones that neither EM headquarters nor site officials included in their list of sites' cleanup milestones. For example, milestones related to a major construction project at one of the selected sites we reviewed—Savannah River—are not listed in either EM headquarters' or the Savannah River Site's list of enforceable milestones. According to South Carolina state environmental officials, milestones associated with this project are part of a separate permit and dispute resolution agreement not connected to the federal facility agreement or one of the sites' compliance agreements. Recently, DOE acknowledged in its fiscal year 2019 budget request that this project has faced technical challenges, and officials noted that the previously agreed-upon start date for operating this project would be delayed. However, this milestone and its delay are not included in either EM headquarters' or Savannah River's list of milestones. Similarly, officials at the Hanford Site said that some milestones governing Hanford's cleanup are part of the site wide RCRA permit issued by the state, which is separate from its federal facility agreement, and, as a result, officials do not track this information in the same Hanford milestone tracking system and do not report it to EM headquarters.

EM does not have a standard definition of milestones for either sites or headquarters to use for reporting and monitoring cleanup milestones or guidance on how often sites should update the status of milestones. EM headquarters officials cited guidance that sites can refer to when entering their milestone data into the headquarters-managed database. This guidance addresses how to submit milestone data but does not include a definition of milestones or specify how often sites should update the

information.[20] EM headquarters officials noted that sites have the discretion to input milestones as they choose. EM's lack of a standard definition of milestones limits management's ability to use milestones to manage EM's cleanup mission and monitor its progress. We have previously found that poorly defined, incomplete, or missing requirements make it difficult to hold projects accountable, result in programs or projects that do not meet user needs, and can result in cost and schedule growth.[21] In addition, according to Standards for Internal Control in the Federal Government, information and communication are vital for an entity to achieve its objectives. [22] According to these standards, the first principle of information and communication is that management should define the information requirements at the relevant level and the requisite specificity for appropriate personnel. Without this, EM's ability to use milestones for managing and measuring the performance of its cleanup program is limited.

## EM Does Not Track Sites' Renegotiated Milestone Dates and Has Not Consistently Reported Milestone Information to Congress as Required

EM relies on cleanup milestones, among other metrics, to measure the overall performance of its operations activities. However, sites regularly renegotiate milestones they are at risk of missing, and EM does not track data on the history of postponed milestones. As a result, EM cannot accurately track the progress of cleanup activities to meet these milestones. Additionally, EM has not consistently reported required information to Congress, and the information it has reported is incomplete. For example, in its report to Congress on the status of the enforceable milestones, EM includes the latest (meaning the most recently renegotiated) milestone dates with no indication of whether or how often those milestones have been missed or postponed.

[20]Department of Energy, *Milestones Module Guidance* (March 2016).

[21]See, for example: GAO, *DOE Project Management: NNSA Needs to Clarify Requirements for Its Plutonium Analysis Project at Los Alamos,*GAO-16-585 (Washington, D.C.: Aug. 9, 2016); *Defense Acquisition Process: Military Service Chiefs' Concerns Reflect Need to Better Define Requirements before Programs Start*, GAO-15-469 (Washington, D.C.: June 11, 2015); *Defense Acquisitions: Managing Risk to Achieve Better Outcomes*, GAO-10-374T (Washington, D.C.: Jan. 20, 2010); and *United States Coast Guard: Improvements Needed in Management and Oversight of Rescue System Acquisition*, GAO-06-623 (Washington, D.C.: May 31, 2006).

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

## Sites Renegotiate Milestone Dates Before They Are Missed, and EM Does Not Track How Often This Occurs

Site officials typically renegotiate enforceable milestones they are at risk of missing with their regulators, in accordance with the modification procedures established in federal facility agreements. EM officials said that sites have the ability to renegotiate milestones before they are missed. For example, the Hanford Site Federal Facility Agreement allows DOE to request an extension of any milestone; the request must include, among other things, DOE's explanation of the good cause for the extension. As long as there is consensus among EM and its regulators, the milestone is changed. Similarly, the Los Alamos Federal Facility Agreement requires site officials to negotiate cleanup milestones each fiscal year.[23] Because renegotiated milestones are not technically missed, EM avoids any fines or penalties associated with missed milestones.

Site officials we interviewed at the four selected sites stated that it is common for regulators and sites to renegotiate milestones before sites miss them. For example, at the Savannah River Site, both DOE and South Carolina officials said they could not recall any missed milestones among the thousands of milestones completed since the cleanup began. Similarly, Hanford officials told us that since the beginning of the cleanup effort in 1989, more than 1,300 milestones had been completed and only 62 had actually been missed because, in most cases, whenever milestones were at risk of being missed, they were renegotiated. However, officials at these sites could not provide us with the exact number of times milestones had been renegotiated. This is because once milestones are changed, sites are not required to maintain or track the original milestones. As a result, the new milestones become the new agreed-upon time frame, essentially resetting the deadline.

Because EM does not track the original baseline schedule for renegotiated milestone dates, milestones do not provide a reliable measure of program performance. According to best practices identified in GAO's schedule assessment guide, agencies should formally establish a baseline schedule against which performance can be measured.[24] In particular, we have previously found that management does not have the ability to identify and mitigate the effects of unfavorable performance without a formally established baseline schedule against which it can

[23]According to Los Alamos site officials, a 2016 Consent Order includes a single-year milestone table established on DOE's ability to fund cleanup work at the site and targets to lay out plans for the following 2 fiscal years.

[24]GAO-16-89G.

measure performance. We have also found that, without a documented and consistently-applied schedule change control process, program staff may continually revise the schedule to match performance, hindering management's insight into the true performance of the project. In addition, DOE's internal project management policies call for steps to maintain a change control process, including setting a baseline schedule for completing certain activities and maintaining a record of any subsequent deviations from that baseline.[25] EM uses milestones as one of its metrics for measuring the performance of its cleanup efforts, since the milestones are effectively schedule targets. However, since neither EM headquarters nor the sites track renegotiated milestones and their baseline dates at the sites, EM cannot accurately use milestones for managing and measuring the performance of its cleanup program.

## EM Has Not Consistently Reported Required Information to Congress, and the Information It Has Reported Is Incomplete

EM has not consistently reported required information to Congress on the status of its milestones. The National Defense Authorization Act for Fiscal Year 2011 established a requirement for EM to annually provide Congress with a future-years defense environmental cleanup plan. This plan is to contain, among other things, information on the current dates for enforceable milestones at specified cleanup sites, including whether each milestone will be met and, if not, an explanation as to why and when it will be met.[26] However, since 2011, EM has only provided Congress with the required annual plan in 2 years—2012 and 2017—and EM officials told us in September 2018 that they were unsure when EM would release the next future-years plan.[27] EM officials said that, instead of the annual plan, they have provided oral briefings to Congressional staff during the 4 years when a formal report was not produced.

[25]Department of Energy, *Requirements for Management of the Office of Environmental Management's Cleanup Program* (Washington, D.C.: July 2017).

[26]Pub. L. No. 111-383, § 3116(a), 124 Stat. 4512 (codified as amended at 50 U.S.C. § 2582a (2018)). The National Defense Authorization Act for Fiscal Year 2011 required that milestone information from the following sites be included in the annual future-years defense environmental cleanup plans: (1) Idaho National Laboratory; (2) Waste Isolation Pilot Plant; (3) Savannah River Site; (4) Oak Ridge National Laboratory; (5) Hanford Site; (6) any defense closure site of the Department of Energy; and (7) any site of the National Nuclear Security Administration.

[27]Department of Energy, *Future-Years Defense Environmental Management Plan* (Washington, D.C.: September 2012), and *Future-Years Defense Environmental Management Plan: FY 2018 to FY 2070* (Washington, D.C.: August 2017).

In addition, our analysis of the 2012 and 2017 plans EM submitted to Congress identified three ways in which the plans provide inaccurate or incomplete information on EM's enforceable milestones.

- **No historical record.** First, the plans contain no indication of whether each milestone date reported is the original date for that milestone or whether or how many times the milestones listed have been missed or postponed. Instead, the plans report the latest (and most recently renegotiated) dates for the milestones without listing the original dates or acknowledging that some of the milestones have been delayed, in some cases by several years, beyond their original agreed-upon completion dates. For example, we found that at least 14 milestones from the 2012 plan were repeated in the 2017 plan with new forecasted completion dates, but the 2017 plan gave no indication that these milestones had been postponed (see table 3).[28] The milestones' due dates had been pushed back by as many as 6 years without any indication in the 2017 report that they were delayed. As noted above, EM headquarters does not track changes to milestones and EM officials at both headquarters and the sites said that they have not historically kept a record of the original baseline dates for renegotiated milestones they change. As a result, EM officials could not readily provide information on whether the other milestones listed in the 2012 report met their listed due date or whether they were postponed. Headquarters officials stated that to gather this information they would need to survey officials at each site.

**Table 3: Examples of Changed Milestone Dates in Environmental Management's (EM) 2012 and 2017 Future-Years Defense Environmental Cleanup Plans[a]**

| Site | Milestone name | Due date listed in EM's 2012 plan | Due date listed in EM's 2017 plan |
|---|---|---|---|
| Hanford Site | Barrier 3 Construction Complete | 10/31/2014 | 10/31/2019 |
| | Barrier 3 Design/Monitoring Approval From Ecology | 6/30/2013 | 9/30/2018 |
| | Barrier 4 Construction Complete | 10/31/2015 | 10/31/2020 |
| | Barrier 4 Design/Monitoring Approval From Ecology | 6/30/2014 | 9/30/2019 |
| | Complete Disposition Of 300 Area Surplus Facilities | 9/30/2015 | 9/30/2018 |
| | LAW Facility Construction Substantially Complete | 12/31/2014 | 12/31/2020 |

[28]We were able to match the names of 14 milestones in the 2012 report to those in the 2017 report, but there may be other milestones that represent the same cleanup work but whose names changed in the intervening 5 years.

| Site | Milestone name | Due date listed in EM's 2012 plan | Due date listed in EM's 2017 plan |
|---|---|---|---|
| | M-015-21A Submit 200-BP-5 and 200-PO- 1 Operable Unit Feasibility Study Report and Proposed Plan(s) to Ecology | 6/30/2015 | 6/30/2018 |
| | M-016-175, Begin sludge removal from 105-KW Fuel Storage Basin | 9/30/2014 | 9/30/2018 |
| | M-016-176, Complete sludge removal from 105-KW Fuel Storage Basin | 9/30/2015 | 12/31/2019 |
| | M-016-178, Initiate deactivation of 105-KW Fuel Storage Basin | 12/31/2015 | 12/31/2019 |
| | M-024-58F, Initiate Discussions of Well Commitments | 6/1/2013 | 6/1/2018 |
| Idaho National Laboratory | Cease use of tank farm | 12/31/2012 | 12/31/2018 |
| Oak Ridge Reservation | Submit to TDEC a draft plan for disposition of the transuranic waste remaining in Solid Waste Storage Area 5 North-Trench 13 | 8/1/2014 | 6/30/2019 |
| Savannah River Site | Issue Record of Decision for D-Area Operable Unit (Includes 10 sub-units with 10 associated milestones) | 12/6/2016 | 6/30/2019 |

Source: GAO analysis of Department of Energy data. | GAO-19-207

[a]Department of Energy, *Future-Years Defense Environmental Management Plan* (Washington, D.C.: September 2012); and *Future-Years Defense Environmental Management Plan: FY 2018 to FY 2070* (Washington, D.C.: August 2017).

- **Inaccurate forecast.** Second, the forecast completion dates for milestones listed in the 2012 and 2017 plans may not present an accurate picture of the status of the milestones and EM's cleanup efforts. For example, in the 2012 plan, DOE reported that four out of 218 milestones were at risk of missing their planned completion date, while the rest were on schedule. As discussed above, we found 14 of the milestones in the 2012 plan had been postponed and listed again in the 2017 plan.[29] Similarly, the 2017 plan listed only one milestone out of 154 as forecasted to miss its due date. However, because EM does not have a historical record of the changes made to the milestones, it is unclear how many of these milestones represented their original due dates.
- **Incomplete list.** Third, the plans did not include milestones from all of the 10 DOE cleanup sites that EM is required to report on.[30] In 2012, EM did not report milestone information for two of the 10 sites that

[29]This does not include milestones that may have been delayed but did not appear in the 2017 plan.

[30]The act does not require EM to report on six cleanup sites: Brookhaven National Laboratory, Energy Technology Engineering Center, Moab Uranium Mill Tailings Project, Paducah Gaseous Diffusion Plant, Portsmouth Gaseous Diffusion Plant, and West Valley Demonstration Project.

were required to be included in the plan. In the 2017 plan, information was missing for one of the 10 required sites. EM headquarters officials said that this could be because some sites did not update their milestone information or some sites may still be renegotiating new milestones. However, neither report indicated that data were missing for these sites.

As a result of these issues, DOE's future-years defense environmental cleanup plans provide only a partial picture of the milestones and overall cleanup progress made across the cleanup complex, and actual progress made in cleanup is not transparent to Congress. The absence of reliable and complete information on the progress of EM's cleanup mission limits EM's ability to manage its mission and complicates Congress's ability to oversee the cleanup work.

## EM Does Not Analyze the Root Causes of Missed or Postponed Milestones and Does Not Have Guidelines for Considering Root Causes When Renegotiating New Milestones

Best practices and DOE requirements for project management call for a root cause analysis when problems lead to schedule delays, but EM officials at both headquarters and selected sites have not analyzed reasons why milestones are missed or postponed. According to best practices identified in GAO's cost estimating guide, agencies should identify root causes of problems that lead to schedule delays and renegotiated milestones.[31] Specifically, when risks materialize (i.e., when milestones are missed or delayed), risk management should provide a structure for identifying and analyzing root causes. The benefits of doing so include developing a better understanding of the factors that caused milestones to be missed and providing agencies with information to more effectively address those factors in the future. In addition, DOE has recently emphasized the importance of doing this kind of analysis. In 2015, DOE issued a directive requiring sites to do a root cause analysis when the project team, program office, or independent oversight offices determine that a project has breached its cost or schedule thresholds.[32] This directive, which applies to all programs and projects within DOE, calls for "an independent and objective root cause analysis to determine

[31]GAO, *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs,* GAO-09-3SP (Washington, D.C.: Mar. 2, 2009).

[32]Department of Energy, *Memorandum for Heads of All Department Elements: Project Management Policies and Principles* (Washington, D.C.: June 8, 2015). This language is mirrored in DOE's order that outlines guidance for managing capital asset projects. See Department of Energy, *Program and Project Management for the Acquisition of Capital Assets*, Order 413.3B, Chg. 5 (Washington, D.C.: April 12, 2018).

the underlying contributing causes of cost overruns, schedule delays, and performance shortcomings," such as missed or postponed milestones.

However, EM has not done a complex-wide analysis of the reasons for missed or postponed milestones. Similarly, officials we interviewed at the four selected sites said that they were not aware of any site-wide review of why milestones were missed or postponed. According to headquarters officials, this analysis has not been done because EM has determined that DOE requirements governing this type of analysis apply only to contract schedules, not regulatory milestones, and that missed or postponed milestones are not necessarily an indication of cleanup performance shortcomings. However, as previously noted in this report, missing or postponing milestones is a systemic problem across the cleanup complex that makes it difficult for DOE to accurately identify cleanup performance shortcomings. Because EM has not analyzed why it has missed or postponed milestones, EM cannot address these systemic problems and consider those problems when renegotiating milestones with regulators.[33] Without such analysis, EM and its cleanup regulators lack information to set more realistic and achievable milestones and, as a result, future milestones are likely to continue to be pushed back, further delaying the cleanup work. As we have reported previously, these delays lead to increases in the overall cost of the cleanup.[34]

## Conclusions

The federal government faces a large and growing future environmental liability, the vast majority of which is related to the cleanup of radioactive and hazardous waste at DOE's 16 sites around the country. EM has responsibility for addressing the human health and environmental risks presented by this contamination in the most cost-effective way. However, most of EM's largest projects are significantly delayed and over budget, and state regulators for nearly all of EM's cleanup sites have responded by initiating enforcement actions, often leading to additional agreements,

[33]EM issued standard operating procedures for negotiating milestones in 2013. This document specifies such things as which milestone changes require headquarters approval and when sites must prepare a negotiating strategy before meeting with regulators to make changes. See Department of Energy, *Review and Approval of Regulatory Agreements, Milestones and Decision Document: U.S. Department of Energy Office of Environmental Management Standing Operating Policies and Procedures (SOPP)* (Washington, D.C.: April 2013).

[34]GAO-19-28.

including administrative orders and court settlements, in addition to initial federal facility agreements to ensure those risks are addressed.

EM relies on cleanup milestones, among other metrics, to measure the overall performance of its operations activities, and EM reports that very few of its cleanup milestones over the past 2 decades have been missed. However, EM's self-reported performance in achieving milestones does not provide an accurate view of actual progress in cleaning up sites. EM has not established clear definitions for tracking and reporting milestones and does not have any requirements governing the way sites are to update milestone information. As a result, EM's internal tracking of these milestones has inconsistencies. Additionally, since the requirement to annually report on the status of milestones was set in 2011, EM has produced only two reports to Congress, and these were inaccurate and incomplete. Without a clear and consistent approach to collecting and reporting this data, including the history of milestone changes, EM cannot accurately use milestones for managing and measuring the performance of its cleanup program. The absence of reliable and complete information on the progress of EM's cleanup mission also limits EM's and Congress's ability to oversee the cleanup work. In addition, without a root cause analysis of why milestones are missed or postponed, EM and its cleanup regulators lack information to set more realistic and achievable milestones. As a result, future milestones are likely to continue to be pushed back, further delaying the cleanup work, which will likely increase cleanup costs and risks to human health and the environment.

## Recommendations for Executive Action

We are making the following four recommendations to DOE:

The Assistant Secretary of DOE's Office of Environmental Management should update EM's policies and procedures to establish a standard definition of milestones and specify requirements for both including and updating information on milestones across the complex. (Recommendation 1)

The Assistant Secretary of DOE's Office of Environmental Management should track original milestone dates as well as changes to its cleanup milestones. (Recommendation 2)

The Assistant Secretary of DOE's Office of Environmental Management should comply with the requirements in the National Defense Authorization Act by reporting annually to Congress on the status of its cleanup milestones and including a complete list of cleanup milestones

for all sites required by the act. The annual reports should also include, for each milestone, the original date along with the currently negotiated date. (Recommendation 3)

The Assistant Secretary of DOE's Office of Environmental Management should conduct root cause analyses of missed or postponed milestones. (Recommendation 4)

## Agency Comments and Our Evaluation

We provided a draft of this report to DOE for review and comment. DOE provided written comments, which are reproduced in appendix II; the agency also provided technical comments that we incorporated in the report as appropriate. Of the four recommendations in the report, DOE agreed with three, and partially agreed with one.

- Regarding the recommendation that DOE update EM's policies and procedures to establish a standard definition of milestones and specify requirements for both including and updating information on milestones across the complex, the agency agreed with the recommendation. DOE stated that these policy-driven reforms can improve the efficiency of milestone tracking.
- Regarding the recommendation that DOE track changes to cleanup milestones, the agency agreed with the recommendation. DOE stated that EM currently monitors milestone status, including changes as the need for changes are identified and as part of its ongoing communication with field offices, and therefore DOE considers the recommendation to be closed. However, as we noted in the report, neither EM headquarters nor the sites track the original baseline schedule for renegotiated milestone dates. We adjusted the language of the recommendation to make clear that the EM Assistant Secretary should track original milestone dates as well as changes to cleanup milestones. DOE stated in its written comments that EM does not believe that tracking original and changed milestones will strengthen EM's ability to use milestones to manage and measure the performance of its cleanup program. However, as we noted in this report, according to best practices identified in GAO's schedule assessment guide, agencies should formally establish a baseline schedule against which performance can be measured. We have found that, without a documented and consistently-applied schedule change control process, program staff may continually revise the schedule to match performance, hindering management's insight into the true performance of the project. In addition, DOE's internal project management policies call for steps to maintain a change control

process, including setting a baseline schedule for completing certain activities and maintaining a record of any subsequent deviations from that baseline.

- Regarding our recommendation that DOE comply with the requirements in the National Defense Authorization Act by reporting annually to Congress on the status of its cleanup milestones and including a complete list of cleanup milestones for all sites required by the act, the agency partially agreed with the recommendation. DOE stated that additional budget and clarification of purpose and scope would be required to fulfill this recommendation. As we point out in our report, DOE has not fully complied with requirements established by the act, including not submitting all required annual reports and, even when DOE did submit these reports, its reporting omitted information about some sites. DOE stated that EM is reviewing options to address this recommendation.
- Regarding our recommendation that DOE conduct root cause analyses of performance shortcomings that lead to missed or postponed milestones, the agency agreed with the recommendation and stated that EM is evaluating options to implement it. However, DOE stated that there may be multiple reasons why milestones are changed, and not all of the changes are due to DOE performance. To acknowledge the uncertainty in the causes of missed or postponed milestones, we adjusted the language of the recommendation to clarify that the EM Assistant Secretary should conduct root cause analyses of missed or postponed milestones.

In addition, in its written comments, DOE disagreed with the draft report's description of the process and authorities related to renegotiating compliance milestones, stating that EM cannot and does not unilaterally delay/postpone milestones and that EPA and state regulator approval of milestone changes is required. We agree, and the report states that it is common for regulators and sites to renegotiate milestones before sites miss them. DOE also disagreed with the draft report’s characterization of the coordination between EM sites and headquarters in tracking milestones. In particular, DOE’s written comments state that site-specific databases include all regulatory compliance milestones drawn from applicable agreements, while the headquarters database tracks major enforceable milestones. However, as our report notes, because not all sites make the same distinction between major and non-major milestones, sites are not consistently reporting the same types of milestones to EM headquarters. In addition, DOE’s written comments state that EM sites and headquarters routinely collaborate and discuss the status of milestones via meetings and EM periodically requests that

sites verify the data in the EM headquarters database. Nevertheless, as our report notes, EM requirements governing the submission of milestone information do not specify when or how often sites are to update this information.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Energy, and other interested parties. In addition, this 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 trimbled@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.

David C. Trimble
Director, Natural Resources and Environment

# Appendix I: Department of Energy (DOE) Cleanup Sites

## Brookhaven National Laboratory

The Brookhaven National Laboratory was established in 1947 by the Atomic Energy Commission. Formerly Camp Upton, a U.S. Army installation site, Brookhaven is located on a 5,263-acre site on Long Island in Upton, NY, approximately 60 miles east of New York City. Historically, Brookhaven was involved in the construction of accelerators and research reactors such as the Cosmotron, the High Flux Beam Reactor, and the Brookhaven Graphite Research Reactor. These accelerators and reactors led the way in high-energy physics experiments and subsequent discoveries but also resulted in radioactive waste. To complete the cleanup mission, DOE is working to build and operate groundwater treatment plants, decontaminate and decommission the High Flux Beam Reactor and the Brookhaven Graphite Research Reactor, and dispose of some wastes off-site.

## Energy Technology Engineering Center

The Energy Technology Engineering Center occupies 90 acres within the 290 acre Santa Susana Field Laboratory 30 miles north of Los Angeles, California. The area was primarily used for DOE research and development activities. In the mid-1950s, part of the area was set aside for nuclear reactor development and testing, primarily related to the development of nuclear power plants and space power systems, using sodium and potassium as coolants. In the mid-1960s, the Energy Technology Engineering Center was established as a DOE laboratory for the development of liquid metal heat transfer systems to support the Office of Nuclear Energy Liquid Metal Fast Breeder Reactor program. DOE is now involved in the deactivation, decommissioning, and dismantlement of contaminated facilities on the site.

## Hanford Site

DOE is responsible for one of the world's largest environmental cleanup projects: the treatment and disposal of millions of gallons of radioactive and hazardous waste at its 586 square mile Hanford Site in southeastern Washington State. Hanford facilities produced more than 20 million pieces of uranium metal fuel for nine nuclear reactors along the Columbia River. Five plants in the center of the Hanford Site processed 110,000 tons of fuel from the reactors, discharging an estimated 450 billion gallons of liquids to soil disposal sites and 53 million gallons of radioactive waste to 177 large underground tanks. Plutonium production ended in the late 1980s. Hanford cleanup began in 1989 and now involves (1) groundwater monitoring and treatment, (2) deactivation and decommissioning of contaminated facilities, and (3) the construction of the waste treatment

and immobilization plant intended, when complete, to treat the waste in the underground tanks.

## Idaho National Laboratory

DOE's Idaho Site is an 890-square-mile federal reserve, situated in the Arco Desert over the Snake River Plain Aquifer in central Idaho. The Idaho Cleanup Project involves the environmental cleanup of the Idaho Site, contaminated with legacy wastes generated from World War II-era conventional weapons testing, government-owned research and defense reactors, spent nuclear fuel reprocessing, laboratory research, and defense missions at other DOE sites.

## Lawrence Livermore National Laboratory

The 1-square-mile Lawrence Livermore National Laboratory site is an active, multi-program DOE research laboratory about 45 miles east of San Francisco. A number of research and support operations at Lawrence Livermore handle, generate, or manage hazardous materials that include radioactive wastes. The site first was used as a Naval Air Station in the 1940s. In 1951, it was transferred to the U.S. Atomic Energy Commission and was established as a nuclear weapons and magnetic fusion energy research facility. Over the past several years, Lawrence Livermore constructed several treatment plants for groundwater pumping and treatment and for soil vapor extraction. These systems will continue to operate until cleanup standards are achieved.

## Los Alamos National Laboratory

Los Alamos National Laboratory is located in Los Alamos County in north central New Mexico. The laboratory, founded in 1943 during World War II, served as a secret facility for research and development of the first nuclear weapon. The site was chosen because the area provided controlled access, steep canyons for testing high explosives, and existing infrastructure. The Manhattan Project's research and development efforts that were previously spread throughout the nation became centralized at Los Alamos and left a legacy of contamination. Today, the Los Alamos National Laboratory Cleanup Project is responsible for the treatment, storage, and disposition of a variety of radioactive and hazardous waste streams; removal and disposition of buried waste; protection of the regional aquifer; and removal or deactivation of unneeded facilities.

## Moab Uranium Mill Tailings Project

The Moab Site is located about 3 miles northwest of the city of Moab in Grand County, Utah. The former mill site encompasses approximately 435 acres, of which about 130 acres is covered by the uranium mill

tailings pile. Uranium concentrate (called yellowcake), the milling product, was sold to the U.S. Atomic Energy Commission through December 1970 for use in national defense programs. After 1970, production was primarily for commercial sales to nuclear power plants. During its years of operation, the mill processed an average of about 1,400 tons of ore a day. The milling operations created process-related wastes and tailings, a radioactive sand-like material. The tailings were pumped to an unlined impoundment in the western portion of the Moab Site property that accumulated over time, forming a pile more than 80 feet thick. The tailings, particularly in the center of the pile, have a high water content. Excess water in the pile drains into underlying soils, contaminating the ground water.

## Nevada National Security Site

In 1950, President Truman established what is now known as the Nevada National Security Site in Mercury, Nevada, to perform nuclear weapons testing activities. In support of national defense initiatives, a total of 928 atmospheric and underground nuclear weapons tests were conducted at the site between 1951 and 1992, when a moratorium on nuclear testing went into effect. Today, the site is a large, geographically-diverse research, evaluation, and development complex that supports homeland security, national defense, and nuclear nonproliferation. In Nevada, DOE activities focus on groundwater, soil, and on-site facilities; radioactive, hazardous, and sanitary waste management and disposal; and environmental planning.

## Oak Ridge Reservation

DOE's Oak Ridge Reservation is located on approximately 33,500 acres in eastern Tennessee. The reservation was established in the early 1940s by the Manhattan Engineer District of the U. S. Army Corps of Engineers and played a role in the production of enriched uranium during the Manhattan Project and the Cold War. DOE is now working to address excess and contaminated facilities, remove soil and groundwater contamination, and enable modernization that allows the National Nuclear Security Administration to continue its national security and nuclear nonproliferation responsibilities and the Oak Ridge National Laboratory to continue its mission for advancing technology and science.

## Paducah Gaseous Diffusion Plant

The Paducah Gaseous Diffusion Plant, located within an approximately 650-acre fenced security area in in McCracken County in western Kentucky, opened in 1952 and played a role in the production of enriched uranium during and after the Cold War until ceasing production for

commercial reactor fuel purposes in 2013. Decades of uranium enrichment and support activities required the use of a number of typical and special industrial chemicals and materials. Plant operations generated hazardous, radioactive, mixed (both hazardous and radioactive), and nonchemical (sanitary) wastes. Past operations also resulted in soil, groundwater, and surface water contamination at several sites located within plant boundaries.

## Portsmouth Gaseous Diffusion Plant

The Portsmouth Gaseous Diffusion Plant is located in Pike County, Ohio, in southern central Ohio, approximately 20 miles north of the city of Portsmouth, Ohio. Like the Paducah Plant, this facility was also initially constructed to produce enriched uranium to support the nation's nuclear weapons program and was later used by commercial nuclear reactors. Cleanup activities here are similar to those at the Paducah Plant.

## Sandia National Laboratories

The Sandia National Laboratories comprises 2,820 acres within the boundaries of the 118 square miles of Kirtland Air Force Base and is located about 6 miles east of downtown Albuquerque, New Mexico. It is managed by the National Nuclear Security Administration. Sandia National Laboratories was established in 1945 for nuclear weapons development, testing, and assembly for the Manhattan Engineering District. Beginning in 1980, the mission shifted toward research and development for nonnuclear components of nuclear weapons. Subsequently, the mission was expanded to research and development on nuclear safeguards and security and multiple areas in science and technology.

## Savannah River Site

The Savannah River Site complex covers 198,344 acres, or 310 square miles, encompassing parts of Aiken, Barnwell, and Allendale counties in South Carolina, bordering the Savannah River. The site is a key DOE industrial complex responsible for environmental stewardship, environmental cleanup, waste management, and disposition of nuclear materials. During the early 1950s, the site began to produce materials used in nuclear weapons, primarily tritium and plutonium-239. Five reactors were built to produce nuclear materials and resulted in unusable by-products, such as radioactive waste. About 35 million gallons of radioactive liquid waste are stored in 43 underground tanks. The Defense Waste Processing Facility is processing the high-activity waste, encapsulating radioactive elements in borosilicate glass, a stable storage form. Since the facility began operations in March 1996, it has produced

more than 4,000 canisters (more than 16 million pounds) of radioactive glass.

## Separations Process Research Unit

The Separations Process Research Unit is an inactive facility located at the Knolls Atomic Power Laboratory in Niskayuna, New York, near Schenectady. The Mohawk River forms the northern boundary of this site. Built in the late 1940s, its mission was to research the chemical process to extract plutonium from irradiated materials. Equipment was flushed and drained, and bulk waste was removed following the shutdown of the facilities in 1953. Today, process vessels and piping have been removed from all the research unit's facilities. In 2010, cleanup of radioactivity and chemical contamination in the Lower Level Railroad Staging Area, Lower Level Parking Lot, and North Field areas was completed.

## Waste Isolation Pilot Plant

The Waste Isolation Pilot Plant is an underground repository located near Carlsbad, New Mexico, that is used for disposing of defense transuranic waste. The plant is managed by DOE's Office of Environmental Management and is the only deep geological repository for the permanent disposal of defense generated transuranic waste.

## West Valley Demonstration Project

The West Valley Demonstration Project occupies approximately 200 acres within the 3,345 acres of land called the Western New York Nuclear Service Center. The project is located approximately 40 miles south of Buffalo, New York. The West Valley Demonstration Project Act of 1980 established the project. The act directed DOE to solidify and dispose of the high-level waste and decontaminate and decommission the facilities used in the process. The land and facilities are not owned by DOE. Rather, the project premises are the property of the New York State Energy Research and Development Authority. DOE does not have access to the entire 3,345 acres of property.

# Appendix II: Comments from the Department of Energy

**Department of Energy**
**Washington, DC 20585**

JAN 2 4 2019

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

Dear Mr. Trimble:

This letter provides the Department of Energy (DOE) Office of Environmental Management's (EM) response to the draft Government Accountability Office (GAO) report, "DOE Should Take Actions to Improve Oversight of Cleanup Milestones" (GAO-19-207) ("draft report"). EM requests this letter be incorporated into the final report.

EM appreciates the GAO assessment of regulatory compliance milestones related to the cleanup and management of DOE defense nuclear facilities, and provides in this letter clarifications and responses to the recommendations made in the draft report. While EM does not believe a milestone tracking system can drive cleanup performance by itself, EM agrees that tracking milestones is an important tool. EM plans to make the milestone tracking system a more effective and efficient tool. More importantly, EM believes its recent initiatives to include end-state contracting, a new fee advisory board, and enhancements to Performance Evaluation and Management Plans (PEMPs) will drive significant improvements in cleanup performance.

**Points of Clarification**

**EM Coordination on Milestone Tracking.** EM disagrees with the draft report's characterization of the coordination between EM sites and headquarters in tracking milestones. Specifically, EM disagrees that maintaining EM headquarters and site milestone datasets causes inconsistencies in the milestone data. By design, site-specific and EM headquarters databases serve different purposes. Site-specific databases include all regulatory compliance milestones drawn from applicable agreements, decrees, and other sources. Sites use these comprehensive datasets to facilitate routine engagements with regulators. For example, a given site may use the dataset for prioritization planning, a necessary and fundamental activity given ongoing cleanup data analysis and single year budget outlays. The EM headquarters database tracks major enforceable milestones such as activities that include important decisions and on-the-ground cleanup work. EM uses this focused dataset to address complex-wide questions.

EM disagrees with the draft report's claim that "sites do not consistently provide EM headquarters with the most up-to-date information on the status of milestones at each site." EM sites and headquarters routinely collaborate and discuss the status of milestones in monthly site briefings, annual budget preparation meetings, and annual

agreements, milestones, and decision documents (AMDD) reporting. EM also periodically requests that sites verify the data in the EM headquarters database to support up-to-date completeness and accuracy.

**Causes of and Process for Renegotiating Milestones.** EM disagrees with the draft report's limited description of the drivers for renegotiating milestones and does not believe the draft report accurately describes the drivers and authorities related to milestone renegotiation. There may be multiple reasons why milestones are changed, and not all of the changes are due to DOE performance. For example, some of the milestones require regulator action (e, g., timely review of a DOE document). The draft report also asserts that EM "performance shortcomings" lead to "missed milestones." This is not always true. Regulatory compliance milestone performance is the product of several interrelated, dynamic factors. The fact that EM routinely renegotiates milestones with regulators does not automatically signal an EM deficiency that requires analysis and reform.[1] In most instances, milestones are renegotiated according to established processes to address technical, regulatory, or financial challenges, that the parties to the cleanup agreements agree are appropriate to support a revised milestone date. For example, milestones may be renegotiated to limit liabilities, fines, and/or penalties. In other cases, routine renegotiations are built into the cleanup agreements. Rolling milestone arrangements, for example, include annual renegotiations of outyear milestones to proactively overcome cleanup uncertainties, inconsistent budgets, and enable adjustments to priorities by design (e.g., Los Alamos).

EM also disagrees with the draft report's description of the process and authorities related to renegotiating compliance milestones. EM cannot and does not unilaterally delay/postpone milestones. EPA and state regulator approval of milestone changes is required. EPA and state regulators, rather than EM, often drive renegotiation. For example, GAO listed the Oak Ridge Trench 13 milestone as an example of a changed milestone. In that case, EM submitted the required plan well ahead of the milestone date in the enforceable order. However, upon receipt and review, the Tennessee Department of Environment & Conservation (TDEC) non-concurred on the preferred option. EM and TDEC ultimately agreed to defer the milestone and provide TDEC additional information supporting the options. Therefore, the State regulator drove and approved the milestone change.

**Utility and Costs of Tracking Historical Original and Changed Milestones.** The draft report does not clearly explain or acknowledge the foreseeable expenditure of resources that would be required to expand the EM milestone dataset to include milestone dates since their inception. EM does not agree with the draft report's position that tracking original and changed milestones will strengthen EM's ability to use milestones to manage and measure the performance of its cleanup program. Original milestone dates have limited utility once changed because EM does not have sole authority over the milestone

[1] At Hanford, the parties have often used the existing provisions of the Tri-Party Agreement (e.g., Modification of Agreement, Good Cause for Extensions, Resolution of Disputes) to address regulatory compliance milestone issues. The administrative record for the Tri-Party Agreement, while voluminous, is available online at the following link: https://pdw.hanford.gov/arpir/

tracking and renegotiation process. Regulators, and their distinct discretionary preferences, are significant drivers in how milestones should be set, tracked, enforced, prioritized, implemented, and renegotiated in federal facility and other environmental compliance agreements.

**Responses to Recommendations**

**Recommendation 1:** The EM Assistant Secretary should update EM's policies and procedures to establish a standard definition of milestones and specify requirements for both including and updating information on milestones across the complex.

Management Response: Concur. EM supports the recommendation to develop written definitions and guidance to strengthen consistency with respect to approaching corporate-level data entry for regulatory compliance milestones. EM agrees that policy driven reforms can improve the efficiency of milestone tracking.

Estimated completion date: September 30, 2019.

**Recommendation 2:** The EM Assistant Secretary should track changes to cleanup milestones.

Management Response: Concur. EM currently monitors milestone status, including changes as the need for changes are identified and as part of its ongoing communication with field offices.

Estimated completion date: EM considers this recommendation closed.

**Recommendation 3:** The EM Assistant Secretary should comply with the requirements in the National Defense Authorization Act by reporting annually to Congress on the status of its cleanup milestones and including a complete list of cleanup milestones for all sites required by the Act. The annual reports should also include, for each milestone, the original date along with the currently negotiated date.

Management Response: Partially Concur. EM is reviewing options to address this recommendation. However, additional budget and clarification of purpose and scope would be required to fulfill this recommendation.

Estimated completion date: December 31, 2019.

**Recommendation 4:** The EM Assistant Secretary should conduct root cause analyses of performance shortcomings that lead to missed or postponed milestones.

Management Response: Concur. EM is evaluating options to address this recommendation, including the possibility of elaborating on milestone performance in other, conventional root cause analyses of cleanup activities. For example, a more accurate view of actual progress in cleaning up sites might be found in EM's site "key

performance goals," in accordance with the GPRA [Government Performance and Results Act] Modernization Act of 2010.

Estimated completion date: September 30, 2019.

If there are questions, please contact me or Ms. Elizabeth A. Connell, Acting Associate Principal Deputy Assistant Secretary for Regulatory and Policy Affairs, at (202) 586-0637.

Sincerely,

Anne Marie White
Assistant Secretary
for Environmental Management

# Appendix III: GAO Contact and Staff Acknowledgments

## GAO Contact

David C. Trimble, (202) 512-3841 or trimbled@gao.gov

## Staff Acknowledgments

In addition to the contact named above, Nico Sloss (Assistant Director), Jeffrey T. Larson (Analyst in Charge), Natalie M. Block, Antoinette C. Capaccio, R. Scott Fletcher, Cindy K. Gilbert, Richard P. Johnson, Jeffrey R. Rueckhaus, Ilga Semeiks, Sheryl E. Stein, and Joshua G. Wiener made key contributions to this report.