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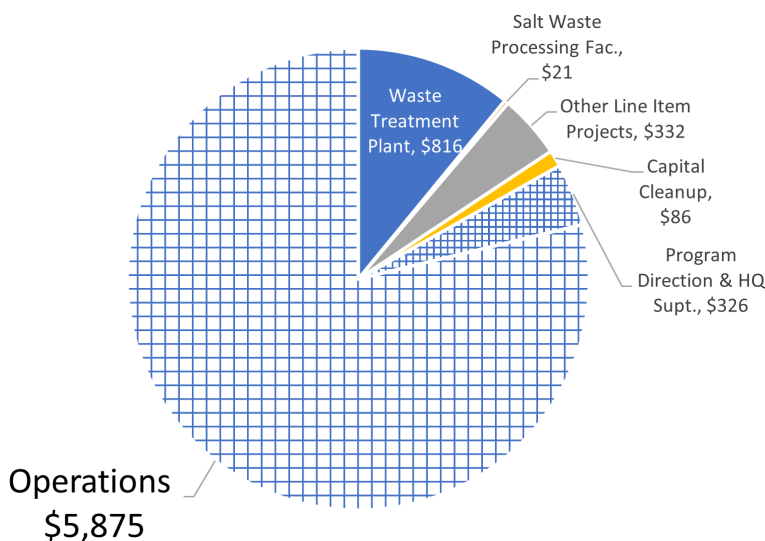
## Review of Effectiveness and Efficiency of Defense Environmental Cleanup Activities of the Department of Energy's Office of Environmental Management: First Report

The U.S. Department of Energy's Office of Environmental Management (DOE-EM) is currently responsible for cleaning up and disposing of waste at 17 sites in the continental United States contaminated by work supporting the civilian nuclear fuel cycle, naval propulsion, or nuclear weapons development. Eleven of these sites are co-located with currently operating DOE facilities; the other six are inactive other than for cleanup and disposal activities. All of these sites require some form of soil and groundwater cleanup or treatment, building demolition and disposal (often on-site), and/or waste processing and immobilization. DOE EM, with a budget authority in Fiscal Year 2020 of over \$7 billion for cleanup and site services, manages the contractors that perform these activities.

At the request of Congress, per the National Defense Authorization Act of Fiscal Year 2019, the National Academies of Sciences, Engineering, and Medicine formed a committee to review the effectiveness and efficiency of the management of EM projects. This first report considers overall project management practices, project management metrics and outcomes, and contract structures and performance measures. The second report,

expected in mid-2021, will focus on specific DOE-EM sites to assess how effective the management of the numerous projects at the sites are contributing to the wider programmatic objectives of EM.

The EM program, which began in 1989, has made substantial progress over the past several decades, primarily evidenced by its reduction by 90 percent of the footprint of contaminated sites in terms of land area. EM also has made changes in response to external and DOE internal management reviews by adopting several management improvements. However, completion of cleanup and disposal activities at the 17 sites remaining in the EM portfolio will take many decades, so project completions and site closures will no longer suffice as the principal program performance metric. Moreover, estimates of financial liability for cleanup of the remaining sites



*Spending on projects (in millions of dollars) subject to Order 413.3B (solid wedges, \$1,255 million) and activities not subject to it (cross-hatched wedges) in Fiscal Year 2020.*

have outpaced the rate of cleanup expenditures, with total cleanup liabilities currently estimated at over \$400 billion, about 60 times the current annual EM budget. While EM has adopted many management reforms in recent years, challenges remain, with further opportunities to improve program effectiveness and efficiency.

## PROJECT MANAGEMENT

DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, was developed in the 1990s in response to concerns about project management effectiveness across the entire DOE enterprise. The study committee compared the requirements and procedures of Order 413.3B with other leading international protocols and best practices for project management. It found that Order 413.3B generally compares favorably with these other benchmarks, but there are several areas where DOE could further enhance the Order.

One example is that EM only applies Order 413.3B to construction projects, major items of equipment and a subset of environmental cleanup projects with estimated total project costs of \$50 million or higher. This interpretation of Order 413.3b means that most EM activities do not fall under the Order, and such activities thus do not benefit from the full range of proven processes, requirements, and tracking. ***The committee recommends that DOE confirm, clarify, and expand DOE Order 413.3B to establish its applicability to all capital asset projects and all DOE-EM projects. DOE-EM should reduce the threshold value for applicability of Order 413.3B from \$50 million to \$20 million, as is being considered in other parts of DOE.*** In addition, EM should evaluate the benefits of applying the requirements for Project Execution Plans equivalent to those in Order 413.3B to those activities that are managed as projects (versus operations) and which are not currently managed under Order 413.3B.

## PROJECT MANAGEMENT METRICS

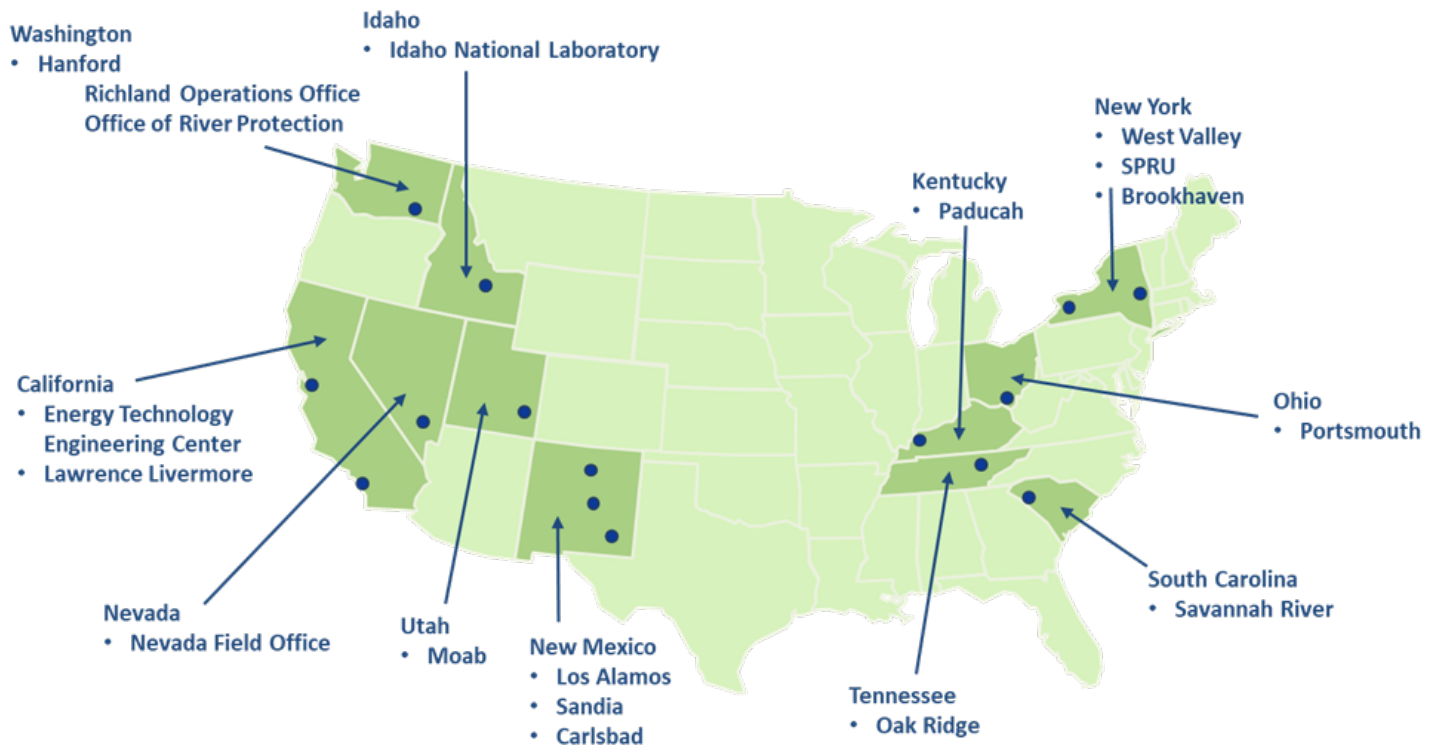
DOE-EM, with the help of DOE's Office of Project Management, has developed detailed processes and methods for tracking project-level outcomes and success measures. DOE-EM's portfolio of projects (work that is subject to 413.3B) is approximately 25 percent of its annual budget. The percentage of actively tracked projects using a certified Earned Value Management System (for monitoring project management through an integrated set of work scopes, schedules, and budgets) is smaller.

DOE-EM project management issues are not unique to that office. As EM increases its project management responsibilities using Indefinite Delivery/Indefinite Delivery (IDIQ) contracts, ***EM should form collaborations to share best project management practices with teams facing analogous challenges for the Naval Facilities Engineering Systems Command (NAVFAC) and Base Realignment and Closure (BRAC) and Formerly Used Defense Sites (FUDS) activities.***

The other key measure of project performance is cost management. Performance of the EM portfolio is currently calculated based on the number of projects by weighing the number that are performing versus those that are not, meaning one large, costly project will have the same weight as a small one. This disproportionately weights many small projects toward their overall performance. To correct this, ***DOE-EM should calculate overall performance based on aggregate value, not the number of projects that are performing well.***

Delays to the scheduled completion of projects can have a dramatic effect on cost as well. ***DOE-EM should implement a modification to its Earned Value Management System (EVMS) to track schedule performance, through the use of a revised Schedule Performance Index (SPI(t)), defined as the ratio of Scheduled Time of Work Performed and Actual Time of Work Performed.***

Another area for improvement is the reporting of cost information in the project dashboards and project success reports. Currently, DOE-EM integrates all cost overruns into binary success metrics of Yes/No, which do not



Sites in EM inventory as of 2020. SOURCE: Adapted from Todd Shrader, Principle Deputy Assistant

provide information on the magnitude of a cost overrun or underrun. ***DOE-EM should explicitly include the percentage of cost over- or under-run in their Project Success metrics dashboard to bring more transparency to cost performance.***

## CONTRACTING

Creating and motivating a culture of completion is important to DOE-EM's mission success. The committee concurs with the imperative of outcomes-based completion contracting and agrees with the need to build on past, successful initiatives such as the contracts that governed the Rocky Flats and Fernald cleanup projects. DOE-EM has advanced the end state contracting model (ESCM) as a new and improved vehicle for achieving outcomes-based completion contracting. The committee has carefully reviewed the ESCM concept and compared it to the attributes of the completion contracts successfully deployed at the Fernald and Rocky Flats site. The committee found that many of the completion contracts' features that made Fernald and Rocky Flats successful are not present in the current ESCM.

The committee found that ESCM focuses on delivering a set of discrete outputs that DOE-EM does not clearly map to a clearly defined intermediate or final end-state. This deficiency deprives DOE-EM and the contractor of benefitting from a completion-oriented contract fully integrated throughout the supply chain and fostering innovation at the scale the program requires. ***DOE-EM should establish well-defined, outcomes-based intermediate end-states in its ten-year cleanup contracts. Any intermediate outcomes should have clear, measurable metrics to assess site-based achievement of the defined end-states.*** EM should report progress on these metrics across the portfolio of end-state programs every quarter, and such reports should represent a key EM performance measure.

DOE-EM's reliance on "discrete tangible progress" through individual task orders under an IDIQ contract without identifying an overall strategy or program management plan, is not, in the committee's view, outcomes-based contracting. Breaking up the scope of work into many discrete tasks diminishes the focus on outcomes from the overall project. The committee believes that EM can adapt the current contract procurement process by awarding larger task orders that define one or more intermediate end states, involving the completion of a discrete, defined set of jobs, thereby reducing residual risk to DOE-EM. Larger task orders could increase the opportunity for contractor innovation and provide focused oversight at a higher level within DOE-EM. ***DOE-EM should structure task orders on a scale appropriate for defining intermediate outcomes and award fewer individual tasks.*** DOE-EM should apply to such task orders the same management oversight as currently required for Major Systems Projects (MSP) exceeding the threshold of \$750 million in total cost.

## CONTRACT EXECUTION: FEES AND INCENTIVES

DOE-EM seeks to obtain the maximum return from its contractors by offering a balanced mix of integrated, fair, and challenging incentives. DOE-EM contracts typically provide a two-part fee structure consisting of a base fee and a performance fee. The performance fee generally includes both objective and subjective fee components and must relate to clearly defined performance objectives and measures. However, DOE-EM's rating of contractor performance does not appear consistent through the years for a specific contract or across contracts in a specific year. To increase transparency in contractor performance evaluation, the committee recommends that ***DOE-EM should create a consolidated set of unambiguous "subjective" criteria for similar types of cleanup activities, and use these criteria in the evaluation of all contract performance across its portfolio.***

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