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DEPARTMENT OF ENERGY

Observations on Project and Program Cost Estimating in NNSA and the Office of Environmental Management

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Highlights

Highlights of GAO-13-510T, a testimony before the Subcommittee on Strategic Forces, Committee on Armed Services, U. S. Senate

Why GAO Did This Study

DOE's NNSA and EM ensure the safety, security, and reliability of the U.S. nuclear weapons stockpile and address environmental cleanup of Cold War sites. Together, NNSA and EM have outlined plans that could commit American taxpayers to $450 billion in programs and projects over decades to address their missions. NNSA and EM oversee contracts for the execution of both projects, including capital asset acquisitions, and programs central to the achievement of their missions. GAO has reported on the status of DOE's projects and programs and has repeatedly identified cost overruns as compared with cost estimates. A realistic cost estimate provides a basis for both an accurate budget and effective resource allocation. In a time of fiscal constraint, Congress needs high-quality cost information upon which to make decisions about NNSA's and EM's projects and programs.

This testimony focuses on GAO's (1) prior findings and preliminary observations from ongoing work on cost-estimating practices for NNSA's and EM's capital asset projects, and (2) prior findings and preliminary observations from ongoing work on cost-estimating practices for NNSA's operating programs. It is largely based on prior GAO reports issued from January 2010 to February 2013. For its ongoing work, GAO reviewed DOE policies, orders, and guidance and interviewed DOE, NNSA, and contractor officials.

GAO is making no new recommendations. DOE continues to act on the recommendations GAO has made to improve cost estimating. GAO will continue to monitor implementation of these recommendations.

View GAO-13-510T. For more information, contact David Trimble at (202) 512-3841 or trimbled@gao.gov.

What GAO Found

For more than a decade, GAO has reported on the challenges the Department of Energy's (DOE) National Nuclear Security Administration (NNSA) and the Office of Environmental Management (EM) have faced in meeting their projects' cost performance targets as developed in estimates and for ensuring that these cost estimates are based on sound assumptions. NNSA and EM are included on GAO's High-Risk List in recognition of the potential for vulnerabilities to fraud, waste, abuse, and mismanagement in contract administration and management of major projects. In January 2010, GAO reported on DOE's project cost-estimating practices and found that DOE did not have a cost-estimating policy and that cost-estimating guidance it had developed in the 1990s remained in effect but was out-of-date. GAO also found that DOE was taking steps to improve its cost-estimating practices, such as establishing the Office of Cost Analysis (OCA) in 2008 to improve cost-estimating capabilities and better ensure that project cost estimates are reliable by providing a new independent cost-estimating function. Both DOE's NNSA, a separately organized agency within the department, and EM adopted policies and practices to support cost estimating. GAO is conducting an ongoing review of DOE's and NNSA's cost-estimating practices for this Subcommittee. Its preliminary observations indicate that while DOE followed through on some of GAO's January 2010 recommendations to improve the department's cost-estimating practices—such as revising the department's project management order to better align it with some cost-estimating best practices—it has not addressed other recommendations with which it initially concurred. For example, GAO's preliminary observations indicate that OCA has been disbanded, and DOE may not have developed a cost-estimating policy.

To develop budget estimates for operating programs, NNSA has implemented a planning, programming, budgeting, and evaluation (PPBE) process, which provides a framework for the agency to plan, prioritize, fund, and evaluate program activities. In particular, NNSA's PPBE policy includes a process by which the agency reviews the cost-estimating practices used by its contractors and its program office to validate future budget requests. In June 2010, GAO reported on NNSA's program to operate and maintain weapons facilities and infrastructure and found that NNSA could not accurately identify the total costs of this program's activities. GAO determined that, for fiscal year 2009, the costs of the activities associated with this program totaled over $500 million more than the budget request for it. Building on these findings, in July 2012, GAO reported on NNSA's implementation of its PPBE process, particularly in the area of validating programs' budget requests, and found deficiencies that GAO concluded effect the credibility and reliability of those estimates. For example, GAO found that NNSA officials conducted informal, undocumented reviews of budget estimates that contractors submitted because, according to agency officials, the agency's trust in its contractors minimized the need for formal review of budget estimates provided by them. Further, GAO found that NNSA's annual budget validation review process occurred too late in its budget cycle to inform agency or congressional budget development or appropriations decisions. GAO made recommendations to address these two deficiencies, and NNSA agreed with these recommendations. Preliminary observations from GAO's ongoing work for this Subcommittee on DOE cost estimating show that DOE and NNSA may not have specific cost-estimating requirements or guidance for programs to support the budget formulation process, an issue on which GAO did not make recommendations in its July 2012 report.

GAO plans to report on this ongoing work later this year.

Chairman Udall, Ranking Member Sessions, and Members of the Subcommittee:

Thank you for the opportunity to discuss our work on project and program cost estimating and related budget information in the National Nuclear Security Administration (NNSA), a separately organized agency within the Department of Energy (DOE), and DOE's Office of Environmental Management (EM). In fiscal year 2012, NNSA and EM received appropriations of over $16 billion to ensure the safety, security, and reliability of the U.S. nuclear weapons stockpile and to address the environmental cleanup of Cold War sites. Together, NNSA and EM have outlined plans that could commit American taxpayers to $450 billion in programs and projects over decades to address their missions. Specifically, in 2011, NNSA put forward plans to modernize the U.S. nuclear security enterprise at a cost of $88 billion over the next decade and a total cost of over $180 billion to do so through 2031.[1] In 2012, DOE estimated that its total liability for environmental cleanup, the largest component of which is managed by EM, is almost $270 billion and includes responsibilities that could continue beyond the year 2087.[2] In a time of fiscal constraint, Congress needs high-quality cost and budget information upon which to make decisions about NNSA's and EM's projects and programs. Our recent and ongoing work on cost estimating, budget validation, and program expenditures highlight some of the challenges Congress faces in getting reliable and accurate cost information from NNSA and EM that it can use to make cost-informed decisions and effectively conduct oversight.[3]

NNSA and EM oversee contracts for the execution of both projects, including capital asset acquisitions, and programs central to the

[1]U.S. Department of Energy, *FY 2012 Stockpile Stewardship and Management Plan* (Washington, D.C.: Apr. 15, 2011).

[2]U.S. Department of Energy, *Fiscal Year 2012 Agency Financial Report,* DOE/CF-0081 (Washington, D.C.: Nov. 14, 2012).

[3]See, for example, GAO, *Department of Energy: Actions Needed to Develop High-Quality Cost Estimates for Construction and Environmental Cleanup Projects,* GAO-10-199 (Washington, D.C.: Jan. 14, 2010); GAO, *Nuclear Weapons: Actions Needed to Identify Total Costs of Weapons Complex Infrastructure and Research and Production Capabilities,*GAO-10-582 (Washington, D.C.: June 21, 2010); and GAO, *Modernizing the Nuclear Security Enterprise: NNSA's Reviews of Budget Estimates and Decisions on Resource Trade-offs Need Strengthening,*GAO-12-806 (Washington, D.C.: July 31, 2012).

achievement of their missions. DOE defines a capital asset acquisition project as having a defined start and end point with a cost that includes both purchase price and all other costs incurred to bring it to a form and location suitable for its intended use. Capital asset project costs exclude operating expenses that are part of routine operations and maintenance functions. Examples of ongoing DOE capital asset projects include NNSA's Uranium Processing Facility at the Y-12 National Security Complex in Tennessee—currently estimated to cost up to $6.5 billion—and EM's Waste Treatment and Immobilization Plant in Washington, currently estimated to cost $13.4 billion. While capital asset projects are a visible part of DOE's budget, these projects comprise a relatively small portion of the total budget. In fiscal year 2012, capital asset projects comprised just under 10 percent of NNSA's budget, and approximately 90 percent of that budget was for operating programs. DOE defines a program as an organized set of activities directed toward a common purpose or goal and characterized by a strategy for accomplishing one or more definite objectives. A program includes routine operations and maintenance costs and can include projects in its scope. An example of an ongoing program is NNSA's Tritium Readiness Program—a program to produce a steady supply of tritium, a key isotope used in nuclear weapons—that has had an annual funding requirement of about $70 million.

For NNSA, work activities on both projects and programs are largely carried out by management and operating (M&O) contractors at NNSA's eight government-owned, contractor-operated sites.[4] For EM, with a remaining environmental cleanup mission covering 17 sites in 11 states, cleanup work activities are carried out by contractors as projects, such as by Washington River Protection Solutions for the operation of nuclear waste tanks at the Hanford Site in Washington.

[4]M&O contracts are agreements under which the federal government contracts for the operation, maintenance, or support, on its behalf, of a government-owned or -controlled research, development, special production, or testing establishment wholly or principally devoted to one or more of the major programs of the contracting federal agency. Federal Acquisition Regulation, 48 C.F.R. § 17.601. Specifically, NNSA manages three national nuclear weapons design laboratories—Lawrence Livermore National Laboratory in California, Los Alamos National Laboratory in New Mexico, and Sandia National Laboratories in New Mexico and California. It also manages four nuclear weapons production plants—the Pantex Plant in Texas, the Y-12 National Security Complex in Tennessee, the Kansas City Plant in Missouri, and the Tritium Extraction Facility at DOE's Savannah River Site in South Carolina. NNSA also manages the Nevada National Security Site, formerly known as the Nevada Test Site.

For decades, we have reported on the status of DOE's major projects (i.e., those costing $750 million or more) and programs and have repeatedly identified project cost overruns and schedule delays, as well as missed programmatic milestones. For example, in November 1996, we reported that, as of June 1996, most of DOE's completed major projects and at least half of its 34 ongoing projects were experiencing cost overruns and/or schedule delays.[5] Thirteen years later in March 2009, we testified that DOE had added nearly $14 billion and 45 years to its initial cost and schedule estimates of then ongoing construction projects, and it added an additional $25 billion to $42 billion and an additional 68 to 111 years to initial cost and schedule estimates of ongoing environmental cleanup projects.[6] Further, in our March 2009 report, we found that NNSA was able to meet its refurbishment schedule for a life extension program only by changing the objectives of the program and, among other things, reducing the number of refurbishments needed for program completion.[7] In February of this year, NNSA and EM were again included on GAO's High-Risk List in recognition of the potential for vulnerabilities to fraud, waste, abuse, and mismanagement in contract administration and management of major projects.[8]

In 2008, DOE completed an effort to document its contract and project management challenges, which involved identifying issues that significantly impeded the department's ability to complete projects within

[5]GAO, *Department of Energy: Opportunity to Improve Management of Major System Acquisitions.* GAO/RCED-97-17 (Washington, D.C.: Nov. 26, 1996).

[6]GAO, *Department of Energy: Contract and Project Management Concerns at the National Nuclear Security Administration and Office of Environmental Management,* GAO-09-406T (Washington, D.C.: Mar. 4, 2009).

[7]The end of the Cold War caused a dramatic shift in how the nation maintains nuclear weapons. Instead of designing, testing, and producing new nuclear weapons, the strategy shifted to maintaining the existing nuclear weapons stockpile indefinitely. Life extension programs extend, through refurbishment, the operational lives of weapons in the nuclear stockpile by 20 to 30 years and certify these weapons' military performance requirements without underground nuclear testing. NNSA is currently conducting life extension programs for multiple weapon types in the U.S. stockpile, including the Air Force's B61 gravity bomb. GAO, *Nuclear Weapons: NNSA and DOD Need to More Effectively Manage the Stockpile Life Extension Program,*GAO-09-385 (Washington, D.C.: Mar. 2, 2009).

[8]GAO, *High-Risk Series: An Update,*GAO-13-283 (Washington, D.C.: February 2013). In our 2013 High-Risk Update, we narrowed the focus of NNSA's and EM's high-risk designation to focus on major projects, those with individual values of $750 million or greater.

budget and on schedule. DOE undertook this exercise—known as a root-cause analysis—as part of its effort to be removed from our list of agencies at high risk for fraud, waste, abuse, and mismanagement. The top contract and project management issue identified in that root-cause analysis was that DOE often does not complete front-end planning to an appropriate level before establishing a project's performance baseline—a project's cost, schedule, and scope— including for cost estimates and budget planning. According to cost estimating best practices compiled in our March 2009 Cost Estimating and Assessment Guide,[9] the most rigorous method reviewers have in validating a project's cost estimate is the independent cost estimate. Generated by an entity that has no stake in the approval of a project, an independent cost estimate provides an independent validation of expected project costs, according to our cost-estimating guide. An independent cost estimate is usually developed based on the same technical parameters as the project team's estimate, so the estimates are comparable. Conducting an independent cost estimate is especially important at major milestones because it provides senior decision makers with a more objective assessment of the likely cost of a project. In mid-2008, DOE adopted a corrective action plan designed to mitigate the issues identified in the root-cause analysis. The corrective action plan included a set of actions designed to establish and implement a "federal independent government cost estimating capability" to address the issues it identified related to cost estimating.

Since that time, DOE has taken steps to improve the cost-estimating aspects of contract and project management in NNSA and EM, but weaknesses persist. In a time of fiscal constraint, Congress needs high-quality cost information upon which to make decisions about NNSA's and EM's projects and programs. A realistic cost estimate provides a basis for accurate budgeting and effective resource allocation, which increases the probability of a project's or program's success in meeting its goals. My testimony today is based primarily on reports we issued from January 2010 to February 2013. Specifically, I will focus my testimony on (1) our prior findings on cost-estimating practices for NNSA's and EM's capital asset projects, as well as preliminary observations from our ongoing work for this Subcommittee on NNSA cost-estimating practices for such

[9]The guide is a compilation of cost-estimating best practices drawn from across industry and government. GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, GAO-09-3SP (Washington, D.C.: March 2009).

projects and (2) our prior findings on cost estimating and related budget information for NNSA's programs, as well as preliminary observations from our ongoing work for this Subcommittee on NNSA's cost-estimating practices for such programs. Detailed information on our scope and methodology for our prior work can be found in these reports.

To develop our preliminary observations, we reviewed DOE and NNSA policies, orders, and guidance related to preparing and reviewing cost estimates, as well as past GAO reports. We interviewed DOE, NNSA, and contractor officials to discuss the requirements and guidance used to prepare and review these estimates. We are conducting our ongoing work 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. We obtained DOE's and NNSA's views on the new information in our testimony concerning our ongoing work on DOE's and NNSA's cost-estimating practices.

Background

NNSA relies primarily on the requirements in DOE Order 413.3B for planning and executing projects, from identification of need through project completion.[10] This project management order requires, among other things, that cost estimates be established for these projects, and an independent review of these estimates be conducted for larger projects. For example, for projects with a total cost of greater than $100 million, DOE's Office of Acquisition and Project Management is required to validate the accuracy and completeness of a project's performance baseline, including its estimated cost, at certain important milestones. DOE's project management order establishes five major milestones—or "critical decision points"—that span the life of a project as follows:

- Milestone 0: Approve mission need.
- Milestone 1: Approve alternative selection and cost range. At this milestone, DOE completes the conceptual design, selects its

[10]DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets,* was issued in November 2010. It supersedes earlier DOE Orders 413.3A and 413.3.

preferred approach, and approves the project's preliminary cost range.

- Milestone 2: Approve the performance baseline—defined as a project's cost, schedule, and scope (the activities needed to achieve project goals). At this milestone, DOE completes its preliminary design and develops a definitive cost estimate, which is no longer a range. This cost estimate is to be used for establishing the project's funding profile throughout construction, and it informs annual budget requests.

- Milestone 3: Approve the start of construction.

- Milestone 4: Approve the start of operations or project completion.

DOE's project management order specifies the requirements that must be met for a project, along with the documentation necessary, to move past each project milestone; the order also requires that DOE senior management review the supporting documentation and approve the project at each milestone. DOE also provides suggested approaches for meeting the requirements contained in its project management order through additional guidance that is not mandatory. NNSA has supplemental requirements and guidance for establishing and reviewing project cost estimates, including requirements for conducting independent cost estimates, and a cost-estimating guide that provides additional suggestions on preparing and reviewing cost estimates.

With respect to operating programs, DOE Order 130.1 on program budget formulation—approved in 1995 and listed as current on DOE's website for Directives, Delegations, and Requirements—outlines the requirements for the department's annual budget formulation process, including that budget requests for operating programs "shall be based on cost estimates that have been fully reviewed and deemed reasonable" by the cognizant program organization. To this end, DOE's budget formulation order recognizes that operating programs' cost estimates bear a direct relationship to the future budget estimates for these programs. Further, consistent with Federal Accounting Standards Advisory Board guidance, NNSA is required to provide reliable and timely information on the full cost of its programs because this information is crucial for effective

management of government operations and for budget oversight.[11] To develop budget estimates for operating programs, NNSA is required under section 3252 of the National Defense Authorization Act for Fiscal Year 2000—the NNSA Act—to develop a planning, programming, and budgeting process that operates under sound financial and fiscal management principles.[12] Beginning in 2002, NNSA issued policies that identify the responsibilities of NNSA management, program and site offices, and contractors throughout the agency's budget cycle, including for validating programs' budget requests by reviewing aspects of cost estimating.[13] According to NNSA's policy, the cycle is composed of four phases—planning, programming, budgeting, and evaluation (PPBE)—and their associated activities, which together provide a framework for the agency to plan, prioritize, fund, and evaluate its program activities. While these phases appear to be sequential, the process is continuous and concurrent because of the amount of time required to develop priorities and review resource requirements.

- *Planning.* NNSA is to identify the goals it needs to achieve over the next 5 years and the program activities needed to meet those goals.

- *Programming.* NNSA is to determine which program activities and funding levels it will include in its next budget proposal to DOE. This determination is based on analysis of the activities' estimated costs, as well as the need to meet the NNSA goals defined in the planning process. To determine these activities, NNSA program offices are to work with their contractors to obtain estimates for the cost of the program activities identified in the planning phase.

- *Budgeting.* NNSA is to integrate its planning and programming priorities into DOE's departmental budget process by (1) submitting its

[11]Federal Accounting Standards Advisory Board, *Statement of Federal Financial Accounting Standards No., 4, Managerial Cost Accounting Standards and Concepts* (Washington, D.C.: July 31, 1995).

[12]NNSA was created by the National Defense Authorization Act for Fiscal Year 2000 (Pub. L. No. 106-65, § 3201 et seq. [1999]).

[13]See GAO, *National Nuclear Security Administration: Additional Actions Needed to Improve Management of the Nation's Nuclear Programs,* GAO-07-36 (Washington, D.C.: Jan. 19, 2007). In 2008, NNSA revised many of these policies and issued others in response to our findings in 2007 of deficiencies in how the agency ensures the validity of its budget estimates and how it decides to allocate its resources.

proposed budget to DOE and participating in a strategic review process; (2) validating its budget request by, in part, reviewing the cost-estimating practices used by the NNSA contractors and program offices; and (3) executing the budget and controlling funds to achieve the priorities established in the programming phase and maintain fiscal limits.

- *Evaluation*. NNSA is to employ an ongoing cycle of evaluations to review program performance.

Accurately identifying the activities necessary to conduct a program is a key aspect of PPBE's programming phase. NNSA documents the activities associated with a program, as well as the sites responsible for conducting these activities, in work breakdown structures—management tools used to identify the work activities that completely define a program. We published best practices for establishing work breakdown structures in our March 2009 cost-estimating guide.[14] Among other things, these best practices discuss establishing work breakdown structures that allow a program to track cost by defined deliverables, promote accountability by identifying work products that are independent of one another, and provide a basis for identifying resources and tasks for developing a program cost estimate. The ability to generate reliable cost estimates is a critical function, and a program's cost estimate is often used to establish its budgets.

Observations on Cost Estimating Practices for NNSA and EM Projects

For more than a decade, we have reported on the challenges NNSA and EM have faced in meeting their projects' cost performance targets as developed in cost estimates and for ensuring that the cost estimates developed are based on sound assumptions. In our most recent *High-Risk Update*, we reported that, as of August 2012, NNSA was managing 3 major projects with estimated costs totaling as much as $17.2 billion and that EM was managing 7 major projects with estimated costs totaling as much as $48.5 billion.[15] We examined these 10 projects, but we were only able to analyze changes in cost estimates for 7 of them because of limitations in the data. For these 7 projects, we determined that DOE has added as much as $16.5 billion to original cost estimates with further cost

[14]GAO-09-3SP.

[15]GAO-13-283.

increases anticipated. While each of these projects has faced significant technical execution challenges, the extent of their cost growth as compared with project estimates calls into question the quality of those original estimates. For example:

- We reported in February 2011 that NNSA's project to design and construct a new Uranium Processing Facility at the Y-12 National Security Complex in Tennessee had experienced nearly sevenfold cost growth from its 2004 estimate to the current estimate of from $4.2 to $6.5 billion.[16] Since our February 2011 report, the facility is to be redesigned and enlarged to correct issues concerning processing equipment at an additional cost of $540 million, and the initial scope of the project has been significantly reduced. According to NNSA officials, the initial cost estimate for the Uranium Processing Facility, as well as subsequent revisions were based on an estimate to construct a less complex facility and assumed a funding profile where annual appropriations were not subject to budgetary constraints.

- We reported in March 2012 that NNSA's project to design and construct a new plutonium facility at Los Alamos National Laboratory in New Mexico had experienced a nearly sixfold increase from $3.7 billion to $5.8 billion before being deferred for at least 5 years.[17] We found that the facility's original design may not have met all of the mission needs identified.

- In December 2012, we reported that the estimated cost to construct EM's Waste Treatment and Immobilization Plant at the Hanford Site in Washington has tripled to $13.4 billion since its inception in 2000.[18] Significant technical challenges remain unresolved, contributing to uncertainty as to whether the project will operate safely and effectively.

DOE's approach to managing the work its contractors perform, including developing project cost estimates, has been a challenge for 30 years. In 1982, we reported that DOE did not have sufficient guidance to provide to

[16]GAO, *High-Risk Series: An Update,* GAO-11-278 (Washington, D.C.: February 2011).

[17]GAO, *Modernizing the Nuclear Security Enterprise: New Plutonium Facility at Los Alamos May Not Meet All Mission Needs,* GAO-12-337 (Washington, D.C.: Mar. 26, 2012).

[18]GAO, *Hanford Waste Treatment Plant: DOE Needs to Take Action to Resolve Technical and Management Challenges,* GAO-13-38 (Washington, D.C.: Dec. 19, 2012).

its contractors for developing cost estimates.[19] DOE subsequently implemented a cost-estimating policy that increased oversight by, among other things, placing a headquarters-based office in charge of cost estimating and requiring it to conduct independent cost estimates. The policy also directed DOE to establish guidance that outlined procedures to be used by contractors when generating estimates and by DOE officials reviewing them. In the mid-1990s, however, as part of a governmentwide management reform movement, DOE rescinded its cost-estimating policy and replaced it with a less prescriptive one that did not contain specifics on cost estimating but rather focused on managing the life cycles of the department's physical assets.

In January 2010, we reported on DOE's project cost-estimating practices.[20] We found that DOE continued to lack a cost-estimating policy and that the cost-estimating guide it developed in the 1990s remained in effect.[21] We also found that the guide was out of date and did not contain important components. For example the guide assigned responsibilities to offices that no longer existed and was based on policies that had been canceled. In addition, we found that the guide did not contain sufficient information to help ensure that a cost estimator following the guide would successfully create a high-quality cost estimate. However, we also found that DOE was taking steps to improve its cost-estimating practices. For example, DOE established the Office of Cost Analysis (OCA) in 2008 to improve cost-estimating capabilities and better ensure that project cost estimates are reliable by providing a new independent cost-estimating capability. Further, EM acted to place cost estimators at its large sites and establish an internal cost-estimating office capable of providing cost-estimating assistance primarily to its smaller sites. In addition, NNSA adopted a policy that, among other things, specified when independent cost estimates should be conducted. Our report recommended, among other things, that DOE issue a revised cost-estimating policy and updated guidance as soon as possible, requiring that an independent cost estimate be conducted for major projects at Milestones 1, 2, and 3. DOE generally concurred with the recommendations we made in this report but

[19]GAO, *Further Improvements Needed in the Department of Energy for Estimating and Reporting Project Costs,* GAO/MASAD-82-37 (Washington, D.C.: May 26, 1982).

[20]GAO-10-199.

[21]U.S. Department of Energy, *Cost Estimating Guide,* DOE G 430.1-1 (Washington, D.C.: Mar. 29, 1997).

did not concur with conducting an independent cost estimate at all three of these milestones. Rather, at this time DOE explained that its new policy would require an independent cost estimate for Milestones 1 and 2, but not for Milestone 3 unless warranted by risk and performance indicators or required by senior officials.

We are conducting an ongoing review of the department's and NNSA's cost-estimating practices for this Subcommittee. In particular, we are reviewing the extent to which NNSA's current cost estimating requirements and guidance for projects and programs align with cost-estimating best practices. Preliminary observations from our ongoing work indicate that departmental and NNSA cost-estimating practices for projects and programs need revision to align with cost-estimating best practices in our 2009 guide.[22] Our ongoing review, in many ways, picks up where our January 2010 report left off. After initially concurring with most of the recommendations we made in that report to improve the department's cost-estimating practices, DOE followed through on some of our recommendations, such as requiring an independent cost estimate for Milestone 2 for projects with a projected cost of $100 million or more; however, other actions appear to fall short of what is needed to ensure that DOE's cost-estimating practices fully adhere to best practices. Our ongoing work is focused on several aspects of DOE and NNSA's cost-estimating requirements and guidance, including the following:

- *The department may have a continuing need for a cost-estimating policy.* DOE has not established a cost-estimating policy. DOE's 2008 Root-Cause Analysis identified an insufficient independent cost-estimating capability as one of the top five reasons that DOE was unable to complete projects on cost and schedule. The analysis found that not having a cost-estimating policy was one of the root causes contributing to problems with cost estimating. DOE tasked OCA with, among other things, implementing actions to improve cost estimating within DOE, including reestablishing a cost-estimating policy and updating associated guidance. As we previously reported, having a cost-estimating policy would establish roles and responsibilities for those preparing, reviewing, and updating all types of cost estimates.[23]

[22]To evaluate whether NNSA is meeting cost estimating best practices, we relied on our cost-estimating guide, GAO-09-3SP.

[23]GAO-10-199.

Such a policy would also identify when different cost estimates would be conducted, while also serving as a mechanism for providing standardized cost-estimating procedures to agency officials and contractors. DOE subsequently disbanded OCA and, instead of issuing a specific cost-estimating policy, chose instead to revise its project management order and supplemental guidance that sets requirements and provides suggestions on how to manage capital asset acquisition projects. While the revisions to the order and guide included some provisions to improve project cost-estimating practices, the project management order and supplemental guide only apply to activities involving capital asset acquisition projects and do not apply to the broader range of departmental activities involving cost estimating.[24] As part of our ongoing work, we will examine whether establishing a departmental cost-estimating policy that would apply to all departmental activities—including operating programs and noncapital asset projects, rather than just capital asset projects—could contribute to improvements in departmental cost estimating.[25] For example, information on the costs of program activities can be used as a basis to estimate future costs in preparing and reviewing budgets.

- *The department's revised project management order appears not to meet cost-estimating best practices.* Our preliminary observations indicate that as we found in 2010, DOE's project management order continues not to meet cost-estimating best practices.[26] We noted in our 2010 report that this order did not specify (1) how cost estimates should be developed, (2) which phases of a project should be included in the estimate, (3) how the estimate should be maintained throughout the life of a project, and (4) when an independent cost estimate should be prepared. DOE revised its order in November 2010 to, among other things, include a requirement that an independent cost estimate be prepared prior to the approval of

[24]According to DOE's capital asset acquisition order, capital asset acquisition projects typically include planning and execution of construction, assembly, renovation, modification, environmental renovation, decontamination and decommissioning, large capital equipment, and technology development activities.

[25]Noncapital asset projects may be managed as operating projects. Examples of such projects include stabilization, packaging, storage, transportation, and disposition of waste and nuclear materials and facility shutdown and deactivation activities.

[26]GAO-10-199.

Milestone 2 for projects with total project costs equal to or greater than $100 million. This revision partially addresses the issue involving independent cost estimates but does not fully align with best practices that propose independent cost estimates should also be prepared for Milestones 1 and 3.[27] Beyond this revision, DOE's revised order does not address any of the other shortcomings we reported on in 2010 as noted above. Our ongoing work will include a more detailed assessment of how this order could better align with cost-estimating best practices.

- *NNSA and DOE cost-estimating guidance may not fully align with cost-estimating best practices*. NNSA and DOE issued cost-estimating guides in 2010 and 2011, respectively, as part of efforts to improve cost-estimating practices. Our preliminary observations on these guides show that each generally aligns with cost-estimating best practices but also falls short in a few areas. For example, our preliminary observations on NNSA's 2010 guide show that it meets or substantially meets 8 of the 12 criteria in our 2009 cost-estimating guide[28] and that it partially or minimally meets, four other criteria—these other criteria are in the areas of determining the structure of the estimate, conducting risk and uncertainty analysis, conducting sensitivity analyses, and presenting the estimate to management for approval. Our ongoing review will include a more detailed assessment of the 2010 NNSA and 2011 DOE guides and the extent to which they align with cost-estimating best practices.

- *Other NNSA actions to improve cost-estimating practices may not align with cost-estimating best practices.* NNSA has taken actions in recent years to improve its cost-estimating capabilities, but these actions may not fully reflect cost-estimating best practices. These actions have included (1) issuing a policy in 2009 that defines requirements for conducting independent cost estimates and (2) issuing separate guidance in 2012 to require that preliminary design for high-hazard nuclear facilities be at least 90 percent complete prior

[27]Section 310 of the Consolidated Appropriations Act, 2012 requires a separate independent cost estimate to be developed prior to milestones 2 and 3 for projects under DOE's project management order where the total project cost exceeds $100 million. (Pub. L. No. 112-74, 125 Stat 878 (2011)).

[28]GAO-09-3SP.

to the establishment of a project performance baseline.[29] With respect to NNSA's policy for conducting independent cost estimates, we found that the policy provides NNSA the discretion to conduct independent cost estimates for projects with estimated total costs below $100 million at Milestone 2. NNSA officials explained that a proposed revision to this policy would make these reviews mandatory for Milestone 2. While the revised policy may align with best practices for conducting independent cost estimates at Milestone 2, it may not reflect best practices that also propose conducting these reviews at Milestones 1 and 3. NNSA's guidance for completing 90 percent of the design for high-hazard nuclear facilities before establishing a performance baseline states its objective is to ensure that a highly credible cost estimate is developed prior to establishing a performance baseline. Our preliminary observations show that other projects may benefit from the completion of 90 percent of their preliminary designs, regardless of the extent to which the project is considered high-hazard. In addition, we have observed that NNSA's guidance to implement this requirement is articulated in an NNSA memo that has not yet been translated into official NNSA policy. According to NNSA officials, the 90 percent design requirement will be incorporated into the revision to the independent cost estimating policy. Our ongoing work will further examine these policies and the extent to which they align with cost estimating best practices.

Observations on Cost Estimating and Information for NNSA Programs

In June 2010, we reported on NNSA's program to operate and maintain weapons facilities and infrastructure and found that the agency's budget justification for this program significantly understated its costs.[30] Building on these findings, in July 2012, we reported on NNSA's implementation of its PPBE process, particularly in the area of validating programs' budget requests, and we found deficiencies that we concluded effect the credibility and reliability of those estimates.[31] Preliminary observations from our ongoing work on cost estimating for this Subcommittee show

[29]DOE regulations define three categories of high-hazard nuclear facilities according to their potential to produce significant radiological consequences from an event that could either (1) extend beyond the boundaries of a DOE site, (2) remain within the boundaries of a site, or (3) remain within the immediate vicinity.

[30]GAO-10-582.

[31]GAO-12-806.

that DOE and NNSA may not have any specific cost-estimating requirements or guidance for programs.

In our June 2010 report, which focused on NNSA's fiscal year 2009 budget and expenditures, we reported on the extent to which NNSA's budget justification accurately reflected a program's cost. Specifically, we examined NNSA's program that operates and maintains weapons facilities and infrastructure and found that NNSA's budget justification significantly understated that program's cost.[32] We found that, because of allowable differences in contractors' cost accounting practices, NNSA could not accurately identify the total costs to operate and maintain weapons facilities and infrastructure. This condition is inconsistent with the Federal Accounting Standards Advisory Board standard on Managerial Cost Accounting, which states a general standard for federal agencies to provide reliable and timely information on the full cost of federal programs to allow an organization to assess the reasonableness of program costs and to establish a baseline for comparison. When we asked NNSA's site contractors to provide us with information on their fiscal year 2009 costs for each of the activities described by this program's work breakdown structure, six of eight sites fully responded. The costs for these sites' activities totaled over $500 million more—approximately $1.1 billion—than the $558.6 million NNSA included in its budget request to fund the program at these sites. We determined that one reason NNSA's budget estimate for this program was so different from the costs to execute its work scope was because NNSA's site contractors were not consistent in how they identified the activities they paid for with program funds. We concluded that, without the ability to consistently identify program costs, NNSA did not have the ability to adequately justify future presidential budget requests and risked being unable to identify both the return on investment of planned budget increases and opportunities for cost savings. Further, we recommended that M&O contractors report to NNSA annually on the total costs to operate and maintain weapons facilities and infrastructure to allow Congress to better oversee management of the nuclear security enterprise. NNSA agreed with our report and its recommendations.

Building on these findings, in July 2012, we reported on NNSA's overall budget formulation process, including its implementation of PPBE. We

[32]GAO-10-582.

found that, according to senior NNSA officials, NNSA does not comply with DOE's order on budget formulation because the agency believes the order expired in 2003 and, therefore, no longer applies to NNSA budget activities.[33] DOE's order on budget formulation outlines the requirements for the department's annual budget formulation process including that budget requests "shall fully justify and describe intended program outputs and outcomes" and that budget requests "shall be based on cost estimates that have been thoroughly reviewed and deemed reasonable" by the cognizant program organization. Rather, we found that NNSA is guided by its own policy for the PPBE process, which includes how costs are estimated and validated for operating programs. Our 2012 review found significant deficiencies in NNSA's implementation of its PPBE process, leading us to conclude that the credibility of NNSA's budget proposals for operating programs is reduced, which effectively reduces the ability of Congress to decide on resource trade-offs. For example, we found the following:

- NNSA did not have a thorough, documented process for assessing the validity of its budget estimates prior to their inclusion in the President's budget submission to Congress. Instead, we found that officials conducted informal, undocumented reviews of budget estimates that contractors submitted, and that the level of review varied across site and headquarters program offices. According to NNSA officials, the agency's trust in its contractors minimized the need for formal review of budget estimates provided.

- NNSA's annual budget validation review process occurred too late in the budget cycle to inform agency or congressional budget development or appropriations decisions. We found that, while NNSA policy states that the timing of NNSA's budget validation review process should inform budgeting development and decisions, budget validation reviews were actually completed after the completion of budget formulation process.

- NNSA's budget validation review process was not sufficiently thorough to ensure the credibility and reliability of NNSA's budget because it was limited to assessing the processes contractors and programs used to develop budget estimates rather than assessing the accuracy of the resulting budget estimates. In addition, NNSA

[33]GAO-12-806.

guidance stipulates that to help ensure the validity of budget estimates NNSA conduct its validation process for 20 percent of the agency's programs request annually. However, we found that in fiscal year 2012 NNSA completed validation reviews for only 1.5 percent of its budget request.

In our July 2012 report, we recommended that, to enhance NNSA's ability to better ensure the validity of its budget submissions, and to decide on resource trade-offs, DOE should evaluate its budget formulation order and update it as necessary. Further, we recommended, among other things, that NNSA (1) amend its budget validation review process, to ensure that all budget estimates are thoroughly reviewed by site and headquarters program offices, and that these reviews are timed to inform NNSA, DOE, OMB, and congressional budget decisions and (2) reinstitute an independent cost analysis capability, as it had with OCA, to provide senior decision makers with independent reviews, including an analysis of different options for deciding on resource trade-offs, and facilitate NNSA making the best decisions about what activities to fund and whether they are affordable. NNSA, responding on behalf of DOE, stated that it generally agreed with six of the seven recommendations we made in this report, but NNSA disagreed with our report's characterization that the agency's budget estimate review process is not thorough.

In both our June 2010 and July 2012 reports, we discuss a data system NNSA was developing to provide a consistent framework for managing the PPBE process within NNSA's Office of Defense Programs.[34] In 2010, we found that to support development of this tool, NNSA was revising its work breakdown structure for its program to operate and maintain weapons facilities and infrastructure to ensure (1) that activities associated with the program were identified and (2) that the costs of these activities could be identified.[35] In 2012, we concluded that this type of tool could help NNSA obtain the basic data it needs to make informed management decisions, determine return on investment, and identify opportunities for cost saving.[36] For example, the tool included a

[34]The Office of Defense Programs accounted for 54 percent of the President's fiscal year 2013 budget request for NNSA.

[35]GAO-10-582.

[36]GAO, *National Nuclear Security Administration: Observations on NNSA's Management and Oversight of the Nuclear Security Enterprise,* GAO-12-473T (Washington, D.C.: Feb. 16, 2012).

mechanism to identify when decisions on resource trade-offs must be made if contractor-developed budget estimates for program requirements exceed the budget targets NNSA provided for those programs. Further, NNSA officials stated that they eventually plan to use this tool to compare budget estimates of program activities with the amounts the programs ultimately expended.[37] We learned in March of this year, as part of our work to follow up on recommendations made in our June 2010 report, that the tool is still in development and that NNSA has a pilot project under way to enhance the tool to provide full PPBE reporting for the B61 life extension program.

While development of this tool is positive, our ongoing work for this Subcommittee on cost estimating has identified that at least one NNSA M&O contractor has acknowledged that weaknesses in NNSA's planning and budgeting have led to diminished credibility with the Department of Defense (DOD) and Congress that need to be addressed in the near-term. As such, DOD, in collaboration with NNSA, established an effort in January 2012 to balance the resources and requirements for the U.S. nuclear security enterprise with its budget needs for fiscal years 2014 to 2018, particularly where DOD has allocated funds to NNSA to augment the agency's budget in support of DOD requirements.[38] This effort to examine NNSA's resources and requirements is being conducted by DOD's Office of Cost Assessment and Program Evaluation (CAPE), which is tasked, among other things, with ensuring that the costs of DOD programs are presented accurately and completely. Among the CAPE's early findings has been to question NNSA's cost estimate for its life extension program for the B61 bomb. According to NNSA officials, the CAPE's $10.1 billion July 2012 independent cost assessment for this program was $2.2 billion higher than the cost estimate NNSA included in its Weapon Design and Cost Report. The CAPE identified several

[37]GAO-12-806.

[38]In 2010, the Secretaries of Defense and Energy signed a memorandum of agreement outlining budget commitments between the two agencies to modernize the nuclear weapons infrastructure of the United States and strengthen aspects of stockpile management. The agreement established that DOD would work to transfer to DOE $5.7 billion of budget authority in fiscal years 2011 through 2015 to support specific NNSA programs—such as the life extension program for the W76 warhead—and projects, such as the Uranium Processing Facility discussed above. The recently released *President's Budget for Fiscal Year 2014* provides annual estimates from fiscal year 2015 through 2023 for the amount by which DOD's budget authority will decrease and NNSA's will increase, totaling $14.8 billion.

differences in assumptions that account for the difference between the two estimates. Additionally, the CAPE cited process issues related to NNSA's cost estimate, including a lack of historical data on the costs of previous life extension programs and a lack of a detailed program definition. These are the same types of issues we identified in our June 2010 and July 2012 reports.

Preliminary observations from our ongoing work for this Subcommittee on DOE cost estimating show that DOE and NNSA may lack specific cost-estimating requirements or guidance for programs. We have conducted initial meetings with the managers of several large NNSA programs to determine what requirements and guidance are used to generate cost estimates for the work in their programs. These programs include the Plutonium Disposition Program in NNSA's Office of Defense Nuclear Nonproliferation as well as the B61 Life Extension Program and the Science Campaigns in NNSA's Office of Defense Programs. NNSA officials responsible for the Plutonium Disposition Program told us they have constructed a life cycle cost estimate for the overall program, but that there is no (1) DOE or NNSA requirement that would prescribe how such an estimate should be developed or (2) requirement for an independent review of this estimate. An independent review of such an estimate is important given the magnitude of some of DOE's and NNSA's larger programs—for example, the current life cycle cost estimate for the Plutonium Disposition Program is more than $23 billion. Similarly, NNSA officials responsible for the B61 Life Extension Program told us that in constructing a cost estimate for the program they consulted guidance, including DOE's project management order, but DOE and NNSA do not specify detailed cost estimating methodologies. Unlike the Plutonium Disposition Program, however, the estimate for this program has undergone several reviews, including by the CAPE. NNSA officials in the Science Campaigns told us that their activities are ongoing in nature rather than a more traditional project or program that has a definitive start and end date and, as a result, its cost estimates are prepared by way of the annual budget formulation process and prepared consistently with departmental budget formulation guidance and supplemental NNSA guidance. Our ongoing work will continue to assess these issues to determine how cost estimates are generated for NNSA programs and the extent to which any requirements and guidance for these activities align with cost estimating best practices.

We plan to report on this ongoing work later this year.

Chairman Udall, Ranking Member Sessions, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions you may have at this time.

GAO Contact and Staff Acknowledgments

If you or your staff members have any questions about this testimony, 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 statement. GAO staff who made key contributions to this testimony are Allison B. Bawden and Daniel J. Feehan, Assistant Directors, and Michael Meleady, Timothy Persons, Cheryl Peterson, Karen Richey, Peter Ruedel, Rebecca Shea, Joseph Thompson, and Jack Warner.