



August 2015

MODERNIZING THE NUCLEAR SECURITY ENTERPRISE

NNSA Increased Its Budget Estimates, but Estimates for Key Stockpile and Infrastructure Programs Need Improvement

Accessible Version

GAO Highlights

Highlights of [GAO-15-499](#), a report to congressional committees

Why GAO Did This Study

Nuclear weapons continue to be an essential part of the nation's defense strategy. The end of the cold war resulted in a shift from producing new nuclear weapons to maintaining the stockpile through refurbishment. Also, billions of dollars in scheduled maintenance for nuclear weapons infrastructure has been deferred. The 2010 *Nuclear Posture Review* identified long-term stockpile modernization goals for NNSA that include (1) sustaining a safe, secure, and effective nuclear arsenal and (2) investing in a modern infrastructure.

The National Defense Authorization Act for Fiscal Year 2011 included a provision for GAO to report annually on NNSA's nuclear security budget materials. This report (1) identifies changes in estimates to the 2015 budget materials from the prior year's materials, and (2) assesses the extent to which NNSA's 2015 budget estimates align with plans for major modernization efforts, and (3) addresses the agency's stated goal of stopping the growth of its deferred maintenance backlog.

GAO analyzed NNSA's 2014 and 2015 nuclear security budget materials, which describe modernization plans and budget estimates for the next 25 years, and interviewed NNSA officials.

What GAO Recommends

GAO recommends improving the transparency of future budget materials by identifying potential risks to the achievement of program goals if budget estimates are lower than plans suggest are necessary. NNSA agreed with GAO's recommendations and outlined actions to address them.

View [GAO-15-499](#). For more information, contact David C. Trimble at (202) 512-3841 or trimbled@gao.gov.

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NNSA Increased Its Budget Estimates, but Estimates for Key Stockpile and Infrastructure Programs Need Improvement

What GAO Found

The National Nuclear Security Administration's (NNSA) 25-year budget estimates for modernizing the nuclear security enterprise in its fiscal year 2015 budget materials total \$293.4 billion, which is an increase of \$17.6 billion (6.4 percent) compared with the prior year's materials. NNSA's budget materials are (1) its 2015 congressional budget justification that includes the President's fiscal year budget request and information about 4 additional years of planned budget requests, and (2) its update to its *Stockpile Stewardship and Management Plan* that includes NNSA's long-range, 25-year plans for sustaining the stockpile and modernizing the nuclear security enterprise. Congress funds NNSA's 2015 budget estimates in four program areas: stockpile; infrastructure; science, technology, and engineering capabilities; and other weapons activities. GAO found that some budget estimates for individual programs within these four areas changed more significantly from 2014 to 2015 than the total budget estimates changed. For example, stockpile budget estimates to refurbish nuclear weapons through life extension programs (LEP) decreased by 31 percent in part due to changes in programs' production schedules. In contrast, infrastructure budget estimates for construction projects increased by 71 percent largely because the estimates were more complete than those GAO evaluated in 2014.

For NNSA's major modernization efforts—which include LEPs that are not in full scale production and major construction projects—near-term budget estimates for two of three LEPs align with plans, but estimates for construction projects are too preliminary to assess alignment. NNSA's near-term budget estimates to refurbish its B61 bomb and W88 warhead align with its plans because annual budget estimates reflect internally developed estimated cost ranges for the programs. However, the near-term budget estimates for the cruise missile LEP are not aligned with NNSA's 2015 plans because annual budget estimates are below the low point of the program's internally developed estimated cost range. A 2008 internal review of NNSA's project management stated that failure to request full funding can result in risks to programs' goals such as increased program costs and schedule delays. GAO's prior work has emphasized the importance of transparency in federal agencies' budget presentations because such information helps Congress understand how new funding requests relate to program decisions. Including information in future versions of budget materials on the potential risks to achieving LEPs' goals when funding requests are not aligned with plans would improve the quality of budget materials.

NNSA's infrastructure budget estimates are not adequate to address its reported \$3.6 billion deferred maintenance backlog, and the backlog will continue to grow. One reason the backlog will continue to grow is that the 2015 budget estimates to address the problem fall below DOE infrastructure investment benchmarks for maintaining and recapitalizing existing facilities, activities that can reduce deferred maintenance. NNSA's goal to stop the growth of the backlog is stated in its budget materials, but these materials do not identify that budget estimates for maintenance and recapitalization fall below DOE's infrastructure investment benchmarks. Including information in future versions of budget materials on the potential risks to the achievement of infrastructure goals if budget estimates fall below internal benchmarks would improve the transparency of budget materials.

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Abbreviations

ALT	alteration
CMRR-NF	Chemistry and Metallurgy Research Replacement-Nuclear Facility
DOD	Department of Defense
DOE	Department of Energy
FYNSP	Future-Years Nuclear Security Program
IW	Interoperable Warhead
LEP	life extension program
NNSA	National Nuclear Security Administration
OMB	Office of Management and Budget
OST	Office of Secure Transportation
SSMP	Stockpile Stewardship and Management Plan
ST&E	science, technology and engineering
UPF	Uranium Processing Facility



August 6, 2015

Congressional Committees

Nuclear weapons have been and continue to be an essential part of the nation's defense strategy. During the cold war, the nation designed, tested, and produced new nuclear weapons. Since then, the strategy has shifted to maintaining the existing nuclear weapons stockpile indefinitely without underground nuclear testing as the United States has observed a moratorium on such testing since 1992. To ensure a credible U.S. nuclear deterrent under the moratorium, the United States uses a science-based approach to stockpile stewardship. This approach combines nonnuclear experiments, physics modeling, and computer simulations to predict nuclear weapon performance over a wide range of conditions and scenarios. The Department of Energy's (DOE) National Nuclear Security Administration (NNSA)¹ is responsible for activities in pursuit of this nuclear weapons stockpile stewardship mission, which is largely executed at eight government-owned, contractor-operated sites that comprise its nuclear security enterprise.² NNSA reports that 29 percent of the nuclear security enterprise's approximately 3,800 buildings are over 60 years old.

The 2010 Nuclear Posture Review identified long-term modernization goals for NNSA, including sustaining a safe, secure, and effective nuclear arsenal through the refurbishment of existing weapons to extend their

¹NNSA is a separately organized agency within DOE that is responsible for the management and security of DOE's nuclear weapons, nuclear nonproliferation, and naval reactor programs. In addition to NNSA, two other organizations are responsible for the nation's nuclear weapons program. First, the Department of Defense (DOD) is responsible for implementing the U.S. nuclear deterrent strategy, which includes establishing the military requirements associated with planning for the stockpile. Second, the Nuclear Weapons Council, which is composed of representatives from DOD and DOE, facilitates high-level coordination to secure, maintain, and sustain the nuclear weapons stockpile.

² NNSA oversees 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 oversees four nuclear weapons production plants—the Pantex Plant in Texas; the Y-12 National Security Complex in Tennessee; the National Security Campus in Kansas City, Missouri (formerly known as the Kansas City Plant); and the Savannah River Tritium Enterprise in South Carolina. NNSA also oversees the Nevada National Security Site, formerly known as the Nevada Test Site.

operational lives; increasing investments to rebuild and modernize the nuclear security enterprise's aging infrastructure; and strengthening the science, technology, and engineering (ST&E) base.³ Of particular focus in the 2010 Nuclear Posture Review is the need to recapitalize the nuclear security enterprise's infrastructure by performing major renovations needed to keep existing facilities modern and relevant. In addition to the modernization goals included in the Nuclear Posture Review, the Nuclear Weapons Council established in 2012 a long-term plan for the nuclear weapons stockpile to align NNSA nuclear weapon life extension programs (LEP),⁴ DOD programs to modernize the delivery platforms that carry those weapons, and initial operations for NNSA's plutonium and uranium infrastructure.⁵ According to a senior NNSA official, the agency considers its current major modernization efforts to include three LEPs (currently at various stages of development), as well as major construction projects to replace aging, existing facilities for plutonium (the Chemistry and Metallurgy Research Replacement-Nuclear Facility or its alternative) and uranium (the Uranium Processing Facility).

NNSA's plans and budget estimates⁶ for the modernization activities are included in two key policy documents, updated annually, that together comprise NNSA's nuclear security budget materials.⁷

³Department of Defense, *Nuclear Posture Review Report* (Washington, D.C.: Apr. 6, 2010). Section 1041 of the Floyd D. Spence Defense Authorization Act for Fiscal Year 2001 (Pub. L. No. 106-398) required the Secretary of Defense, in consultation with the Secretary of Energy, to "conduct a comprehensive review of the nuclear posture of the United States for the next 5 to 10 years."

⁴LEPs extend, through refurbishment, the operational lives of weapons in the nuclear stockpile by 20 to 30 years.

⁵Modern nuclear weapons have two stages: the primary, which is the initial source of energy, and the secondary, which is driven by the primary and provides additional explosive energy. Plutonium and uranium are key elements that may be used in these stages.

⁶NNSA refers to the cost figures included in its budget materials over the next 5 years as "budget requirements" and those after 5 years as "estimated budget requirements." We refer to these figures as "budget estimates" throughout this report.

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- First, NNSA’s Stockpile Stewardship and Management Plan (SSMP) provides information on modernization and operations plans and budget estimates over the next 25 years. The SSMP is NNSA’s formal means for communicating to Congress the status of certain activities and its long-range plans and budget estimates for sustaining the stockpile and modernizing the nuclear security enterprise. The SSMP also discusses the current and projected composition and condition of the nuclear weapons stockpile. NNSA has submitted annual plans since 1998, except in 2013.⁸ NNSA’s 2015 SSMP contains information, including budget estimates, on modernization plans for the 5-year Future-Years Nuclear Security Program (FYNSP), as well as long-range budget estimates through 2039.⁹
 - Second, NNSA’s annual justification of the President’s budget request, which typically includes the FYNSP, provides Congress with recommended spending levels for programs, projects, and activities, based on the President’s policy priorities. NNSA’s 2015 budget justification and FYNSP provide information and estimates through 2019.

NNSA’s 2015 budget justification included a goal to stop the growth of the agency’s deferred maintenance backlog—maintenance that was not performed when it should have been or was scheduled to be and therefore is put off or delayed for a future period—which is reported in the 2015 SSMP to be \$3.6 billion.¹⁰ We have previously reported that

⁷A third document that includes information on modernization budget estimates is the annual report DOD and DOE are required to submit jointly to the relevant Senate and House committees and subcommittees, referred to as the “section 1043” report. DOD and DOE are required to submit a detailed report that addresses, among other things, the plan for the nuclear weapons stockpile and its delivery systems and 10-year budget estimates for modernization. As required by law, GAO is reviewing the June 2014 section 1043 report for accuracy and completeness with respect to the budget estimates in another audit.

⁸The 2014 SSMP stated that NNSA did not submit the 2013 SSMP to Congress because analytic work conducted by DOD and NNSA to evaluate future needs for nuclear modernization activities across the nuclear security enterprise was ongoing and, as such, predecisional.

⁹Department of Energy, *Fiscal Year 2015 Stockpile Stewardship and Management Plan Report to Congress* (Washington, D.C.: April 2014).

¹⁰ For the purpose of this report the term maintenance includes maintenance and repair. We have previously reported that NNSA does not have complete information on the condition of its facilities. See GAO, *Nuclear Weapons: NNSA Needs More Comprehensive Infrastructure and Workforce Data to Improve Enterprise Decision-making*, [GAO-11-188](#) (Washington, D.C.: Feb. 14, 2011).

deferring maintenance can reduce the overall life of federal facilities, lead to higher costs in the long term, and pose risks to safety and agencies' missions.¹¹

The National Defense Authorization Act for Fiscal Year 2011 included a provision for GAO to study and report annually on whether NNSA's nuclear security budget materials provide for funding that is sufficient to modernize and refurbish the nuclear security enterprise, as well as recapitalize its infrastructure.¹² This is the fourth year that we have undertaken work in response to this mandate. In June 2011, we briefed the congressional defense committees on our findings based on NNSA's 2012 nuclear security budget materials. We found, among other things, that NNSA's 2012 budget justification and associated FYNSP generally supported the agency's long-range plans, but that a number of issues could affect these plans. These issues included the management of major construction projects without firm cost and schedule baselines, which could lead to project cost growth and schedule slippages that might adversely affect NNSA's modernization plans, as well as challenges in refurbishing weapons using aging infrastructure. In June 2012, we sent a letter to the Senate and House Armed Services Committees that explained that we could not complete our review of the 2013 budget materials because NNSA did not issue the documents required for our review. In December 2013, we reviewed NNSA's 2014 budget materials. We found, among other things, that while total budget estimates for modernization had increased compared with the 2012 budget materials, the 2014 estimates may not represent total funding needed and therefore did not fully align with aspects of these plans.¹³ For example, NNSA did not include in its budget estimates billions of dollars in planned major construction projects because, according to agency officials, these infrastructure plans were too preliminary.

¹¹GAO, *Federal Real Property: Improved Transparency Could Help Efforts to Manage Agencies' Maintenance and Repair Backlog*, [GAO-14-188](#) (Washington, D.C.: Jan. 23, 2014).

¹²Ike Skelton National Defense Authorization Act for Fiscal Year 2011, Pub. L. No. 111-383, § 3113, 124 Stat. 4137, 4509, *amended by* National Defense Authorization Act for Fiscal Year 2013, Pub. L. No. 112-239, § 3132(a)(2), 126 Stat. 1632, 2185 (codified as amended at 50 U.S.C. § 2455).

¹³GAO, *Modernizing the Nuclear Security Enterprise: NNSA's Budget Estimates Do Not Fully Align with Plans*, [GAO-14-45](#) (Washington, D.C.: Dec. 11, 2013).

This report (1) identifies the extent to which budget estimates for modernizing the nuclear security enterprise changed between the 2015 budget materials and the prior year's materials, (2) assesses the extent to which NNSA's budget estimates for its current major modernization efforts align with plans for those estimates, and (3) assesses the extent to which NNSA's 2015 budget estimates for modernizing the nuclear security enterprise address the agency's stated goal of stopping the growth of the deferred maintenance backlog.

To identify the changes to NNSA's budget estimates for modernizing the nuclear security enterprise, we compared the information in the 2014 budget materials with the information in the 2015 versions of those materials and interviewed key NNSA officials. To assess the extent to which the total 2015 budget estimates align with plans for major modernization efforts—which the agency defines as nuclear weapon LEPs and construction projects for plutonium and uranium infrastructure—we compared the budget estimates included in NNSA's 2015 budget materials with its long-range plans included in the SSMP. We discussed any potential misalignments with NNSA officials and also reviewed NNSA's 2016 budget justification to determine whether misalignments identified in the 2015 budget materials persisted. Additionally, we reviewed prior GAO reports on modernization and the specific programs or projects included in NNSA's modernization plans, as well as the GAO Cost Estimating and Assessment Guide.¹⁴ A list of related GAO products is included at the end of this report. To assess the extent to which NNSA's budget estimates address the agency's stated goal of stopping the growth of the deferred maintenance backlog, we reviewed DOE's Real Property Asset Management Plan and departmental guidance for managing real property.¹⁵ We also interviewed NNSA officials responsible for the agency's infrastructure planning efforts.

¹⁴GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs* [GAO-09-3SP](#) (Washington, D.C.: Mar. 2, 2009), p. 38. The *GAO Cost Estimating and Assessment Guide* states that because a reasonable and supportable budget is essential to a program's efficient and timely execution, a competent estimate is the key foundation of a good budget. Additionally, credible cost estimates help program offices justify budgets to Congress, the Office of Management and Budget, department secretaries, and others.

¹⁵Real property is property that includes facilities and land. Department of Energy, *Real Property Asset Management Plan* (Washington, D.C.: August 2005) and the Department of Energy, *Three Year Rolling Timeline: Implementing the Goals and Objectives of DOE's Asset Management Plan* (Washington, D.C.: March 2013).

We compared estimates in the 2015 budget materials with infrastructure investment benchmarks contained in DOE's Real Property Asset Management Plan and discussed potential misalignments with NNSA officials.

To assess the reliability of the data underlying NNSA's budget estimates, we reviewed the data to identify missing values, outliers, or other anomalies; interviewed knowledgeable NNSA officials about the data and their methodologies for using the data to construct their estimates; and compared the figures in the 2015 budget justification with those in the 2015 SSMP to ensure that they were consistent. We determined that the data were sufficiently reliable for our purposes. However, we did not assess the reliability of NNSA's underlying budget estimating processes. As in prior reviews, we limited the scope of our review to NNSA's Weapons Activities appropriations account, which is the account used to fund modernization activities, according to agency officials.¹⁶ All data are presented in current dollars unless otherwise noted. A detailed description of our objectives, scope, and methodology can be found in appendix I.

We conducted this performance audit from July 2014 to August 2015 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

Congress funds NNSA's modernization efforts through various activities and programs within the Weapons Activities appropriation that generally address four areas: (1) stockpile, (2) infrastructure, (3) ST&E capabilities, and (4) other weapons activities.¹⁷ The four areas, which are described in

¹⁶NNSA's 2015 budget consists of four appropriation accounts: (1) Defense Nuclear Nonproliferation, (2) Naval Reactors, (3) Federal Salaries and Expenses (formerly known as the Office of the Administrator), and (4) Weapons Activities. The 2015 budget request for all four appropriations totaled \$11.7 billion, with \$8.3 billion—or 71 percent—requested for Weapons Activities.

¹⁷The 2014 SSMP used the term ST&E capabilities, but the 2015 SSMP changed the name to research, development, testing, and evaluation. We will use the term as used in the 2014 budget materials for consistency.

greater detail below, are interconnected. For example, research and experiments funded in the ST&E area contribute to the design and production of refurbished weapons, funded in the stockpile area. The infrastructure area offers critical support to both the stockpile and ST&E capabilities areas by providing a suitable environment for their various activities, such as producing weapons components and performing research and experimentation activities. The other weapons activities area offers support to the three other areas by, for example, providing for the security of nuclear weapons and nuclear material. In fiscal year 2015, the President requested \$8.3 billion in total appropriations for Weapons Activities, and the Congress appropriated \$8.2 billion.

The stockpile area includes weapons refurbishments through LEPs and other major weapons alterations and modifications; surveillance efforts to evaluate the condition, safety, and reliability of stockpiled weapons; maintenance efforts to perform certain minor weapons alterations or to replace components that have limited lifetimes; and core activities to support these efforts, such as maintaining base capabilities to produce uranium and plutonium weapons components.¹⁸ Our analysis of NNSA's data indicates that about 40 percent of the budget estimates for the stockpile area from 2015 to 2039 is for LEPs. The U.S. nuclear weapons stockpile is composed of seven different weapon types, including air-delivered bombs, ballistic missile warheads, and cruise missile warheads (see table 1).

¹⁸NNSA funds activities that directly support the stockpile area through the Directed Stockpile Work program within the Weapons Activities appropriation.

Table 1: Types of Nuclear Weapons Currently in the U.S. Stockpile

Warhead or bomb type	Delivery system	Life extension program (LEP) or major alteration planned during 2015 to 2039
B61-3/4/10	Tactical bomb	checkmark ^a
B61-7/11	Strategic bomb	
W76-0/1	Submarine-launched ballistic missile warhead	checkmark ^b
W78	Intercontinental ballistic missile warhead	checkmark
W80-1	Air Launched Cruise Missile, Advanced Cruise Missile	checkmark ^c
B83-1	Strategic bomb	
W87	Intercontinental ballistic missile warhead	checkmark ^d
W88	Submarine-launched ballistic missile warhead	checkmark ^e

Source: Nuclear Weapons Council. | GAO-15-499

^aThe National Nuclear Security Administration (NNSA) is consolidating the 3, 4, 7, and 10 modifications of the B61 bomb into a single B61-12 modification during an ongoing life extension program.

^bNNSA is replacing all W76-0 nuclear warheads with W76-1 warheads, which are currently being produced as part of an ongoing life extension program.

^cThe President's fiscal year 2016 budget justification renames this LEP the W80-4.

^dNNSA plans to refurbish the W87 as part of a future interoperable warhead LEP. An interoperable warhead is designed to be used on multiple delivery systems.

^eNNSA plans to perform a major alteration of the W88, as well as a subsequent life extension program for the W78/88-1, which is planned to become the first interoperable warhead.

The infrastructure area involves NNSA-owned, leased, and permitted physical infrastructure and facilities supporting weapons activities. NNSA's 2015 nuclear security budget materials include information on budget estimates for three major types of infrastructure activities: operating and maintaining the existing infrastructure, recapitalizing (improving) existing facilities, and constructing new facilities. Our analysis of NNSA's budget materials indicates that about 57 percent of the budget estimates for infrastructure from 2015 to 2039 is for the operation,

maintenance, and recapitalization of existing facilities and about 27 percent is for new facilities construction.¹⁹

The ST&E capabilities area is composed of five “campaigns,” which are technically challenging, multiyear, multifunctional efforts to develop and maintain critical science and engineering capabilities, including capabilities that enable the annual assessment of the safety and reliability of the stockpile, improve understanding of the physics and materials science associated with nuclear weapons, and support the development of code-based models that replace underground testing. Our analysis of NNSA’s data indicates that about 36 percent of the budget estimates for the ST&E capabilities area from 2015 to 2039 are for the Advanced Simulation and Computing Campaign. This campaign procures supercomputers; develops the computer code to simulate nuclear weapons; and develops simulations to analyze and predict these weapons’ performance, safety, and reliability and to certify their functionality.

Other weapons activities include budget estimates associated with nuclear weapon security and transportation, as well as legacy contractor pensions, among other things. Our analysis of NNSA’s data indicates that about 44 percent of the budget estimates for the other weapons activities area from 2015 to 2039 are for nuclear weapon security.

NNSA’s modernization efforts in the areas described above include those directed toward NNSA’s goal of stopping the growth of its deferred maintenance backlog in its facilities and infrastructure.²⁰ Deferred maintenance can be avoided either by conducting scheduled

¹⁹The remaining portion is for activities funded through infrastructure program accounts that are for activities not associated with facilities operations, maintenance, recapitalization, or construction, such as the Minority Serving Institutions Partnership Program—one of NNSA’s outreach programs with universities—and the Material Recycling and Recovery subprogram, which provides recycling and recovery of plutonium, enriched uranium, lithium, and tritium from fabrication and assembly operations, limited life components, and dismantlement of weapons and components.

²⁰DOE defines a facility as land, buildings, and other structures, as well as their systems and equipment. These include any DOE-owned, -leased, or -controlled facilities, which may or may not be furnished to a contractor under a contract with DOE. DOE defines infrastructure as all real property, installed equipment, and related real property that is not solely supporting a single program mission or facility. An example of infrastructure is piping that provides water to multiple facilities.

maintenance activities, recapitalization activities, or demolition activities.²¹ Maintenance activities—including the replacement of parts, systems, or components—are needed to preserve or maintain a facility in an acceptable condition to safely operate.²² Regular maintenance throughout a facility’s service life can minimize deferred maintenance or prevent it from accumulating. NNSA’s budget materials contain two categories of maintenance budget estimates: direct-funded and indirect-funded. According to a NNSA official, estimates for direct-funded maintenance are included in the budget in two places: (1) the maintenance account specified in NNSA’s budget materials and (2) the program budgets for certain NNSA programs that are the major users of key scientific and production facilities, such as the Advanced Simulation and Computing Facility at Lawrence Livermore National Laboratory and the Tritium Extraction Facility at the Savannah River Site.²³ Indirect-funded maintenance represents activities that are budgeted and paid for as part of a site’s overhead costs. According to NNSA officials, some sites, such as Lawrence Livermore National Laboratory, use indirect-funded maintenance as the primary way to budget and pay for maintenance. The 2015 budget materials estimate that NNSA will budget \$1.6 billion for direct-funded maintenance over the next 5 years and \$2.3 billion for indirect-funded maintenance over the next 5 years. NNSA identifies the total direct and indirect budget estimates planned for maintenance at each site and reports this information for the FYNSP in the congressional budget justification. NNSA is required by DOE to collect this information from its management and operating contractors through a DOE

²¹According to NNSA officials, constructing a new, replacement facility can also address deferred maintenance associated with an old, existing facility. However, even after a new facility is constructed, the deferred maintenance associated with the facility it replaced remains part of the backlog until the older facility is either recapitalized for other uses or demolished.

²² Maintenance, as distinguished from capital improvements, exclude activities directed toward expanding the capacity of an asset or otherwise upgrading it to serve needs different from, or significantly greater than, its current use.

²³According to an NNSA official, in addition to the two facilities listed above budget estimates for maintenance of three other facilities are supported through program accounts rather than the maintenance account. These are the National Ignition Facility at Lawrence Livermore National Laboratory, the “Z” Machine at Sandia National Laboratories, and the Omega Laser Facility at the University of Rochester Laboratory for Laser Energetics.

prescribed tool known as the Integrated Facilities and Infrastructure Crosscut Budget.²⁴

NNSA can recapitalize facilities or their subsystems (e.g., roofing, ventilation systems, and electrical systems) when they wear out or become outdated (i.e., reach the end of their useful service life). For example, in 2016 NNSA plans to replace approximately 500 sprinkler heads, which are about 50 years old, in a building that manufactures nonnuclear components at its Y-12 National Security Complex in Tennessee. Similarly, in 2015, NNSA continues to upgrade a control tower's electrical and mechanical components at its Sandia National Laboratories site in New Mexico to support nonnuclear testing activities for nuclear bombs. The 2015 budget materials estimate that \$1.8 billion will be spent on recapitalization over the next 5 years and that \$11.5 billion will be spent on such recapitalization over the next 25 years.²⁵ According to officials, if NNSA determines that a facility is no longer needed for mission operations, the agency can demolish the facility. For example, NNSA recently demolished building 9744 at the Y-12 plant because the support structure was failing. Budget estimates for demolition are included as a subprogram in the recapitalization estimates; the 2015 budget materials contain 5-year budget estimates of \$105 million and 25-year estimates of \$230 million for demolition activities.²⁶

The current process by which NNSA prioritizes infrastructure investment is based on data on a facility's condition and importance to achieving programmatic goals. Contractors that manage and operate each site within the nuclear security enterprise are required by a DOE order to

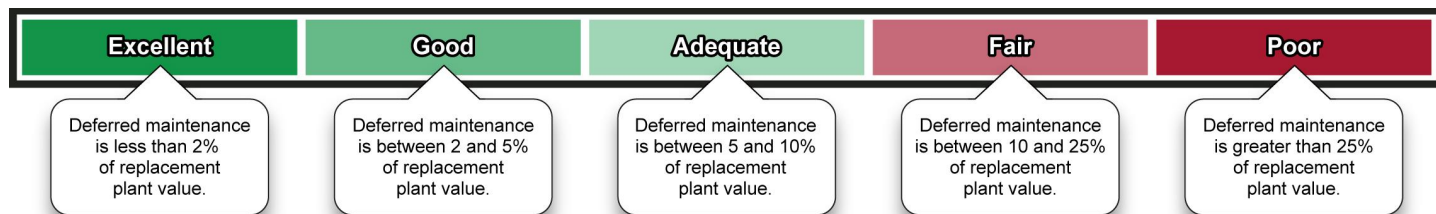
²⁴According to DOE Order 430.1B, *Real Property Asset Management*, the Integrated Facilities and Infrastructure Crosscut Budget is supported by 10-year site planning efforts conducted annually by NNSA's management and operating contractors at its eight nuclear security enterprise sites and is intended to be integral to budget planning by identifying resource requirements associated with these 10-year planning efforts.

²⁵The explanatory statement accompanying the Consolidated Appropriations Act, 2014 directed NNSA to create a specific budgetary control for recapitalization after the House Committee on Appropriations expressed concern about the conditions of infrastructure across the nuclear security enterprise brought about by insufficient investments. NNSA made its first targeted request for recapitalization in the 2015 budget materials. NNSA plans to manage its recapitalization activities through the delineation of distinct projects that have a clearly defined scope, cost, and schedule basis.

²⁶The budget estimates for recapitalization contained in the 2015 budget materials and cited above include estimates for demolition.

inspect all facilities on their site at least every 5 years and are to update DOE’s infrastructure database annually with information relating to the condition of the site’s facilities.²⁷ This information includes estimating the amount of a facility’s deferred maintenance and its replacement plant value, which is the cost to replace the existing structure with a new structure of comparable size using current technology, codes, standards, and materials. According to DOE’s real property asset management order, a facility’s condition is determined based on the scale shown below in figure 1.²⁸

Figure 1: Department of Energy Facility Condition Index Scale



Source: GAO analysis of Department of Energy data. | GAO-15-499

NNSA categorizes each individual facility’s importance to accomplishing its mission based on designations defined by the Federal Real Property Council.²⁹ The categories are as follows:

- **Mission critical.** Facilities and infrastructure that are used to perform activities—such as nuclear weapons production, research and development, and storage—to meet the highest-level programmatic

²⁷Department of Energy, *Real Property Asset Management*, DOE Order 430.1B (Washington, D.C.: Apr. 25, 2011).

²⁸DOE Order 430.1B. The Facility Condition Index is the ratio of the estimated value of deferred maintenance to the facility’s replacement plant value. The cost of deferred maintenance is determined by estimating a corrective cost to address deficiencies that are identified through condition assessment inspections.

²⁹In 2004, Executive Order No. 13327, “Federal Real Property Asset Management”, established the Federal Real Property Council within the Office of Management and Budget for administrative purposes, to among other activities, develop guidance for, and facilitate the success of, each agency’s real property asset management plan. The executive order also directed each executive agency, such as DOE, to appoint a Senior Real Property Officer.

goals, without which operations would be disrupted or placed at risk. According to NNSA data, 245 (or 4.0 percent) of the agency's 6,085 facilities are designated as mission critical.

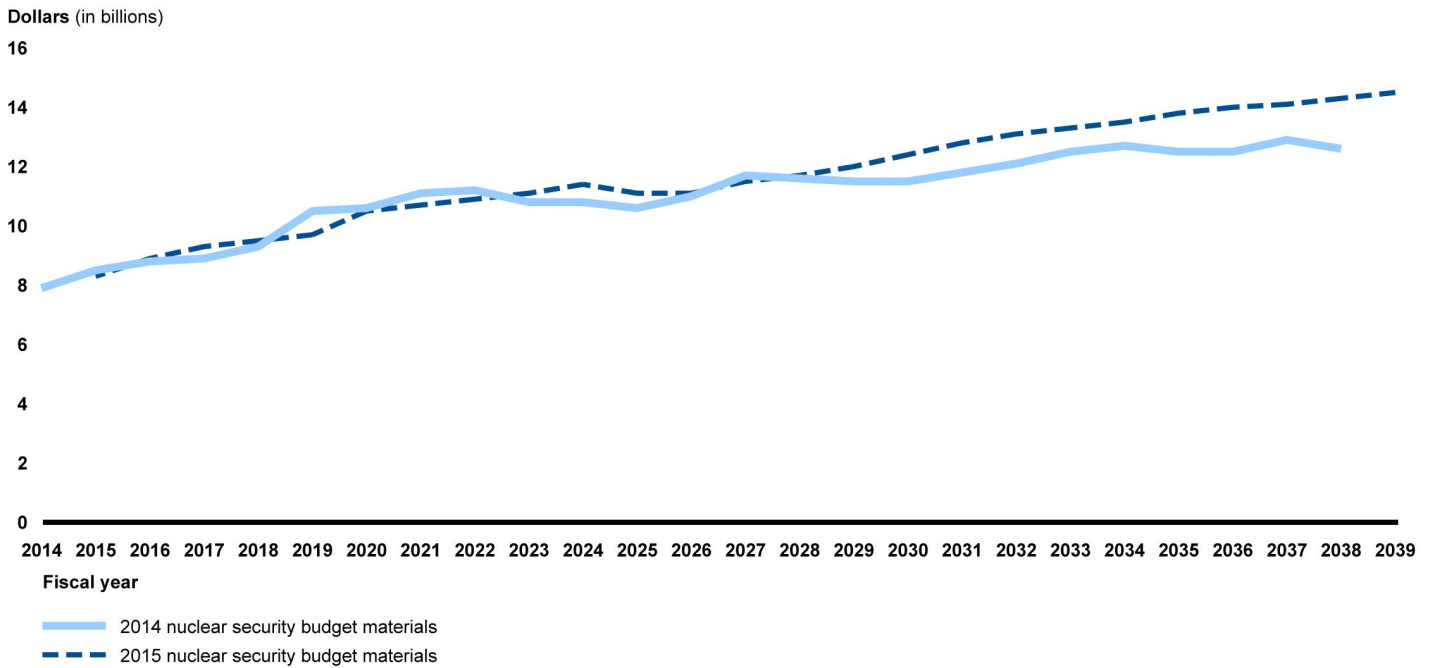
- **Mission dependent, not critical.** Facilities and infrastructure—such as waste management, nonnuclear storage, and machine shops—that play a supporting role in meeting programmatic goals. According to NNSA data, 2,063 (or 33.9 percent) of the agency's 6,085 facilities are designated as mission dependent, not critical.
- **Not mission dependent.** Facilities and infrastructure—such as cafeterias and parking structures, that do not link directly to programmatic goals but support secondary missions or quality-of-workplace initiatives. According to NNSA data, 3,777 (or 62.1 percent) of the agency's 6,085 facilities are designated as not mission dependent.

Total Budget Estimates for Modernization Increased Compared with 2014 Plans

NNSA's 2015 budget estimates for modernization total \$293.4 billion over 25 years, an increase of \$17.6 billion (6.4 percent) from the \$275.8 billion in estimates provided in 2014. These budget estimates are provided in four program areas: stockpile, infrastructure, ST&E, and other weapons activities. Some budget estimates for individual programs within these four areas changed more significantly from 2014 to 2015 than the total budget estimates changed—decreasing by as much as 31 percent and increasing by as much as 71 percent—because of changes in programs' production schedules, scope, the methodology used to develop certain budget estimates, and budgetary structure.³⁰ Figure 2 provides a comparison of total budget estimates for nuclear modernization activities in NNSA's 2014 and 2015 budget materials.

³⁰In general, the 2015 budget materials will contain higher budget estimates than in prior years. Since both the 2014 and 2015 budget materials cover 25 years and are presented in current year dollars, estimates in later years will increase because of inflation. The last year included in the 2015 budget materials is 2039, which is outside the time frame of the 2014 budget materials. We did not adjust for this factor.

Figure 2: Comparison of Budget Estimates for Nuclear Modernization Activities in the National Nuclear Security Administration's Fiscal Years 2014 and 2015 Budget Materials



Source: GAO analysis of National Nuclear Security Administration data. | GAO-15-499

Note: Data are presented in current dollars.

Table 2, which appears on the next page, details the changes in NNSA's 25-year budget estimates from 2014 to 2015 for modernization in four program areas: stockpile, infrastructure, ST&E, and other weapons activities.

Table 2: Changes in the National Nuclear Security Administration’s 25-Year Budget Estimates for Modernization from 2014 to 2015, by Program Area

Dollars in billions

Area	2014 25-year budget estimates (2014 to 2038)	2015 25-year budget estimates (2015 to 2039)	Difference	Percentage change
Stockpile	\$107.2	\$103.5	-\$3.6	-3.4%
Infrastructure	75.7	83.7	7.9	10.4%
Science, technology, and engineering capabilities	53.7	59.2	5.4	10.1%
All other weapons activities ^a	39.1	47.0	7.9	20.2%
Total	\$275.8	\$293.4^{b,c}	\$17.6	6.4%

Source: GAO analysis of National Nuclear Security Administration data. | GAO-15-499

Note: Totals may not sum due to rounding. Data are presented in current dollars.

aAll other weapons activities includes budget estimates associated with nuclear weapon security and transportation, as well as legacy contractor pensions, among other things.

bIn the 2015 budget materials, NNSA omitted 20 years of site operations funding for the Y-12 National Security Complex in Tennessee totaling \$4.3 billion. NNSA officials confirmed that this budget estimate should have been included and provided GAO with revised data. The budget estimates above reflect the revised data, which differ from the estimates contained in the 2015 Stockpile Stewardship and Management Plan as issued.

cThe 2015 budget materials do not include approximately \$24 billion in cost savings included in the prior year’s budget materials. In December 2013, GAO reported that NNSA incorporated cost savings into its budget estimates before fully assessing how to achieve the savings. See GAO, Modernizing the Nuclear Security Enterprise: NNSA’s Budget Estimates Do Not Fully Align with Plans, GAO-14-45 (Washington, D.C.: Dec. 11, 2013). According to NNSA officials, the agency concluded that some of these cost savings could not be achieved while others had already been achieved, and therefore removed them from the 2015 budget materials.

Within these four program areas, we found that some budget estimates for individual programs changed more significantly from 2014 to 2015 than the total budget estimates changed—decreasing by as much as 31 percent and increasing by as much as 71 percent—because of changes in (1) programs’ scope, (2) production schedules, (3) the methodology used to develop certain budget estimates, and (4) budgetary structure. Table 3 shows the changes in the 25-year budget estimates for those individual programs with estimates that changed more significantly than the total and identifies the causes for those changes.

Table 3: Changes in the National Nuclear Security Administration’s 25-Year Budget Estimates for Modernization from 2014 to 2015 by Program and Area, and Causes for These Changes

Dollars in billions

Program	Amount change, 2015 budget materials compared with 2014 materials	Percentage change, 2015 budget materials compared with 2014 materials	Change in production schedule?	Change in program scope?	Change in methodology?	Change in budgetary structure?
Stockpile area						
Life Extension Programs	(\$18.4)	(31%)	checkmark	checkmark	checkmark	
Stockpile Services	\$11.3	37		checkmark		checkmark
Infrastructure area						
Line Item Construction Projects	\$9.6	71			checkmark	
Science, technology, and engineering capabilities area						
Inertial Confinement Fusion Ignition and High Yield Campaign	\$5.0	48				checkmark
Science Campaign	\$3.0	23		checkmark		checkmark
Advanced Simulation and Computing Campaign	\$2.0	11		checkmark		
Other weapons activities area						
Emergency Response and Counterterrorism Programs	\$7.9	Not applicable ^a				checkmark

Source: GAO analysis of National Nuclear Security Administration data. | GAO-15-499

Note: Data are presented in current dollars.

^aPercentage change cannot be calculated because the 2014 budget materials did not include these programs.

In the Stockpile Area and for Multiple Reasons, Budget Estimates for LEPs Decreased Significantly While Estimates for Stockpile Services Increased Significantly

Reasons for Decrease in Budget Estimates for LEPs

The 25-year budget estimates for the stockpile area changed significantly between the 2014 and 2015 budget materials for multiple reasons. Specifically, budget estimates for LEPs decreased by \$18.4 billion or 31 percent, and budget estimates for Stockpile Services increased by \$11.3 billion or 37 percent. LEP budget estimates decreased due to, among other things, delayed production schedules and changes in estimating methodologies while estimates for Stockpile Services increased due to changes in program scope and budgetary structure.

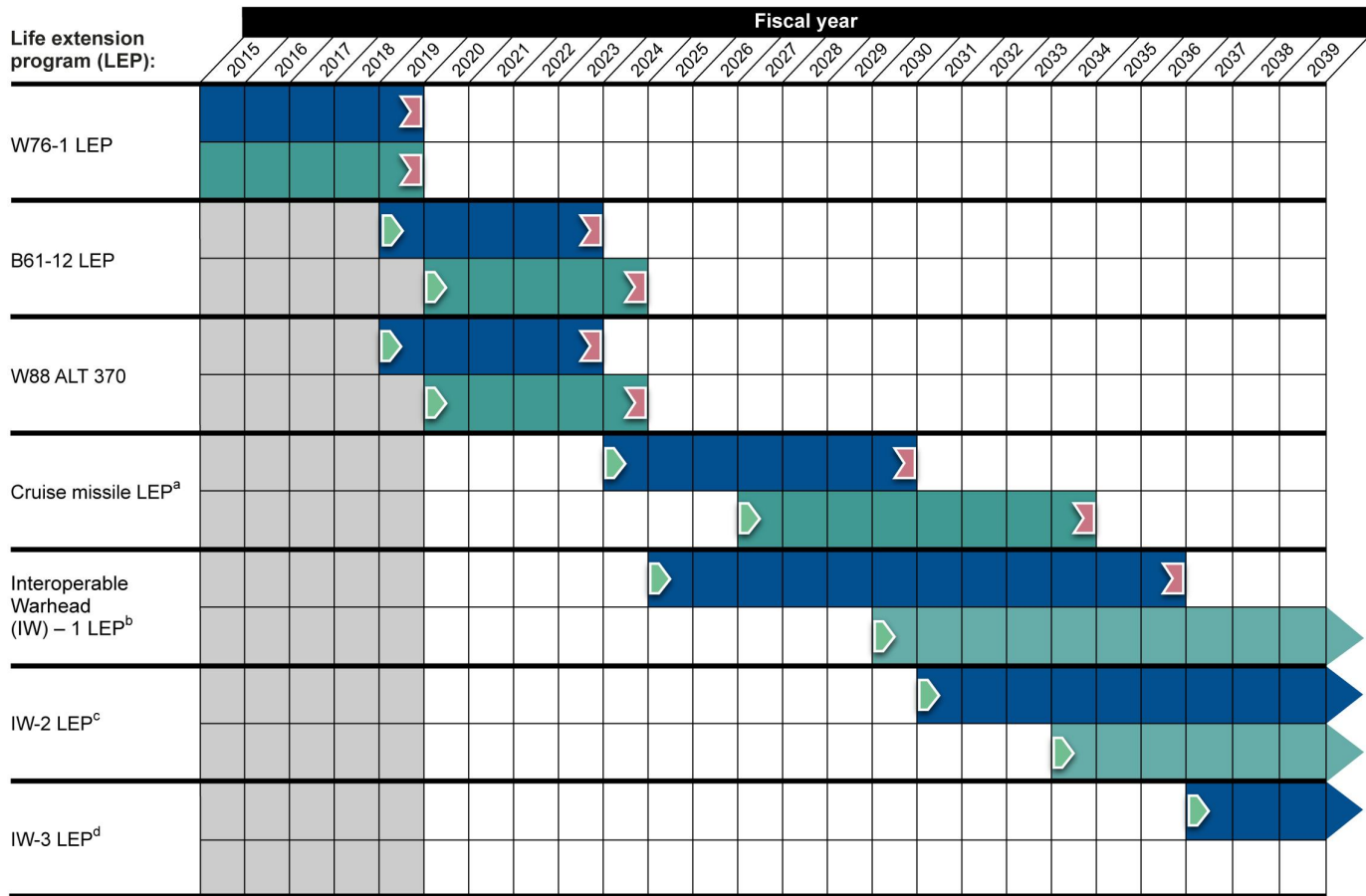
The 2015 budget materials estimate that, over the next 25 years, \$41.7 billion will be needed for nuclear weapon LEPs, which is a decrease of \$18.4 billion (31 percent) compared with the estimates contained in the prior year's budget materials. According to NNSA documents and officials, one reason for this decrease in budget estimates is delayed production schedules. The 2015 budget materials state that NNSA will complete three LEPs—the W76-1, B61-12, and the cruise missile—as well as the W88 alteration over the next 25 years, whereas the prior year's budget materials stated that the agency planned to complete these and an additional LEP. The program that will no longer be completed within the 25-year time frame of the 2015 budget materials is the Interoperable Warhead 1 (IW-1) LEP.³¹ The first production unit for the IW-1 LEP is now estimated to be in 2030, which is a 5-year delay over the prior year's plans, and no programmatic activities are planned to occur during the 5-year FYNSP period from 2015 through 2019.³² According to NNSA documents, this schedule delay is due, in part, to the agency providing more time to study the concept of interoperability and to reduce uncertainty about the agency's ability to achieve necessary plutonium and uranium capabilities to support the LEP. In addition, the 2015 budget materials included a 3-year delay to the first production unit of the IW-2 LEP (now estimated in 2034) and a 4-year delay to the first production unit of the IW-3 LEP (now estimated to be no earlier than 2041) compared with the prior year's plans. These schedule delays move some budget estimates previously included in the 2014 budget materials

³¹An interoperable (i.e., common) warhead is planned to be used on multiple delivery systems.

³²The "first production unit" is the first complete warhead from a production line certified for deployment.

outside the 25-year time frame covered by the 2015 budget materials. See figure 3 for a summary of changes to the production schedules for the planned LEPs from the 2014 to the 2015 budget materials, and see appendix II for a summary of schedule changes to major modernization efforts since the 2010 Nuclear Posture Review.

Figure 3: Comparison of Production Schedules for Planned Stockpile Life Extension Programs and Major Alterations in the National Nuclear Security Administration’s 2014 and 2015 Budget Materials



- Fiscal year 2014 *Stockpile Stewardship and Management Plan*
- Fiscal year 2015 *Stockpile Stewardship and Management Plan*
- Future-Years Nuclear Security Program
- First production unit^e
- Production complete

Source: GAO analysis of National Nuclear Security Administration data. | GAO-15-499

Note: Before the first production unit, NNSA must complete multiple studies, assessments, and engineering activities. In general, this process takes about 10 years.

^aProgram has been renamed “W80-4 LEP” in the President’s 2016 budget request.

^bProduction to be completed by 2040 according to the 2015 budget materials.

^cNo year given for production completion in either the 2014 or 2015 budget materials.

^dNo year given for production completion in either the 2014 or 2015 budget materials.

^eThe “first production unit” is the first complete warhead from a production line certified for deployment.

Second, according to NNSA officials, DOD and NNSA made programmatic decisions about one LEP’s scope that reduced uncertainties and risks. Specifically, NNSA officials said that the agency selected the W80 warhead for the cruise missile LEP (the B61 and the W84 were also under consideration). The selection of a specific warhead, according to NNSA officials, removed certain risks and uncertainties associated with the potential of conducting research and development on three separate warheads and allowed the agency to significantly lower its program cost estimate. Further, NNSA officials said that the selection of the W80 warhead allowed the agency to eliminate uncertainties related to component design, technology development efforts, and certification requirements. The 2015 budget materials estimate that \$6.8 billion will be needed to complete the cruise missile LEP, while the prior year’s materials estimated that \$11.6 billion would be needed. This change represents a decrease of \$4.8 billion or 42 percent.

Finally, to develop LEP budget estimates for the 2015 budget materials NNSA used either (1) budget estimates contained in Selected Acquisition Reports³³ or (2) the midpoint between the high and low bounds of the ranges in their cost estimates for LEPs and then applied a percentage inflation rate, which was calculated based on numbers provided by the Office of Management and Budget (OMB), according to NNSA officials.³⁴ This methodology differed from that in the prior year’s report, in which NNSA used the low point of the estimated cost ranges and used an inflation rate higher than that which would result from the application of OMB guidance to account for uncertainties and risks. According to NNSA

³³Selected Acquisition Reports are recurring summary status reports to Congress on, among other things, the cost and schedule of acquisition programs. The W76-1 LEP, the B61-12 LEP, and the W88 ALT 370 have Selected Acquisition Reports.

³⁴Office of Management and Budget, Circular A-94: *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*, (Washington, D.C.: Oct. 29, 1992).

Reasons for Increase in
Budget Estimates for Stockpile
Services

officials, using the midpoint estimate is a better way to account for uncertainties and risks, and using the OMB-recommended inflation rate makes LEP inflation rates consistent with the rate applied to all other NNSA programs.

The 2015 budget materials estimate that, over the next 25 years, \$42.2 billion will be needed for Stockpile Services, which is an increase of \$11.3 billion (37 percent) compared with the estimates contained in the prior year's budget materials. For three Stockpile Services subprograms, the 2015 budget materials included increased program scope.³⁵ According to NNSA officials, this increased scope includes, among other things, (1) expanded manufacturing capabilities, such as the capability related to detonator production at Los Alamos National Laboratory, and (2) increased weapon assembly/disassembly and stockpile surveillance activities. For each of the three subprograms, the 25-year budget estimates increased approximately \$2.0 billion over the estimates in the prior year's materials. With regard to budgetary structure changes, the 2014 budget materials included the Tritium Readiness subprogram, with its 25-year budget estimate of \$3.6 billion, in the ST&E area.³⁶ The joint explanatory statement accompanying the Consolidated Appropriations Act, 2014 stated that funding for NNSA's Tritium Readiness subprogram was being provided in the stockpile area. In its 2015 budget materials NNSA included budget estimates for the Tritium Readiness subprogram, with its 25-year budget estimate of \$3.7 billion, in the stockpile area as a Stockpile Services subprogram. This budgetary structure change represents a significant increase to the budget estimate for Stockpile Services and a corresponding decrease in the ST&E area's budget estimates, but the net increase to the overall budget estimates for modernization attributable to Tritium Readiness was small (\$70 million).

³⁵These three subprograms are: (1) Research and Development Certification and Safety, (2) Management, Technology, and Production, and (3) Production Support.

³⁶Tritium is a key radioactive isotope used to enhance the power of nuclear weapons. The Tritium Readiness subprogram covers activities to produce tritium and associated weapons components.

In the Infrastructure Area, Significant Increase in Budget Estimates for Line Item Construction Projects Was Due to a More Complete Methodology

The 2015 budget materials estimate that, over the next 25-years, \$23.0 billion will be needed for construction projects, which is an increase of \$9.6 billion (71 percent) over the prior year's materials.³⁷ This increase in budget estimates for line item construction in the 2015 budget materials is because the estimates are more complete than those included in the 2014 budget materials. In December 2013, we found that the estimates contained in NNSA's 2014 budget materials omitted most of the budget estimates for two multibillion dollar construction projects, the Uranium Processing Facility and the Chemistry and Metallurgy Research Replacement-Nuclear Facility.³⁸ We recommended that NNSA include in future modernization plans at least a range of potential budget estimates for projects and programs that the agency knows are needed, and NNSA generally concurred with the recommendation. Consistent with our recommendation, in the 2015 budget materials, NNSA: (1) included preliminary estimates (at the midpoint of a low-high cost range) for the phase 2 and 3 Uranium Processing Facility and the Chemistry and Metallurgy Research Replacement-Nuclear Facility and (2) increased from \$364 million to \$851 million (current year dollars) budgeted for construction projects scheduled for the 20 years after the FYNSP.

In the ST&E Area, Budget Estimates for Certain Activities Increased Due to Budgetary Structure Changes and Increased Program Scope

The 2015 budget materials estimate that, over the next 25 years, \$59.2 billion will be needed for all ST&E related activities, which is an increase of \$5.4 billion (10 percent) over the prior year's budget materials. Across ST&E activities, some increases in budget estimates are offset by decreases, such as the budgetary structure change described above that moved the Tritium Readiness subprogram from the ST&E area to the stockpile area. The most significant increases in the ST&E area are as follows:

- The 25-year estimates in the 2015 budget materials for the Inertial Confinement Fusion Ignition and High Yield Campaign are \$15.4 billion, which is an increase of \$5.0 billion (48 percent) over the prior

³⁷During the 5-year FYNSP, the budget estimates and scope for line item construction projects remained fairly consistent between the 2014 budget materials (\$3.4 billion; 12 projects) and the 2015 budget materials (\$3.1 billion; 14 projects) with the primary difference being reduced budget estimates for the Uranium Processing Facility.

³⁸[GAO-14-45](#).

year's materials.³⁹ According to NNSA officials, approximately 86 percent of the \$5.0 billion increase is due to a budgetary structure change. Specifically, the 2014 budget materials split estimates for operating the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory by including a portion within the campaign and another portion within the laboratory's site operations account (infrastructure area).⁴⁰ NNSA officials told us that, in accordance with congressional direction received during the 2014 appropriations process, the 2015 budget materials contain estimates for NIF operations solely in the Inertial Confinement Fusion Ignition and High Yield Campaign, increasing the campaign's 2015 budget estimates by \$4.3 billion over the prior year's estimates. While this budgetary structure change increased budget estimates for the ST&E area and decreased estimates for the infrastructure area, NNSA officials said there was no net increase to the total budget estimates for modernization.

- The Science Campaign's 2015 budget materials estimate that, over the next 25 years, \$16.1 billion will be needed, which is an increase of \$3.0 billion (23 percent) over the prior year's budget materials.⁴¹ Approximately 83 percent of this increase is dedicated to funding increased plutonium experimentation to support future LEPs, according to our analysis of NNSA's budget materials.
- The Advanced Simulation and Computing Campaign's 2015 budget materials estimate that over the next 25 years \$21.0 billion will be needed, which is an increase of \$2.0 billion (11 percent) over the prior

³⁹The Inertial Confinement Fusion Ignition and High Yield Campaign utilizes laser- and pulsed power-based high energy density physics and advanced experimental capabilities to study materials under extreme conditions similar to those of a nuclear explosion.

⁴⁰The National Ignition Facility is designed to produce extremely intense pressures and temperatures in order to try to simulate fusion conditions created in nuclear explosions, known as "ignition."

⁴¹The Science Campaign conducts scientific experiments to improve the reliability of physics models for weapons performance. The campaign supports, among other things, annual stockpile assessments, the development of predictive capability in weapons simulations, and experiments to understand the complexities associated with the extreme temperatures, stresses, strains, and strain rates experienced during a nuclear explosion.

year's budget materials.⁴² Approximately 90 percent of this increase is associated with new programmatic scope for NNSA's exascale computing efforts, which are being coordinated with DOE's Office of Science.⁴³ According to NNSA officials, exascale computing budget estimates were not included in the 2014 budget materials, but they were included in the 2015 budget materials, based on congressional direction received during the 2014 appropriation process.⁴⁴

In the Other Weapons
Activities Area, Budget
Estimates Increased
Significantly Due to
Budgetary Structure Change

The 2015 budget materials estimate that, over the next 25 years, \$47.0 billion will be needed in the other weapons activities area, which is an increase of \$7.9 billion (20 percent) over the prior year's budget materials. This area funds activities associated with nuclear weapon security and transportation as well as information technology, among other things. A budgetary structure change for two of the agency's emergency response and counterterrorism programs was the primary reason for the increased budget estimates. The 2014 budget materials did not include estimates for these programs under Weapons Activities; rather the programs were budgeted under Defense Nuclear Nonproliferation, an NNSA account that is separate from that used to fund modernization activities. In the 2015 budget materials, NNSA included 25-year budget estimates of \$7.9 billion for the emergency response and counterterrorism programs. The 2015 budget materials included these programs based on congressional direction received during the 2014 appropriation process.⁴⁵

⁴²The Advanced Simulation and Computing Campaign procures supercomputers; develops the computer code to simulate nuclear weapons; and develops simulations to analyze and predict these weapons' performance, safety, and reliability and to certify their functionality.

⁴³ Exascale computing seeks to perform at least 10^{18} operations per second, which according to NNSA officials will greatly increase NNSA's ability to perform advanced scientific and engineering simulations.

⁴⁴The joint explanatory statement accompanying the Consolidated Appropriation Act, 2014 directed \$35 million to the exascale initiative.

⁴⁵The joint explanatory statement accompanying the Consolidated Appropriations Act, 2014 directed approximately \$228 million to these programs. The president's 2016 budget justification proposes moving these programs under NNSA's Defense Nuclear Nonproliferation appropriation which, according to the budget request, will align all NNSA funding to prevent, counter, and respond to nuclear proliferation and terrorism in one appropriation.

For NNSA’s Major Modernization Efforts, Near-Term Budget Estimates for Two of Three Life Extension Programs Align with 2015 Plans While Plans for Infrastructure Are Preliminary

NNSA considers its current major modernization efforts to include three LEPs (currently at various stages of development and not in full scale production), as well as major construction projects to replace aging, existing facilities for plutonium (the Chemistry and Metallurgy Research Replacement-Nuclear Facility or its alternative) and uranium (the Uranium Processing Facility). The 5-year budget estimates contained in the 2015 budget materials for two of the three LEPs that NNSA considers major modernization efforts align with NNSA’s 2015 plans.⁴⁶ The 5-year budget estimate for the remaining LEP does not align with the 2015 plans; however, based on our review of whether this misalignment persisted in NNSA’s 2016 budget materials, NNSA’s 2016 budget estimates appear to be better aligned with 2016 plans. Project plans and associated budget estimates for NNSA’s plutonium and uranium construction projects are too preliminary for us to evaluate alignment, but NNSA’s 2015 budget materials for these projects are improved in comparison to the 2014 version of these materials that we previously reviewed.

Near-Term Budget Estimates for Two of Three Life Extension Programs Align with NNSA’s 2015 Plans

The 5-year budget estimates contained in the 2015 budget materials for two of the three LEPs that NNSA considers major modernization efforts align with NNSA’s 2015 plans for these two programs. NNSA’s 5-year budget estimates for the B61-12 LEP and the W88 alteration—both of which are currently in the design phase and scheduled for first production units in 2020—align with their associated plans.⁴⁷ Specifically, we found that, for 2015-2019, NNSA plans to request approximately \$672 million annually for the B61-12 and \$160 million annually for the W88 alteration. In general, these annual budget estimates are consistent with the midpoints of the program’s internally estimated cost ranges, indicating that the budget estimates reflect program plans. In addition, NNSA officials said that the budget estimates for the B61-12 LEP and the W88 alteration are consistent with these programs’ established cost baselines as outlined in their Selected Acquisition Reports to the Congress. We found that, compared with the prior year’s budget materials, which did not include a high-to-low cost range for these LEPs, the 2015 budget

⁴⁶We did not review the budget estimates associated with the W76-1 LEP because this program is not organized within NNSA’s Office of Major Modernization Programs, is currently in full scale production, and production is planned to be completed in fiscal year 2019. According to NNSA officials, the W76-1 LEP’s budget estimates are consistent with the program’s established cost baseline as outlined in its Selected Acquisition Report to the Congress.

⁴⁷A weapon alteration generally refurbishes fewer components than an LEP.

materials did include such a range. This inclusion is a positive development in how budget estimates are presented because the range reflects the uncertainty in these estimates for executing a technically complex program and allows decision makers an opportunity to evaluate where the budget estimates included in NNSA's materials fall within this range.

In contrast, the 5-year budget estimates contained in the 2015 budget materials for the cruise missile LEP—which is currently in the design phase and scheduled for a first production unit in the mid-2020s—are not aligned with the program's plans. In each year of the 2015 FYNSP, budget estimates for the cruise missile LEP are below the low point of the program's internally developed cost range, which is the minimum funding level that would be consistent with the internal cost estimate.⁴⁸

Specifically, the 2015 budget materials contain 5-year budget estimates for the cruise missile LEP totaling approximately \$480 million, which is \$220 million less than the approximately \$700 million that is needed to support the low point of the program's internally estimated cost range. An additional \$150 million would be needed in the 5-year budget estimates for these estimates to reflect the approximately \$850 million midpoint of the internally developed cost range for the cruise missile LEP. According to NNSA officials, the shortfall against the low point and midpoints of the cost estimate in the 5-year budget estimates reflects the difference between an ideal budget environment where funding is unconstrained and the trade-offs made in an actual budget environment where constraints are imposed by competing priorities.

A 2008 DOE review to identify the underlying problems associated with the department's contract and project management identified that failure to request full program funding can result in increased program costs and schedule delays, which are risks to the achievement of program goals.⁴⁹

⁴⁸NNSA expects to start the required design and cost studies in fiscal year 2017 to establish a formal cost and scope baseline for the cruise missile LEP. In fiscal year 2018, NNSA expects to begin the process of developing the Selected Acquisition Report for the cruise missile LEP. Selected Acquisition Reports are recurring summary status reports to the Congress on, among other things, the cost and schedule of acquisition programs. NNSA officials confirmed that 5-year budget estimates for this LEP included in the 2015 budget materials were below the cost range for an assumed scope.

⁴⁹Department of Energy, *Root Cause Analysis: Contract and Project Management* (Washington D.C.: April 2008).

NNSA officials said that the longer-term budget estimates in the 2015 budget materials “buy back” the shortfall in later fiscal years so that the total estimated cost of the cruise missile LEP is reflected in the budget materials.⁵⁰ Specifically, the 2015 budget materials include cruise missile LEP budget estimates at the high end of its cost range for years 2020-2027. The 2015 budget materials, however, do not explicitly state that the budget request for the cruise missile LEP is not consistent with the total amount needed to fund the program’s internal cost estimate for 2015-2019 at even the low point.⁵¹ DOE guidelines state that the department should aim to disseminate information to the public that is transparent to its intended users and meets a basic level of quality. Aspects of quality include the usefulness of the information to the intended users and whether it is presented in an accurate, clear, complete, and unbiased manner.⁵² NNSA’s budget materials are a key source of information that is used by Congress to make appropriation decisions. Including information in future versions of budget materials that explicitly identify potential risk to the achievement of program objectives and goals—such as increased program cost and schedule delays, which may result from shortfalls in LEP budget requests compared with internal cost estimates—would improve the transparency and quality of information available to congressional decision makers. In addition, our prior work has emphasized the importance of transparency in federal agencies’ budget presentations because such information helps Congress have a clear understanding of how new funding requests relate to funding decisions for existing projects with continuing resource needs.

Unlike the budget estimates included in the 2015 budget materials, NNSA’s 2016 budget justification contains 5-year budget estimates (2016 to 2020) for the cruise missile LEP that appear to be better aligned with revised program plans. NNSA’s 2016 budget justification includes approximately \$1.8 billion in budget estimates for 2016-2020, which is approximately \$1.3 billion more than the 5-year budget estimates contained in the 2015 budget materials, and more closely aligned with

⁵⁰This is similar to what we found about the budget estimates for two LEPs in our review of NNSA’s 2014 budget materials. See [GAO-14-45](#).

⁵¹In our review of the 2014 budget materials, we also identified a potential shortfall in NNSA’s 5-year funding for the cruise missile LEP. See [GAO-14-45](#).

⁵²Department of Energy, *The Department of Energy’s Information Quality Guidelines* (Washington, D.C.: Oct. 1, 2002).

NNSA's updated midpoint cost estimate for the program. Further, both the internal cost estimate and the \$1.8 billion in near-term budget estimates appear to support a change in the production schedule for the cruise missile LEP based on a congressional requirement in the 2015 National Defense Authorization Act that NNSA deliver the first cruise missile warhead by September 2025, a 2-year acceleration to its 2015 production schedule.⁵³

NNSA's Plans for Its Plutonium and Uranium Construction Projects Are Too Preliminary for GAO to Assess

For NNSA's major modernization efforts related to plutonium and uranium infrastructure, the agency has not established a firm cost, schedule, and scope baseline for either the Chemistry and Metallurgy Research Replacement-Nuclear Facility (or its alternative) or the Uranium Processing Facility, and the 2015 budget materials do not specify when these projects will establish such a baseline. This precludes us from assessing the extent to which budget estimates align with the agency's preliminary plans. We have previously reported on NNSA's challenges—significant cost increases, schedule delays, and scope changes—in executing these projects.⁵⁴ We have other ongoing reviews being conducted to provide continuing oversight of both of these projects. The 2015 budget materials do include estimates for both these projects which, as stated above, is an improvement from the prior year's budget materials in which NNSA omitted most of the budget estimates for these projects.

⁵³We will fully review NNSA's 2016 budget materials in our next report to Congress under 50 U.S.C. § 2455.

⁵⁴See GAO, *Modernizing the Nuclear Security Enterprise: New Plutonium Research Facility at Los Alamos May Not Meet All Mission Needs*, [GAO-12-337](#) (Washington, D.C.: Mar. 26, 2012), *Nuclear Weapons: Factors Leading to Cost Increases with the Uranium Processing Facility*, [GAO-13-686R](#) (Washington, D.C.: July 12, 2013), and *High-Risk Series: An Update*, [GAO-15-290](#) (Washington, D.C.: Feb 11, 2015).

NNSA's Budget Estimates for Infrastructure Are Not Adequate to Stop the Growth of Its Deferred Maintenance Backlog, and NNSA Is Taking Steps to Improve Information to Better Prioritize Investment

NNSA's infrastructure budget estimates included in its 2015 budget materials are not adequate to address its reported \$3.6 billion deferred maintenance backlog, and the deferred maintenance backlog will continue to grow. One reason the backlog will continue to grow is that the amounts in 2015 budget estimates to address the problem fall below DOE infrastructure investment benchmarks for maintenance or recapitalization. NNSA has calculated that it has \$3.6 billion in deferred maintenance in its backlog; however, NNSA has identified needed improvements to information about the backlog that would help prioritize investment. Specifically, the amount of the backlog that actually needs to be addressed is unclear because approximately 40 percent of the backlog is related to facilities that have little to no effect on programmatic operations, and improvements in NNSA's data would enhance the agency's ability to identify mission priorities to drive investment needs. NNSA is currently undertaking a broad effort to improve its enterprise-wide data on facilities and infrastructure.

NNSA's Budget Estimates for Maintaining and Recapitalizing Its Aging Nuclear Infrastructure Fall Below DOE's Planning Benchmarks

NNSA's 2015 budget estimates do not support the agency's goal to stop the growth of its \$3.6 billion deferred maintenance backlog. According to the 2015 budget materials, NNSA estimates that its total deferred maintenance backlog will exceed \$4 billion by 2019—an increase of approximately \$400 million from the 2015 estimate.⁵⁵ One reason for the continued growth of the deferred maintenance backlog is that the amounts in budget estimates for maintaining and recapitalizing existing facilities fall below DOE's infrastructure investment benchmarks.⁵⁶ DOE's 2005 Real Property Asset Management Plan and associated budget

⁵⁵The deferred maintenance estimates are based on data from NNSA's Infrastructure Data Analysis Center, as of March 13, 2014. These estimates are adjusted for inflation. We did not assess the reliability of the deferred maintenance estimates but rather report NNSA's deferred maintenance figure to demonstrate how it is used, as well as to demonstrate limitations in the figure for understanding the backlog and in particular whether NNSA is meeting its goal of reducing it.

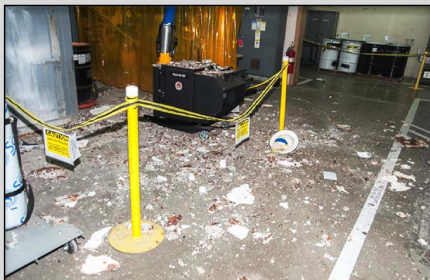
⁵⁶DOE investment benchmarks are based on findings from the National Research Council, *Stewardship of Federal Facilities: A Proactive Strategy for Managing the Nation's Public Assets*, (Washington, D.C.: 1998); and National Academies of Science, *Key Performance Indicators for Federal Facilities Portfolios: Federal Facilities Council Technical Report Number 147* (Washington, D.C.: 2005).

guidance issued by DOE's Senior Real Property Officer for the 2015 budget cycle include investment benchmarks for maintenance and for recapitalization.⁵⁷ Specifically, they are as follows:

⁵⁷NNSA officials confirmed that DOE's 2005 plan is still a relevant planning document, applicable to NNSA, and that the budget guidance issued by the Senior Real Property Officer for 2015 implements the 2005 plan. The Senior Real Property Officers are senior-level managers who develop and implement agency asset management plans and monitor the agency's real property assets.

Concrete Ceiling Incident at Y-12 National Security Complex

The Y-12 National Security Complex serves the National Nuclear Security Administration as a manufacturing facility for nuclear weapons components. The use of corrosive substances in building 9204-2, which produces lithium for the nuclear weapons stockpile, has caused significant concrete and metal degradation in several areas. In March 2014, a large section of concrete ceiling fell. Large chunks of concrete rebounded into a frequently used walkway and an adjacent welding station. No personnel were struck by the concrete, but workers had used the welding station earlier that day. The sites' management and operations contractor reported the incident a "near miss." The photos below depict the ceiling and the floor after the incident.



Source: Y-12 National Security Complex. | GAO-15-499

- According to DOE's benchmark for maintenance, NNSA's annual maintenance budget estimates should be at least 2 percent of a site's replacement plant value in order to keep facilities in good working order.⁵⁸ We determined, based on NNSA's reporting of real property value, that the average, annual replacement plant value for the eight sites within the nuclear security enterprise and other related infrastructure⁵⁹ over the 5-year FYNSP is about \$50 billion, which means that maintenance budget estimates should be approximately \$1 billion a year.⁶⁰ However, the maintenance budget estimates contained in the 2015 budget materials are on average approximately \$772 million a year over the next 5 years, which is an average annual shortfall of \$224 million compared with the DOE maintenance benchmark. These annual shortfalls amount to a \$1.1 billion shortfall over the next 5 years. According to NNSA's Associate Administrator for Infrastructure and Operations, NNSA is changing its investment strategy to stop the decline of NNSA infrastructure and to improve safety, working conditions, sustainability, and productivity. This strategy will (1) invest more in infrastructure modernization including recapitalization, sustainability, and disposition and (2) consider reasonable increases to risk in operations and annual maintenance by minimizing resources dedicated to annual maintenance. Further, the 2015 budget materials state that the agency plans to decrease annual maintenance work scope by 10 percent at all sites across the nuclear security enterprise, but the materials do not describe what, if any, impact this decision will have on the deferred maintenance backlog or the goal of stopping its growth.

⁵⁸Agency officials have told us that the top end of the required maintenance benchmarks may be conservative, and NNSA has learned over time that some maintenance can be deferred without affecting the safety, performance, and reliability of the facility.

⁵⁹NNSA also includes infrastructure for the Office of Secure Transportation (OST) in the agency's calculation of real property value and deferred maintenance. The OST is managed by NNSA and is responsible for the safe and secure transport in the contiguous United States of government-owned special nuclear materials.

⁶⁰All maintenance budget estimates include both direct and indirect maintenance. The replacement plant value estimates are for all facilities and infrastructure based on NNSA's Infrastructure Data Analysis Center data effective March 13, 2014. These estimates are adjusted for inflation. A reliable estimate of the appropriate level of spending on maintenance and recapitalization requires a reliable estimate of the replacement plant value. We did not assess the reliability of the replacement plant value, but rather we used the reported replacement plant value to determine whether NNSA's budget estimates meet its own infrastructure investment benchmarks to budget a certain percentage of estimated replacement plant value for maintenance, as well as recapitalization.

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- According to DOE's benchmark for recapitalization, recapitalization budget estimates should be 1 percent of a site's replacement value to keep existing facilities modern and relevant in an environment of changing standards and missions.⁶¹ Again, based on NNSA's reporting of real property value, we determined that the average, annual replacement plant value for the eight sites within the nuclear security enterprise and other related infrastructure over the 5-year FYNSP is about \$50 billion, which means that recapitalization budget estimates should be approximately \$500 million a year. However, the annual recapitalization budget estimates contained in the 2015 budget materials are approximately \$360 million a year over the next 5 years, which is an average annual shortfall of \$140 million as compared with the DOE recapitalization benchmark. These annual shortfalls amount to a \$700 million shortfall over the next 5 years. Even though the recapitalization budget estimates do not meet the DOE benchmark, NNSA officials told us that this funding level is (1) an increase from prior years and (2) the increase is responsive to direction from NNSA's Associate Administrator for Infrastructure and Operations to maximize resources that can be dedicated to recapitalization. According to agency officials, NNSA's infrastructure investment decisions are based on a risk reduction methodology to which the amount of deferred maintenance is a key input. However, deferred maintenance is not the only input the agency considers when planning investment decisions. Other considerations include safety risk reduction, increased program capabilities, and opportunities to improve energy efficiency.

NNSA's 2016 budget justification (covering the 2016-2020 FYNSP) restates the agency's commitment to increase investment to stop the growth of deferred maintenance through maintenance and

⁶¹DOE's 2005 real property management plan states that budget estimates should be dedicated toward recapitalization activities, but the plan did not provide a specific benchmark. The plan's associated 2015 budget guidance (issued in April 2013) states that DOE programs, including NNSA, should institute a "recapitalization strategy" that is equal to 1 percent of replacement plant value if the program's overall facility condition fell below a certain threshold. According to NNSA data, its overall facility condition was below the established threshold. These "recapitalization strategy" budget estimates were to be added to the agency's maintenance budget account because NNSA at that time did not have a separate recapitalization budget account. NNSA made its first targeted request for recapitalization in the 2015 budget materials. We compared the budget estimates contained in the specific recapitalization control to the investment benchmark of 1 percent of replacement plant value. NNSA officials confirmed that this approach was reasonable.

recapitalization. NNSA has proposed a restructuring of its infrastructure budget in its 2016 congressional budget justification.⁶²

Water Diverter at the Los Alamos National Laboratory Radiochemistry Lab

The Radiochemistry Facility at Los Alamos National Laboratory conducts radiological and chemical analyses of samples and produces medical isotopes. This photo depicts a water intrusion incident that interrupted research activities at the lab. No one was injured but the lab could not be used for a few days and work was relocated to another part of the building. A water diverter was used to immediately prevent further damage to the lab. The roof has since been repaired and the lab is back to full operation.



Source: Los Alamos National Security, LLC. | GAO-15-499

We found that the 5-year \$1.1 billion shortfall in maintenance budget estimates and the \$700 million shortfall in recapitalization budget estimates as compared with DOE infrastructure investment benchmarks are not explicitly identified in NNSA's 2015 budget materials. Further, the budget materials do not identify the potential effects this shortfall may have on the agency's stated goal of stopping the growth of its deferred maintenance backlog. As stated earlier, DOE guidelines state that the department should aim to disseminate information to the public that is useful to the intended users and presented in an accurate, clear, complete, and unbiased manner. NNSA's budget materials are a key source of information for Congress as it makes appropriation decisions. In addition, our prior work has emphasized the importance of transparency in federal agencies' budget presentations because such information helps Congress have a clear understanding of how new funding requests relate to funding decisions for existing projects with continuing resource need. Historical underfunding of maintenance and recapitalization, among other things, has led to the current level of deferred maintenance across the nuclear security enterprise. According to a 2014 NNSA infrastructure planning document, there are numerous examples within the nuclear security enterprise where deteriorated infrastructure conditions have affected mission performance. Therefore, it is important to identify the risks, if any, associated with levels of maintenance and recapitalization investment that fall below DOE benchmarks. Providing such information would present Congress with key information it needs to make infrastructure resource allocation decisions during the appropriations process.

NNSA Has Identified Needed Improvements to Information to Better Prioritize Infrastructure Investment

NNSA has identified opportunities to improve information about its reported \$3.6 billion backlog that the agency needs in order to better prioritize infrastructure investment. While NNSA's reported \$3.6 billion total deferred maintenance backlog in the 2015 budget materials meets the accounting requirements for real property reporting, the figure is not useful for budget estimating because (1) approximately 40 percent of the backlog is related to facilities that have little or no effect on programmatic operations and is therefore low priority to be addressed and (2)

⁶²As mentioned earlier, we will review NNSA's 2016 budget materials in our next review for Congress.

strengthening NNSA's data would improve the agency's ability to fully prioritize investment needs. The agency has ongoing efforts to improve its infrastructure data.

According to NNSA data, facilities considered not mission dependent comprise 40 percent (\$1.4 billion) of the deferred maintenance backlog.⁶³ As stated earlier, these facilities that are not mission dependent—such as cafeterias, parking structures, and excess facilities—do not link directly to programmatic goals but only support secondary missions or quality-of-workplace initiatives. NNSA officials told us that deferred maintenance at these facilities is low priority and unlikely to be addressed, beyond keeping facilities in a safe condition, because the agency is targeting scarce budgetary resources to mission critical facilities.⁶⁴ As mentioned above, DOE guidelines and our prior work have emphasized the importance of transparency in federal agencies' budget presentations to help Congress have a clear understanding of how new funding requests relate to funding decisions for existing projects with continuing resource needs. Reporting the \$3.6 billion deferred maintenance backlog without explaining that over one-third of it has little or no effect on the programmatic mission and is of low priority limits the transparency and usefulness of the budget materials for the purpose of planning for infrastructure investment. Clarifying the budget materials in this manner would provide Congress with key information during the appropriation process.

We also found that improvements in NNSA's data would enhance the agency's ability to identify mission priorities to drive investment needs. Specifically,

⁶³In March 2015, GAO issued a report on the transfer of excess facilities to DOE's Office of Environmental Management. Specifically, GAO reported that NNSA has identified 83 facilities at six of its eight sites for transfer to DOE's Office of Environmental Management for disposition, and that the condition of NNSA's facilities awaiting transfer continues to degrade. NNSA data show that the agency spent almost \$34 million maintaining the 27 facilities still in operation that will become nonoperational within the next 25 years and over \$10 million in fiscal year 2013 on surveillance and maintenance activities for the 56 nonoperational facilities. See GAO, *DOE Facilities: Better Prioritization and Life Cycle Cost Analysis Would Improve Disposition Planning*, [GAO-15-272](#) (Washington, D.C.: Mar. 19, 2015).

⁶⁴The explanatory statement accompanying the Consolidated and Further Continuing Appropriation Act, 2015 directs NNSA to develop a 10 year strategic plan that would reduce the deferred maintenance backlog to 2014 levels and dispose of unneeded facilities.

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- According to NNSA officials, the categories of mission-based designations—defined by the Federal Real Property Council—that are assigned to NNSA facilities and infrastructure do not always accurately reflect the importance of facilities and infrastructure to mission achievement and, therefore, are not fully useful for prioritizing infrastructure investment. Among other things, NNSA’s current process for prioritizing infrastructure budget estimates focuses on those facilities and infrastructure identified as mission critical, but this designation may not accurately target infrastructure investment requirements because it understates the importance of some key facilities and other infrastructure to its mission. For example, agency officials said that current plutonium research and production facilities at Los Alamos National Laboratory are designated as mission critical, but the facility that treats the associated radioactive and hazardous waste is designated mission dependent, not critical. According to NNSA officials, if the waste treatment facility experienced an unexpected shutdown, the research and production facilities could slow down or stop operations since the waste could not be treated. However, the designation assigned to the waste facility does not elevate it to the highest priority for infrastructure investment. Elevating the importance of all mission dependent, not critical, facilities does not provide an optimal solution because doing so could similarly overstate the importance of some facilities and infrastructure that are less essential to mission achievement. NNSA officials with whom we spoke agreed that improved data on the importance of facilities and infrastructure to mission achievement, beyond the designations defined by the Federal Real Property Council, could help NNSA better identify needed infrastructure investment and improve the planning basis for its budget estimates. To improve this information, NNSA is planning to implement a “mission dependency index” that will measure a facility’s importance based on (1) the direct loss of capability and (2) how that loss effects other assets. According to agency officials, this new index may result in increased investment for supporting and enabling infrastructure (e.g., waste processing facilities, power lines, HVAC systems, etc.) that is currently considered mission dependent, not critical. According to NNSA plans, this ongoing effort is currently being used to inform program execution and is scheduled to be completed by the time the agency develops its 2017 budget materials.
 - NNSA is improving data about the condition of its facilities and infrastructure at a level of detail to inform investment prioritization decisions. NNSA currently reports on conditions at the facility level and is in the process of implementing a method to report the condition

of a facility's subsystems, according to agency officials we interviewed. These officials told us that a facility's overall condition can be assessed as good even if the facility has a failing subsystem that is essential to its operation. A failure of a critical subsystem could stop programmatic activities at the entire facility. For example, a leak in the fire suppression system shut down operations at the Device Assembly Facility, a mission critical facility at the Nevada National Security Site, for 10 days.⁶⁵ Further, according to officials, a subsystem within a facility could be in better condition than the rating of the entire facility might otherwise indicate making prioritization within such facilities challenging. NNSA officials with whom we spoke agreed that improved data about the condition of subsystems could help NNSA better identify needed investment and improve the basis for its budget estimates. To improve this information, NNSA is adopting a standardized condition assessment process and infrastructure database used by the Department of Defense. According to officials, NNSA plans to implement a revised facility inspection program that (1) conducts more detailed and more frequent inspections of its key facilities—those that are mission critical, and mission dependent (not critical)—and those facilities' key subsystems and (2) uses statistical modeling that is based on, among other things, material used and component age to predict the optimal time to conduct maintenance or recapitalization activities on these subsystems. According to NNSA plans, this ongoing effort is currently being used to inform program execution and is scheduled to be completed by the time the agency develops its 2017 budget materials.

Conclusions

NNSA faces a complex, decades-long task in planning, budgeting, and ensuring the execution of interconnected activities to modernize the nuclear security enterprise. Because NNSA annually submits a budget justification and updates its SSMP, the agency has an opportunity each year to improve its nuclear security budget materials so that they are more useful for congressional decision makers. DOE guidelines on data quality state that information should be useful to the intended users and presented in an accurate and complete manner, and our prior work has emphasized the importance of transparency in federal agencies' budget presentations. NNSA's 2015 budget materials continue to demonstrate

⁶⁵The Device Assembly Facility currently supports experiments for the stockpile stewardship program, among other things.

weaknesses, particularly with respect to (1) internal cost estimates for LEPs that are not fully supported by near-term budget estimates, which could affect the programs' cost and schedule, and (2) near-term budget estimates for maintenance and recapitalization that do not achieve DOE benchmarks for infrastructure investment, which could impair NNSA's ability to meet its goal of stopping the growth in its reported \$3.6 billion deferred maintenance backlog. Providing information in the budget materials on the potential risks to the achievement of program objectives when near-term budget estimates are not aligned with plans would improve the transparency of budget materials and benefit Congress during appropriation deliberations.

With particular regard to the total deferred maintenance backlog reported by NNSA, it is not useful for budget estimating because it includes deferred maintenance that is unlikely to be addressed. DOE guidelines and our prior work have emphasized the importance of transparency in the information federal agencies provide, such as in their budget presentations. Such information helps Congress have a clear understanding of how new funding requests relate to funding decisions for existing projects with continuing resource needs. By not explicitly identifying that some deferred maintenance is unlikely to be addressed, the agency cannot fully target infrastructure investment across the nuclear security enterprise or clarify programmatic scope to Congress. NNSA has ongoing efforts to improve its data on the relationship between facilities and infrastructure and the missions they support, as well as the level of detail it has on facility condition.

Recommendations for Executive Action

To improve transparency in future NNSA budget materials so that they are more useful for congressional decision makers, we recommend that the Administrator of NNSA take the following three actions:

- In instances where NNSA's internal cost estimates for a life extension program suggest that additional funding may be needed beyond what is included in the 5-year budget estimates to align with the program's plan, identify the amount of the shortfall in its budget materials and, what, if any, effect the shortfall may have on the program's cost and schedule or the risk of achieving program objectives.
- In instances where budget estimates do not achieve DOE benchmarks for maintenance and recapitalization investment over the 5-year budget estimates, identify in the budget materials the amount

of the shortfall and the effects, if any, on the deferred maintenance backlog.

- Until improved data about the importance of facilities and infrastructure to mission is available, clarify in the budget materials for the 5-year FYNSP period the amount of the deferred maintenance backlog associated with facilities that has little to no effect on programmatic operations and is therefore low priority to be addressed.

Agency Comments and Our Evaluation

We provided a draft of this report to DOE and NNSA for their review and comment. NNSA provided written comments, which are reproduced in full in appendix III, as well as technical comments, which we incorporated in our report as appropriate. In its comments, NNSA agreed with our recommendations and outlined planned actions to incorporate these recommendations into the agency's fiscal year 2017 budget materials, which is the next opportunity for such incorporation.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Energy, the Administrator of NNSA, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff members 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 major contributions to this report are listed in appendix IV.



David C. Trimble
Director, Natural Resources and Environment

List of Committees

The Honorable John McCain
Chairman
The Honorable Jack Reed
Ranking Member
Committee on Armed Services
United States Senate

The Honorable Lamar Alexander
Chairman
The Honorable Dianne Feinstein
Ranking Member
Subcommittee on Energy and Water Development
Committee on Appropriations
United States Senate

The Honorable Mac Thornberry
Chairman
The Honorable Adam Smith
Ranking Member
Committee on Armed Services
House of Representatives

The Honorable Mike Simpson
Chairman
The Honorable Marcy Kaptur
Ranking Member
Subcommittee on Energy and Water Development
Committee on Appropriations
House of Representatives

Appendix I: Objectives, Scope, and Methodology

Our objectives were to (1) identify the extent to which the National Nuclear Security Administration's (NNSA) budget estimates for modernizing the nuclear security enterprise changed between the 2015 budget materials and the prior year's material, (2) assess the extent to which NNSA's budget estimates for its current major modernization efforts align with plans, and (3) assess the extent to which NNSA's 2015 budget estimates for modernizing the nuclear security enterprise address its stated goal of stopping the growth of the deferred maintenance backlog. All years in this report refer to fiscal years, unless otherwise noted.

To identify the changes to NNSA's budget estimates, we compared the estimates in the 2014 budget materials with the estimates in the 2015 version of those materials. NNSA's budget materials are composed of two key policy documents that are issued annually: the agency's budget justification, which contains estimates for the 5-year Future-Years Nuclear Security Program (FYNSP), and the Stockpile Stewardship and Management Plan (SSMP), which provides budget estimates over the next 25 years. We compared the budget estimates down to the subprogram and line item construction project level. If we identified changes between the 2015 and 2014 budget materials, we reviewed both versions of the materials and interviewed knowledgeable officials from NNSA to determine the reasons for those changes. We reviewed prior GAO reports on modernization and specific programs or projects included in the plans to provide context for NNSA's plans and changes in the plans. A list of related GAO products is included at the end of this report. We also reviewed the GAO Cost Estimating and Assessment Guide, which highlights best practices for developing, managing, and evaluating cost estimates for capital programs.¹

To assess the extent to which the total 2015 budget estimates align with plans for major modernization efforts—which the agency defines as nuclear weapon life extension programs (LEP) and projects for plutonium and uranium infrastructure—we compared the budget estimates included in NNSA's 2015 budget materials with its long-range plans included in the SSMP. In addition to new issues that we identified as part of our review of the 2015 budget materials, we also followed up on the findings identified in our December 2013 report, such as the extent to which NNSA's 2015

¹[GAO-09-3SP](#).

budget materials include estimates for plutonium and uranium infrastructure projects that were omitted in the prior year's materials.² Additionally, we reviewed prior GAO reports to provide context for the concerns we identified and discussed areas where budget estimates did not appear to align with its modernization plans with knowledgeable officials from NNSA. If we identified areas in the 2015 budget materials where estimates did not appear to align with modernization plans, we reviewed the 2016 FYNSP included in NNSA's 2016 budget justification to determine the extent to which this misalignment persisted.

To determine the extent to which NNSA's budget estimates for modernizing the nuclear security enterprise address its stated goal of stopping the growth of the deferred maintenance backlog,³ we compared budget estimates contained in the 2015 budget materials over the 5 years of the FYNSP for (1) maintenance and (2) recapitalization to infrastructure investment benchmarks contained in the Department of Energy's (DOE) 2005 Real Property Asset Management Plan.⁴ DOE's 2005 plan states that budget estimates for maintenance should be at least 2 percent of the replacement plant value, which is the cost to replace the existing structure with a new structure of comparable size using current technology, codes, standards, and materials. NNSA's 2015 budget materials include the total replacement plant value for all eight sites in the nuclear security enterprise. DOE's 2005 plan states that budget estimates should be dedicated toward recapitalization activities, but the plan did not provide a specific benchmark. The plan's associated 2015 budget guidance (issued in March 2013) states that DOE programs, including NNSA, should institute a "recapitalization strategy" that is equal to 1 percent of replacement plant value if the program's overall facility condition fell below a certain threshold.⁵ According to NNSA data, its overall facility condition was below the established threshold. These "recapitalization strategy" budget estimates were to be added to the agency's

²[GAO-14-45](#).

³The deferred maintenance backlog is the cumulative value of maintenance that was not performed when it should have been or was scheduled to be and which, therefore, is put off or delayed for a future period.

⁴Department of Energy, *Real Property Asset Management Plan* (Washington, D.C.: August 2005).

⁵Department of Energy, *Three Year Rolling Timeline: Implementing the Goals and Objectives of DOE's Asset Management Plan* (Washington, D.C.: March 2013).

maintenance budget account because NNSA at that time did not have a separate recapitalization budget account. NNSA made its first targeted request for recapitalization in the 2015 budget materials. We compared the budget estimates contained in the specific recapitalization control to the investment benchmark of 1 percent of replacement plant value. NNSA officials confirmed that this approach was reasonable. We then calculated the amount of budget estimates for maintenance (2 percent of replacement plant value) and recapitalization (1 percent of replacement plant value) that would be equal to DOE's own infrastructure investment benchmarks.⁶ We then compared these benchmarks with annual budget estimates in NNSA's 2015 budget justification for maintenance and recapitalization over each year of the FYNSP to determine if the total budget estimates met, exceeded, or fell short of the benchmarks.⁷ We discussed with knowledgeable officials from NNSA areas where these budget estimates did not appear to align with the stated policy goal.

We also reviewed NNSA's Infrastructure Data Analysis Center system to identify the estimated value of NNSA's real property and the total amount of deferred maintenance across the nuclear security enterprise. We did not assess the reliability of these estimates because they were mostly used to determine whether NNSA was meeting its own stated goal of reducing deferred maintenance and dedicating benchmarked proportions of replacement plant value to maintenance and recapitalization.⁸ We also reviewed documentation and received briefings from NNSA officials on

⁶The replacement plant value estimates are based on NNSA's Infrastructure Data Analysis Center data effective March 13, 2014. These estimates are adjusted for inflation. A reliable estimate of the appropriate level of spending on maintenance or on recapitalization requires a reliable estimate of the replacement plant value. GAO did not assess the reliability of the replacement plant value, but rather we used it to determine whether NNSA's budget estimates met its own infrastructure investment benchmarks for maintenance, as well as recapitalization.

⁷Budget estimates for maintenance and recapitalization come from NNSA's 2015 budget justification. Total maintenance includes both direct and indirect maintenance that is derived from the sites' Integrated Facilities and Infrastructure crosscut budget. GAO did not assess the reliability of the Integrated Facilities and Infrastructure crosscut budget, but rather we used it to determine whether NNSA's budget materials contained estimates that met its own infrastructure investment benchmarks, which is based on a certain percentage of replacement plant value, for maintenance and recapitalization.

⁸We have previously reported that NNSA does not have complete information on the condition of its facilities. See [GAO-11-188](#).

the agency's ongoing efforts to improve its infrastructure data and resource prioritization.

To assess the reliability of NNSA's budget estimates and DOE's real property management system, we conducted manual and electronic tests of the data, looking for missing values, outliers, or other anomalies. Additionally, we interviewed knowledgeable NNSA officials about the data and their methodologies for using the data to construct their estimates, including discussing missing data that we identified in our tests of the data. During our review, we found that NNSA had omitted 20 years of budget data for site operations at the Y-12 National Security Complex in Tennessee after 2019. We brought this to the attention of agency officials who confirmed the omission and provided GAO with corrected budget estimates. We determined that the corrected Y-12 data and the data underlying the budget estimates were sufficiently reliable for our purposes, which was to report the total amount of budget estimates and those estimates dedicated to certain programs and projects. We also found that the limited amount of data we used from DOE's real property information management system were also sufficiently reliable for our purposes, which was to report the total amount of deferred maintenance and replacement plant value in the nuclear security enterprise, as well as the amount of deferred maintenance and replacement plant value associated with specific facility designations (i.e., not mission dependent). However, we did not assess the reliability of NNSA's underlying budget estimating processes or independently verify the reliability of specific budget estimates because such analysis exceeds the scope of our mandate.

We limited the scope of our review to NNSA's Weapons Activities appropriation. NNSA does not have a definition of "modernization," but NNSA officials consider all of the programs in the Weapons Activities appropriation to directly or indirectly support modernization. This scope is consistent with our December 2013 review.⁹ Additionally, we focused our review on those programs or projects with the potential to have a significant impact on NNSA's modernization plans or budgets. All data are presented in current dollars, which include projected inflation, unless otherwise noted. NNSA's budget estimates do not incorporate reductions

⁹[GAO-14-45](#).

for sequestration. As stated in NNSA's 2014 SSMP, incorporating such reductions would lead to adjustments to future plans.

We conducted this performance audit from July 2014 to August 2015 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Comparison of Budget Estimates and Schedules for Planned Key Modernization Activities in the 2010 Nuclear Posture Review and Subsequent Budget Materials

The 2010 Nuclear Posture Review identified long-term modernization goals for the Department of Energy's National Nuclear Security Administration (NNSA) including sustaining a safe, secure, and effective nuclear arsenal through the refurbishment of existing weapons to extend their operational lives by 20 to 30 years through nuclear weapon life extension programs (LEP); increasing investments to rebuild and modernize the nuclear security enterprise's aging infrastructure; and strengthening the science, technology, and engineering base.¹ NNSA annually updates two planning documents in support of the framework contained in the Nuclear Posture Review that include estimated budgets and schedule information for these modernization efforts, among other things. These planning documents are as follows:

- NNSA's Stockpile Stewardship and Management Plan (SSMP), which provides information on modernization and operations plans and budget estimates over the next 25 years. The SSMP is NNSA's formal means for communicating to Congress the status of certain activities and its long-range plans and budget estimates for sustaining the stockpile and modernizing the nuclear security enterprise. The SSMP also discusses the current and projected composition and condition of the nuclear weapons stockpile. Except in 2013, NNSA has submitted annual plans since 1998.² NNSA's 2015 SSMP contains information, including budget estimates, on modernization plans for the 5-year Future-Years Nuclear Security Program (FYNSP), as well as long-range budget estimates.
- NNSA's annual justification of the President's budget request, which typically includes the FYNSP, provides Congress with recommended spending levels for programs, projects, and activities, based on the

¹Department of Defense, *Nuclear Posture Review Report* (Washington, D.C.: Apr. 6, 2010). Section 1041 of the Floyd D. Spence Defense Authorization Act for Fiscal Year 2001 (Pub. L. No. 106-398) required the Secretary of Defense, in consultation with the Secretary of Energy, to "conduct a comprehensive review of the nuclear posture of the United States for the next 5 to 10 years."

²All years in this report refer to fiscal years, unless otherwise noted. The 2014 SSMP stated that NNSA did not submit the 2013 SSMP to Congress because analytic work conducted by DOD and NNSA to evaluate future needs for nuclear modernization activities across the nuclear security enterprise was ongoing and, as such, predecisional.

President's policy priorities. The FYNSP is generally consistent with the first 5 years of NNSA's plan presented in its SSMP. In addition, the report that the Department of Energy (DOE) jointly submits with the Department of Defense (DOD) in accordance with section 1043 of the National Defense Authorization Act for Fiscal Year 2012³ as amended is required to provide 10-year budget estimates and plans to enhance the reliability of the nuclear weapons stockpile and modernize infrastructure.⁴ Similarly, the FYNSP is generally consistent with the first 5 years of NNSA's plan presented in this joint report.

The 2010 Nuclear Posture Review included discussion of a number of planned major modernization efforts for NNSA, while other efforts have been identified in later versions of the planning documents discussed above. In particular, the Nuclear Posture Review identified three planned LEPs, one for the W76—a warhead delivered by submarine launched ballistic missile—another for the B61—a gravity bomb delivered by aircraft—and also discussed the potential for a common warhead developed through refurbishment and for use on both Navy and Air Force delivery vehicles. NNSA's planning documents for 2015 continue to include LEPs for the W76 and B61 and the 2015 SSMP further developed the concept of a common warhead, now termed an "interoperable" warhead (IW), including long-range plans for three IWs. In addition, NNSA's 2015 planning documents include an LEP for the Air Force's cruise missile warhead and a major alteration (ALT) of the Navy's W88 warhead, also delivered on a submarine launched ballistic missile, neither of which was discussed in the Nuclear Posture Review. The Nuclear Posture Review also discussed major line item construction projects to replace aging facilities for NNSA's plutonium and uranium processing missions. The project for plutonium processing is known as the Chemistry

³ Pub. L. No. 112-81, § 1043(a) (2011), *amended by* National Defense Authorization Act for Fiscal Year 2013, Pub. L. No. 112-239, § 1041 (2013) *and* National Defense Authorization Act for Fiscal Year 2014, Pub. L. No. 113-66, § 1054 (2013) *and* Carl Levin and Howard P. "Buck" McKeon National Defense Authorization Act for Fiscal Year 2015, Pub. L. No. 113-291, § 1643 (2014).

⁴ GAO reviewed the section 1043 report issued in July 2013. See GAO, *Nuclear Weapons: Ten-Year Budget Estimates for Modernization Omit Key Efforts, and Assumptions and Limitations Are Not Fully Transparent*, [GAO-14-373](#) (Washington, D.C.: June 10, 2014). As required by law, GAO is reviewing the accuracy and completeness of the budget estimates published in the section 1043 report issued in July 2014 in another audit.

Appendix II: Comparison of Budget Estimates and Schedules for Planned Key Modernization Activities in the 2010 Nuclear Posture Review and Subsequent Budget Materials

and Metallurgy Research Replacement-Nuclear Facility (CMRR-NF), and the project for uranium processing is known as the Uranium Processing Facility (UPF). Both projects are being reconceptualized as a result of project execution challenges and increasingly escalating cost estimates.⁵ Table 4 summarizes changes to the schedules for these major modernization efforts as reported in NNSA’s annual updates to its planning documents.

Table 4: Changes in Schedules for the National Nuclear Security Administration’s (NNSA) Major Modernization Efforts, According to Agency Planning Documents, Fiscal Years 2010-2015

	Fiscal year 2010 Nuclear Posture Review	Fiscal year 2011 Update to the Joint NNSA and Department of Defense Report	Fiscal year 2012 Stockpile Stewardship and Management Plan	Fiscal year 2013 NNSA congressional budget justification^a	Fiscal year 2014 Stockpile Stewardship and Management Plan	Fiscal year 2015 Stockpile Stewardship and Management Plan
W76-1 Life Extension Program (LEP) End of Production Date ^b	2017	2018	2018	Not provided ^c	2019	2019
B61-12 LEP First Production Unit Date ^d	2017	2017	2017	Not provided ^c	2019	2020
W88 ALT 370 First Production Unit Date ^d	Not discussed	Not provided	2018 ^e	Not provided	2019	2020
Cruise Missile LEP First Production Unit Date ^d	Not discussed	Not discussed	2031	Not provided	2024	2027
Interoperable Warhead-1 (IW-1) LEP First Production Unit Date ^d	Initiate study	Study options	Study options ^f	2023 ^g	2025	2030
IW-2 LEP First Production Unit Date ^d	Not discussed	Not discussed	Not discussed	Not discussed	2031	2034
IW-3 LEP First Production Unit Date ^d	Not discussed	Not discussed	Not discussed	Not discussed	2037	2041

⁵See [GAO-12-337](#), [GAO-13-686R](#), and [GAO-15-290](#).

Appendix II: Comparison of Budget Estimates and Schedules for Planned Key Modernization Activities in the 2010 Nuclear Posture Review and Subsequent Budget Materials

	Fiscal year 2010 Nuclear Posture Review	Fiscal year 2011 Update to the Joint NNSA and Department of Defense Report	Fiscal year 2012 Stockpile Stewardship and Management Plan	Fiscal year 2013 NNSA congressional budget justification^a	Fiscal year 2014 Stockpile Stewardship and Management Plan	Fiscal year 2015 Stockpile Stewardship and Management Plan
Uranium Processing Facility Operational Date ^h	2021	2024	2024	2022	Phase 1: 2025 Begin phases 2 and 3 in 2030	Phase 1: 2025 Begin phases 2 and 3 in 2030
Chemistry and Metallurgy Research Replacement-Nuclear Facility Operational Date	2021	2023	2023	Deferred to 2028 or later	Deferred. Alternative strategy in development	Deferred. Alternative strategy in development

Source: GAO analysis of NNSA planning documents. | GAO-15-499.

Note: All dates in table refer to fiscal year.

aNNSA did not publish an SSMP for fiscal year 2013. Instead, we report data from NNSA's fiscal year 2013 congressional budget justification.

bFor the W76-1 LEP, we report the date for the end of production rather than for the first production unit because the first production unit was completed in 2008.

cNNSA's 2013 budget justification stated that completion of production would be discussed in the 2013 Stockpile Stewardship and Management Plan, which was never published.

dThe "first production unit" is the first complete warhead from a production line certified for deployment.

eThe first production unit schedule discussed is for a W88 program of smaller scope than the W88 ALT 370.

fThe Fiscal Year 2012 Stockpile Stewardship and Management Plan included separate schedules for first production units of LEPs for the W88 and W78 warheads if a single, interoperable option was not to be pursued. The first production unit dates for these warheads were reported as 2024 and 2021 respectively.

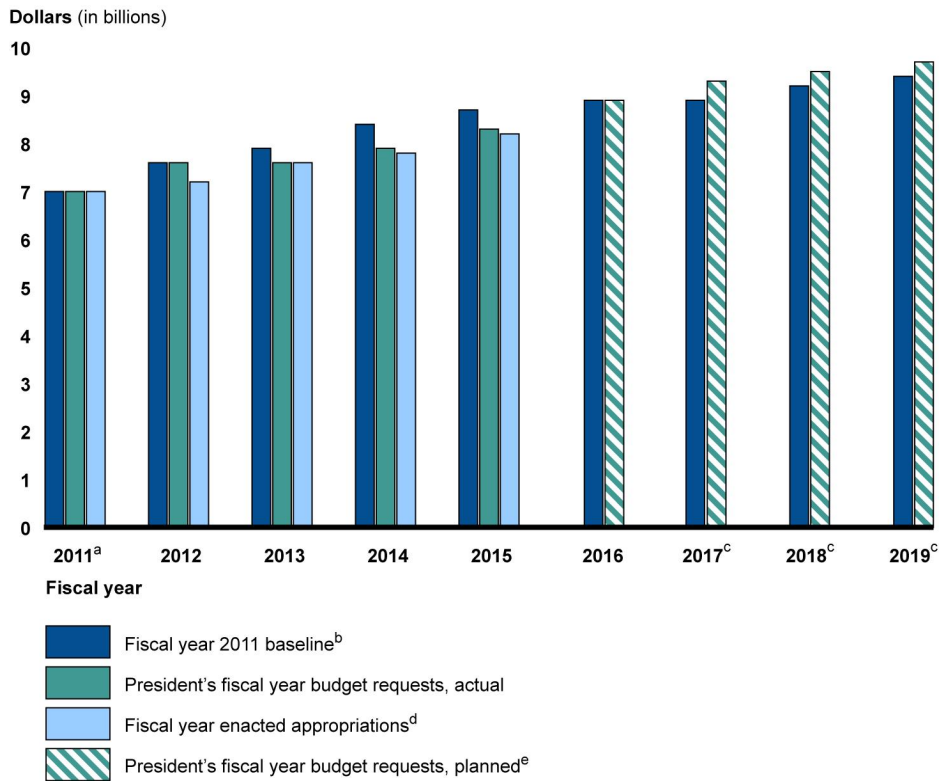
gThe option presented in NNSA's fiscal year 2013 congressional budget justification is for a W78 LEP.

hThe Uranium Processing Facility construction project began as a single large project, but was later broken up into three separately phased projects.

Figure 4 presents budget information from fiscal year 2011 through fiscal year 2019, comparing planned budget estimates for modernization presented in the Fiscal Year 2011 Joint NNSA and Department of Defense Report (baseline) to estimates in budget materials for subsequent years.

Appendix II: Comparison of Budget Estimates and Schedules for Planned Key Modernization Activities in the 2010 Nuclear Posture Review and Subsequent Budget Materials

Figure 4: Budget Estimates and Enacted Appropriations for All National Nuclear Security Administration Modernization Activities, Fiscal Years 2011 through 2019



Sources: GAO analysis of National Nuclear Security Administration planning documents and congressional appropriations. | GAO-15-499

Note: In this figure, data for fiscal years 2011 through 2015 represent budget information for prior fiscal years while data for fiscal years 2016 through 2019 represent budget information for future fiscal years. For this reason, there is no information to report for the President's actual fiscal year budget requests or for enacted appropriations for fiscal years 2016 through 2019.

^aIn 2011, the President's fiscal year budget request, actual, was made prior to issuance of the fiscal year 2011 baseline.

^bThe fiscal year 2011 baseline reflects budget estimates included in the update to the fiscal year 2011 joint NNSA Department of Defense report, which was the first set of long-term budget estimates made available subsequent to the release of the 2010 Nuclear Posture Review.

^cIn fiscal years 2017 through 2019, the update to the fiscal year 2011 joint report included a range of budget estimates for modernization. The low ends of the ranges are reported here. For these three fiscal years, the high ends of the reported ranges are \$9 billion (fiscal year 2017), \$9.3 billion (fiscal year 2018), and \$9.6 billion (fiscal year 2019).

^dFiscal year enacted appropriations are as reported by NNSA in its annual congressional budget justifications for the following fiscal year. This includes congressional direction.

^ePresident's fiscal year budget requests, planned, reflects the 5-year Future Years Nuclear Security Plan as included in NNSA's congressional budget justification for fiscal year 2015.

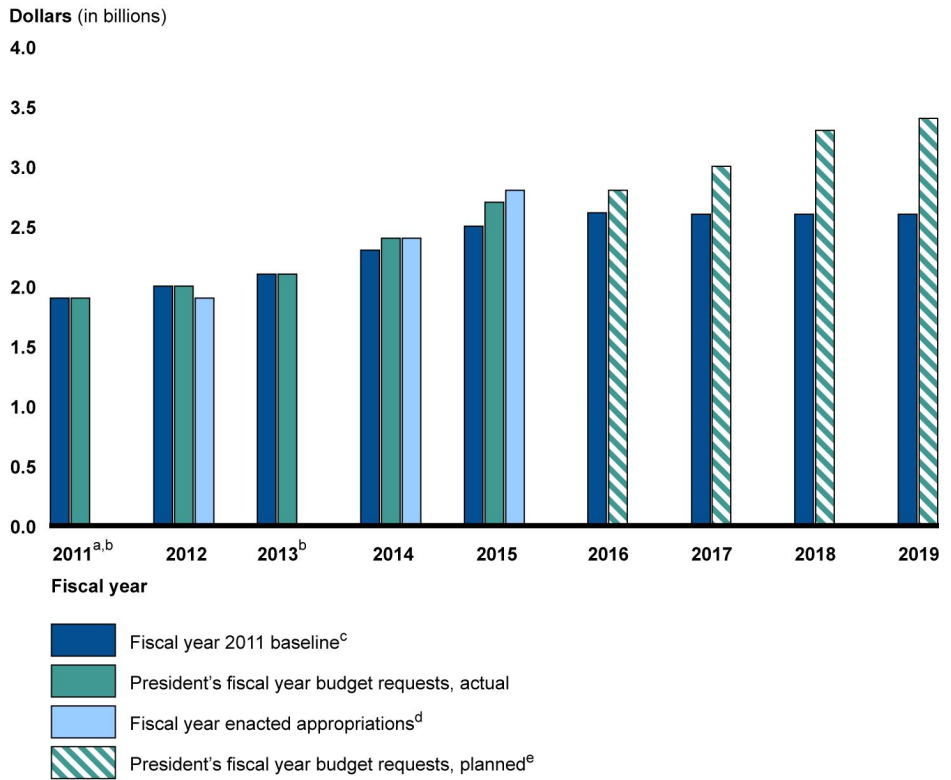
**Appendix II: Comparison of Budget Estimates
and Schedules for Planned Key Modernization
Activities in the 2010 Nuclear Posture Review
and Subsequent Budget Materials**

NNSA's total budget estimates for modernization generally address four areas: (1) stockpile; (2) infrastructure; (3) science, technology, and engineering (ST&E) capabilities; and (4) other weapons activities.⁶ NNSA's stockpile area represents the largest portion of NNSA's overall budget estimates for modernization (about 35 percent of the total budget estimates in 2015) and includes LEPs. Figure 5 presents budget information from fiscal year 2011 through fiscal year 2019, comparing planned budget estimates for the stockpile area presented in the Fiscal Year 2011 Joint NNSA and Department of Defense Report (baseline) to estimates in budget materials for subsequent years.

⁶The 2014 SSMP used the term ST&E capabilities, but the 2015 SSMP changed the name to research, development, testing, and evaluation. We will use the term as used the 2014 budget materials for consistency.

Appendix II: Comparison of Budget Estimates and Schedules for Planned Key Modernization Activities in the 2010 Nuclear Posture Review and Subsequent Budget Materials

Figure 5: Budget Estimates and Enacted Appropriations for National Nuclear Security Administration Modernization of the Stockpile, Fiscal Years 2011 through 2019



Sources: GAO analysis of National Nuclear Security Administration planning documents and congressional appropriations. | GAO-15-499

Note: In this figure, data for fiscal years 2011 through 2015 represent budget information for prior fiscal years while data for fiscal years 2016 through 2019 represent budget information for future fiscal years. For this reason, there is no information to report for the President's actual fiscal year budget requests or for enacted appropriations for fiscal years 2016 through 2019.

^aIn 2011, the President's fiscal year budget request, actual, was made prior to issuance of the fiscal year baseline.

^bNNSA operated under a continuing resolution in fiscal years 2011 and 2013 during which time Congress did not direct a specific funding level for the stockpile area.

^cThe fiscal year 2011 baseline reflects budget estimates included in the update to the fiscal year 2011 joint NNSA Department of Defense report, which was the first set of long-term budget estimates made available subsequent to the release of the 2010 Nuclear Posture Review.

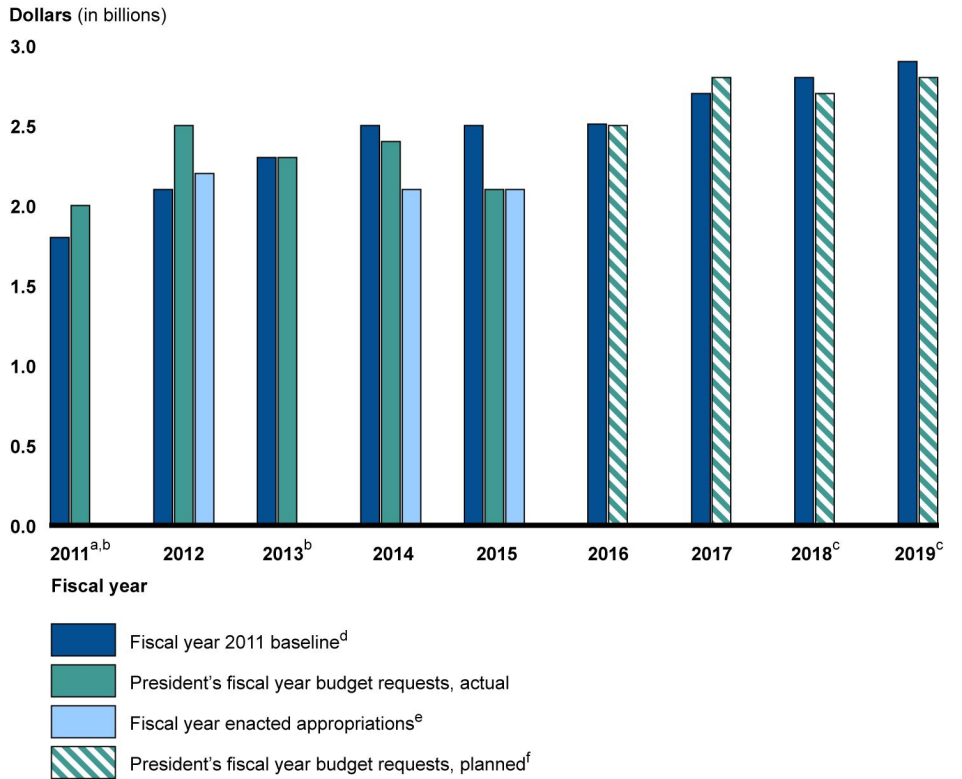
^dFiscal year enacted appropriations are as reported by NNSA in its congressional budget justifications for the following year. This includes congressional direction.

^ePresident's fiscal year budget requests, planned, reflects the 5-year Future Years Nuclear Security Plan as included in NNSA's congressional budget justification for fiscal year 2015.

Appendix II: Comparison of Budget Estimates and Schedules for Planned Key Modernization Activities in the 2010 Nuclear Posture Review and Subsequent Budget Materials

NNSA’s infrastructure area represents the second largest portion of NNSA’s overall modernization plans (about 29 percent of the total budget estimates in 2015) and includes construction of new facilities as well as operations and maintenance of existing facilities and infrastructure. Figure 6 presents budget information from fiscal year 2011 through fiscal year 2019, comparing planned budget estimates for the infrastructure area presented in the Fiscal Year 2011 Joint NNSA and Department of Defense Report (baseline) to estimates in budget materials for subsequent years.

Figure 6: Budget Estimates and Enacted Appropriations for National Nuclear Security Administration Modernization of Infrastructure, Fiscal Years 2011 through 2019



Sources: GAO analysis of National Nuclear Security Administration planning documents and congressional appropriations. | GAO-15-499

Note: In this figure, data for fiscal years 2011 through 2015 represent budget information for prior fiscal years while data for fiscal years 2016 through 2019 represent budget information for future fiscal years. For this reason, there is no information to report for the President’s actual fiscal year budget requests or for enacted appropriations for fiscal years 2016 through 2019.

^aIn 2011, the President’s fiscal year budget request, actual, was made prior to issuance of the fiscal year 2011 baseline.

**Appendix II: Comparison of Budget Estimates
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Activities in the 2010 Nuclear Posture Review
and Subsequent Budget Materials**

bNNSA operated under a continuing resolution in fiscal years 2011 and 2013 during which time Congress did not direct a specific funding level for the infrastructure area.

cln fiscal years 2018 and 2019, the update to the fiscal year 2011 joint report included a range of budget estimates for infrastructure. The low ends of the ranges are reported here. For these two fiscal years, the high ends of the reported ranges are \$2.9 billion (fiscal year 2018), and \$3.1 billion (fiscal year 2019).

dThe fiscal year 2011 baseline reflects budget estimates included in the update to the fiscal year 2011 joint NNSA Department of Defense report, which was the first set of long-term budget estimates made available subsequent to the release of the 2010 Nuclear Posture Review.

eFiscal year enacted appropriations are as reported by NNSA in its congressional budget justifications for the following fiscal year. This includes congressional direction.

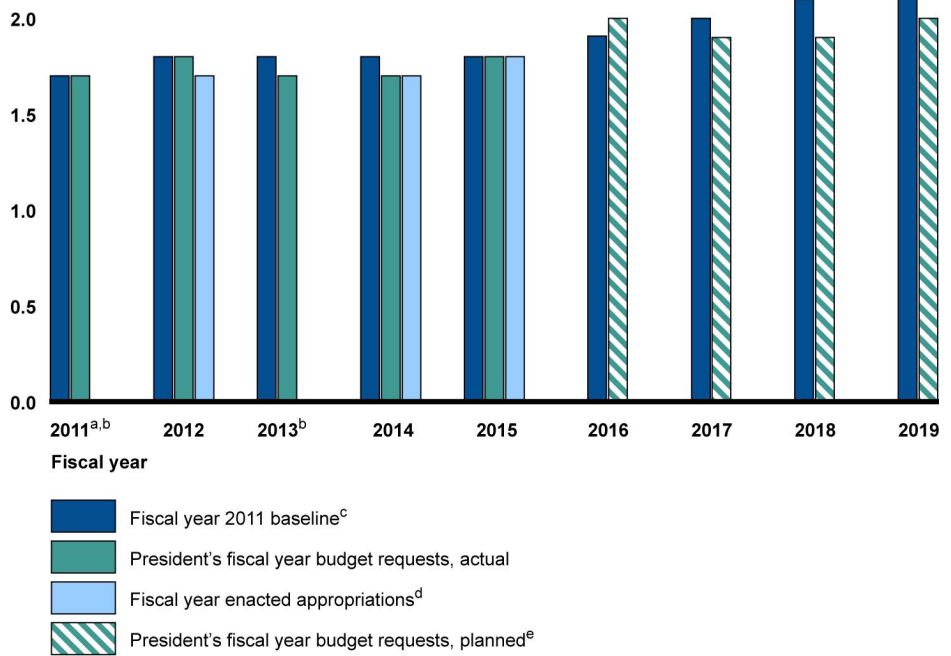
fPresident's fiscal year budget requests, planned, reflects the 5-year Future Years Nuclear Security Plan as included in NNSA's congressional budget justification for fiscal year 2015.

NNSA's ST&E capabilities area represents the third largest portion of NNSA's overall modernization plans (about 20 percent of the total budget estimates in 2015) and includes technically challenging, multiyear, multifunctional efforts to develop and maintain critical science and engineering capabilities in support of the stockpile. Figure 7 presents budget information from fiscal year 2011 through fiscal year 2019, comparing planned budget estimates for the ST&E area presented in the Fiscal Year 2011 Joint NNSA and Department of Defense Report (baseline) to estimates in budget materials for subsequent years.

Appendix II: Comparison of Budget Estimates and Schedules for Planned Key Modernization Activities in the 2010 Nuclear Posture Review and Subsequent Budget Materials

Figure 7: Budget Estimates and Enacted Appropriations for National Nuclear Security Administration Modernization of Science, Technology, and Engineering Capabilities, Fiscal Years 2011 through 2019

Dollars (in billions)
2.5



Sources: GAO analysis of National Nuclear Security Administration planning documents and congressional appropriations. | GAO-15-499

Notes: In this figure, data for fiscal years 2011 through 2015 represent budget information for prior fiscal years while data for fiscal years 2016 through 2019 represent budget information for future fiscal years. For this reason, there is no information to report for the President's actual fiscal year budget requests or for enacted appropriations for fiscal years 2016 through 2019.

NNSA's budget structure in this area has changed from year to year because of proposals in the President's request and because of congressional direction, which may affect comparison.

^aIn 2011, the President's fiscal year budget request, actual, was made prior to issuance of the fiscal year 2011 baseline.

^bNNSA operated under a continuing resolution in fiscal years 2011 and 2013 during which time Congress did not direct a specific funding level for the science, technology, and engineering capabilities area.

^cThe fiscal year 2011 baseline reflects budget estimates included in the update to the fiscal year 2011 joint NNSA Department of Defense report, which was the first set of long-term budget estimates made available subsequent to the release of the 2010 Nuclear Posture Review.

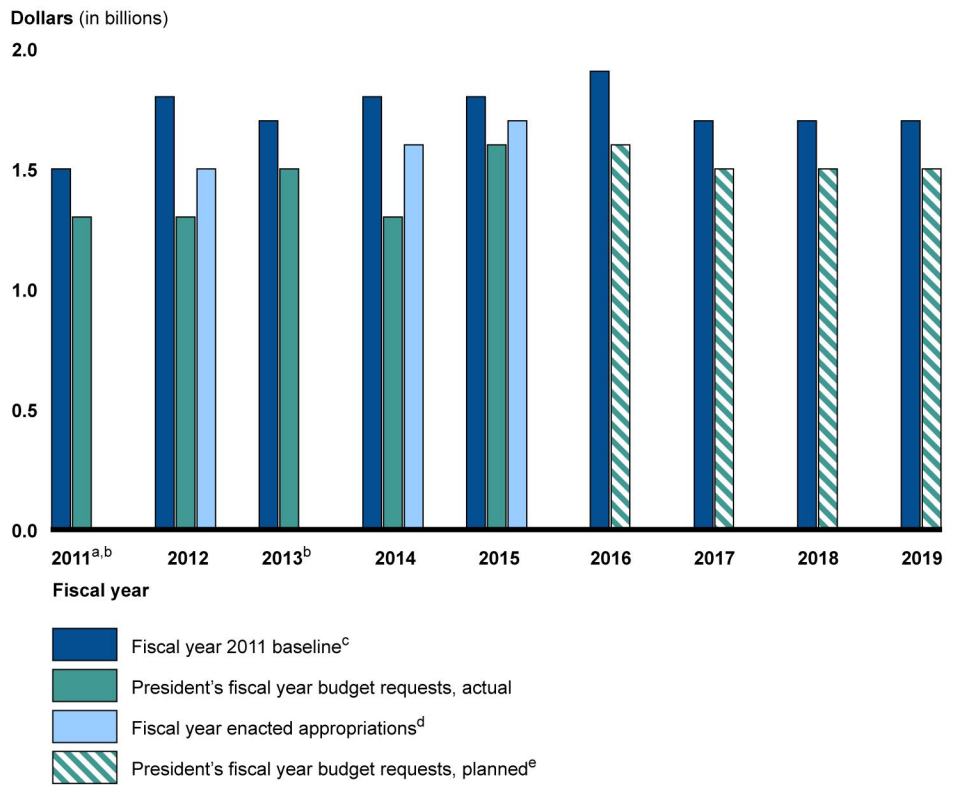
^dFiscal year enacted appropriations are as reported by NNSA in its congressional budget justifications for the following fiscal year. This includes congressional direction.

^ePresident's fiscal year budget requests, planned, reflects the 5-year Future Years Nuclear Security Plan as included in NNSA's congressional budget justification for fiscal year 2015.

Appendix II: Comparison of Budget Estimates and Schedules for Planned Key Modernization Activities in the 2010 Nuclear Posture Review and Subsequent Budget Materials

NNSA’s other weapons activities represent the smallest portion of NNSA’s overall modernization plans (about 16 percent of the total budget estimates in 2015) and includes nuclear weapon security and transportation as well as legacy contractor pensions, among other things. Figure 8 presents budget information from fiscal year 2011 through fiscal year 2019, comparing planned budget estimates for other weapons activities presented in the Fiscal Year 2011 Joint NNSA and Department of Defense Report (baseline) to estimates in budget materials for subsequent years.

Figure 8: Budget Estimates and Enacted Appropriations for National Nuclear Security Administration Modernization of Other Weapons Activities, Fiscal Years 2011 through 2019



Sources: GAO analysis of National Nuclear Security Administration planning documents and congressional appropriations. | GAO-15-499

Notes: In this figure, data for fiscal years 2011 through 2015 represent budget information for prior fiscal years while data for fiscal years 2016 through 2019 represent budget information for future fiscal years. For this reason, there is no information to report for the President's actual fiscal year budget requests or for enacted appropriations for fiscal years 2016 through 2019.

NNSA's budget structure in this area has changed from year to year because of proposals in the President's request, which may affect comparison.

**Appendix II: Comparison of Budget Estimates
and Schedules for Planned Key Modernization
Activities in the 2010 Nuclear Posture Review
and Subsequent Budget Materials**

aIn 2011, the President's fiscal year budget request, actual, was made prior to issuance of the fiscal year 2011 baseline.

bNNSA operated during a continuing resolution in fiscal year 2011 during which time Congress did not direct a specific funding level for the other weapons activities area.

cThe fiscal year 2011 baseline reflects budget estimates included in the update to the fiscal year 2011 joint NNSA Department of Defense report, which was the first set of long-term budget estimates made available subsequent to the release of the 2010 Nuclear Posture Review. Budget estimates for fiscal years 2017 through 2019 did not include estimates for growth in contractor pension costs because these were listed as "to be determined" in the fiscal year 2011 joint report.

dFiscal year enacted appropriations are as reported by NNSA in its congressional budget justifications for the following fiscal year. This includes congressional direction.

ePresident's fiscal year budget requests, planned, reflects the 5-year Future Years Nuclear Security Plan as included in NNSA's congressional budget justification for fiscal year 2015.

Appendix III: Comments from the National Nuclear Security Administration



Department of Energy
Under Secretary for Nuclear Security
Administrator, National Nuclear Security Administration
Washington, DC 20585



July 24, 2015

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

Dear Mr. Trimble:

Thank you for the opportunity to review the Government Accountability Office's (GAO) draft report titled *MODERNIZING THE NUCLEAR SECURITY ENTERPRISE: NNSA Increased Its Budget Estimates, but Estimates for Key Stockpile and Infrastructure Programs Need Improvement (GAO-15-499)*.

The National Nuclear Security Administration (NNSA) concurs with GAO's recommendations, which highlight opportunities for increased transparency of budget materials, and will take appropriate action in the upcoming budgeting and reporting cycles. We also appreciate the auditors' recognition of our efforts to self-identify and employ enhanced analytical tools to provide infrastructure data and analysis above federal requirements.

The attachment to this memorandum details the specific actions taken and planned to address each of GAO's recommendations. We have also provided technical and general comments under separate cover for your consideration to enhance the clarity and factual accuracy of the report. If you have any questions regarding this response, please contact Dean Childs, Director, Audit Coordination and Internal Affairs, at (301) 903-1341.

Sincerely,

Frank G. Klotz

Enclosure



Enclosure

NATIONAL NUCLEAR SECURITY ADMINISTRATION
Response to Report Recommendations

**“MODERNIZING THE NUCLEAR SECURITY ENTERPRISE: NNSA Increased
Its Budget Estimates, but Estimates for Key Stockpile and Infrastructure Programs
Need Improvement” (GAO-15-499)**

To improve transparency in future NNSA budget materials so that they are more useful for congressional decision makers, GAO recommends that the Administrator of NNSA take the following actions:

Recommendation 1: In instances where NNSA’s internal cost estimates for a life extension program suggest that additional funding may be needed beyond what is included in the 5-year budget estimates to align with the program’s plan, identify the amount of the shortfall in its budget materials and what, if any, effect the shortfall may have on the program’s cost and schedule or the risk of achieving program objectives.

Management Response: *Concur*

NNSA will include, as appropriate, statements in future Stockpile Stewardship and Management Plans on the effect of funding an LEP effort at less than suggested by a planning estimate cost range. It should be noted that preliminary LEP planning estimates are based on point scopes that meet current policy objectives rather than a specific range of options (such as considered in the LEP 6.2 Feasibility Study). These estimates do not represent a baseline or the specific plan for executing the LEP, and are a reasonable estimate of future required funding in advance of a specific plan being developed. The baseline is established based on the actual scope selected and a detailed, bottoms up plan for execution developed as part of the LEP 6.2A (Cost Study and Option Downselect) study.

NNSA is developing methods and approaches to enhance cost estimating capabilities to inform planning and budgeting estimates. The identification of potential risks for achieving program goals are included within this analytic process.

Recommendation 2: In instances where budget estimates do not achieve DOE benchmarks for maintenance and recapitalization investment over the 5-year budget estimates, identify in the budget materials the amount of the shortfall and the effects, if any, on the deferred maintenance backlog.

Management Response: *Concur*

NNSA will implement this recommendation in the FY 2017 budget request.

Recommendation 3: Until improved data about the importance of facilities and infrastructure to mission is available, clarify in the budget materials for the 5-year FYNSP period the amount of the deferred maintenance backlog that is associated with facilities that have little to no effect on programmatic operations and is therefore low priority to be addressed.

Management Response: *Concur*

NNSA will implement this recommendation in the FY 2017 budget request. NNSA will include deferred maintenance on current excess facilities planned for demolition and deferred maintenance on facilities that will be excess in the future, which are being maintained at a minimum level for safety and usefulness until planned retirement.

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

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

Staff Acknowledgments

In addition to the individual named above, Allison B. Bawden (Assistant Director), Patrick Bernard, Pamela Davidson, Tom Fullum, and Jason Trentacoste made key contributions to this report.

Appendix V: Accessible Data

Agency Comment Letter

Text for Appendix III:
Comments from the
National Nuclear Security
Administration

Page 1

Department of Energy

Under Secretary for Nuclear Security Administrator, National Nuclear
Security Administration

Washington, DC 20585

July 24, 2015

Mr. David C. Trimble Director, Natural Resources and Environment

U.S. Government Accountability Office Washington, DC 20548

Dear Mr. Trimble:

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SECURITY ENTERPRISE: NNSA Increased Its Budget Estimates, but
Estimates /or Key Stockpile and Infrastructure Programs Need
Improvement (GAO-15-499).

The National Nuclear Security Administration (NNSA) concurs with GAO's
recommendations, which highlight opportunities for increased
transparency of budget materials, and will take appropriate action in the
upcoming budgeting and reporting cycles. We also appreciate the
auditors' recognition of our efforts to self-identify and employ enhanced
analytical tools to provide infrastructure data and analysis above federal
requirements.

The attachment to this memorandum details the specific actions taken
and planned to address each of GAO's recommendations. We have also

provided technical and general comments under separate cover for your consideration to enhance the clarity and factual accuracy of the report. If you have any questions

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Enclosure

Page 2

NATIONAL NUCLEAR SECURITY ADMINISTRATION

Response to Report Recommendations

"MODERNIZING THE NUCLEAR SECURITY ENTERPRISE: NNSA Increased

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To improve transparency in future NNSA budget materials so that they are more useful for congressional decision makers, GAO recommends that the Administrator of NNSA take the following actions:

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Management Response: Concur

NNSA will include, as appropriate, statements in future Stockpile Stewardship and Management Plans on the effect of funding an LEP effort at less than suggested by a planning estimate cost range. It should be noted that preliminary LEP planning estimates are based on point scopes that meet current policy objectives rather than a specific range of options (such as considered in the LEP

6.2 Feasibility Study). These estimates do not represent a baseline or the specific plan for executing the LEP, and are a reasonable estimate of future required funding in advance of a specific plan being developed. The baseline is established based on the actual scope selected and a detailed, bottoms up plan for execution developed as part of the LEP 6.2A (Cost Study and Option Downselect) study.

NNSA is developing methods and approaches to enhance cost estimating capabilities to inform planning and budgeting estimates. The identification of potential risks for achieving program goals are included with this analytic process.

Recommendation 2: In instances where budget estimates do not achieve DOE benchmarks for maintenance and recapitalization investment over the 5-year budget estimates, identify in the budget materials the amount of the shortfall and the effects, if any, on the deferred maintenance backlog.

Page 3

Management Response: Concur

NNSA will implement this recommendation in the FY 2017 budget request.

Recommendation 3: Until improved data about the importance of facilities and infrastructure to mission is available, clarify in the budget materials for the 5-year FYNSP period the amount of the deferred maintenance backlog that is associated with facilities that have little to no effect on programmatic operations and is therefore low priority to be addressed.

Management Response: Concur

NNSA will implement this recommendation in the FY 2017 budget request. NNSA will include deferred maintenance on current excess facilities planned for demolition and deferred maintenance on facilities that will be excess in the future, which are being maintained at a minimum level for safety and usefulness until planned retirement.

Accessible text and data tables for figures

Text for Figure 1: Department of Energy Facility Condition Index Scale

- Excellent: Deferred maintenance is less than 2% of replacement plant value.

- Good: Deferred maintenance is between 2 and 5% of replacement plant value.
- Adequate: Deferred maintenance is between 5 and 10% of replacement plant value.
- Fair: Deferred maintenance is between 10 to 25% of replacement plant value.
- Poor: Deferred maintenance is greater than 25% of replacement plant value.

Data Table for Figure 2: Comparison of Budget Estimates for Nuclear Modernization Activities in the National Nuclear Security Administration’s Fiscal Years 2014 and 2015 Budget Materials

Fiscal Year	2014 Budget Materials	2015 Budget Materials
2014	7.9	N/A
2015	8.5	8.3
2016	8.8	8.9
2017	8.9	9.3
2018	9.3	9.5
2019	10.5	9.7
2020	10.6	10.5
2021	11.1	10.7
2022	11.2	10.9
2023	10.8	11.1
2024	10.8	11.4
2025	10.6	11.1
2026	11.0	11.1
2027	11.7	11.5
2028	11.6	11.7
2029	11.5	12.0
2030	11.5	12.4
2031	11.8	12.8
2032	12.1	13.1
2033	12.5	13.3
2034	12.7	13.5
2035	12.5	13.8
2036	12.5	14.0
2037	12.9	14.1
2038	12.6	14.3
2039	N/A	14.5

Data Table for Figure 4: Budget Estimates and Enacted Appropriations for All National Nuclear Security Administration Modernization Activities, Fiscal Years 2011 through 2019

Source	2011	2012	2013	2014	2015	2016	2017	2018	2019
Fiscal year 2011 Joint NNSA and Department of Defense Report	7.0**	7.6	7.9	8.4	8.7	8.9	8.9	9.2	9.4
President's Budget Request For That Fiscal Year	7.0	7.6	7.6	7.9	8.3	N/A	N/A	N/A	N/A
Source	2011	2012	2013	2014	2015	2016	2017	2018	2019
Actual Appropriation Enacted by the Congress and Signed by the President	7.0	7.2	7.6	7.8	8.2	N/A	N/A	N/A	N/A
Source	2011	2012	2013	2014	2015	2016	2017	2018	2019
Future Budget Estimates Contained in Fiscal Year 2015 Budget Materials	N/A	N/A	N/A	N/A	N/A	8.9	9.3	9.5	9.7

** The amount for 2011 was already requested by NNSA prior to the 1251 Update.

Data Table for Figure 5: Budget Estimates and Enacted Appropriations for National Nuclear Security Administration Modernization of the Stockpile, Fiscal Years 2011 through 2019 (\$ billions)

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Fiscal year 2011 Joint NNSA and Department of Defense Report	1.9	2.0	2.1	2.3	2.5	2.6	2.6	2.6	2.6
President's Budget Request For That Fiscal Year	1.9	2.0	2.1	2.4	2.7	N/A	N/A	N/A	N/A
	2011	2012	2013	2014	2015	2016	2017	2018	2019
Actual Appropriation Enacted by the Congress and Signed by the President	N/A	1.9	N/A	2.4	2.8	N/A	N/A	N/A	N/A
	2011	2012	2013	2014	2015	2016	2017	2018	2019
Future Budget Estimates Contained in Fiscal Year 2015 Budget Materials	N/A	N/A	N/A	N/A	N/A	2.8	3.0	3.3	3.4

Data Table for Figure 6: Budget Estimates and Enacted Appropriations for National Nuclear Security Administration Modernization of Infrastructure, Fiscal Years 2011 through 2019

	2011 ^a	2012	2013	2014	2015	2016	2017	2018	2019
Fiscal year 2011 baseline ^d	1.8	2.1	2.3	2.5	2.5	2.5	2.7	2.8 ^c	2.9 ^c
President's fiscal year budget requests, actual	2.0	2.5	2.3	2.4	2.1	N/A	N/A	N/A	N/A
Fiscal year enacted appropriations	N/A ^b	2.2	N/A ^c	2.1	2.1	N/A	N/A	N/A	N/A
President's fiscal year budget requests, planned ^e	N/A	N/A	N/A	N/A	N/A	2.5	2.8	2.7	2.8

Data Table for Figure 7: Budget Estimates and Enacted Appropriations for National Nuclear Security Administration Modernization of Science, Technology, and Engineering Capabilities, Fiscal Years 2011 through 2019

	2011 ^a	2012	2013	2014	2015	2016	2017	2018	2019
Fiscal year 2011 baseline ^c	1.7	1.8	1.8	1.8	1.8	1.9	2.0	2.1	2.2
President's fiscal year budget requests, actual	1.7	1.8	1.7	1.7	1.8	N/A	N/A	N/A	N/A
Fiscal year enacted appropriations	N/A ^b	1.7	N/A ^b	1.7	1.8	N/A	N/A	N/A	N/A
President's fiscal year budget requests, planned ^d	N/A	N/A	N/A	N/A	N/A	2.0	1.9	1.9	2.0

Data Table for Figure 8: Budget Estimates and Enacted Appropriations for National Nuclear Security Administration Modernization of Other Weapons Activities, Fiscal Years 2011 through 2019

	2011 ^a	2012	2013	2014	2015	2016	2017	2018	2019
Fiscal year 2011 baseline ^c	1.5	1.8	1.7	1.8	1.8	1.9	1.7	1.7	1.7
President's fiscal year budget requests, actual	1.3	1.3	1.5	1.3	1.6	N/A	N/A	N/A	N/A
Fiscal year enacted appropriations	N/A ^b	1.5	N/A ^b	1.6	1.7	N/A	N/A	N/A	N/A
President's fiscal year budget requests, planned ^d	N/A	N/A	N/A	N/A	N/A	1.6	1.5	1.5	1.5

Related GAO Products

Stockpile

Nuclear Weapons: Actions Needed by NNSA to Clarify Dismantlement Performance Goal. [GAO-14-449](#). Washington, D.C.: April 30, 2014.

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