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Energy and Water Development: FY2017 Appropriations for Nuclear Weapons Activities

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Summary

The annual Energy and Water Development appropriations bill funds civil works projects of the Army Corps of Engineers, the Department of the Interior's Bureau of Reclamation, the Department of Energy (DOE), and several independent agencies.

The DOE budget includes funding for the National Nuclear Security Administration (NNSA), a separately organized agency within DOE. NNSA operates three programs: Defense Nuclear Nonproliferation, which secures nuclear materials worldwide, conducts research and development (R&D) into nonproliferation and verification, and operates the Nuclear Counterterrorism and Incident Response Program; Naval Reactors, which "is responsible for all U.S. Navy nuclear propulsion work"; and Weapons Activities.

The last is the subject of this report. The Weapons Activities account supports programs that maintain U.S. nuclear missile warheads and gravity bombs and the infrastructure programs that support that mission. Specifically, according to DOE's budget documentation, these programs "support the maintenance and refurbishment of nuclear weapons to continue sustained confidence in their safety, reliability, and performance; continued investment in scientific, engineering, and manufacturing capabilities to enable certification of the enduring nuclear weapons stockpile; and manufacture of nuclear weapons components."

The Consolidated Appropriations Act, 2016 (P.L. 114-113) provides $12,526.5 million for NNSA, of which $8,846.9 million is allocated to the Weapons Activities account. The budget request for the FY2017 seeks $9,243.1 million for Weapons Activities within a total budget of $12,884 million for NNSA. This represents an increase of approximately 4.4% in the Weapons Activities Account over FY2016.

Weapons Activities has three main programs, each with a request of over $1 billion for FY2017, as follows:

- Directed Stockpile Work supports programs that work directly on nuclear weapons. It includes life extension programs, maintenance, and other activities. The FY2016-enacted amount was $3,387.9 million; the FY2017 request is $3,330.5 million, a 2% reduction.
- Research, Development, Test and Evaluation Programs, which advance the science, engineering, computation, and manufacturing, support Directed Stockpile Work. The FY2016-enacted amount was $1,818.5 million; the FY2017 request is $1,854.7 million, a 2% increase.
- Infrastructure and Operations maintains, operates, and modernizes the National Nuclear Security Administration infrastructure. It supports construction of new facilities and funds deferred maintenance in older facilities. In the FY2016 budget, this program replaced the program known as Readiness in Technical Base and Facilities. The FY2016-enacted amount was $2,279.1 million; the FY2017 request is $2,721.9 million, a 19% increase.

Weapons Activities also includes several smaller programs, all of which are described in this report: Secure Transportation Asset, Defense Nuclear Security, Information Technology and Cybersecurity, and Legacy Contractor Pensions.

This report will be updated as necessary.

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Overview

The Nuclear Security Enterprise

Responsibility for U.S. nuclear weapons resides with both the Department of Defense (DOD) and the Department of Energy (DOE). DOD develops, deploys, and operates the missiles and aircraft that can deliver nuclear warheads. It also generates the military requirements for the warheads carried on those platforms. The National Nuclear Security Administration (NNSA), which is a semi-autonomous agency within the Department of Energy, oversees the research, development, test, and acquisition programs that produce, maintain, and sustain the warheads. Moreover, DOE is responsible for storing and securing the warheads that are not deployed with DOD delivery systems and for dismantling warheads that have been retired and removed from the stockpile.

Congress authorizes funding for both DOD and NNSA nuclear weapons activities in the annual National Defense Authorization Act (NDAA). While Congress considers appropriations for DOD's nuclear weapons activities in the Defense Appropriations bill, however, it funds the NNSA budget through the Energy and Water Development Appropriations bill. This report focuses on the portion of the Energy and Water Development Appropriations Bill that funds NNSA's nuclear weapons activities.

Reorganization of the Nuclear Security Enterprise

During World War II, when the United States first developed nuclear weapons, the Army managed the nuclear weapons program. In 1946, Congress passed the Atomic Energy Act of 1946 to establish the Atomic Energy Commission (AEC). The AEC was an independent civilian agency tasked with managing the U.S. nuclear weapons program. In the Energy Research and Development Act of 1974, Congress dissolved the AEC and created the Nuclear Regulatory Commission and the Energy Research and Development Administration (ERDA), which among other functions managed the nuclear weapons program. That program was moved again by the Department of Energy Organization Act of 1977, which dissolved ERDA and created DOE.[1]

Congress, in passing the National Defense Authorization Act for Fiscal Year 2000 (P.L. 106-65, Title XXXII), established the National Nuclear Security Administration. NNSA is a semi-autonomous agency operating within DOE. In addition to managing the nuclear weapons program, NNSA also manages the Defense Nuclear Nonproliferation and Naval Reactors programs.

These reorganizations stem, in part, from long-standing concerns about the management of the nuclear weapons complex. Many reports and legislative provisions have been written over the past several decades to address this issue. Most recently, in the National Defense Authorization Act for Fiscal Year 2013 (P.L. 112-239), Congress established the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise and directed the panel to make recommendations on "the most appropriate governance structure, mission, and management of the nuclear security enterprise." In its report to Congress, the panel stated:

> The panel finds that the existing governance structures and many of the practices of the enterprise are inefficient and ineffective, thereby putting the entire enterprise at risk over the long term. These problems have not occurred overnight; they are the result of decades

[1] For a history of the nuclear weapons program and related topics, 1939-2010, see U.S. Department of Energy, National Nuclear Security Administration, "NNSA Timeline," http://www.nnsa.energy.gov/aboutus/ourhistory/timeline.

> of neglect. This is in spite of the efforts of many capable and dedicated people who must nonetheless function within the confines of a dysfunctional system.…
>
> One unmistakable conclusion is that NNSA governance reform, at least as it has been implemented, has failed to provide the effective, mission-focused enterprise that Congress intended.[2]

The panel's recommendations included strengthening presidential guidance and oversight of the nuclear enterprise; establishing new congressional mechanisms for leadership and oversight of the enterprise; replacing NNSA with a new Office of Nuclear Security within DOE, renamed to the Department of Energy and Nuclear Security, with the Secretary responsible for the mission; and building a culture of performance, accountability, and credibility. NNSA, in its review of the report, supported many of the suggested changes in management and contracting within NNSA, but did not support the proposed changes in the name and structure of the organization or its leadership.

Congress has also expressed concerns about cost growth and transparency in NNSA's programs. These concerns focus on both major construction projects and weapons refurbishment programs. Congress addressed these concerns in the Consolidated and Further Continuing Appropriations Act for 2015 (P.L. 113-235). Section 304 required that NNSA's construction of high-hazard nuclear facilities have independent oversight by the Office of Independent Enterprise Assessments "to ensure the project is in compliance with nuclear safety requirements." Section 305 required an independent cost estimate for approving performance baseline and starting construction for projects with total cost over $100 million. Section 308 required the Secretary of Energy to provide an analysis of alternatives for each major warhead refurbishment program reaching the development engineering stage. The Senate reiterated its concerns in S.Rept. 114-54, its report on H.R. 2028, the Energy and Water Development and Related Agencies Appropriations Act, 2016. In this report, the committee expressed its concern "with the continued poor cost estimating by the Department, particularly within the NNSA," and directed the Secretary of Energy to "provide a report … that outlines the Department's plan for improving cost estimating for major projects and programs."

The Nuclear Weapons Complex

At the end of the Cold War in 1991, the U.S. nuclear weapons complex consisted of 14 sites—3 laboratories, the nuclear weapons test site in Nevada, and a number of manufacturing plants for weapons materials and components. As the number of nuclear weapons in the U.S. arsenal declined and demand for new warheads and materials abated in the 1990s, the United States closed several facilities in the complex.

The complex now consists of eight sites in seven states. These sites include three laboratories (Los Alamos National Laboratory, NM; Lawrence Livermore National Laboratory, CA; and Sandia National Laboratories, NM and CA); four production sites (Kansas City Plant, MO; Pantex Plant, TX; Savannah River Site, SC; and Y-12 National Security Complex, TN); and the Nevada National Security Site (formerly Nevada Test Site). NNSA manages and sets policy for the complex; contractors operate the eight sites.

[2] Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise, "A New Foundation for the Nuclear Enterprise," November 2014, pp. ix-x, http://cdn.knoxblogs.com/atomiccity/wp-content/uploads/sites/11/2014/12/Governance.pdf?_ga=1.83182294.1320535883.1415285934.

Despite the post-Cold War reductions in the complex, some in Congress have pressed for further changes, seeking additional reductions in personnel, greater efficiencies in production, a smaller footprint at each site, and increased security. Many Members have also supported calls for increased investments within the complex, both to replace aging facilities and improve operations and security.

The Obama Administration has requested increased funding for the nuclear weapons complex in each of its annual budgets. In an editorial published in late January 2010, Vice President Biden noted that U.S. nuclear laboratories and facilities had been "underfunded and undervalued" for more than a decade.[3] He stated that the President's budget request for FY2011 would include "$7 billion for maintaining our nuclear-weapons stockpile and complex, and for related efforts," an amount that was $600 million more than Congress appropriated for FY2010. He also stated that the Administration would "boost funding for these important activities by more than $5 billion" over the next five years.

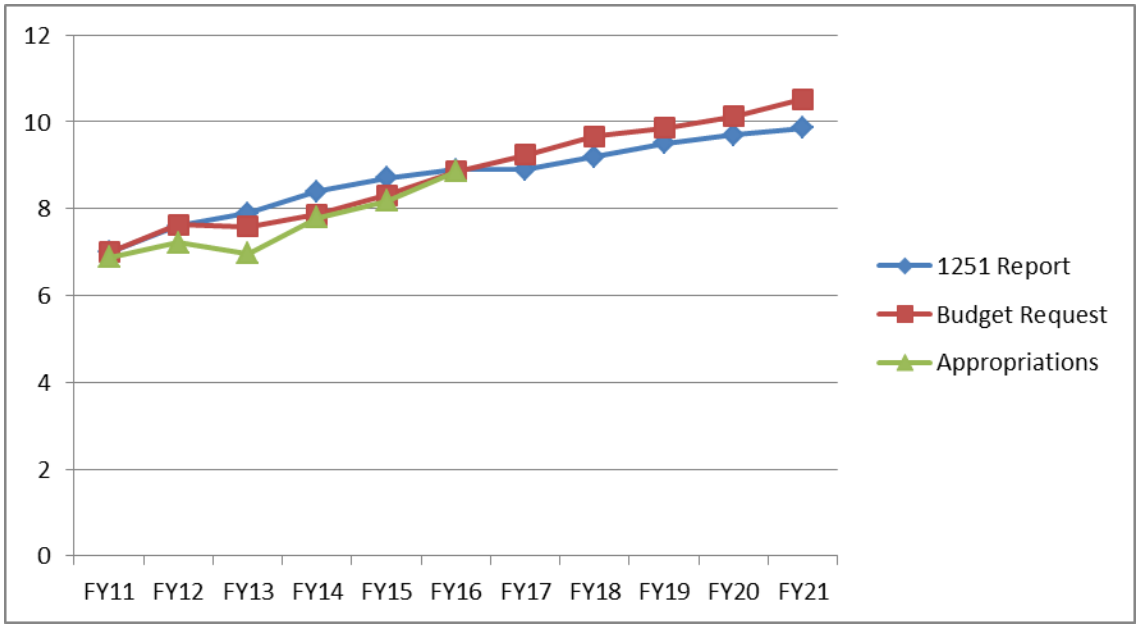
The Administration further outlined its funding plans for the nuclear weapons enterprise in a report submitted to Congress in May 2010, and updated in November 2010, in support of the ratification of the New START Treaty. Congress had requested this report, known as the "1251 report" in the National Defense Authorization Act for Fiscal Year 2010 (P.L. 111-84), Section 1251, and mandated that it outline a comprehensive plan to "(1) maintain delivery platforms [that is, bombers, missiles, and submarines that deliver nuclear weapons]; (2) sustain a safe, secure, and reliable U.S. nuclear weapons stockpile; and (3) modernize the nuclear weapons complex."[4] In the November 2010 update of that document, the Administration projected weapons stockpile and infrastructure costs for FY2011-FY2020 at between $85.4 billion and $86.2 billion. As is shown on **Figure 1**, below, funds appropriated for these programs fell below the projected levels early in the decade. However, the FY2017 budget request and projections for subsequent years now exceed the amount predicted in the 2010 report.

[3] Joe Biden, "The President's Nuclear Vision," *Wall Street Journal*, January 29, 2010.

[4] The White House, "The New START Treaty—Maintaining a Strong Nuclear Deterrent," Fact Sheet, May 13, 2010, http://iipdigital.usembassy.gov/st/english/article/2010/05/20100514114003xjsnommis0.6300318.html#axzz44scaKFT1.

Figure 1. Funding for NNSA Nuclear Weapons Activities

Projected, Requested, and Appropriated, FY2011-FY2021 (billions of current dollars)



Managing the Nuclear Weapons Stockpile

The United States conducted 1,030 nuclear weapons test explosions between 1945 and 1992. These were the primary means by which the United States both determined whether its nuclear weapons designs would work and confirmed that the weapons remained reliable and effective as they aged. In 1992, Congress enacted a moratorium on U.S. nuclear weapons testing when it attached the Hatfield-Exon-Mitchell amendment to the Energy and Water Development Appropriations Act, 1993.[5] President George H. W. Bush signed the bill into law (P.L. 102-377) October 2, 1992.

In the absence of nuclear weapons testing, the United States has adopted a science-based program to maintain and sustain confidence in the reliability of the U.S. nuclear stockpile. Congress established the Stockpile Stewardship Program in the National Defense Authorization Act for Fiscal Year 1994 (P.L. 103-160). This program, as amended by the National Defense Authorization Act for Fiscal Year 2010 (P.L. 111-84, §3111), is to ensure "that the nuclear weapons stockpile is safe, secure, and reliable without the use of underground nuclear weapons testing."

NNSA implements the Stockpile Stewardship Program through the activities funded by Weapons Activities account in the NNSA budget. This account includes three major program areas, each with a budget in excess of $1 billion, and several smaller programs. These are detailed below. The aggregate funding for these programs appears in **Table 1**. Anticipated funding for future years appears in **Table 2**.

[5] This amendment banned testing before July 1, 1993, set conditions on a resumption of testing, and then banned testing after September 1996 unless another nation tested. The United States signed the Comprehensive Test Ban Treaty, which banned all nuclear explosive tests. Although Congress voted against giving its consent to ratification of this Treaty in 1999, and the Treaty has not yet entered into force, the United States continues to observe a moratorium on nuclear explosive testing.

Table 1. Funding for Weapons Activities, FY2015-FY2017

(millions of current dollars)

Program	FY2015 Enacted Comparable[a]	FY2016 Request Comparable	FY2016 Enacted	FY2017 Request
DSW	2,797.2	3,187.3	3,387.8	3,330.5
RDT&E Programs	1,766.2	1,776.6	1,818.5	1,854.7
RTBF	688.0	1,054.5	—	—
I&S	1,386.7	1,466.1	—	—
I&O	—	—	2,279.1	2,721.9
Other[0]	1,369.6	1,362.6	1,363.5	1,336.0
Total	**8,007.7**	**8,846.9**	**8,846.9**	**9,243.1**

Sources: FY2016 NNSA Congressional Budget Request, House and Senate Appropriations Committee reports.

Notes: Details may not add to totals due to rounding. DSW: Directed Stockpile Work; RDT&E: Research, Development, Test and Evaluation; RTBF: Readiness in Technical Base and Facilities; I&S: Infrastructure and Safety.

a. The FY2016 budget request changed several NNSA budget categories. "Comparable" figures for FY2014 and FY2015 allocate funds for those years according to the FY2016 budget structure.

b. The House Appropriations Committee recommended including Infrastructure and Safety within a new category, Infrastructure and Operations (I&O), which was formerly RTBF. The Omnibus Appropriations Bill accepted this budget structure. I&O consolidates RTBF, Infrastructure and Safety, and Site Stewardship.

For FY2014, FY2015, and FY2016 request, "Other" includes Secure Transportation Asset, Site Stewardship, Defense Nuclear Security, Information Technology and Cybersecurity, Legacy Contractor Pensions, and (for FY2014 only) Use of Prior Year Balances. For House, and for Senate for FY2014 and FY2015, "Other" includes Secure Transportation Asset, Defense Nuclear Security, Information Technology and Cybersecurity, and Legacy Contractor Pensions. For Senate Appropriations Committee for FY2016, "Other" includes Secure Transportation Asset, Defense Nuclear Security, Information Technology and Cybersecurity, Legacy Contractor Pensions, and Nuclear Counterterrorism Incident Response.

Table 2. Weapons Activities: FY2017 Request and FY2018-FY2021 Plan

(millions of current dollars)

	FY2017	FY2018	FY2019	FY2020	FY2021
DSW	3,330.5	3,752.0	3,781.9	3,938.6	4,268.2
RDT&E Programs	1,854.7	1,916.5	1,969.6	2,028.1	2,030.5
I&O	2,721.9	2,645.9	2,792.9	2,829.1	2,885.8
Other[0]	1,336.0	1,346.9	1,318.9	1,322.1	1,333.7
Total	**9,243.1**	**9,661.3**	**9,863.3**	**10,117.9**	**10,518.2**

Sources: FY2016 NNSA Congressional Budget Request for rows through Total; bottom row, The White House, "November 2010 Update to the National Defense Authorization Act of FY2010 Section 1251 Report: New START Treaty Framework and Nuclear Force Structure Plans," p. 9, http://www.lasg.org/CMRR/Sect1251_update_17Nov2010.pdf.

Notes: Details may not add to totals due to rounding. DSW: Directed Stockpile Work; RDT&E: Research, Development, Test and Evaluation; I&O: Infrastructure and Operations (formerly, RTBF).
"Other" includes Secure Transportation Asset, Site Stewardship, Defense Nuclear Security, Information Technology and Cybersecurity, and Legacy Contractor Pensions.

Directed Stockpile Work (DSW)

According to NNSA's budget materials,[6] Directed Stockpile Work includes those programs that directly support the nuclear weapons currently in the U.S. nuclear stockpile. These activities include maintenance and surveillance of existing warheads; refurbishment and life extension of existing warheads; assessments of the reliability of existing warheads; and the dismantlement and disposition of retired warheads. It also includes programs that support research, development, and certification of technology needed to meet stockpile requirements and strategic materials. In the Consolidated Appropriations Act, 2016 (P.L. 114-113), Congress appropriated $3,387.8 million for DSW programs. The NNSA budget requests $3,330.5 million for FY2017, which represents a 1.7% decrease from the amount enacted in FY2016.

Specific program areas under DSW include the following.

Life Extension Programs (LEPs)

These programs are designed to extend the life of existing warheads through design, certification, manufacture, and replacement of components. An LEP for the W76 warhead for the Trident II (D-5) submarine-launched ballistic missile (SLBM) is ongoing, as is an LEP for the B61 mod 12. (A "mod," such as B61 mod 12 or B61-12, is a modification or version of a bomb or warhead type.) NNSA is also pursuing an alteration (known as an Alt) for the W88 warhead currently deployed on Trident II (D-5) missiles and is in the early stages of a life extension program for the W80 cruise missile warhead. The new W80-4 will be deployed on the new Long Range Standoff missile (LRSO) currently under development by the Air Force. According to the NNSA budget documents, total funding requested for LEPs in FY2017 is $1,340.3 million. The increase of $37.8 million over FY2016 reflects an expanded scope of work on the W88 Alt 370 and the "ramp up" of work on the W80-4 LEP.

For FY2017, the amounts requested by NNSA for LEPs are as follows:

- $222.8 million for the W76-1 LEP. The first production unit (FPU) was completed in FY2008, and NNSA expects to complete 80% of the units through FY2017. Production is scheduled to be completed by FY2019.
- $616.1 million for the B61-12 LEP. This modification would combine four existing types of B61 warheads, and would eventually allow a reduction in the number of gravity bombs in the U.S. nuclear arsenal. The LEP would refurbish both nuclear and non-nuclear components on the weapon to address aging, to extend the bomb's service life, and to improve the safety, effectiveness, and security of the bomb. The FPU is scheduled for FY2020.
- $281.1 million for the W88 Alt [Alteration] 370, to provide an arming-fuzing-firing system and to refresh the warhead's conventional high explosives. NNSA expects this program to transition from Phase 6.3 (Development Engineering) to

[6] Department of Energy, *Budget Request For FY2017*, Volume I, National Nuclear Security Administration, Washington, D.C., February 2016, http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume1.pdf.

Phase 6.4 in FY2017, and for the program to provide the First Production Unit in 2020.

- $220.3 million for the W80-4, the warhead for the new long-range cruise missile. The LEP would seek to use common components from other LEPs and to improve warhead safety and security. NNSA plans to continue Phase 6.2 (Feasibility Study and Design Options) activities for the W80-4 LEP in FY2017. The FPU is scheduled for FY2025.

The FY2016 budget request proposed suspending activities for an interoperable warhead (W78/88-1) that could be used on land-based intercontinental ballistic missiles (ICBMs) and SLBMs, and projected a 2030 FPU. The FY2017 budget continues this change, and does not request any funding for the W78/W88-1 LEP.

Stockpile Systems

According to NNSA, Stockpile Systems programs provide for routine maintenance, replacement of limited-life components, surveillance, and assessment of fielded systems for all weapons types in the active stockpile. As noted in the Explanatory Statement to the Consolidated Appropriations Act, 2016 (P.L. 114-113, Division D, Title III),[7] Congress appropriated $482.4 million for these programs; NNSA has requested $443.7 million for FY2017. According to NNSA, the reduction of $38.8 million is due to the completion of some maintenance activities, and to a NNSA decision to support higher priority programs in other areas.

Weapons Dismantlement and Disposition (WDD)

The number of warheads in the U.S. stockpile has fallen sharply since the end of the Cold War, and continues to decline. According to a fact sheet released by the State Department, the stockpile peaked at 31,255 warheads in 1967, stood at 19,008 warheads in 1991, and declined to 4,804 warheads by 2013.[8] Warheads removed from the stockpile are awaiting dismantlement. The WDD program includes the interim storage of warheads to be dismantled; actual dismantlement; and disposition (i.e., storing or eliminating warhead components and materials). As the Explanatory Statement notes, Congress appropriated $52 million for these programs; NNSA has requested $68.9 million for FY2017. According to NNSA, this increase will support the President's commitment, pledged at the 2015 Nuclear Nonproliferation Treaty Review Conference, to accelerate dismantlement of retired U.S. nuclear warheads by 20%.

Stockpile Services

According to NNSA's budget documents, programs under Stockpile Services "provide the logistical, mechanical and support foundation for all DSW operations that are applicable to multiple weapon system in the enduring stockpile." These activities include Production Support; Research and Development (R&D) Support; R&D Certification and Safety; Management, Technology, and Production; and Plutonium Infrastructure Sustainment. According to NNSA, "all enduring systems, LEPs, and dismantlements rely on Stockpile Services to provide the base

[7] U.S. Congress, House Committee on Appropriations, *Senate Amendment to H.R. 2029*, Explanatory Statement, prepared by House Rule Committee, 114th Cong., 2nd sess. http://docs.house.gov/meetings/RU/RU00/20151216/104298/HMTG-114-RU00-20151216-SD005.pdf

[8] U.S. Department of State, *Transparency in the U.S. Nuclear Weapons Stockpile*, Fact Sheet, Washington , D.C., April 29, 2014, http://www.state.gov/documents/organization/225555.pdf.

development, production and logistics capability needed to meet program requirements." Stockpile Services also funds research, development, and production activities that support two or more weapons-types, and work that is not identified or allocated to a specific weapon-type.

According to the Explanatory Statement, Congress appropriated $938.6 million for Stockpile Services in FY2016. NNSA has requested $899.9 million for FY2017. This reduction is due to reductions in early technology development, advanced engineering efforts, and multi-system surveillance activities.

Strategic Materials

According to NNSA's budget request, this program, which was new in FY2016, "consolidates management of nuclear material processing capabilities within the nuclear security enterprise. The program includes Uranium, Plutonium and Tritium Sustainment, Domestic Uranium Enrichment, and Strategic Materials Sustainment. According to the Explanatory Statement, Congress provided $612.3 million for this program area in FY2016. This included $250 million for Strategic Materials Sustainment, which consolidated funding for activities needed to manage NNSA's inventory of materials used in nuclear weapons. NNSA is seeking $577.8 million for strategic materials in the FY2017 budget request. According to NNSA's budget request, this reduction occurred by "moving the conceptual planning and design of some projects to the Capabilities Based Investments (CBI) line, and deferring the reestablishment of a purified depleted uranium supply until evaluation of existing supplies and future demand is completed."

Research, Development, Test and Evaluation (RDT&E) Programs

According to NNSA's budget request, RDT&E includes five programs that focus on efforts "to develop and maintain critical capabilities, tools, and processes needed to support science based stockpile stewardship, refurbishment, and continued certification of the stockpile over the long-term in the absence of underground nuclear testing." It funds not only the science and engineering programs, but also large experimental facilities, such as the National Ignition Facility at Lawrence Livermore National Laboratory. The Consolidated Appropriations Act, 2016 (P.L. 114-113), provided $1,818.5 million for RDT&E in FY2016. NNSA has requested $1,854.7 million in FY2017. According to NNSA's budget documents, the increased funding in FY2017 will support future LEP options and system certification.

Specific programs under RDT&E include:

Science Program

According to NNSA's budget documents, the Science Program provides "the knowledge and expertise, and the confidence needed to maintain the nuclear stockpile without nuclear testing." It performs experiments that allow NNSA to understand the physics of nuclear explosions and to validate nuclear weapons performance simulations. Its goals include improving the ability to assess warhead performance without nuclear testing, improving readiness to conduct nuclear tests should the need arise, and maintaining the scientific infrastructure of the nuclear weapons laboratories. According to NNSA, this program provides the basis for annual assessments of weapon performance, the understanding of the impacts of surveillance findings to ensure that the nuclear stockpile continues to meet military requirements, and the core technical expertise required to be responsive to global nuclear security policy questions.

According to the Explanatory Statement, Congress appropriated $423.1 million for the Science Program. NNSA had requested $389.6 million; Congress added $45.7 million for advanced radiography capabilities. In the Explanatory Statement, Congress directed NNSA to provide an "estimate of the cost to develop new radiography capabilities at U1a and detail the costs of any Major Items of Equipment in its budget request." NNSA has requested $442 million for the Science Program in FY2017, and has included $50.5 million for advanced radiography in that request.

Engineering Program

The Engineering Program is responsible for "creating and maturing advanced toolsets and capabilities necessary to maintain a safe, secure, and effective nuclear weapons stockpile and enhance nuclear weapon safety, security, and use-control." According to NNSA, this program "matur[es] advanced technologies to improve weapon surety; provid[es] the tools for qualifying weapon components and certifying weapons without underground testing; and support[s] annual stockpile assessments." According to the Explanatory Statement, Congress provided $131.4 million for the Engineering Program, matching the requested amount. NNSA has requested $139.5 million for this program in FY2017. According to NNSA's budget documents, this funding will allow it to shift its priorities to meeting the immediate needs of the Directed Stockpile work program.

Inertial Confinement Fusion Ignition and High Yield Program

This program is developing tools to create extremely high temperatures and pressures in the laboratory—approaching those of a nuclear explosion—to support weapons-related research and to attract scientific talent to the Stockpile Stewardship Program. The centerpiece of this campaign is the National Ignition Facility (NIF), the world's largest laser, located at Lawrence Livermore National Laboratory. NIF is intended to produce "ignition," the point at which a nuclear fusion reaction generates more energy than is used by the lasers to create the reaction. While achieving ignition has been delayed, NIF has nonetheless proven to be of value to stockpile stewardship at energy levels that do not reach ignition. NIF was controversial in Congress for many years, but controversy waned as the program progressed. NIF was dedicated in May 2009.[9] The program also supports the Z Facility at the Sandia National Laboratories (SNL), and the Omega Laser Facility (Omega) at the University of Rochester's Laboratory for Laser Energetics (LLE).

According to the Explanatory Statement, Congress provided $511.1 million for this program area. Within this total, $329 million was allocated to operations at NIF. NNSA has requested $523 million for this program area in FY2017, with $340.4 million allocated to programs at NIF. The goals for FY2017 are, according to NNSA, to provide "key data that reduces uncertainty in calculations of nuclear weapons performance and builds on previous work and accomplishments." NNSA also hopes to maintain recent increases in the pace of operations at the NIF, which allowed an increase in the number of experiments from around 200 in 2014 to 356 in 2015.

[9] Lawrence Livermore National Laboratory, "Dedication of World's Largest Laser Marks the Dawn of a New Era," press release, May 29, 2009, https://publicaffairs.llnl.gov/news/news_releases/2009/NR-09-05-05.html.

Advanced Simulation and Computing (ASC) Program

The ASC program develops computation-based models of nuclear weapons that integrate data from other campaigns, past test data, and laboratory experiments, to create what NNSA calls "the computational surrogate for nuclear testing to determine weapon behavior." NNSA notes that "modeling the extraordinary complexity of nuclear weapons systems is essential to maintaining confidence in the performance of our aging stockpile without underground testing." This program also supports nonproliferation, emergency response, and nuclear forensics. According to the Explanatory Statement, Congress provided $623 million for this program. NNSA has requested $663.2 million for FY2017.

Advanced Manufacturing Development

Through FY2015, this program was called the Readiness Campaign. It had several subprograms, but the entire FY2015 request was for the Nonnuclear Readiness subprogram, which "develops capabilities to manufacture components used for Directed Stockpile Work." Congress did not fund this program in FY2015, and, instead, recommended that NNSA establish an Advanced Manufacturing Development program "to develop, demonstrate, and utilize advanced technologies that are needed to enhance the NNSA's secure manufacturing capabilities and ensure timely support for the production of nuclear weapons and other critical national security components."[10] According to NNSA, this program allows it to significantly reduce cost and schedule risk associated with the development and production of stockpile components by exploring the development of an array of advanced technologies and then ensure those technologies can be used to produce components for the stockpile.

In FY2016, NNSA requested $130 million for this program area; according to the Explanatory Statement, Congress appropriated this amount. NNSA has requested $87.1 million for this program in FY2017. According to its budget documents, this funding will, among other things, allow it to "further understand additive manufacturing and its potential, develop new and/or improve base technologies that apply to multiple weapons, and to produce and manufacture technologies for the nuclear security enterprise.

Infrastructure and Operations (I&O)

Prior to FY2016, the Infrastructure and Operations Program area was known as Readiness in Technical Base and Facilities. According to NNSA's budget documents, funding for this program "maintains, operates, and modernizes the National Nuclear Security Administration (NNSA) infrastructure." It not only provides "a comprehensive approach to arresting the declining state of NNSA infrastructure while maximizing return on investment," but also "constructs state-of-the-art facilities, infrastructure, and scientific tools" needed to maintain a safe, secure, and effective nuclear arsenal. There is widespread agreement that NNSA's infrastructure is in need of significant upgrades, with some facilities dating from early in the nuclear age. NNSA has requested a nearly 20% increase in funding for I&O in FY2017, from the level of $2,279.1 million enacted in for FY2016, as noted in the Explanatory Statement, to $2,722 million requested for FY2017. The key goals for the program are the need to "arrest the growth in

[10] U.S. Congress, House Committee on Appropriations, Subcommittee on Energy and Water Development, and Related Agencies, *Energy and Water Development Appropriations Bill, 2015*, Report, 113th Cong., 2nd sess., H.Rept. 113-486.

deferred maintenance; dispose of the Kansas City Bannister Federal Complex; and increase investments for upgrading aging infrastructure to address safety and programmatic risks."

Specific programs under I&O include the following.

Operations of Facilities

The Operations of Facilities program includes the funding needed to "operate NNSA facilities in a safe and secure manner." It contains, essentially, the operating budgets for each of the eight NNSA sites, funding such areas as "water and electrical utilities; safety systems; lease agreements; and activities associated with Federal, state, and local environmental, and worker safety and health regulations." According to the Explanatory Statement, Congress appropriated $830.8 million for this program area; NNSA has requested $824 million for FY2017.

Safety and Environmental Operations

According to NNSA's budget documents, the Safety and Environmental Operations program "provides support safe, efficient operation of the nuclear security enterprise through the provision of safety data; environmental monitoring; and nuclear material packaging." According to the Explanatory Statement, Congress appropriated $107 million for this program; NNSA has requested $110 million for FY2017.

Maintenance and Repair of Facilities

The Maintenance and Repair of Facilities funds the "recurring day-to-day work required to sustain and preserve NNSA facilities and equipment in a condition suitable for their designated purpose." According to the Explanatory Statement, Congress appropriated $277 million for this program; NNSA has requested $294 million for FY2017.

Recapitalization

According to NNSA, the Recapitalization program is key to arresting the declining state of NNSA infrastructure. The program, which funds two subprograms – Infrastructure and Safety and Capabilities-Based Investments – is intended to address obsolete support and safety systems, revitalize aging facilities, and improve the reliability, efficiency, and capability of core infrastructure. This is a key area where NNSA seeks to increase funding in FY2017. According to the Explanatory Statement, Congress appropriated $352.5 million for this program; NNSA has requested $667.3 million for FY2017.

Construction

According to NNSA's budget documents, the Construction program focuses on two primary objectives: identifying construction projects that are needed to support the objectives of the weapons program and developing and executing of these projects within approved cost and schedule baselines. NNSA is currently planning or managing 20 projects through this program area. This includes two controversial and expensive projects – the Uranium Processing Facility (UPF) at the Y-12 National Security Complex (TN) and the Chemistry and Metallurgy Research Replacement (CMRR) Project, which deals with plutonium, at Los Alamos National Laboratory (NM). Both have been significantly revised over the past several years due to cost growth and schedule slippage. NNSA plans to allocate FY2017 to the UPF project to complete facility

designs, for the construction of approved subprojects, and to continue to work on sub-projects for plutonium operations at Los Alamos.

According to the Explanatory Statement, Congress provided $711.1 million for the Construction program. Within this total, $430 million was allocated to the UPF and $155.6 million was allocated to CMRR. While Congress appropriated the requested amounts for these programs, both the House and Senate Appropriations Committees expressed concerns about NNSA's construction funding. In its report, the House Appropriations Committee noted:

> The Committee is concerned that there is little accountability for advancing construction projects at the early design stages and that advance funds are being requested to initiate new construction without providing the cost and schedule projections for which the NNSA is accountable. Without this information, the Committee cannot determine whether the projects requested are affordable and are being managed appropriately so that it may approve new start authority.… The Committee will consider a request to initiate a new construction start when the Department is prepared to provide an accurate multi-year cost and schedule estimate with its budget request.[11]

The Explanatory Statement also directed NNSA to submit the results of the Department's Independent Cost Review of the UPF project and a multi-year funding profile with the FY2017 budget request.

NNSA has requested $826.7 million for construction in FY2017. Within this total, it has requested $575 million for UPF and $159.6 million for CMRR.[12]

Other Programs

Weapons Activities has several smaller programs, including the following.

Secure Transportation Asset

This program provides for safe and secure transport of nuclear weapons, components, and materials. It includes special vehicles for this purpose, communications and other supporting infrastructure, and threat response. According to the Explanatory Statement, Congress approved $237.1 million for this program area, a reduction from the requested amount of $251.6 million. Both the House and Senate Appropriations Committees reduced the funding request, noting that NNSA was seeking a significant increase in the size of the workforce in this program area, but had not offered a sufficient justification for that increase.

NNSA has requested $282.7 million for this program area in FY2017. NNSA notes that this budget request is 19% greater than the FY2016 enacted level, but notes that this funding is necessary to continue to modernize the program's transportation assets and to improve its workforce capabilities. This includes both increasing the numbers of federal agents working on the program – a number that is currently 20% below full staffing levels, maintaining and replacing critical vehicles, and resuming candidate training classes that had been cancelled for several years due to budget shortfalls.

[11] U.S. Congress, House Committee on Appropriations, Subcommittee on Energy and Water Development, and Related Agencies, *Energy and Water Development Appropriations Bill, 2016*, Report, 114th Cong., 2nd sess., H.Rept. 114-91.

[12] For more information on the issues associated with the CMRR, see CRS Report R43406, *U.S. Nuclear Weapon "Pit" Production Options for Congress*, by (name redacted) .

Defense Nuclear Security

According to NNSA's budget documents, this program "provides protection for NNSA personnel, facilities, and nuclear weapons and materials from a full spectrum of threats, ranging from local security incidents to terrorism." It provides operations, maintenance, and construction funds for protective forces, physical security systems, and personnel security. In FY2016 NNSA requested $632.9 million for Defense Nuclear Security. The House Appropriations Committee not only recommended an increase to $682.9 million, but also recommended that $35 million be used to start a Security Improvements Program "that is intended to address the backlog of security projects that must be performed over the next several years." The committee noted that NNSA had identified over $2 billion in security infrastructure upgrades that are needed, but had not adequately prioritized these upgrades in its budget request." According to the Explanatory Statement, Congress provided $682.9 million and directed that $30 million should be used for the Security Improvements Program that would address the backlog of security projects, as directed in the House report.

NNSA has requested $670.1 million for Defense Nuclear Security. The request notes that funding will help fill vacant positions in key security programs at NNSA sites. NNSA did not request any additional funds for the Security Improvements program, noting that the $30 million in FY2016 was a one-time line item to begin to address the backlog of necessary security infrastructure upgrades. According to NNSA, however, the FY2017 budget request will support increased maintenance for existing site security systems and will allow for the preliminary planning and design for the Perimeter Intrusion Detection and Assessment Systems (PIDAS) at the Pantex and Y-12 sites.

Information Technology and Cybersecurity

According to NNSA's budget documents, this program provides funding "to develop information technology and cybersecurity solutions, including continuous monitoring, and security technologies to help meet increased proliferation-resistance and security." It also funds programs to consolidate NNSA's IT services. The Explanatory Statement included $157.6 million for this program; NNSA has requested $176.6 for FY2017.

Legacy Contractor Pensions

For many decades, the University of California (UC) operated Los Alamos and Lawrence Livermore National Laboratories. Laboratory employees, as UC employees, could participate in the UC pension plan. When the contracts for the labs' operations were taken over by private corporations, the contracts between DOE and the new laboratory operators included provisions that provided pensions to employees who had worked under the UC contract that mirrored the UC pension benefits. These pensions were larger than those provided to employees hired after the contracts were granted to private employers. To make up the difference, NNSA has paid into the pension plan for those current employees who formerly worked under the UC system. According to the Explanatory Statement, Congress included $283.9 million for legacy contractor pensions in the Weapons Activities account in FY2016; NNSA has requested $248.5 million in the Weapons Activities Account in FY2017.

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