U.S. DEPARTMENT OF
ENERGY

Fiscal Year 2015

Stockpile Stewardship and Management Plan

Report to Congress
April 2014

United States Department of Energy
Washington, DC 20585

Message from the Secretary

This report is the Department of Energy National Nuclear Security Administration *Fiscal Year 2015 Stockpile Stewardship and Management Plan*. It addresses the statutory requirements of Title 50 of United States Code section 2523 and related congressional requests. This year's Stockpile Stewardship and Management Plan is a summary plan and is intended to provide updates to the *Fiscal Year 2014 Stockpile Stewardship and Management Plan*.

In order to assure our allies and deter potential adversaries as long as nuclear weapons exist, the United States must sustain a safe, secure, and effective nuclear arsenal and seeks to do so without underground nuclear explosive testing. The National Nuclear Security Administration continues to work closely with the Department of Defense, through the Joint Department of Defense/Department of Energy Nuclear Weapons Council, to modernize the stockpile through timely execution of approved life extension programs, as outlined in this report. The National Nuclear Security Administration's technical scoping studies, cost and risk analysis, and resource allocation modeling of alternatives have informed this plan and support the Nuclear Weapons Council process. Thus, with close collaboration between the Department of Defense and Department of Energy, this plan continues to support the Nuclear Weapons Council's "3+2" strategy for the stockpile with some schedule adjustments.

To sustain a safe, secure, and effective nuclear arsenal, the Administration has, for the fifth consecutive year, increased the budget request for Weapons Activities. If adopted by Congress, this budget request will increase funding by 6.9 percent over the previous year. This increase will not only enable the important life extensions called for in the *Nuclear Posture Review Report*, but will also support the research, development, testing, evaluation, and manufacturing capabilities of the nuclear security enterprise. These capabilities underpin our ability to conduct stockpile stewardship and solve the technical challenges of verifying treaty compliance, combating nuclear terrorism and proliferation, and guarding against the threat posed by nuclear technological surprise. Finally, this continued commitment by the Administration is intended to energize the people at our national security laboratories, nuclear weapons production facilities, and Nevada National Security Site, whose intellect and commitment allow the Department of Energy to advance the President's vision to move toward a world free of nuclear weapons.

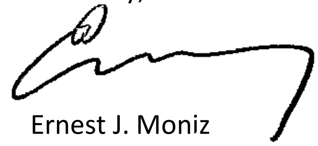
Pursuant to the statutory requirements, this report is being provided to the following members of Congress:

- **The Honorable Barbara Mikulski**
  Chairman, Senate Committee on Appropriations
- **The Honorable Richard C. Shelby**
  Ranking Member, Senate Committee on Appropriations
- **The Honorable Carl Levin**
  Chairman, Senate Committee on Armed Services
- **The Honorable James M. Inhofe**
  Ranking Member, Senate Committee on Armed Services

- **The Honorable Dianne Feinstein**
  Chairman, Subcommittee on Energy and Water Development
  Senate Committee on Appropriations
- **The Honorable Lamar Alexander**
  Ranking Member, Subcommittee on Energy and Water Development
  Senate Committee on Appropriations
- **The Honorable Mark Udall**
  Chairman, Subcommittee on Strategic Forces
  Senate Committee on Armed Services
- **The Honorable Jeff Sessions**
  Ranking Member, Subcommittee on Strategic Forces
  Senate Committee on Armed Services
- **The Honorable Harold Rogers**
  Chairman, House Committee on Appropriations
- **The Honorable Nita M. Lowey**
  Ranking Member, House Committee on Appropriations
- **The Honorable Howard P. McKeon**
  Chairman, House Committee on Armed Services
- **The Honorable Adam Smith**
  Ranking Member, House Committee on Armed Services
- **The Honorable Michael Rogers**
  Chairman, Subcommittee on Strategic Forces
  House Committee on Armed Services
- **The Honorable James Cooper**
  Ranking Member, Subcommittee on Strategic Forces
  House Committee on Armed Services
- **The Honorable Mike Simpson**
  Chairman, Subcommittee on Energy and Water Development, and Related Agencies
  House Committee on Appropriations
- **The Honorable Marcy Kaptur**
  Ranking Member, Subcommittee on Energy and Water Development, and Related Agencies
  House Committee on Appropriations

If you have any questions or need additional information, please contact me or Mr. Bradley Crowell, Assistant Secretary for Congressional and Intergovernmental Affairs, at (202) 586-5450.

Sincerely,



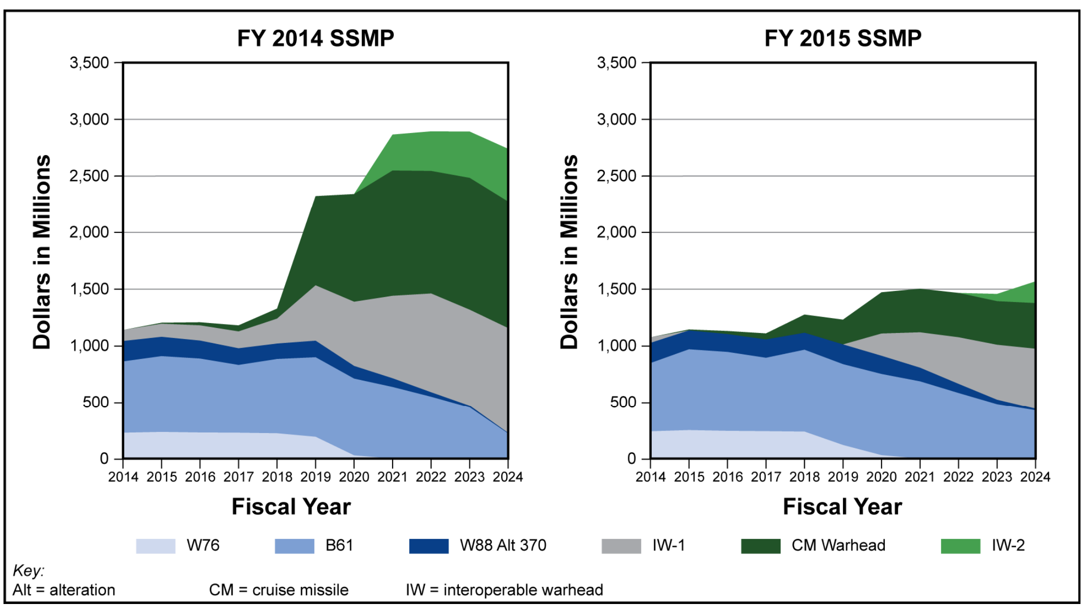
Ernest J. Moniz

Executive Summary

This *Fiscal Year 2015 Stockpile Stewardship and Management Plan* (FY 2015 SSMP) is a statutorily required summary of the changes that have occurred since the publication of the *Fiscal Year 2014 Stockpile Stewardship and Management Plan* (FY 2014 SSMP). The FY 2014 SSMP remains the 25-year strategic program of record for nuclear weapons stockpile management except where it is updated by this document. This plan covers all programs that are funded by Congress in the Weapons Activities account.

The FY 2014 SSMP introduced the Nuclear Weapons Council's approved "3+2" strategy.[1] This strategy implements 2010 *Nuclear Posture Review Report* (DOD 2010) guidance in support of two enduring commitments to the American public: first, to sustain a safe, secure, and effective nuclear deterrent for America and, second, to prudently base that deterrent on a safer, smaller, and more cost-efficient stockpile of nuclear weapons.

The FY 2015 SSMP continues to support the 3+2 strategy, with budget-driven schedule adjustments. Through a deliberate interagency process, these schedule adjustments balance mission requirements with the impact of sequestration (which reduced the National Nuclear Security Administration's [NNSA's] budget in fiscal year (FY) 2013 by approximately 900 million dollars) and the caps on defense spending mandated under the Bipartisan Budget Agreement. The following graphs show the adjusted life extension program of record from FY 2014 to FY 2015, which levels the warhead modernization requirements in today's budget environment while maintaining the vision of the 3+2 strategy.



[1] *A stockpile composed of three interoperable ballistic missile warheads and two interoperable air-carried warheads.*

The most significant adjustment to the strategy is the decision to move the first production unit of the first interoperable warhead out 5 years to FY 2030. That decision was based on assessments of the current state of the stockpile, including that the W78 is aging gracefully; interoperable warhead cost estimates; and the priorities of the Nuclear Weapons Council. This adjustment will provide more time to study the implementation of interoperability as required by the *Nuclear Posture Review Report*. Other necessary adjustments include delaying to FY 2020 the first production units of the B61 life extension program and the W88 Alteration 370, and delaying by up to 3 years the first production unit of the cruise missile warhead. NNSA will complete or begin a life extension for every system that is part of the 3+2 strategy as part of the long-term plan described in this SSMP.

We continue to work to deliver an infrastructure that supports our uranium, plutonium, non-nuclear, and high-explosive manufacturing capabilities. The IW-1 schedule adjustment and our knowledge of plutonium aging more gracefully will allow NNSA to take a more deliberate and cost-effective approach to addressing modernization of plutonium capabilities. NNSA is planning for a pit production capability of 30 pits per year by FY 2026 to better align with the planned life extension program activity and delivery system schedule, and will support the modular acquisition of additional capability to support production beyond the 30-pit-per-year level. Regarding uranium, this FY 2015 SSMP is based on a lower spending profile for the Uranium Processing Facility that allows the project to continue but focuses on an initial phase to move crucial functions out of an aged building by FY 2025. The uranium capability modernization plan applies lessons learned from our plutonium strategy and includes two subsequent phases after completion of the initial phase.

The 3+2 strategy is enabled by the research, development, testing, and evaluation activities and the critical infrastructure that supports the assessment, surveillance, and maintenance of the stockpile and the analysis to specify options for the life extension programs of particular weapon systems. The premiere tools of stewardship are now providing the critical data for developing these options and assessing the stockpile. This FY 2015 SSMP relies heavily on high-performance computing and models validated by experimental data that are applicable to the environments in which the weapons are required to function without error. The level of activity in this plan will continue to provide technically challenging work that will sustain the skills required to implement the 3+2 strategy and inspire the next generation of stockpile stewards.

Execution of the FY 2015 SSMP will depend on improved governance. The Department is working to incentivize mission-effective and cost-efficient solutions to the highest risk nuclear security challenges facing our country. Since the FY 2014 SSMP, the Secretary has reorganized the Department to elevate Management and Performance to one of three Under Secretary positions. Within this framework, the NNSA is committed to effectively managing its major projects and has been driving continued enhancements to contract and project management practices through a reorganized Office of Acquisition and Project Management. We have realigned the lines of responsibility and accountability between headquarters and the field, Federal managers and our management and operating partners; this is exemplified through our security reforms, where we have clarified the chain of command. All of these elements affect NNSA's ability to deliver a robust stockpile stewardship and management program that is effective, efficient, and ensures improved nuclear security.

FISCAL YEAR 2015 STOCKPILE STEWARDSHIP AND MANAGEMENT PLAN

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List of Acronyms

2NV	NNSA Network Vision
Alt	Alteration
ASC	Advanced Simulation and Computing
ATS	Advanced Technology System
BSMS	Builder Sustainment Management System
CDNS	Chief of Defense Nuclear Security
CIO	Chief Information Officer
CMF	Component Maturation Framework
CMR	Chemistry and Metallurgy Research
CMRR-NF	Chemistry and Metallurgy Research Replacement Nuclear Facility
CSL	Cyber Sciences Laboratory
CTO	Chief Technology Officer
DAF	Device Assembly Facility
DARHT	Dual Axis Radiographic Hydrodynamic Test
DM	Deferred Maintenance
DNS	Defense Nuclear Security
DOD	Department of Defense
DOE	Department of Energy
DSW	Directed Stockpile Work
EA	Enterprise Architecture
EPAT	Enterprise Portfolio Analysis Tool
FCI	Facility Condition Index
flop	Floating Point Operations per Second
FTF	Freeze the Footprint
FY	Fiscal Year
FYNSP	Future Years Nuclear Security Program
G2	Enterprise Management Information System Generation 2
HASC	House Armed Services Committee
HED	High Energy Density
HPC	High Performance Computing
ICBM	Intercontinental Ballistic Missile
IDC	Integrated Design Codes
IHE	Insensitive High Explosive
IPRO	Integrated Production Planning and Execution System
IT	Information Technology
IW	Interoperable Warhead
JASPER	Joint Actinide Shock Physics Experimental Research
JC3	Joint Cybersecurity Coordination Center
KCP NSC	Kansas City Plant National Security Campus
KCRIMS	Kansas City Responsive Infrastructure, Manufacturing and Sourcing
LANL	Los Alamos National Laboratory
LAR	License Amendment Request
LEED	Leadership in Energy and Environmental Design
LEP	Life Extension Program

LLNL	Lawrence Livermore National Laboratory
M&O	Management and Operating
MC	Mission Critical
MDNC	Mission Dependent Not Critical
MGT	Mobile Guardian Transporter
Mod	Modification
NCTIR	Nuclear Counterterrorism Incident Response
NDAA	National Defense Authorization Act
New START	New Strategic Arms Reduction Treaty
NIF	National Ignition Facility
NMD	Not Mission Dependent
NMMSS	Nuclear Materials Management and Safeguards System
NMSSUP	Nuclear Materials Safeguards and Security Upgrade Project
NNSA	National Nuclear Security Administration
NRC	Nuclear Regulatory Commission
OCIO	Office of the Chief Information Officer
OMB	Office of Management and Budget
OPM	Other Program Money
Pantex	Pantex Plant
PCF	Predictive Capability Framework
PF-4	Plutonium Facility
PIDAS	Perimeter Intrusion Detection and Assessment System
PPD	Presidential Policy Directive
RAMP	Roof Assessment Management Program
RAT	Replacement Armored Tractor
RDT&E	Research, Development, Testing, and Evaluation
RLUOB	Radiological Laboratory Utility Office Building
RTBF	Readiness in Technical Base and Facilities
SAR	Selected Acquisition Report
SFI	Significant Finding Investigation
SLBM	Submarine-Launched Ballistic Missile
SSMP	Stockpile Stewardship and Management Plan
STA	Secure Transportation Asset
STRATCOM	U.S. Strategic Command
TBSTP	*Technical Basis for Stockpile Transformation Planning*
TPBARs	Tritium-Producing Burnable Absorber Rods
TRIM	Tritium Responsive Infrastructure Modifications
U.S.C.	United States Code
WEPAR	West-end Protected Area Reduction
Y-12	Y-12 National Security Complex
Z	Z Facility

Legislative Language

The National Nuclear Security Administration (NNSA) is required to report on how it plans to maintain the nuclear weapons stockpile. Specifically, Title 50 of United States Code section 2523 (50 U.S.C. 2523), requires that "The Administrator,[1] in consultation with the Secretary of Defense and other appropriate officials of the departments and agencies of the Federal Government, shall develop and annually update a plan for maintaining the nuclear weapons stockpile. The plan shall cover, at a minimum, stockpile stewardship, stockpile management, stockpile surveillance, program direction, infrastructure modernization, human capital, and nuclear test readiness." Pursuant to previous statutory requirements, NNSA was required to submit reports on the plan. Except in 2012,[2] a version of the document has been submitted to Congress annually since 1998. However, starting in 2013, reports on the plan are only required every odd-numbered year, with summaries of the plan provided in even-numbered years.

The *Fiscal Year 2015 Stockpile Stewardship and Management Plan* (SSMP) is a summary of the plan, including a discussion of updates to the *Fiscal Year 2014 Stockpile Stewardship and Management Plan*. The SSMP is captured in a single, top-level, unclassified document. In addition, one classified Annex to the FY 2015 SSMP is also provided. The Annex contains supporting details concerning U.S. nuclear stockpile and stockpile management issues and describes the research, development, testing, and evaluation base for the stewardship and management of the stockpile.

[1] *The term 'Administrator' means the Administrator of the National Nuclear Security Administration.*

[2] *In 2012, an FY 2013 SSMP was not submitted to Congress because analytic work conducted by the Department of Defense/NNSA to evaluate the out-year needs for nuclear modernization activities across the nuclear security enterprise was ongoing and not yet finalized.*

Chapter 1
Weapons Activities – Central to the Nuclear Security Enterprise

1.1 An Update of the Policy Framework and Mission Definition

This chapter, renamed from the *Fiscal Year 2014 Stockpile Stewardship and Management Plan* (FY 2014 SSMP), discusses the President's *National Security Strategy* (White House 2010), which emphasizes the importance of reducing the Nation's nuclear arsenal while ensuring the reliability and effectiveness of the nuclear deterrent. On June 19, 2013, at the Brandenburg Gate nearly 50 years after Kennedy made his famous Cold War speech, President Obama announced a new Presidential Policy Directive (PPD-24) that aligns U.S. nuclear policies to the 21st century security environment. The President's new guidance to the Department of Energy (DOE) nuclear stockpile mission:

- affirms that the United States will maintain a credible deterrent, capable of convincing any potential adversary that the adverse consequences of attacking the United States or our allies and partners far outweigh any potential benefit they may seek to gain through an attack;
- modifies the principles for hedging against technical or geopolitical risk, which will lead to more effective management of the nuclear weapons stockpile; and
- reaffirms that, as long as nuclear weapons exist, the United States will maintain a safe, secure, and effective arsenal that guarantees the defense of the United States and our allies and partners.

The President has supported significant investments to modernize the nuclear security enterprise and maintain a safe, secure, and effective arsenal. The Administration will continue seeking congressional funding support for the nuclear security enterprise.

The President also said,

> …[W]e can ensure the security of America and our allies, and maintain a strong and credible strategic deterrent, while safely pursuing up to a one-third reduction in deployed strategic nuclear weapons from the level established in the New START Treaty…. At the same time, we'll work with our NATO allies to seek bold reductions in U.S. and Russian tactical weapons in Europe.

The policy framework for the stockpile has not changed since the FY 2014 SSMP. The National Nuclear Security Administration (NNSA) continues to support the requirements set forth in the *Nuclear Posture Review Report* (DOD 2010) and the PPD-24, as well as the limits imposed by the New Strategic Arms Reduction Treaty (New START). New START was negotiated with Russia in 2010, was ratified and went into force in February 2011, and its central treaty limits must be met 7 years later in 2018.

1.2 Partnership with the Department of Defense: The "3+2" Strategy

The most significant change in the FY 2014 SSMP was the introduction of the "3+2" strategy. The Nuclear Weapons Council adopted this consolidated strategic vision for stockpile modernization in January 2013 (see Figure 2–8 on page 2-18 of the FY 2014 SSMP). This *Fiscal Year 2015 Stockpile Stewardship and Management Plan* (FY 2015 SSMP) describes in more detail the history, adjustments, goals, and objectives of that strategy. This updated plan continues to require applying the science, modernizing the infrastructure, and sustaining the stockpile to provide a safe, secure, and effective deterrent. In addition, Chapter 8 analyzes the costs associated with implementing and executing that plan.

In 2010 a number of policy guidance documents were published: the *Nuclear Posture Review Report* (DOD 2010) in April, the *National Security Strategy* (White House 2010) in May, the Section 1251 report to Congress in May as part of the process to ratify New START, and the first SSMP (the FY 2011 SSMP) in June. Combined, these documents defined the policy for the Nation's nuclear deterrent and laid out the initial strategy to implement that policy. In the almost 4 years since then, a number of refinements have accumulated in terms of strategic planning. None of these individually or in total represents a change in policy direction as much as an opportunity to provide more specificity and economy to the strategy that supports the policy decisions communicated in spring of 2010.

Since the spring of 2010, NNSA has made adjustments on how to implement the initial strategy. Some of these adjustments have further leveled the workload at the three national security laboratories, the four nuclear weapons production facilities, and the Nevada National Security Site. These adjustments have increased efficiency while retaining and challenging the workforce. Recognizing the President's policy to reduce the nuclear arsenal and the reliance on nuclear weapons, NNSA worked with the Department of Defense (DOD) to develop approaches to hedge against technological and geopolitical surprise with a smaller stockpile. NNSA also made adjustments to the plans for modernizing the infrastructure to enhance safety and security while reducing costs. Finally, NNSA continued to apply the latest technical data and cost analysis to enable the Nuclear Weapons Council to prioritize its requirements.

These adjustments to the initial strategy of 2010 were made in coordination with the Nuclear Weapons Council and resulted in the 3+2 strategy. The adjustments were driven by three factors: efficiency, maturing studies and designs, and improved science. The most basic driver for updating the 2010 strategy was the continuing effort to operate a more efficient and less costly nuclear security enterprise. Another driver involved the options made available as infrastructure designs and weapon studies continued to improve and more detailed cost estimates became available. The final driver was the previous investments in science and surveillance, which provided a better understanding of the effects of stockpile aging and implementation of new infrastructure capabilities.

The goal of the 3+2 strategy is to meet the military and policy objectives of a smaller stockpile with fewer weapon types based on a modernized and responsive nuclear security enterprise that is more responsive to technological and geopolitical surprise. The current size of the stockpile is the smallest since the Eisenhower Administration. It consists of twelve warhead or bomb variants within seven deployed warhead families: two submarine-launched ballistic missile (SLBM) warheads, two intercontinental ballistic missile (ICBM) warheads, and three air-delivered warheads or bombs. As each of these weapons enters a life extension program (LEP), the 3+2 strategy (**Figure 1–1**) will move the Nation toward a stockpile consisting of three interoperable ballistic missile warheads deployed on both the SLBM and ICBM legs of the Triad and two air-delivered warheads or bombs. Making warheads interoperable on different delivery platforms can reduce the number of different systems that must be maintained and serviced, while still providing sufficient diversity among deployed systems. Three interoperable ballistic missile warheads with similar deployed numbers will allow for a greatly reduced technical hedge for each system to protect against a single warhead failure. The priority for interoperability is for ballistic missile warheads; interoperability for the air-delivered warheads is not likely to be pursued within the planning period of this document. This approach reduces the production quantities required of the LEPs, and it meets the President's policy guidance to reduce the size of the hedge stockpile. To support the 3+2 strategy, NNSA must have a responsive infrastructure capable of the full range of activities to produce the future stockpile and to enable a smaller hedge. Finally, none of this will be possible without a predictive scientific capability that evaluates options based on previous life extension designs and responds to technical challenges without requiring new underground nuclear testing.

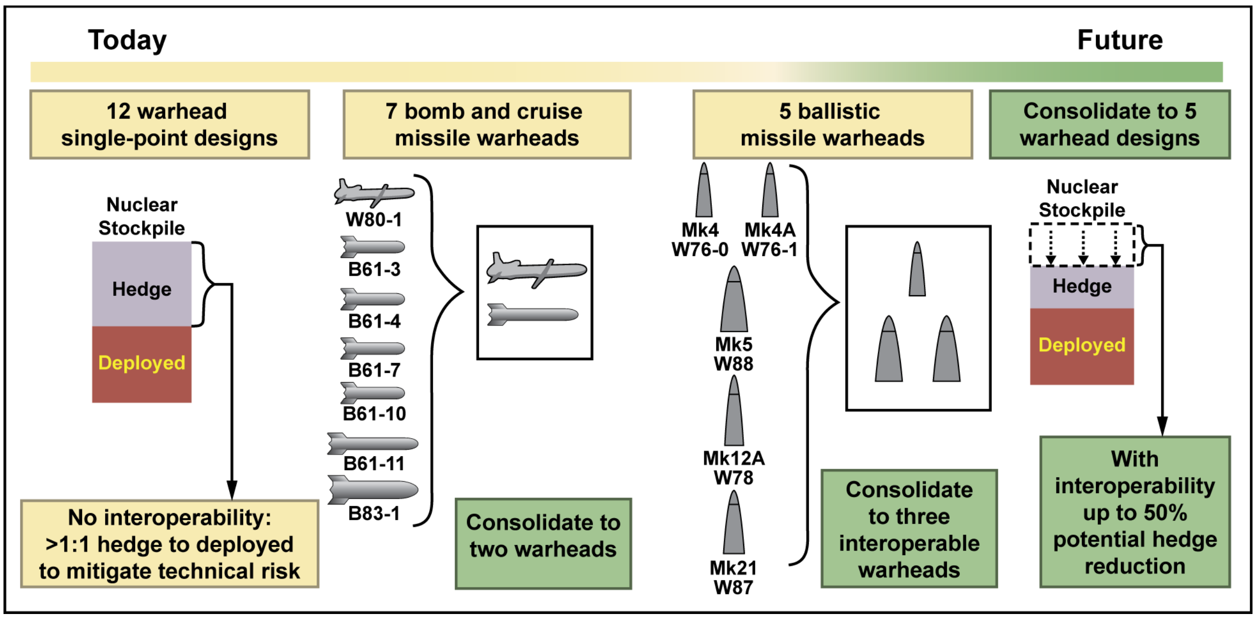


Figure 1–1. 3+2 strategy

As a high priority, NNSA will continue to deliver on the production of the W76-1 LEP with completion in fiscal year (FY) 2019. The W88 Alteration (Alt) 370 project to deliver critical upgrades to key systems on the other SLBM warheads will have a first production unit in FY 2020. These activities sustain the current stockpile during early implementation of the 3+2 strategy.

The first warhead life extension effort of the 3+2 strategy currently in progress is the B61-12 LEP. This program is critical to modernizing the nuclear gravity weapon stockpile while ensuring the sustainment of the Nation's strategic and non-strategic air-delivered nuclear deterrent capability. The B61-12 LEP will refurbish nuclear and non-nuclear components, resulting in the replacement of four current B61 strategic and non-strategic weapon designs. It will allow NNSA to pursue retirement of the B83 gravity bomb, once confidence in the B61-12 stockpile is gained (see Table 2–1 on page 2-2 of the FY 2014 SSMP). By the end of FY 2024, completion of the B61-12 LEP will result in a large reduction in the number of air-delivered gravity weapons (active and inactive) and a large reduction in the total mass of nuclear material used by air-delivered gravity weapons. The result will be a significant reduction in the total nuclear yield (in megatons) possible from air-delivered gravity weapons. All of this will be accomplished while meeting military requirements. Finally, the development activities of the B61-12 LEP will be highly leveraged in subsequent life extension activities.

The next warhead to begin life extension is an air-delivered cruise missile warhead. The Nuclear Weapons Council has identified the W80 or W84 cruise missile warheads as candidates for reuse-based life extension. The funding profile in the Future Years Nuclear Security Program (FYNSP) supports a first production unit date of FY 2027. At this early stage of the project, that date could be accelerated by as much as 2 years with an increased funding rate and adjusted profile that could meet a first production unit date of FY 2025.

The first ballistic missile warhead LEP in the 3+2 strategy is the W78/88-1 warhead, now referred to as the interoperable warhead (IW)-1. The Nuclear Weapons Council's objective is to deploy an interoperable nuclear explosive package for use in the Mk21 ICBM aeroshell[1] and the Mk5 SLBM aeroshell, with adaptable non-nuclear components. Hence, this LEP is also referred to as the first interoperable warhead option, the IW-1. Interoperable warheads, together with the B61-12 and the Air Force cruise missile warhead, lead to a reduction in both the overall stockpile numbers and the number of warhead types. These activities will be consistent with the DOD requirements in the *Nuclear Posture Review Report* (DOD 2010).

NNSA just completed construction of infrastructure improvements that are an enabling component of nuclear weapon sustainment and modernization. NNSA will move into a modern production facility in Kansas City this year and will complete construction of a new High Explosives Processing Facility at the Pantex Plant (Pantex) by the end of FY 2016. NNSA has also developed a plutonium strategy that supports the scheduled LEPs while effectively maintaining the Nation's plutonium capability. A critical element of the plutonium strategy is the timing of the pit production capability, which will increase to 30 pits per year by FY 2026, ultimately reaching a capacity of 50-80 pits per year by FY 2030. Pit reacceptance and reuse functions will augment pit production to ensure necessary quantities are readily available to satisfy future stockpile requirements. The Uranium Processing Facility will provide capabilities for highly enriched uranium that are now performed in aging facilities to be replaced by FY 2025. As a result, NNSA plans to have in place the requisite physical infrastructure required to support the 3+2 strategy and satisfy military requirements. Even with all the above improvements in the NNSA infrastructure, efforts and resources must be allocated to continue to support the NNSA mission.

1.3 Stockpile Stewardship and Management Planning

During the past year, NNSA has continued to improve the methods for stockpile stewardship and management planning. As reflected in Chapter 8, NNSA has refined its cost models, particularly for LEPs. NNSA has also updated and revised the approach for the *Technical Basis for Stockpile Transformation Planning* (TBSTP) for current stockpile systems and planned LEPs. The TBSTP defines the required components and the dates needed for maturation of different technologies. The revised TBSTP approach provides a prioritized list of technologies recommended by the national security laboratories for the Component Maturation Framework (CMF). The CMF is now being used as a portfolio management tool to inform decisions on investment for technology maturation for future stockpile acquisitions. The major strategic goals, or pegposts, of the Predictive Capability Framework (PCF) have been redefined to better reflect the requirements for addressing technical drivers such as certification and assessment when implementing the strategic vision of the SSMP. These changes to the key planning methodologies are described in Chapter 3.

[1] *A heat-resistant shell to protect a vehicle during reentry into the atmosphere.*

1.4 Stockpile Management

Chapter 2 covers the updates to the FY 2014 SSMP for stockpile management activities. These activities include assessments, surveillance, and maintenance of active weapons systems, LEPs, and dismantlement and disposition of retired weapons. The chapter includes two important schedule changes to the previous year's plan.

In FY 2013, work on the IW-1 was accelerated to enable an early focus on the preferred design concept. As part of this effort, a joint certification nuclear design team, consisting of Lawrence Livermore National Laboratory (LLNL) and Los Alamos National Laboratory (LANL) personnel, proposed an early pit downselect. The U.S. Strategic Command (STRATCOM), the Office of the Secretary of Defense, the Air Force, and NNSA all supported the early pit downselect, which was briefed to the Nuclear Weapons Council. The remainder of the Phase 6.2/6.2A activity will be delayed to align the IW-1 first production unit in FY 2030.

Based on the importance of the follow-on air-launched cruise missile warhead development, NNSA has worked with the Nuclear Weapons Council to reduce the options to either the W80 or the W84 warhead families for the replacement cruise missile. Although the replacement cruise missile warhead first production unit could be as early as FY 2025, the current funding is for a first production unit in FY 2027.

1.5 Research, Development, Testing, and Evaluation Activities

In the FY 2014 SSMP, Chapter 3 was named Science, Technology, and Engineering. In this FY 2015 SSMP, the chapter is renamed Research, Development, Testing, and Evaluation Activities to reflect more accurately the activities described in the chapter. The chapter summarizes the updates to the research, development, testing, and evaluation efforts related to stockpile stewardship and management. It includes a brief section on an initial strategy to develop a ten-year plan, as requested recently by Congress, to acquire exascale computing, which is a thousand times faster than NNSA's current capability for advanced simulations. It also summarizes recent accomplishments of the Science, Engineering, Inertial Confinement Fusion, and Advanced Simulation and Computing Campaigns and introduces enhanced capabilities being pursued for future subcritical experiments.

In FY 2013, the three national security laboratories supported plans to develop the Air Force cruise missile warhead and delivered on a series of short-term warhead option studies for other LEPs. Design data were also provided to support the W87 legacy pit engineering development unit fabrication.

1.6 Nuclear Test Readiness

The NNSA no longer maintains a "test readiness program," but maintains test readiness by the collateral exercise of related capabilities at the three national security laboratories and the Nevada National Security Site. The plans in Chapter 4 to ensure nuclear test readiness are unchanged from the FY 2014 SSMP.

1.7 Physical Infrastructure

Chapter 5 summarizes updates to the plans to sustain and modernize the physical infrastructure of the nuclear security enterprise. These updates include a new FY 2015 Integrated Priority List, updated from the FY 2014 list (see Figure 5–2 on page 5-10 of the FY 2014 SSMP), and illustrate potential increased risk from delays or deferrals of capital construction projects that resulted from FY 2013 and FY 2014 budget constraints, such as sequestration and the lapse in funding appropriations. In addition, NNSA has revisited and re-prioritized construction projects for the FY 2015 – FY 2019 FYNSP period. Chapter 5 also reflects the delay of a number of NNSA security projects, as compared to the FY 2014 SSMP (see Figure 5–3 on page 5-11 of the FY 2014 SSMP).

1.8 Federal and Contractor Workforce

Chapter 6 describes the updates to planning for a skilled and diverse Federal and contractor workforce. In particular, the chapter summarizes the findings of two workforce management studies completed in FY 2013. Moreover, the field offices were realigned in FY 2013 under the Office of the Administrator in order to improve the oversight and effectiveness of the management and operating (M&O) workforce.

1.9 Security of the Nuclear Security Enterprise

Chapter 7 summarizes the changes in programs to ensure the security of the Nation's weapons, special nuclear material, security infrastructure, and sensitive information. The Secure Transportation Asset Program realigned its resources in FY 2013 to address several critical stockpile needs: the design, fabrication, and testing of the Mobile Guardian Transporter, the conversion to all Federal pilots, and the restoration of Federal agent strength levels. The responsibility for developing and overseeing the safeguards and security programs for nuclear weapons, nuclear materials, classified information, infrastructure, and personnel has been transferred back to the Office of Chief Defense Nuclear Security. A new wide-area network (OneNNSA Network), a unified, agency-wide collaborative network (OneVoice), and state-of-the-art cloud architecture (YOURcloud) were also established in FY 2013 by the Chief Information Officer Activities Program, which restructured its subprograms to align more closely with the DOE Office of the Chief Information Officer.

1.10 Overview of Projected Budgetary Requirements and Management Processes and Procedures

Chapter 8 graphically summarizes the projected budgetary requirements of the Weapons Activities account as a result of the new out-year budget numbers subsequent to the FY 2014 SSMP. Improved cost estimates for all planned LEPs are also shown against the FY 2014 SSMP schedule for the implementation of the 3+2 strategy. The chapter also reviews the updates to NNSA's business practices for increasing efficiencies, reducing costs, and prioritizing the efforts of the nuclear security enterprise in sustaining the Nation's nuclear stockpile.

1.11 Additional Information

The conclusions to the FY 2015 SSMP are in Chapter 9. Appendix A contains the statutory reporting requirements and related congressional requests and maps these to specific chapters or sections of chapters. There are no changes to the information in Appendices B, C, D, and E of the FY 2014 SSMP. A new appendix, Appendix F, discusses the need for exascale computing, describes NNSA's approach to advancing high performance computing for stockpile stewardship, and discusses the strategy to develop a ten-year plan to acquire that capability. The classified Annex contains updates to Chapters 1, 2, and 3 of the FY 2014 classified Annex.

Chapter 2
Stockpile Management

Stockpile Management encompasses the Directed Stockpile Work (DSW) activities for assessment, surveillance, and maintenance of active weapons systems, for LEPs and alterations, and for weapons dismantlement and disposition. This chapter, in conjunction with Chapter 2 in the classified Annex, provides updates to the status and plans for these activities since the FY 2014 SSMP was submitted.

FY 2013 Stockpile Management Accomplishments

- *Completed Annual Assessment on schedule.*
- *Instituted resource-loaded schedule and earned value management system for B61-12 LEP.*
- *Completed a downselect to W87-like pit for IW-1 and briefed the Nuclear Weapons Council.*
- *Completed first production unit for W87 neutron generator.*
- *Completed cruise missile 90-day study and follow-on study.*

2.1 Nuclear Weapons Stockpile

The baseline for stockpile planning is the *FY 2011 – 2017 Nuclear Weapon Stockpile Plan*, which the President signed in July 2011; the *FY 2011 – 2024 Requirements and Planning Document*, authorized and amended by the Nuclear Weapons Council; and the President's FY 2015 budget request to Congress. The information regarding current U.S. nuclear weapons and associated delivery platforms provided in Table 2–1 of the FY 2014 SSMP is unchanged. Chapter 2 in the classified Annex contains updated details about stockpile quantities and related information.

2.2 Stockpile Assessments, Surveillance, and Significant Finding Investigations

The descriptions of methods and information to determine that the stockpile is safe and effective are unchanged from the subsections under Section 2.2 of the FY 2014 SSMP. Workload projections for major DSW surveillance evaluations in FY 2014 and during the FY 2015 FYNSP are updated in **Tables 2–1** and **2–2** of this FY 2015 SSMP; these two tables are updates to Tables 2–2 and 2–3, respectively, in Section 2.2 of the FY 2014 SSMP. Figures 2–1, 2–2, and 2–3 in Section 2.2 of the FY 2014 SSMP are unchanged. **Figure 2–1** below is an update of the FY 2014 SSMP's Figure 2–4 of historical significant finding investigations (SFIs), with the FY 2013 data added. Updates to key activities and milestones in weapon assessment and surveillance in Figure 2–14 of the FY 2014 SSMP are summarized in the text in Section 2.9.2.

Table 2–1. Fiscal year 2013 actual and fiscal year 2014 baseline major Directed Stockpile Work Program stockpile evaluation activities (as of February 28, 2014)

(This table updates Table 2–2 in the FY 2014 SSMP.)

Warheads	D&Is		JTA Flights		Test Bed Evaluations		Pit NDE		Pit D-Tests		CSA NDE		CSA D-Tests		GTS Tests		DCA Tests		Program Totals	
	Fiscal Year																			
	13	14	13	14	13	14	13	14	13	14	13	14	13	14	13	14	13	14	13	14
B61	10	12	8	8	6	6	30	31	1	1	10	4	0	4	16	4	21	19	102	113
W76-0	0	10	3	3	8	0	0	13	1	1	0	14	0	1	7	15	0	0	19	77
W76-1	7	26	3	6	2	15	45	40	0	1	1	0	2	3	14	6	18	4	92	145
W78	2	11	4	3	8	0	31	49	2	3	9	7	2	0	10	11	0	8	68	116
W80	6	12	5	4	4	8	24	27	1	0	0	0	1	1	9	8	0	8	50	86
B83	5	4	3	2	0	4	17	36	1	2	0	0	1	2	2	10	0	8	29	72
W84 [a]	0	0					0	0	0	0	0	0	0	0			0	0	0	0
W87	8	10	2	2	0	7	8	27	0	1	0	0	1	1	13	8	4	4	36	80
W88	5	8	3	6	0	6	9	13	1	1	0	7	0	1	14	20	14	7	46	83
Totals	**43**	**93**	**31**	**34**	**28**	**46**	**164**	**236**	**7**	**10**	**20**	**32**	**7**	**13**	**85**	**82**	**57**	**58**	**442**	**772**

Key:

CSA = canned subassembly
D&I = disassembly and inspection
DCA = detonator cable assembly
D-tests = destructive tests
GTS = gas transfer system
JTA = Joint Test Assembly
NDE = nondestructive evaluation

[a] Although the W84 is no longer deployed, limited surveillance is being conducted to ensure its continued safety.

Note: FY 2014 Baseline is the workload associated with the FY 2014 President's Budget level of program funding.

Table 2–2. Major surveillance evaluations completed in fiscal year 2013 and baselined for fiscal year 2014, as well as planning requirements for the Future Years Nuclear Security Program (fiscal year 2015 through fiscal year 2019) (as of February 28, 2014)

(This table updates Table 2–3 in the FY 2014 SSMP.)

Major Activity	FY 2013 Actual	FY 2014 Baseline	FY 2015 Requirements	FY 2016 Requirements	FY 2017 Requirements	FY 2018 Requirements	FY 2019 Requirements	FYNSP Total
D&I	43	93	78	75	75	69	67	**364**
JTA Flight	31	34	27	32	26	26	26	**137**
Test Bed Evaluation	28	46	53	44	47	43	44	**231**
Pit NDE	164	236	200 [a]	200 [a]	200 [a]	200 [a]	200 [a]	**1,000**
Pit D-Test	7	10	8	11	9	8	11	**47**
CSA NDE	20	32	42	35	48	31	47	**203**
CSA D-Tests	7	13	16	15	13	13	21	**78**
DCA Test	57	58	75	84	77	83	73	**392**
GTS Tests	85	82	76	71	71	71	70	**359**
TOTALS	**442**	**604**	**575**	**567**	**566**	**544**	**559**	**2,811**

Key:

CSA = canned subassembly
D&I = disassembly and inspection
DCA = detonator cable assembly
D-tests = destructive tests
FY = fiscal year
FYNSP = Future Years Nuclear Security Program
GTS = gas transfer system
JTA = Joint Test Assembly
NDE = nondestructive evaluation

[a] Pit NDE requirements projected for FY 2015 through FY 2019 have not been fully issued by the national security laboratories for the four specific types of diagnostics employed.

Note: FYNSP forecasted quantities do not reflect reductions that may result from the lowering of stockpile readiness proposed for certain weapons.

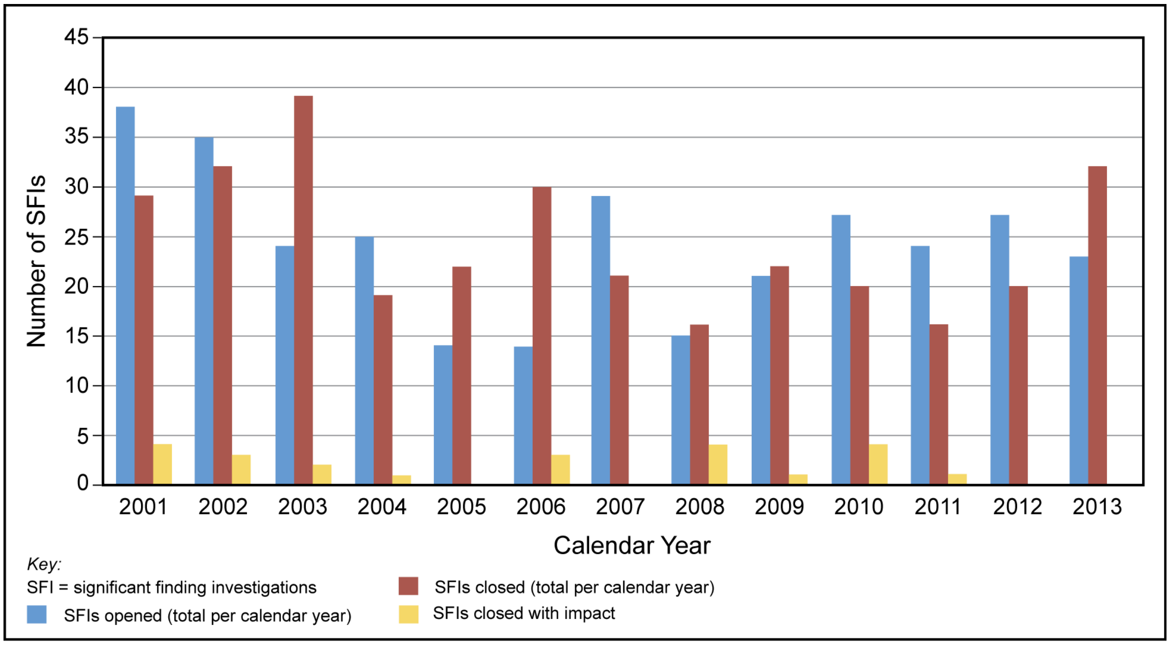


Figure 2–1. Historical number of significant finding investigations opened and closed during calendar years 2001 to 2013 and the number that resulted in an impact to the stockpile
(This figure updates Figure 2–4 in the FY 2014 SSMP.)

2.3 Annual Assessment Report to the President

The FY 2014 National Defense Authorization Act (NDAA) became Public Law 113-66 on December 26, 2013. Section 3122 of the FY 2014 NDAA amended 50 U.S.C. 2525, changing the due date of the joint DOE and DOD memorandum to the President from March 1 to February 1. In addition, the following requirements were added:

- The Laboratory Directors' letters shall include "a concise summary of any SFI (initiated or active) during the previous year for which the head of the national security laboratory has full or partial responsibility."
- The STRATCOM letter shall include
  - "a discussion of the relative merits of other nuclear weapon types (if any), or compensatory measures (if any) that could be taken, that could enable accomplishment of the missions of the nuclear weapon types to which the assessments relate, should such assessments identify any deficiency with respect to such nuclear weapon types" and
  - "a summary of all major assembly releases in place as of the date of the report for the active and inactive nuclear weapon stockpiles."
- If the President does not forward to Congress the matters required (under paragraph 2, dated March 15) by the date required by such paragraph, the officials specified in subsection (b) [The head of each national security laboratory and Commander STRATCOM] shall provide a briefing to the congressional defense committees not later than March 30 on the report such officials submitted to the Secretary concerned under subsection (e) (letters to the Secretary of Energy and Defense).

Also, since the submission of the FY 2014 SSMP, the Directors of the national security laboratories and NNSA completed the Annual Assessment, Cycle 18, on schedule.

Figure 2–5 on page 2-11 of the FY 2014 SSMP is unchanged.

2.4 Maintenance of the Stockpile

The near-term maintenance activity update is:

- Support neutron generator production at a rate of 800 to 900 components per year from FY 2015 to FY 2019. These revised numbers reflect updated requirements in the December 18, 2013, *Neutron Generator Enterprise Integrated Program Plan*.

Updates to key activities and milestones in weapon maintenance in Figure 2–14 of the FY 2014 SSMP are summarized in the text in Section 2.9.2.

2.5 Stockpile Services Subprogram

The activity described as the Enterprise Modeling Consortium in the FY 2014 SSMP has been renamed the Enterprise Modeling and Analysis Consortium to reflect the additional scope of the subprogram. Figure 2–6 of the FY 2014 SSMP is unchanged.

2.6 Sustaining the Stockpile through Life Extension Plans

As noted in the FY 2014 SSMP, insensitive high explosives (IHEs) will replace conventional high explosives when feasible. IHEs improve safety during all stages of a warhead's life cycle, including during assembly and disassembly. Use of IHEs also improves throughput at Pantex by enabling more options for workspaces (such as facilitating multi-unit processing, common-load transport, increased staging capacity, *etc.*). Figure 2–7 on page 2-16 of the FY 2014 SSMP is unchanged. **Figure 2–2** illustrates the life extension activities to implement the 3+2 strategy; this is an update to Figure 2–8 on page 2-17 of the FY 2014 SSMP.

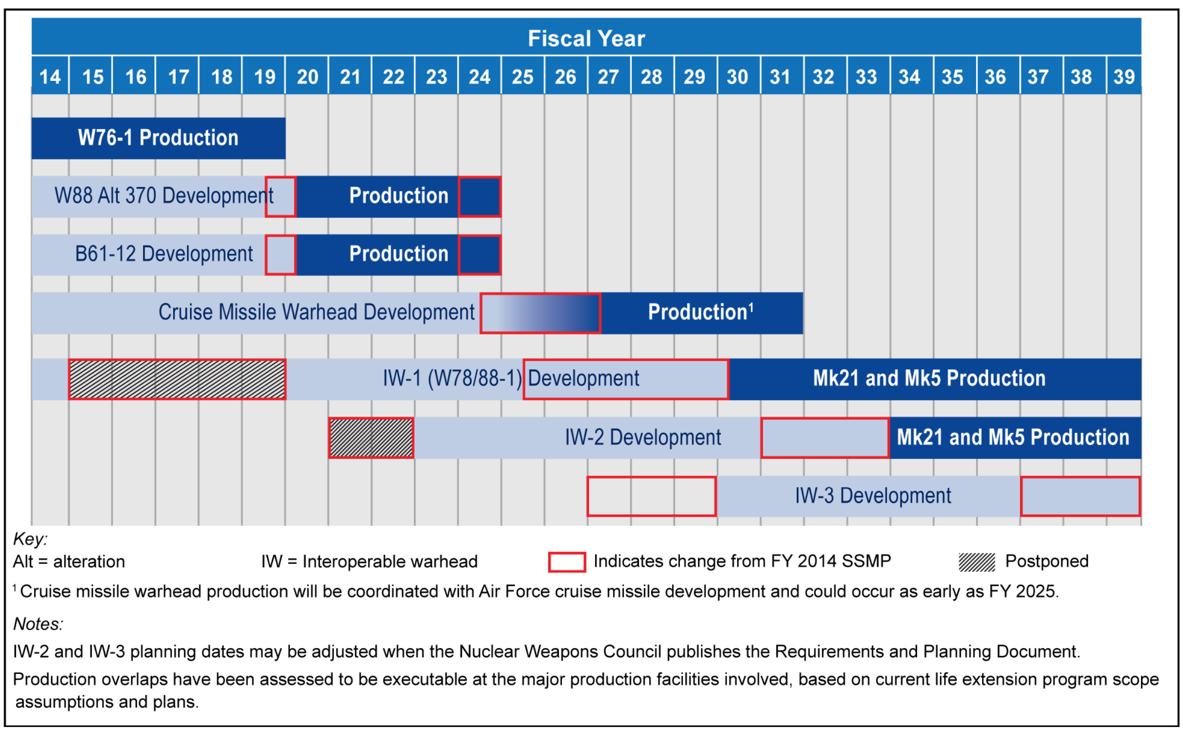


Figure 2–2. National Nuclear Security Administration life extension activities
(This figure updates Figure 2–8 in the FY 2014 SSMP.)

W76-1 LEP

Production problems stemming from a very conservative, but necessary, approach to safety at Pantex resulted in lower than planned production figures for the W76-1 in FY 2013, but deliveries still met Navy requirements. New plans for FY 2014 project a recovery in production quantities by the end of the year to enable completion of the W76-1 by FY 2019.

W88 Alt 370

Sequestration impacts during FY 2013 required changing the planned first production unit date to December 2019 (FY 2020) from December 2018.

B61-12 LEP

Sequestration impacts during FY 2013 required changing the first production unit date to March 2020 (FY 2020) from March 2019.

IW-1 LEP

In FY 2014, the Phase 6.2 study team adjusted the study schedule to align with budget priorities and focused on narrowing scope to a preferred design. LANL and LLNL established a joint certification team. The planned first production unit date has changed from FY 2025 to FY 2030. The IW-1 team will use available funds in FY 2014 to complete a study of alternatives and archive the results for a pending restart as late as FY 2020.

Cruise Missile Warhead

In early FY 2014, the Nuclear Weapons Council removed the B61 warhead family from consideration as a potential cruise missile warhead. A warhead family downselect decision is anticipated at the end of the Concept Assessment Phase, currently projected in the third quarter of FY 2015. An official Phase 6.1 study is scheduled to begin in the fourth quarter of FY 2014. The planned first production unit date has been delayed 1–3 years from FY 2024 based on funding. Current planning in this FY 2015 SSMP assumes a first production unit in FY 2027, but NNSA may adjust the first production unit to be sooner if sufficient funding is available; a key factor for the decision to move the first production unit forward would be better alignment with the Air Force development of the next-generation nuclear cruise missile.

An updated summary of the LEP and alteration plans endorsed by the Nuclear Weapons Council that have since been modified includes the following:

- W88 Alt 370
  - Complete development to support a first production unit no later than December 2019 (FY 2020).
  - Complete production no later than the end of FY 2024.
- B61-12 LEP
  - Complete Phases 6.3 through 6.5 to support a first production unit planned for March 2020 (FY 2020).
  - Complete production no later than the end of FY 2024.
- Cruise Missile Warhead
  - B61 family was removed from consideration.

- Complete Phases 6.1 through 6.5 to support a first production unit in FY 2025–2027.
- Complete production by FY 2032–2034.

- IW-1 LEP
  - Complete Phase 6.2/6.2A through 6.5 to support a first production unit no earlier than FY 2030.
  - Complete production by FY 2040.

Updates to key activities and milestones in LEP planning and execution in Figure 2–15 of the FY 2014 SSMP are summarized in the text in Section 2.9.2.

Plutonium Sustainment and Pit Production

The FY 2015 FYNSP for the Plutonium Sustainment Program includes the following major activities:

- Complete the reconstitution of a power supply production capability.
- Continue to acquire and install pit production equipment that replaces old, end-of-service-life equipment.
- Build up to four W87-like pits per year over the FY 2015 FYNSP to facilitate process development, equipment configuration, and limited pit certification.

The NNSA must balance requirements with plutonium and pit production capabilities to meet national policy goals, stockpile requirements, and LEP planning. In response to budget priorities and changed LEP requirements, the pit production schedule has changed from the FY 2014 SSMP. The first War Reserve W87-like pit to support the current IW-1 schedule is planned for FY 2024, with a ramp up to 30 pits per year capability no later than FY 2026. A notional pit development timeline is shown in **Table 2–3** below, which is an update to Table 2–4 on page 2-22 of the FY 2014 SSMP. Current plans call for pit production capability of 50 – 80 pits per year by FY 2030.

Table 2–3. Pit development timeline to achieve 30 pits per year
(This table updates Table 2–4 in the FY 2014 SSMP.)

Type	Fiscal Year											
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Pit Production Series	Development Builds			Process Prove-in Builds			Qualification Builds			War Reserve Builds		
Number of Builds	4	4	4	4	4	4	5	5	5	10	20	30

Tritium Supply

NNSA's current tritium production plan is illustrated in the schedule shown in **Figure 2–3**, which is an updated version of Figure 2–9 on page 2-24 of the FY 2014 SSMP. In October 2012, a total of 544 tritium-producing burnable absorber rods (TPBARs) were loaded into the Watts Bar Nuclear Power Plant Unit 1. Budget reprioritization in FY 2013 and FY 2014 impacted completion of analyses necessary to support a License Amendment Request (LAR) in FY 2014. These TPBARs are scheduled to be removed in April 2014 and replaced with the next production cycle of 704 TPBARs. The LAR is required to achieve greater than 704 TPBARs in a reactor cycle. This delay will result in the FY 2016 TPBAR quantities being reduced from the planned 1,024 TPBARs to 704 TPBARs.

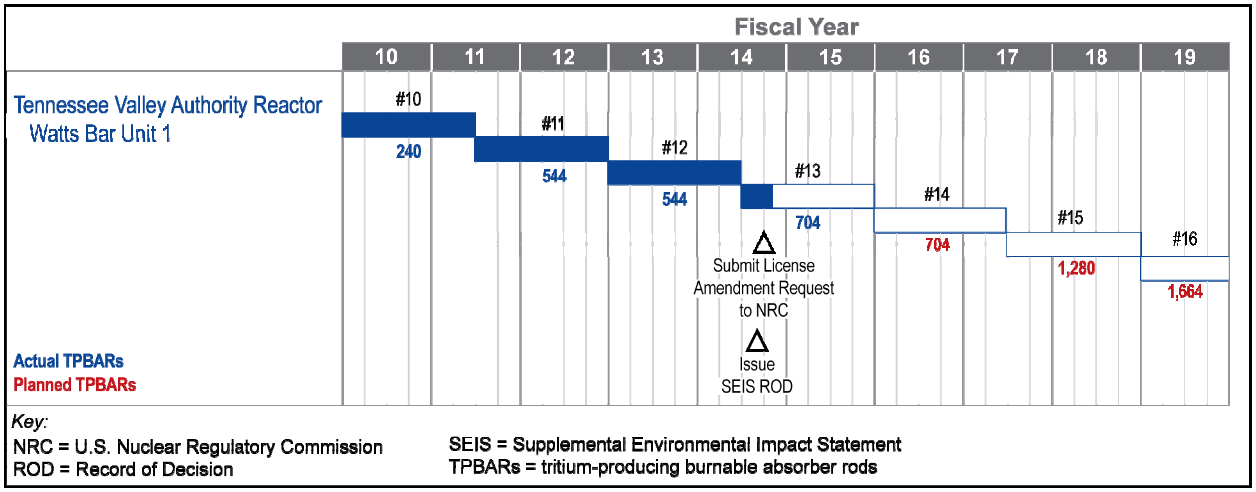


Figure 2–3. Schedule for irradiation of tritium-producing burnable absorber rods to meet post-*Nuclear Posture Review Report* requirements
(This figure updates Figure 2–9 in the FY 2014 SSMP.)

To meet future requirements, the number of TPBARs must increase to approximately 1,700 to 2,500 in the FY 2019 timeframe. Although the program will not be able to ramp up as planned in FY 2016 because of the LAR delays, options are being developed to mitigate the impacts. Options include ramping up at a faster rate in FY 2017 or limited production in a second reactor. NNSA's out-year budget projections include the additional TPBARs starting in FY 2014.

NNSA has identified three unobligated fuel sources to support tritium production in one reactor at least through 2030 and possibly to the mid 2030s. Unobligated fuel is currently supplied from a contract between the Tennessee Valley Authority and the United States Enrichment Corporation through mid FY 2015. From mid FY 2015 through FY 2022, the Depleted Uranium Enrichment Program, based on contracts signed by DOE, the United States Enrichment Corporation, Energy Northwest, and the Tennessee Valley Authority, can supply all the unobligated low-enriched uranium required for one or two reactors. When fuel deliveries from the Depleted Uranium Enrichment Program have been completed, three reloads of low-enriched uranium may remain; however, the plan is to use unobligated fuel from the Mixed Oxide Backup low-enriched uranium inventory for obligation exchanges to support about four reloads for 18-month reactor cycles at the Tennessee Valley Authority, based on currently planned inventory amounts. However, if two reactors are required, additional fuel will be required in the mid 2020s.

When the Depleted Uranium Enrichment Program and Mixed Oxide Backup low-enriched uranium resources are expended, the planning assumptions are less certain. The decision point for relying on a future domestic enrichment capability versus highly enriched uranium down-blending is in the early 2020s. NNSA plans to provide unobligated fuel to the Watts Bar Unit 1 reactor through FY 2039, as shown in **Figure 2–4**, which is an update to Figure 2–10 on page 2-25 of the FY 2014 SSMP.

Figure 2–11 on page 2-27 under Section 2.6 of the FY 2014 SSMP is unchanged.

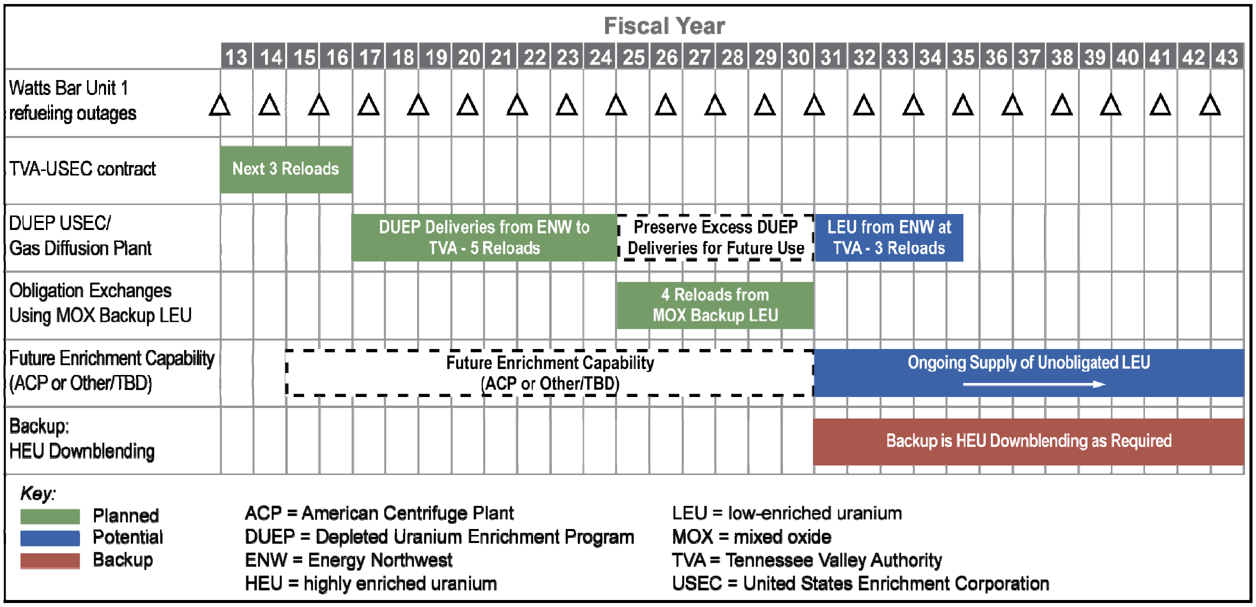


Figure 2–4. Schedule for supplying unobligated low-enriched uranium fuel to the Watts Bar Unit 1 reactor

(This figure updates Figure 2–10 in the FY 2014 SSMP.)

2.7 Weapons Dismantlement and Disposition

For 2013, Pantex did not meet its baseline dismantlement requirement because of issues with tooling, facility down-times, infrastructure repairs, safety enhancements, and software implementation. However, Pantex made significant progress in reducing legacy component inventories by disposing of more than 75,000 components in the fiscal year. The Y-12 National Security Complex (Y-12) slightly exceeded its canned subassembly dismantlement rates for several systems. Y-12 also helped NNSA manage dismantlement plans for several systems in support of the B61 LEP program. The classified Annex contains the most recent dismantlement data. Weapons Dismantlement and Disposition program planning reflects FY 2015 - 2019 budget adjustments and will still meet the FY 2022 goal of dismantling all weapons retired prior to 2009.

Figure 2–12 on page 2-28 of the FY 2014 SSMP is unchanged.

Near-term initiatives concerning dismantlement of retired warheads and bombs include the following:

- NNSA will evaluate the recommendation of the Government Accountability Office to better define the weapons in the queue for the FY 2022 dismantlement goal.
- NNSA will begin to study the pros and cons of eliminating any gaps in dismantlement as recommended by the Government Accountability Office.

2.8 Integrated Surety Solutions for Transportation

These activities are currently being reprioritized to better align with specific warhead applications. They will be addressed in the FY 2016 SSMP.

2.9 Summary of Significant Stockpile Accomplishments and Plans

2.9.1 Recent Major Stockpile Management Accomplishments

The FY 2013 stockpile management accomplishments include:

- Closed five SFIs using the newly implemented laboratory peer review process.
- Completed assessments of neutron generators and gas transfer systems and made recommendations to support decision making.
- Used the LLNL Site 300 to support hydrodynamics testing.
- Instituted a resource-loaded, integrated master schedule and earned value management system across the nuclear security enterprise for the B61-12 LEP.
- Completed a downselect to the pit type for the first interoperable warhead, IW-1.
- Achieved first production unit for the small ferroelectric neutron generator for the W87.
- Completed assembly of four engineering development pits as part of the Plutonium Sustainment Program.
- Fabricated first set of non-nuclear subassemblies developed for the Plutonium Sustainment Program, demonstrating the capability and a rapid, cost-effective response.
- Delivered all hardware to support flight tests for the W88 Alt 370 Critical Radar Arming Fuzing Test, which is scheduled for FY 2014.
- Attained $30 million in cost avoidance for the W88 Alt 370 by qualifying the reuse of sensors in integrated accelerometer units.
- Delivered W76-1 components on schedule, while performing the largest industrial move project in North America under the Kansas City Responsive Infrastructure, Manufacturing and Sourcing (KCRIMS) project.
- Disposed of more than 75,000 legacy components resulting from prior year dismantlements.
- Implemented a new Integrated Production Planning and Execution System (IPRO) at Pantex. IPRO singly replaces a number of aged software systems, including CAS/MRPII, IRIS, Track Right, and Primavera.
- Completed measurements on a stockpile nuclear explosive-like assembly and numerous enduring stockpile pits over a 12-week period. This activity was sponsored by the NNSA Defense Nuclear Nonproliferation Warhead Measurement Campaign. The work improves NNSA's understanding of technical options applicable to future nuclear non-proliferation objectives.

2.9.2 Stockpile Management Activities, Milestones, and Key Annual Deliverables

Figure 2–14 on page 2-32 of the FY 2014 SSMP is unchanged except as noted on page 2-5 regarding neutron generator production quantity plans.

Figure 2–15 on page 2-32 of the FY 2014 SSMP is updated with the following adjustments:

- Establishing capability for production of a second legacy pit has changed to FY 2024 from FY 2019.
- W88 Alt 370 first production unit date has changed from December 2018 to December 2019 (FY 2020).
- B61-12 LEP first production unit date has changed from FY 2019 to March 2020 (FY 2020).
- Cruise missile warhead first production unit date has changed from FY 2024 to FY 2025–FY 2027.
- IW-1 LEP first production unit date has changed from FY 2025 to FY 2030.
- IW-2 first production unit date has changed from FY 2031 to FY 2034.
- IW-3 first production unit date has changed from FY 2037 to FY 2041.

Chapter 3
Research, Development, Testing, and Evaluation Activities

This chapter, renamed from the FY 2014 SSMP, discusses the essential research, development, testing, and evaluation (RDT&E) activities that underpin stockpile stewardship.

3.1 Introduction

RDT&E provides the tools to analyze, compare, evaluate, and recommend modernization options to extend the stockpile life while improving safety and security and addressing broader national security requirements.

FY 2013 Research, Development, Testing, and Evaluation Activities Accomplishments

- *Executed Pollux subcritical experiments with plutonium that provided unprecedented ability to compare predictive models to data from an imploding weapon-relevant system at scale.*
- *Set records for number of stockpile stewardship shots and for neutron yield on the National Ignition Facility.*
- *Executed seven dynamic behavior of plutonium experiments on the Joint Actinide Shock Physics Experimental Research (JASPER) two-stage gas gun to improve phase-aware plutonium equation of state.*
- *Converted Sequoia, the world's third-fastest computer on the Top 500 list, to classified operations.*
- *Fully supported the Cycle 18 Annual Assessment Review Process, provided reports and presentations to Project Officer Groups, the U.S. Strategic Command Strategic Advisory Group Stockpile Assessment Team, and the Secretary of Energy.*

3.2 Management and Planning

The tools and approaches NNSA uses to address RDT&E are unchanged from the FY 2014 SSMP. NNSA continues to improve its planning processes by aligning activities with programmatic elements and recent stockpile decisions. Moreover, an additional approach is being developed to align qualification and certification activities that support component maturation and technology development with the Science, Advanced Simulation and Computing (ASC), Engineering, and Inertial Confinement Fusion Campaigns. The FY 2016 SSMP will provide an in-depth discussion of changes to the TBSTP, the CMF, and the PCF.

Figure 3–1 summarizes the capabilities that RDT&E provides. These capabilities facilitate the assessment of the stockpile condition by revealing anomalies, the evaluation of impacts of anomalies on warhead performance, and the implementation of solutions. In addition, RDT&E also supports the broader national security issues by providing capabilities to avoid technological surprise and to provide confidence in system performance.

3.2.1 Technical Basis for Stockpile Transformation Planning

The TBSTP report was updated in September 2013. No other significant changes have been made to this section.

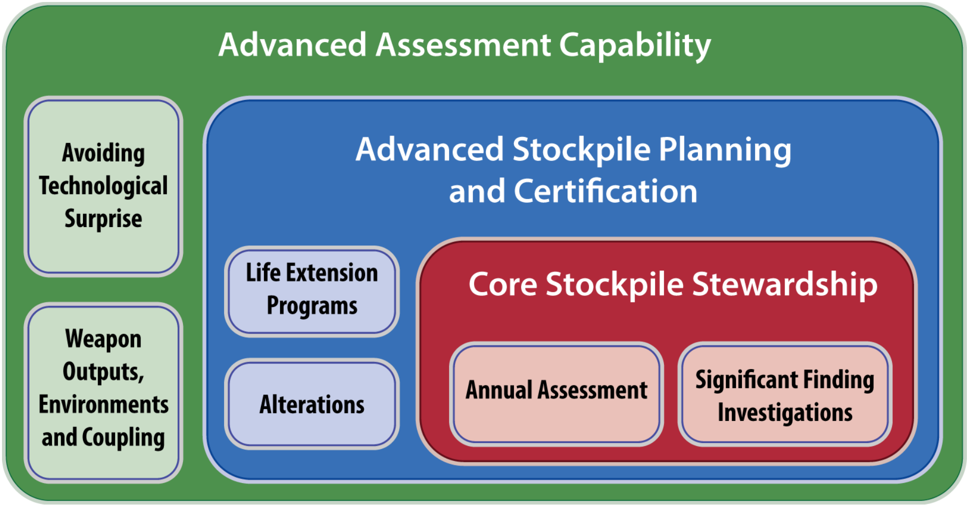


Figure 3–1. Research, development, testing, and evaluation enables the National Nuclear Security Administration to meet the broad range of activities essential to nuclear security mission requirements

3.2.2 Component Maturation and Technology Development

The process to develop technologies and the associated component maturation for insertion into the stockpile continues to progress. CMF is a portfolio management tool with integration, risk, schedule, and status information on primarily pre-Phase 6.3 activities on program-of-record technologies that support LEPs, Alts, and modifications (Mods). The CMF focuses on five goals facilitating inter-site integration and communication on programmatic priorities:

- Determining resource requirements and identifying funding sources
- Linking component maturation and technology development activities with the respective LEP integrated master delivery schedules
- Tracking maturation of selected technologies through the nine technology and manufacturing readiness levels to meet specified first production unit dates
- Integrating with RDT&E to design, develop, and qualify components

Figure 3–3 in the FY 2014 SSMP, the planning framework for component maturation and technology development activities, is not being revised at this time. A new version will be incorporated in the FY 2016 SSMP.

The United States House Armed Services Committee (HASC FY 2014 NDAA HR 1960) directed the NNSA to provide a briefing on NNSA's Advanced Manufacturing roadmap. A classified briefing was provided during February 2014 that included advanced manufacturing processes adaptable for NNSA's mission and potential cost savings and reductions in waste, floor space requirements, and production time. Timelines for development and scale up of these manufacturing technologies and associated benefits and challenges were also provided. Additive Manufacturing is an advanced manufacturing technology that has the potential to revolutionize product realization on a global scale. The roadmap provides an overview in terms of the weapons components that can be manufactured using additive manufacturing; the roadmap also identifies components with immediate near-term impact. Many of the benefits of additive manufacturing can be realized now for components that have lower qualification requirements, and as additive manufacturing technology evolves, it can potentially be applied to support a much broader range of manufacturing requirements. To rapidly realize the benefits of additive manufacturing to its missions, NNSA Defense Programs has established an “Additive Manufacturing Implementation Team” to provide additional focus. This team is planning to identify the key Defense Programs additive manufacturing focus areas for the next 5-10 years and funding requirements for implementation.

3.2.3 General Requirements for Predictive Science Planning

This section replaces Section 3.2.3 of the FY 2014 SSMP in its entirety.

As the weapons in the stockpile age, materials can undergo physical changes that may negatively impact the ability for a weapon to perform its intended function. These changes include, for example, formation of gaps and cracks, changes in mechanical properties (*e.g.,* the loss of ductility, elasticity, or strength) and corrosion resulting from the warhead atmosphere. Advanced tools and diagnostic capabilities are then required to assess the impact of such changes on weapons performance. Similarly, as weapons are refurbished, a combination of reused, remanufactured, and replacement components are incorporated, thereby shifting the weapons further from as-built and nominally as-tested states. Advanced tools and capabilities are required to ensure the performance of these modified weapons.

Both the assessment of the state of the stockpile and the certification of stockpile modifications rely on sound scientific connections to (1) original and reanalyzed data from legacy underground nuclear and non-nuclear testing, (2) established physics, and (3) data from new experiments. “Predictive science” seeks to grow the domain of established weapons physics, to provide increasingly more sophisticated subcritical experimental capabilities, and to broaden the breadth of scientific connections through advances in weapon simulation codes. These predictive science activities focus on filling the knowledge gaps and thus expand our assessment and certification capabilities.

In the last decade, NNSA and the national security laboratories formulated a framework to guide and communicate targeted advancements under the pursuit of “predictive science.” The Predictive Capability Framework, or PCF, projects where weapon science will be heading through the early to mid 2020s. The pegposts were developed based on a desire to replace legacy-code-based weapons simulation calibrations with first-principles capabilities and on advancements that could be reasonably projected based on anticipated near-term and mid-term weapon science research. The pegposts are also informed by the known, out-year needs for stockpile maintenance and LEPs.

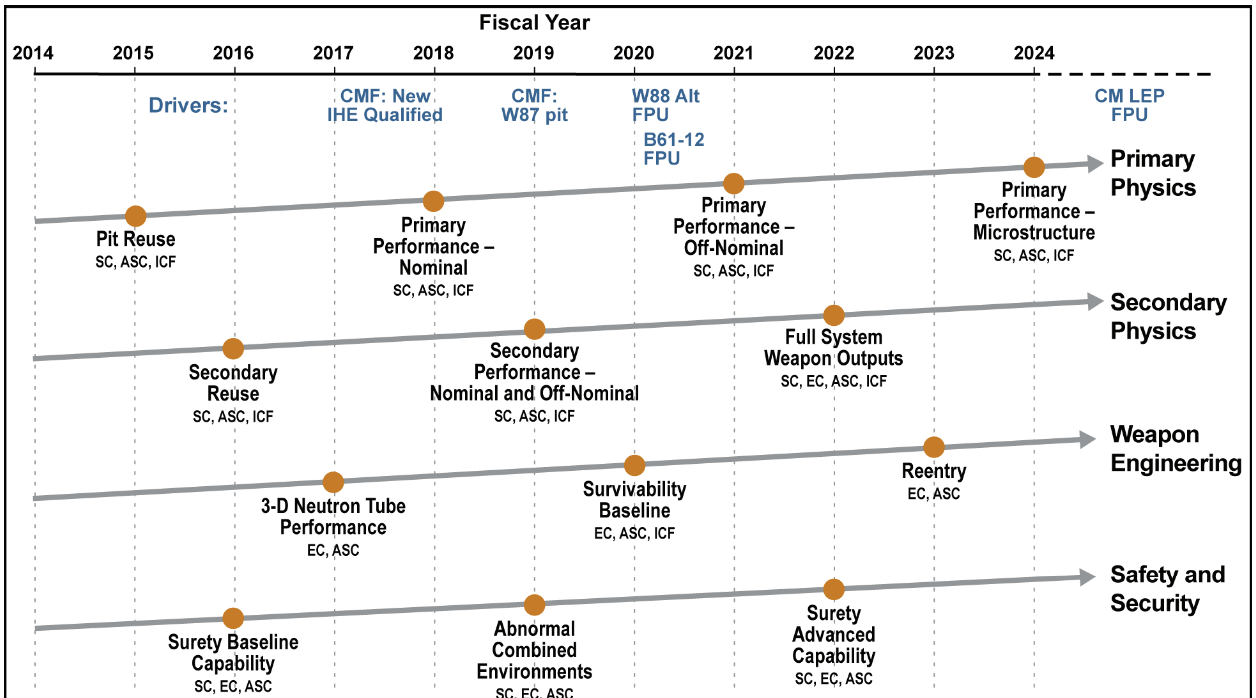
In 2013, NNSA reviewed the state of weapons science and the needed advances to steward the nuclear deterrent over the next 10 years. Aspects included (1) evolution in out-year needs of DSW, (2) observance of the significance and pace of weapons science advances over the previous 7 years, (3) improved insight into outstanding weapons science problems, and (4) better clarity as to what to pursue over the next 10 years. The mission of the nuclear security enterprise will include the following major areas:

- Assessment of the existing, aging stockpile, including SFIs
- Design, implementation, and certification of system alterations
- Design, implementation, and certification of LEP options
- Support of key technology and component maturation activities

Moreover, technical questions are emerging from the examination of future nuclear force structures (as the 3+2 strategy is implemented) and the constraints of today’s nuclear weapon production infrastructure. For instance, given the reduced number of total warheads and systems, NNSA must address what constitutes appropriate weapon and weapon component diversity and what is the most effective approach to perform surveillance on a significantly smaller stockpile. Since Stockpile Stewardship Program capabilities are essential and are frequently used for broader national security programs, these programs also require some capability development.

NNSA has identified the mission drivers and key knowledge and capability gaps over a large range of topical focus areas. These items have been grouped into four broad categories of weapons physics, weapons engineering, cross-cutting topics, and enabling capabilities. The topical areas within weapons physics essentially follow the time sequence of the operation of a nuclear explosive package. The weapons engineering areas are characterized by component design and general functioning, operation through the stockpile-to-target-sequence environments, and operation in hostile encounters and in abnormal environments. The cross-cutting topics include stockpile surveillance and stockpile and component diversity.

Finally, a host of enabling capabilities supports the advances in weapons science and engineering, including experimental facilities and computational tools. Major advances expected over the next decade have been identified and captured in a revised PCF chart. The result is 13 pegposts or points grouped under four lines or "strands" of activity: Primary Physics, Secondary Physics, Weapon Engineering, and Safety and Security, as illustrated in **Figure 3–2.** This revised PCF chart replaces Figure 3–4 in the FY 2014 SSMP.



Key:
3-D = three-dimensional
Alt = alteration
ASC = Advanced Simulation and Computing Campaign
CM = cruise missile
CMF = Component Maturation Framework
EC = Engineering Campaign
FPU = first production unit
ICF = Inertial Confinement Fusion Ignition and High Yield Campaign
IHE = insensitive high explosive
LEP = life extension program
SC = Science Campaign

Figure 3–2. Version 2.0 of the Predictive Capability Framework, identifying major efforts required to advance stockpile assessment, sustainment, and certification capabilities
(This figure updates Figure 3–4 in the FY 2014 SSMP.)

Each pegpost along the lines in Figure 3–2 represents a major effort that integrates the contributions to stockpile assessment or certification. The pegposts are equivalent to "objectives," as used elsewhere in this SSMP, and support the main DSW drivers, as indicated at the top of the figure. Achieving these pegposts is critically dependent upon advances in the enabling capabilities. The predictive capabilities represented by the pegposts are demonstrated through computational simulations of increasing complexity, which will require improvements in both the capability and capacity of high performance computing. The validation of simulation models, as well as advances in understanding nuclear weapon performance, is achieved via the NNSA experimental facilities, such as the Dual Axis Radiographic Hydrodynamic Test (DARHT), the National Ignition Facility (NIF), the Z facility (Z), and several platforms at the Nevada National Security Site such as the Joint Actinide Shock Physics Experimental Research (JASPER) gas gun and at U1a. Diagnostic upgrades such as the Advanced Radiographic Capability on the NIF, higher penetration flash radiography, and a new capability for diagnosing neutron reactivity in subcritical experiments at U1a are an essential part of PCF planning.

Near-term examples of PCF pegposts in 2015 and 2016 are the primary and secondary assessments for the reuse of nuclear components. These assessments are driven by the need to ensure predictive capabilities are in place to determine the most likely design options for the cruise missile warhead and the IW-1, including pit reuse recertification and secondary reuse. The out-year pegposts build upon these capabilities by developing common models to quantify uncertainties in predictions, as well as models to assess the impact of variability caused by engineering, aging, or manufacturing features. The culmination of all these advances will support the delivery of high-fidelity, full-system weapon outputs and the characterization of their impact on the surrounding environment.

These management and planning tools will be used to coordinate activities to assess and sustain the stockpile; evaluate LEP options; develop new capabilities, technologies, and components; and certify life-extended weapons. These tools will also contribute to solving diverse national security challenges.

3.3 Technology Development and Component Maturation for Stockpile Sustainment

No significant changes have occurred to this section. Work on technology development and component maturation is progressing and will be updated in the FY 2016 SSMP.

3.4 Predictive Science of Assessment and Certification

Work on predictive science is progressing and will be updated in the FY 2016 SSMP.

3.5 Experimental and Computational Resources

3.5.1 Experimental Resources

While no significant changes have occurred to fielded experimental capabilities since the FY 2014 SSMP, a mission needs statement is in preparation for enhanced capabilities to the subcritical experiment program in areas of deep penetrating flash radiography and neutron diagnosed (reactivity) experiments on plutonium in U1a. The mission needs statement highlights the current gap in capabilities to diagnose plutonium behavior in the late stages of a primary implosion. Implementation of the capability to fill this gap will involve the selection of an enhanced radiographic system, proof-of-principle demonstration for reactivity, enhanced U1a infrastructure requirements, and enhanced authorization basis for experiments at a larger scale using Hazards Category II levels of special nuclear materials.

3.5.2 Facility and Infrastructure Planning

No significant changes have occurred to this section since the FY 2014 SSMP.

3.5.3 Computational Resources

Over the next few decades, NNSA will execute a number of complex LEPs that require unparalleled computational capability. To meet stockpile requirements without underground testing, increased simulation fidelity is required. The computing capabilities enabled by advanced technology systems are critical to support the certification of the stockpile and the schedule of LEPs as discussed in Chapter 2. Two new advanced technology systems are planned to address these needs. Trinity, the first system, is in the vendor selection phase; Sierra, the second system, will follow Trinity by 2.5 years. The request for proposals has been developed and released. An in-depth description of these systems will be in the FY 2016 SSMP. In addition, Advanced Technology Development and Mitigation is a new ASC subprogram to target exascale computing and mitigate the disruption to the stockpile stewardship mission resulting from the direction industry is moving in computational architectures. Additional information on this new subprogram is provided in Section 3.7.2 and then in more detail in Appendix F.

With the exception of the activities summarized in this subsection, no significant changes have occurred to the Computational Resources section since the FY 2014 SSMP.

3.6 Ensuring U.S. Leadership in Science and Technology for National Nuclear Security Administration and Broader National Security Missions

No significant changes have occurred to this section since the FY 2014 SSMP.

3.7 Structure of Campaigns and Programs to Meet the Requirements of Stockpile Sustainment and Deterrence

3.7.1 Science Campaign

No significant changes occurred to the structure or descriptions of the Science Campaign and its five subprograms. The FY 2013 accomplishments are highlighted in the sidebar at the start of the chapter and in Section 3.9 of this chapter.

3.7.2 Advanced Simulation and Computing Campaign

The ASC Campaign has created a new subprogram, Advanced Technology Development and Mitigation, to develop a strategy to acquire the advanced computing technologies to support stockpile stewardship. This strategy fully recognizes the need for exascale computing[1] capabilities to support our out-year requirements in computational assessments, although the stewardship mission will continue to be accomplished with the available computational resources until such systems are available. Even without the technological advances required to achieve effective, power-efficient exascale, other market and technology forces are disrupting the computing ecosystem in a manner that is not conducive to scientific computing. These changes—multi-core nodes, decreased memory capacity, and decreased memory bandwidth (which support cell phone and gaming type applications)—will impact the full spectrum of high performance computing (HPC) used by NNSA for scientific computing. As a result, the continued viability of the current generation of multi-physics integrated design codes (IDCs), produced during an era of relative stability in HPC technologies, is threatened unless action is taken in anticipation of the arrival of the disruptive technology in order to influence its development. While ASC's approach to advancing HPC technologies contributes to the foundation of plans to accelerate delivery of an exascale supercomputer for the Nation, the approach outlined in this FY 2015 SSMP does not accelerate such deliveries. It addresses the need to adapt current IDCs and to build new IDCs to use the looming disruptive technologies, engage in co-design ventures with industry to evolve operating systems and other support software, and work with HPC vendors to deploy technologies useful for the Stockpile Stewardship Program.

Congress recently[2] (on December 24, 2013) requested a ten-year plan to acquire exascale computing to support stockpile stewardship and the incorporation of that plan in the SSMP. Given the quick response required to meet the FY 2015 SSMP schedule and the current flux in DOE planning for the exascale initiative, in lieu of a complete plan, Appendix F in the FY 2015 SSMP discusses the need for an exascale capability and describes ASC's approach to advancing HPC for the stockpile. The FY 2016 SSMP will include a plan for achieving exascale computing, a list of the intermediate milestones, an assessment of the required supporting infrastructure, a description of how the effort will be coordinated with other agencies and private industry, and an estimated cost.

Figure 3–8 in the FY 2014 SSMP, which illustrates the subprograms of the ASC Campaign, will be updated in the FY 2016 SSMP. The FY 2013 accomplishments are highlighted in the sidebar at the beginning of the chapter and in Section 3.9 of this chapter.

3.7.3 Engineering Campaign

No significant changes have occurred to the structure or descriptions of the Engineering Campaign and its four subprograms. The FY 2013 accomplishments are highlighted in the sidebar at the beginning of the chapter and in Section 3.9 of this chapter.

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[1] *An exascale computer would perform 10^{18} floating point operations per second, more than 50 times faster than the current petascale-class computers that are currently the backbone of NNSA's advanced simulation and computing. Petascale computers perform 10^{15} floating point operations per second.*

[2] *See Public Law 113-66, National Defense Authorization Act for Fiscal Year 2014, Sec. 3129, Plan for developing exascale computing and incorporating such computing into the stockpile stewardship program.*

3.7.4 Inertial Confinement Fusion Ignition and High Yield Campaign

No significant changes have occurred to the structure or descriptions of the Inertial Confinement Fusion Ignition and High Yield Campaign and its six subprograms. The FY 2013 accomplishments are highlighted in the sidebar at the beginning of the chapter and in Section 3.9 of this chapter.

3.8 Milestones, Objectives, and Future Planning

Except for the following, no significant changes have occurred to this section since the FY 2014 SSMP. These adjustments are caused by either changes in available funding (resulting in changes to completion dates), new technical information (resulting in changes to objectives), or new priorities (resulting in new milestones and cancellations of others).

- The adjustments to Figure 3–11 of the FY 2014 SSMP are:
  - Delivery of national integrated capabilities for nuclear explosive package safety, analysis of hardened deeply buried targets, diagnostics, and radiation effects on electrical systems will occur in FY 2015 instead of FY 2014.
  - The full-system safety assessment will be in FY 2016 instead of FY 2014.
  - The FY 2015 HPC platform delivery will not be 100x petascale; it will be closer to 50x petascale.
  - The FY 2017 HPC platform delivery will be at reduced scale (100x or less petascale) because of funding constraints.
- The adjustments to Figure 3–12 of the FY 2014 SSMP are:
  - Figure 3–12 will be revised to align with the new PCF pegposts in Figure 3–2 of this FY 2015 SSMP. Key milestones associated with Global Nuclear Security Applications will remain.
- The adjustments to Figure 3–13 of the FY 2014 SSMP are:
  - In FY 2014, add milestone "Complete 120-day study on improving efficiency at NIF and begin implementing results."
  - In FY 2014, add milestone "Complete 60-day study of 3-year plan for ignition and non-ignition experiments on NIF."
  - In FY 2014, delete milestone "Finalize target designs and user optics required for an FY 2017 Advanced Ignition Platform."
  - Move "Complete remaining NIF-ARC[3] beamlines" from FY 2014 to FY 2015.
  - Remove the word "defect" and move "Measure the effect of shell mixing on deuterium-tritium burn" from FY 2015 to FY 2016.
  - Move "Complete NIF advanced diagnostic suite" from FY 2016 to FY 2017.

[3] *ARC is the Advanced Radiographic Capability for the National Ignition Facility.*

- In FY 2017, modify milestone “Demonstrate advanced non-ignition concepts on the ICF HED Facilities” to “Demonstrate a deuterium-tritium burn platform that meets the needs of the Stockpile Stewardship Program.”
- In FY 2017, delete milestone “Assess the viability of fast ignition as an ignition alternative.”

- There are no changes to Figure 3–14 of the FY 2014 SSMP.

3.9 Summary of Recent Accomplishments

Additional FY 2013 accomplishments not described in the sidebar on page 3-1 are listed below.

- Conducted over 700 stockpile stewardship experiments on high energy density facilities (NIF, Omega, and Z), including a record neutron yield of about 10^{15} neutrons on the NIF and dynamic material property measurements on Z.
- Executed hydrodynamic experiments at DARHT on pit reuse concepts.
- Obtained first validation data for computer models to predict impulse from hostile x-ray radiation using new argon gas puff capability at Z.
- Eliminated historical discrepancies between the simulated and measured yield on a W78 underground test based on high-fidelity simulations with modern computer codes.
- Improved the age-aware equation of state of plutonium based on aging studies in support of pit reuse.
- Made significant progress on developing high energy density and hydrodynamic experiment designs to improve understanding of plutonium strength, phase stability, and other weapons science issues.
- Demonstrated cost savings of $4 million and cycle time savings up to 75 percent using additive manufacturing techniques for producing new tooling, fixtures, and encapsulation molds.

Chapter 4
Nuclear Test Readiness

The status of test readiness is unchanged from the FY 2014 SSMP. NNSA no longer maintains a "test readiness program," but maintains test readiness by the exercise of capabilities at the national security laboratories and the Nevada National Security Site. Examples of these capabilities include: diagnostic development; the ability to fabricate samples, test objects, and war reserve components with real and surrogate materials; high explosive characterization and testing; hydrodynamic testing; ongoing reanalysis of underground nuclear testing based on analysis of prompt diagnostics and radiochemistry samples; and activities executed employing formality of nuclear operations. These include operations at the Nevada National Security Site such as the Device Assembly Facility (DAF), which is used to support JASPER, subcritical experiments, and the critical experiments facility; subcritical experiments at U1a; and plutonium experiments at the JASPER gas gun. In general, the research, development, testing, and evaluation activities described in Chapter 3 are all exercising the capabilities of test readiness. In the FY 2016 SSMP, the contents of Chapter 4 will be included in Chapter 3.

FY 2013 Nuclear Test Readiness Accomplishments

- *Performed eight successful hydrodynamic experiments at the Dual Axis Radiographic Hydrodynamic Test (DARHT) facility at Los Alamos National Laboratory, including the sixth Livermore shot, and performed one hydrodynamic experiment at the Contained Firing Facility.*
- *Completed the Gemini subcritical experimental series at U1a and data analysis; exercised nuclear and underground teaming operations.*
- *Routinely operated advanced diagnostics such as gamma reaction history, neutron imaging, and x-ray temperature at the National Ignition Facility and Z facility.*
- *In adding more underground nuclear tests to the primary validation suite, developed enhanced underground nuclear test data analysis algorithms that improve historical data capture from original media and assign error bars that contribute to error analysis.*

Chapter 5
Revitalize Physical Infrastructure

NNSA maintains a capability-based infrastructure that responds to deterrent requirements while balancing risk and cost. This chapter reflects updates to the NNSA plans to sustain and modernize the infrastructure in support of specific capabilities to design, manufacture, certify, maintain, and assess the Nation's stockpile regardless of its size and composition.

> ***FY 2013 Physical Infrastructure Accomplishments***
>
> - *Installed equipment in RLUOB and prepared for "cold" start-up of analytical chemistry operations.*
> - *Completed construction and achieved Leadership in Energy and Environmental Design (LEED) Gold Certification for the new National Security Campus in Kansas City, Missouri.*
> - *Initiated Site Readiness activities to support the start of construction for the Uranium Processing Facility.*

NNSA is committed to major capability improvements for plutonium and uranium. In particular, the plutonium strategy has been refined to meet currently defined programmatic requirements. An increase in the allowable plutonium inventory in the Radiological Laboratory Utility Office Building (RLUOB) and reconfigured floor space in portions of the Plutonium Facility (PF-4) will allow equipment upgrades and streamlined processing. Meanwhile, the phased approach to complete the Uranium Processing Facility[1] is continuing, with the start of site readiness construction. To address cost growth and budget constraint issues, the NNSA Acting Administrator has directed an independent review of the Uranium Processing Facility to evaluate alternative mission delivery scenarios. NNSA continues to execute its balanced infrastructure investment strategy to sustain the existing infrastructure of the nuclear security enterprise, replace or refurbish inefficient and unreliable facilities, and deactivate and dispose of excess facilities.

5.1 Capability-Based Approach to Infrastructure Investment

Table 5–1 summarizes the physical infrastructure that supports design, qualification, and assessment of the stockpile and the links between mission capabilities and the infrastructure condition. Some changes have occurred in Table 5–1 since the FY 2014 SSMP. In the table, the performance status of three mission capabilities has improved from yellow to green. These changes are attributed to the completion of two projects, and the demonstration of weapons design performance.

[1] *The Uranium Processing Facility was previously called the Uranium Capabilities Replacement Project.*

Table 5–1. Infrastructure management strategy to sustain National Nuclear Security Administration functions and mission capabilities [a]

- (Green) Existing infrastructure is estimated to be sufficient for post-*Nuclear Posture Review Report* (DOD 2010) mission capabilities.
- (Yellow) Existing infrastructure may not be sufficient or is inefficient or unreliable for post-*Nuclear Posture Review Report* (DOD 2010) mission capabilities.
- (Red) Existing infrastructure is not sufficient for post-*Nuclear Posture Review Report* (DOD 2010) mission capabilities.

Function	*Mission Capability*	*Current Limitation of Capability*	*Capability Requirement*	*Infrastructure Management Strategy to Mitigate Risk and Sustain Required Capability*
Plutonium	RDT&E	Aged, seismically deficient, and inefficient facility	Modernize and sustain existing facilities	An updated plutonium strategy to mitigate risk and support closure of CMR is presented in section 5.3.1.1
	Pit production	< 10 pits per year	50-80 pits per year capacity	• Implement RLUOB inventory increase and PF-4 plutonium investments to achieve 30 pits per year capability by FY 2026 (was by FY 2021 in the FY 2014 SSMP) • Continue to support strategy reaching capacity of 50-80 pits per year capability
	Storage of components	Insufficient capacity, dispersed locations	Consolidate and sustain existing facilities	Continue mitigation strategy
	Radioactive waste disposition	Consent agreement to close one location and upgrade waste processing system	Sustain existing facilities with some new construction	Continue mitigation strategy
Uranium	HEU and CSA RDT&E	Aged, inefficient and dispersed facilities	Efficient R&D facility	Continue mitigation strategy
	CSA production	160 CSAs per year and aged, fragile, inefficient facilities	Approximately 80 CSAs per year	Continue mitigation strategy
	Storage of components	Satisfactory	Sustain HEUMF	No change
	Radioactive waste disposition	Satisfactory	Sustain existing facilities	No change
Tritium	RDT&E	Satisfactory	Sustain existing facilities	No change
	Manufacturing	Satisfactory; TVA reactors sufficient through FY 2030	940 metric tons of unrestricted and unobligated LEU for one reactor	No change
		704 TPBARs per cycle sufficient through mid FY 2017.	1,700 to 2,500 TPBARs per reactor per cycle by 2019	The number of TPBARs has changed from 544 to 704 TPBARs and fiscal year changed to support loading cycle number 13. This change supports the tritium needed pending the Nuclear Regulatory Commission review and approval of TVA licenses amendment to increase production to required levels.
		Aged and inefficient facilities	Consolidate operations into existing newer facilities	Implement TRIM Program and HANM Risk Reduction project at SRS through combination of expense and capital funding
	Storage	Satisfactory	Sustain existing facilities	No change

Function	Mission Capability	Current Limitation of Capability	Capability Requirement	Infrastructure Management Strategy to Mitigate Risk and Sustain Required Capability
High Explosives	RDT&E	Aged and inefficient facility	Maintain leading-edge energetic materials R&D capability	HE Component Fabrication and Qualification Facility relocated from HE Production mission capability as the facility will support RDT&E
	Production	1,000 pounds per year	Up to 2,500 pounds per year	Continue mitigation strategy
		600 hemispheres per year – fragile, inefficient facilities	Up to 600 hemispheres per year – modernize and consolidate facilities	
	Storage	Satisfactory	Sustain existing facilities	No change
	Disposition	Satisfactory	Sustain existing facilities	No change
Weapons Assembly and Disassembly	Assembly cells and bays, weapon surveillance, NDE, and disassembly	Obsolete and aged cell and bay operational sub-safety systems	Sufficient cells and bays to support all weapon operations	• Upgrade fire alarm panels in nuclear explosives facilities • Continue fire protection building lead-in replacements • Continue other mitigation strategies
Nonnuclear Components	RDT&E	Microelectronics for LEPs	Keep equipment and tooling to near-industry capabilities	Continue mitigation strategy
	Production	Satisfactory facilities at laboratories	2 to 3 phased LEPs	No change
		Satisfactory facilities at production plant **(Yellow to Green change)**		KCP personnel and equipment relocation and installation to NSC in FY 2014 changed capability from “aged and inefficient facilities” to “satisfactory”
Special Nuclear Material	Transportation	Satisfactory	Sustain existing facilities	No change
	Security protection and storage	Plutonium: TA-55 PIDAS - new **(Yellow to Green change)**	Sustain new PIDAS	NMSSUP Phase II PIDAS completion changed TA-55 capability from “old & reached end of design life” to “TA-55 PIDAS - new”
		Plutonium: Superblock supported at Security CAT III	SNM supported at Security CAT III	No change
		SNM staging and DAF storage	Sustain existing infrastructure	• Continue DAF Lead-in Piping project (operations funded) mitigation strategy • Execute Argus Upgrade project installation at DAF
		Security protection and staging for Zone 4 & 12 approaching end of life	Efficient and right-sized PIDAS	No change
		PIDAS for uranium is old, and inefficient and reaching end of design life	20-acre PIDAS campus	• Completed construction of Security Improvement Project • WEPAR cancelled as subproject of UPF Phase I • Consider PIDAS Security Upgrades project that supports reducing the PIDAS from 150 to 80 acres • Consider Final PIDAS Reduction and Entry Control Facilities project that coupled with UPF Phase II and III. Completion would support PIDAS reduction from 80 to 20 acres • Consider Argus Balance of Plant project implementation

Function	Mission Capability	Current Limitation of Capability	Capability Requirement	Infrastructure Management Strategy to Mitigate Risk and Sustain Required Capability
RDT&E Design, Certification, Experiments, and Surveillance	Life extension design support	2 LEPs **(Yellow to Green change)**	Design support for 2 to 3 LEPs	The national security laboratories support of at least 2 LEPs changed the capability from "1 LEP"
	Certifications, surveillance, and assessments of warheads	Up to 7 warheads types	Assessment of up to 7 warhead types	Continue mitigation strategy
	Computational science	Inadequate infrastructure to support more than petaflops	Sustain infrastructure support for petaflops and begin planning for exaflops capability	Implement infrastructure modernization to support Advanced Technology Systems in support of exascale computing as part of Advanced Simulation and Computing
	Testing and experiments to support stockpile certification and surveillance	Aging environmental testing and experimental equipment and infrastructure for LEPs	Sustain stockpile certification and surveillance test capabilities	Continue mitigation strategy
		Inadequate radiography and advanced diagnostics for larger scale subcritical experiments at the Nevada National Security Site	Sustain radiography infrastructure, including diagnostic equipment to support hydrodynamic experiments	Continue mitigation strategy
Enabling Infrastructure	Utility services including HVAC, electrical, fire main, *etc.*	Inadequate electrical services and distribution systems, old and inefficient operations centers, fire protection, seismic upgrades, and support facilities	Upgrade and sustain utilities and infrastructure for modern capabilities	Continue mitigation strategy

Key:

CAT = Category
CMR = Chemistry and Metallurgy Research
CSA = canned subassembly
DAF = Device Assembly Facility
HANM = H-Area New Manufacturing
HE = high explosives
HEU = highly enriched uranium
HEUMF = Highly Enriched Uranium Materials Facility
HVAC = heating, ventilation, and air conditioning
IW = interoperable warhead
KCP = Kansas City Plant
LEP = life extension program
LEU = low-enriched uranium
NDE = nondestructive evaluation
NMSSUP Phase II = Nuclear Materials Safeguard and Security Upgrade Project Phase II
NSC = National Security Campus
PF-4 = Plutonium Facility
PIDAS = Perimeter Intrusion Detection and Assessment System
R&D = research and development
RDT&E = research, development, testing, and evaluation
RLUOB = Radiological Laboratory Utility Office Building
SNM = special nuclear material
SRS = Savannah River Site
SSMP = Stockpile Stewardship and Management Plan
TA-55 = Technical Area 55
TPBARs = tritium-producing burnable absorber rods
TRIM = Tritium Responsive Infrastructure Modifications
TVA = Tennessee Valley Authority
UPF = Uranium Processing Facility
WEPAR = West-end Protected Area Reduction

[a] The infrastructure projects in the column entitled "Infrastructure Management Strategy to Mitigate Risk and Sustain Required Capability" represent the highest priority projects on the Integrated Priority List as shown in Figure 5–1.

Accomplishments in Capability-Based Infrastructure Investment

This new subsection summarizes improvements to the physical infrastructure that have occurred within the last year since publication of the FY 2014 SSMP.

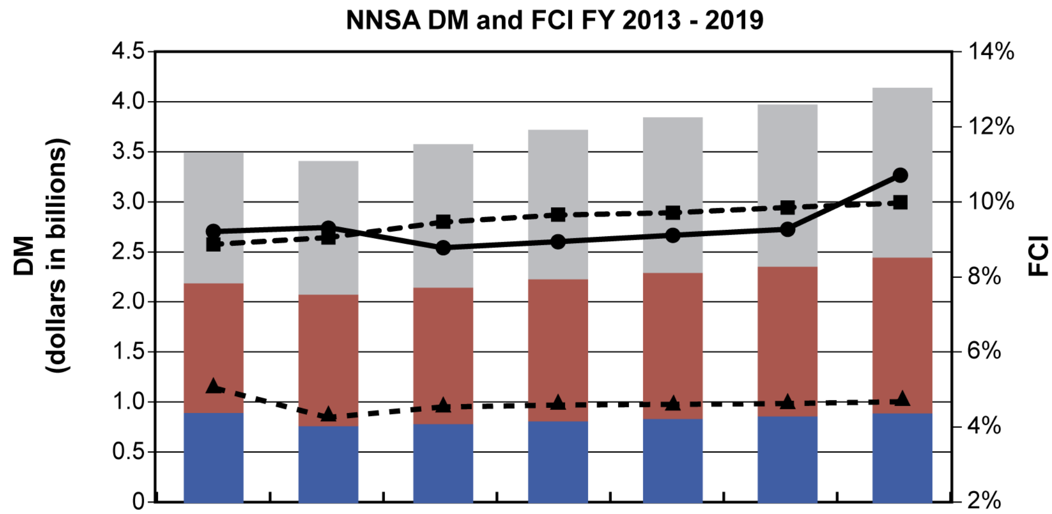
- Equipment was installed in RLUOB and “cold start” analytical chemistry operations[2] have commenced to support readiness and special nuclear material operational startup in FY 2015.
- Phases A and B of the Technical Area 55 Reinvestment II Project have been completed at LANL. The improvements include upgraded glove boxes and other safety systems (*e.g.*, criticality alarms and uninterruptable power). Phase C will be completed in FY 2017.
- Phase II of the Nuclear Materials Safeguards and Security Upgrade Project (NMSSUP) was completed in mid 2014, thereby providing an effective, robust, physical security system for the Technical Area 55 plutonium area.
- Construction at the Kansas City Plant National Security Campus (KCP NSC) was completed in FY 2013, and the General Services Administration lease was executed. Relocation of equipment and personnel is approximately 75 percent complete and is on track for completion by August 2014.
- Phase II of the Test Capabilities Revitalization Project was completed in mid FY 2014 to enable an integrated experimental strategy to develop, validate, and apply models to perform weapons system qualifications.
- The Pantex Wind Project achieved 50 percent construction completion. This project supports installation of five turbines with 11.5 megawatts to power more than 60 percent of Pantex. The initiative is being funded using an energy savings performance contract.
- Construction of the High Explosive Pressing Facility project was 81 percent complete at the end of FY 2013 and is on schedule for completion by FY 2016.
- Execution of the strategic Tritium Responsive Infrastructure Modifications (TRIM) Program continues and supports the relocation and right-sizing functions from legacy facilities into more modern facilities to reduce the cost, footprint, and infrastructure risk. The TRIM capital project, in Figure 5–2 is scheduled to begin in FY 2017 and supports the TRIM Program.
- The Site Readiness subproject activities were initiated to support the start of construction for the Uranium Processing Facility, including the utility and Bear Creek road reroutings.

5.2 Sustainment of Existing Facilities and Infrastructure

NNSA prioritizes the infrastructure using a defined set of facility classifications, namely Mission Critical (MC), Mission Dependent Not Critical (MDNC), and Not Mission Dependent (NMD). NNSA evaluates risks according to mission need and industry standards, such as Facility Condition Index (FCI) goals, and determines the priorities for infrastructure recapitalization and refurbishment accordingly.

[2] *Cold start analytical chemistry operations support initial testing of the operation without special nuclear materials.*

Figure 5–1, which replaces Figure 5–1 in the FY 2014 SSMP, projects the deferred maintenance (DM) and FCI for FY 2013 through FY 2019. As currently projected, NNSA facilities are deteriorating at an increasing rate with a commensurate risk to mission, the environment, and safety. The total DM will exceed $4 billion in FY 2019, a $370 million increase from the FY 2018 out-year projection in the FY 2014 SSMP. The condition of MC and MDNC facilities will continue to degrade and the overall projections for the FY 2015 FYNSP are up 1 percent and 1.5 percent, respectively, as compared to the FY 2014 FYNSP. The FCI for MC and MDNC facilities indicates an increasing level of DM, which increases risks to meeting the mission.



	FY13	FY14	FY15	FY16	FY17	FY18	FY19
DM - Not Mission Dependent	1.2969	1.3399	1.4322	1.4928	1.5545	1.6184	1.6948
DM - Mission Dependent	1.2975	1.3117	1.3667	1.4235	1.4619	1.5020	1.5602
DM - Mission Critical	0.9006	0.7670	0.7871	0.8142	0.8385	0.8635	0.8943
FCI - Not Mission Dependent	9.24%	9.35%	8.81%	8.97%	9.14%	9.30%	10.74%
FCI - Mission Dependent	8.90%	9.03%	9.49%	9.68%	9.74%	9.88%	10.00%
FCI - Mission Critical	5.07%	4.28%	4.56%	4.61%	4.63%	4.65%	4.70%

FCI = (cost of deferred maintenance)/(replacement plant value), where:
FCI ≤ 2%, Excellent   2% < FCI ≤ 5%, Good   5% < FCI ≤ 10%, Adequate   10% < FCI ≤ 25%, Fair   FCI > 25%, Poor

Key:
DM = Deferred Maintenance   FIMS = Facilities Information Management System
FCI = Facility Condition Index

Note: FY 2013 - FIMS Snapshot; NNSA 8 Sites; FY 2014-2019 NNSA Infrastructure Data Analysis Center (IDAC).

Figure 5–1. Facility Condition Index measurements and deferred maintenance

5.3 Construction

NNSA continues to execute line-item construction projects to meet mission requirements. Within the FY 2015 – FY 2019 FYNSP, several projects have been delayed or deferred because of budget constraints. **Figure 5–2** shows the new Integrated Priority List, with significant changes identified from the FY 2014 SSMP Figure 5–2. The Defense Programs programmatic projects and the Infrastructure and Operations infrastructure projects are combined and presented in the Integrated Priority List.

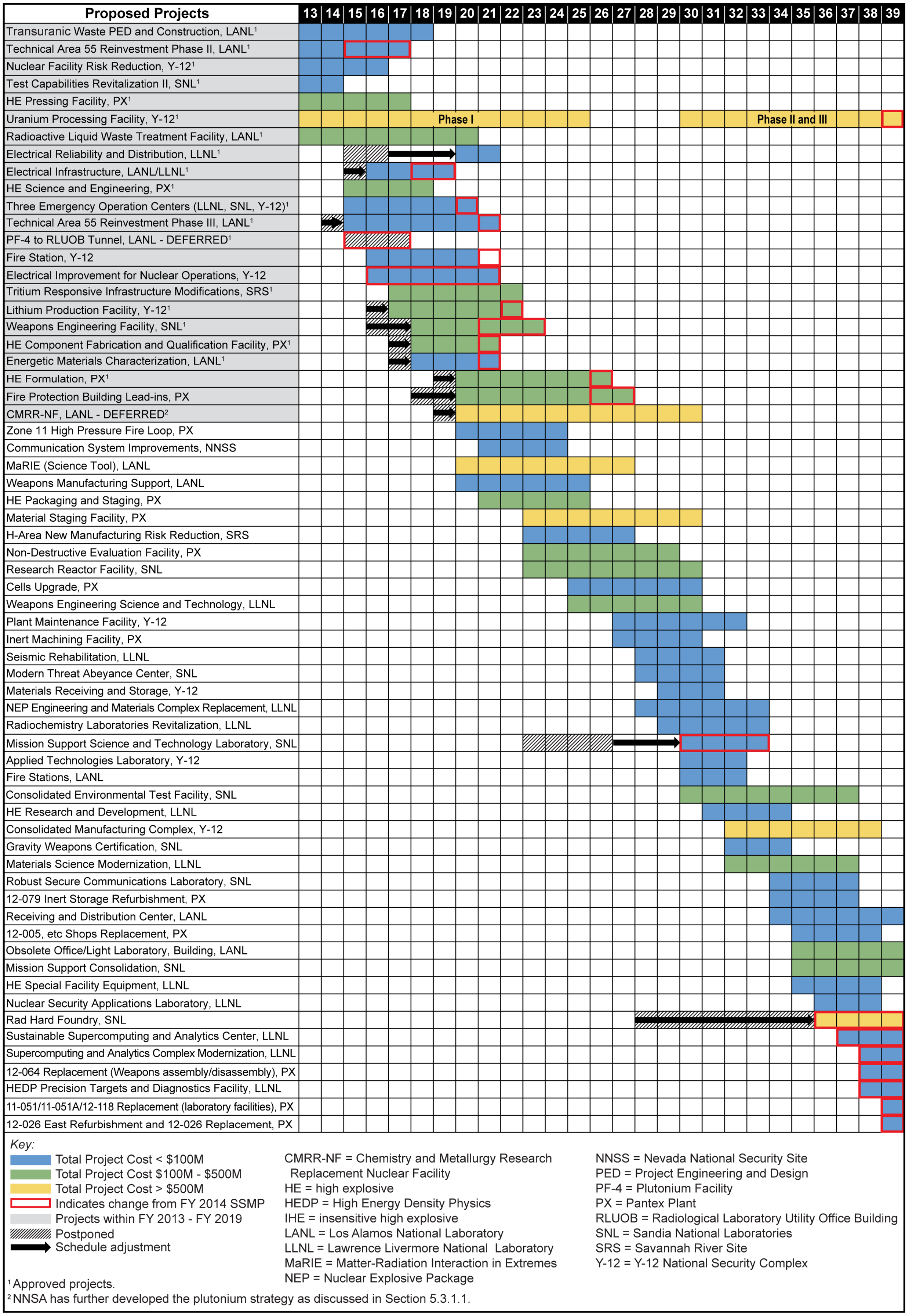


Figure 5–2. Integrated Priority List

5.3.1 Approved and Proposed Line-Item Construction Projects

Two new subsections have been added in this chapter to emphasize the importance of the safety, security, and performance of the stockpile in modernizing the Nation's plutonium and uranium capabilities.

5.3.1.1 Modernization of Plutonium Capabilities

NNSA is working toward ceasing programmatic operations in the Chemistry and Metallurgy Research (CMR) facility by the end of 2019. In 2013, NNSA further developed the plutonium strategy to include major elements that follow a three-step approach that supports using and repurposing the existing facilities, as well as possible future construction. The first two steps support vacating CMR for programmatic operations by FY 2019. The third step will be necessary to address future capacity demands and reduce operational risk in PF-4. The three steps are:

> ***Significant increase in plutonium allowable in the RLUOB***
>
> - *In November 2011, NNSA issued "Guidance on Using Release Fraction and Modern Dosimetric Information Consistently with DOE STD 1027-92," which applies to all NNSA nuclear facilities operating after January 1, 2016.*
> - *The new guidance permits up to four times the previous laboratory limit with a new limit of up to 38.6 grams of plutonium-239 equivalent material.*

1. **Maximize use of RLUOB.** With the increase in the allowable mass limit inventory for radiological facilities, the RLUOB can accommodate more plutonium work. The strategy maximizes use of the RLUOB for additional analytical chemistry and material characterization scope originally planned for the Chemistry and Metallurgy Research Replacement Nuclear Facility (CMRR-NF).
2. **Repurpose laboratory space in PF-4.** PF-4 has a flexible architecture; repurposing under-utilized space is cost-effective. New construction may be required in order to achieve production rates greater than 30 pits per year. The modified reused space will house capabilities intended for the CMRR-NF that the RLUOB cannot accommodate.
3. **Construct modular additions to PF-4 network.** NNSA continues to evaluate an approach to expand the capacity for high-risk operations by constructing small laboratory modules. These modules would accommodate additional plutonium operations, as an alternative to the CMRR-NF construction of a 'big box', and would provide continuity of capabilities essential for manufacturing and characterization requirements. Modular additions are in the pre-conceptual design phase and this third step would likely occur beyond the FYNSP.

5.3.1.2 Modernization of Uranium Capabilities

The Uranium Processing Facility is needed to ensure the long-term viability, safety, and security of the Nation's enriched uranium capability. Without an ability to produce uranium components, NNSA cannot sustain the stockpile. NNSA is concerned about the cost growth and budget constraints facing the Uranium Processing Facility Project. In January 2014, the Acting NNSA Administrator chartered a team, led by the Oak Ridge National Laboratory Director, to develop and recommend alternative approaches to the Uranium Processing Facility Project, including phased approaches and a smaller facility. As one of the charter's objectives, the alternative approach must deliver Building 9212 capabilities within the original cost range and no later than FY 2025. Results of this alternatives analysis will be used to inform Uranium Process Facility decision-making that will be reflected in DOE/NNSA's FY 2016 budget request.

5.3.2 Approved and Proposed Security and Capital Equipment Projects

Figure 5–3, which replaces Figure 5–3 in the FY 2014 SSMP, lists approved and proposed security projects. The figure reflects the Defense Nuclear Security (DNS) Program budgetary position for line item funding through the FY 2015 FYNSP and proposed post-FYNSP projects. Currently, DNS continues to evaluate and prioritize the near-term FYNSP line-item projects. The schedule adjustments reflect budgetary constraints and the need to evaluate and prioritize these projects.

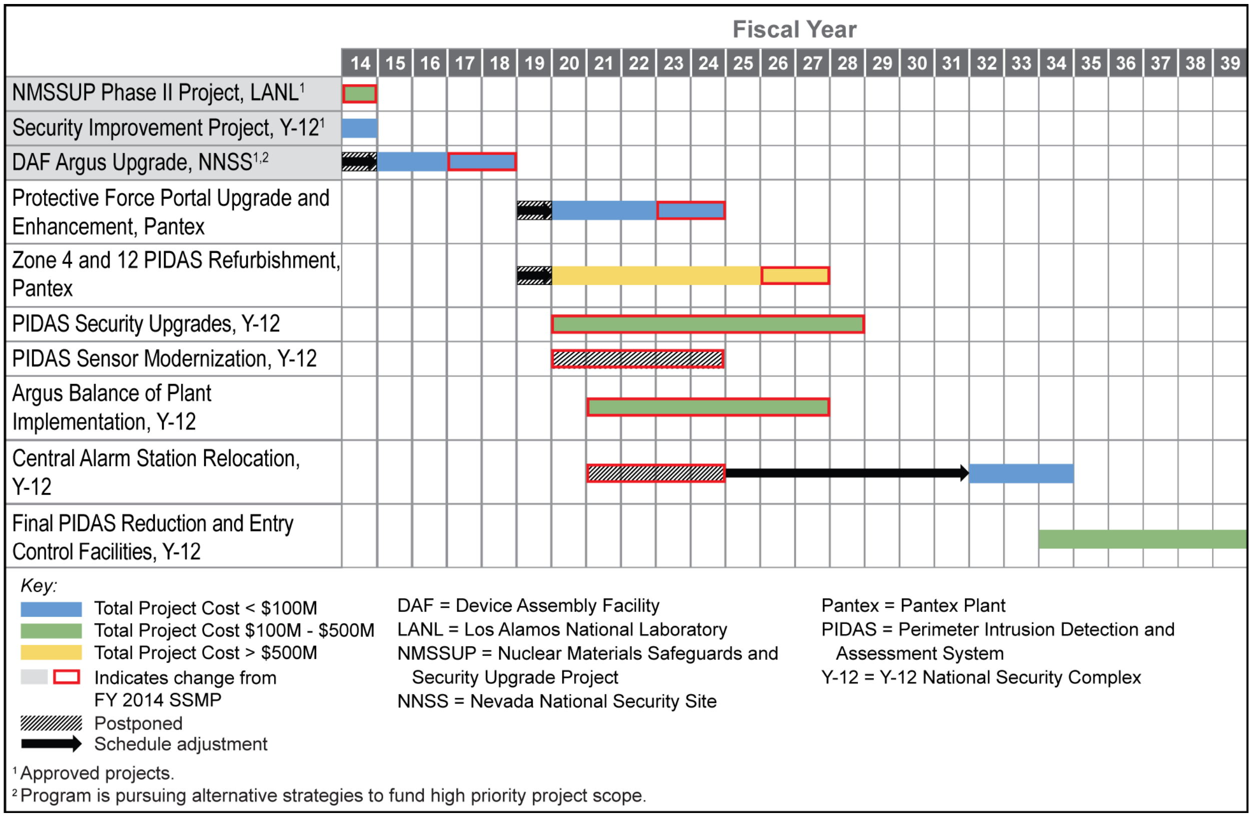


Figure 5–3. Nominal schedule and cost of current and proposed NNSA security projects

The cancellation of the West-End Protected Area Reduction (WEPAR), a proposed subproject of the Uranium Processing Facility, has impacted the DNS project strategy. That subproject would have reduced the protected area at Y-12 from 150 acres to about 80 acres. As a result, the DNS Program must readdress the security infrastructure of the entire Y-12 site. DNS is evaluating a number of security project alternatives to compensate for the cancellation of the WEPAR and support other continuing security needs across the nuclear security enterprise.

The DNS Program's more significant project changes are listed below:

- The Figure 5–3 title changed from "Nominal schedule and cost of security projects" to "Nominal schedule and cost of current and proposed NNSA security projects".

- The NMSSUP Phase II project was completed in mid FY 2014 rather than in late FY 2013.

- The Perimeter Intrusion Detection and Assessment System (PIDAS) Security Upgrades is a new proposed project alternative under consideration that supports the reduction in the protected area at Y-12 from 150 acres to 80 acres. This scope was previously going to be addressed by the WEPAR.

- The PIDAS Sensor Modernization project was cancelled, and its scope was incorporated into the PIDAS Security Upgrades project.

- The Argus Balance of Plant Implementation is a new project that uses the Argus backbone executed through a completed Security Upgrades Project and will provide integrated intrusion detection, alarm monitoring, and access control at key Y-12 facilities.

- The Central Alarm Station Relocation project schedule was adjusted to support the Uranium Processing Facility schedule.

- The Final PIDAS Reduction and Entry Control Facilities project name has changed from the Entry Control Facilities project in the FY 2014 SSMP. It will complete the PIDAS reduction from 80 to 20 acres and is dependent on completion of all three phases of Uranium Processing Facility.

Figure 5–4, which replaces Figure 5–4 in the FY 2014 SSMP, lists approved and proposed capital equipment projects. The schedule adjustments are reflective of the budgetary constraints and the evaluation and prioritization of programmatic requirements. The significant changes to the DNS projects are listed below.

- The name of the Enhanced Radiography Equipment project in the FY 2014 SSMP is now the Enhanced Radiography and Advanced Diagnostics Equipment. In addition, the total project cost of less than $100 million presented in the FY 2014 SSMP has changed with the new range between $100 million and $500 million. Therefore, the project's bar color changed from blue to green.

- The "Exascale project" cited in the FY 2014 SSMP is a reference to a proposed DOE-level Exascale Computing Initiative (see Appendix F for more details). The Initiative's mission, if pursued and adequately resourced, would accelerate the availability of a more powerful computing capability to resolve numerous stockpile issues. In current plans, platforms to support stockpile stewardship will seek to achieve the best balance between floating point operations, memory capacity, and data movement, rather than maximizing the floating point operations, thereby achieving the best possible system for weapons applications. In the absence of a focused Exascale Computing Initiative, ASC will continue to be responsible for delivering high-performance simulation and computing services to the nuclear security enterprise and will do so by acquiring the Trinity Advanced Technology System (ATS) and the Sierra ATS over the next 5 years. The change to the SSMP equipment figure reflects ASC's requirement to deliver platforms per the plan of record, independent of the existence or pace of any future exascale proposals.

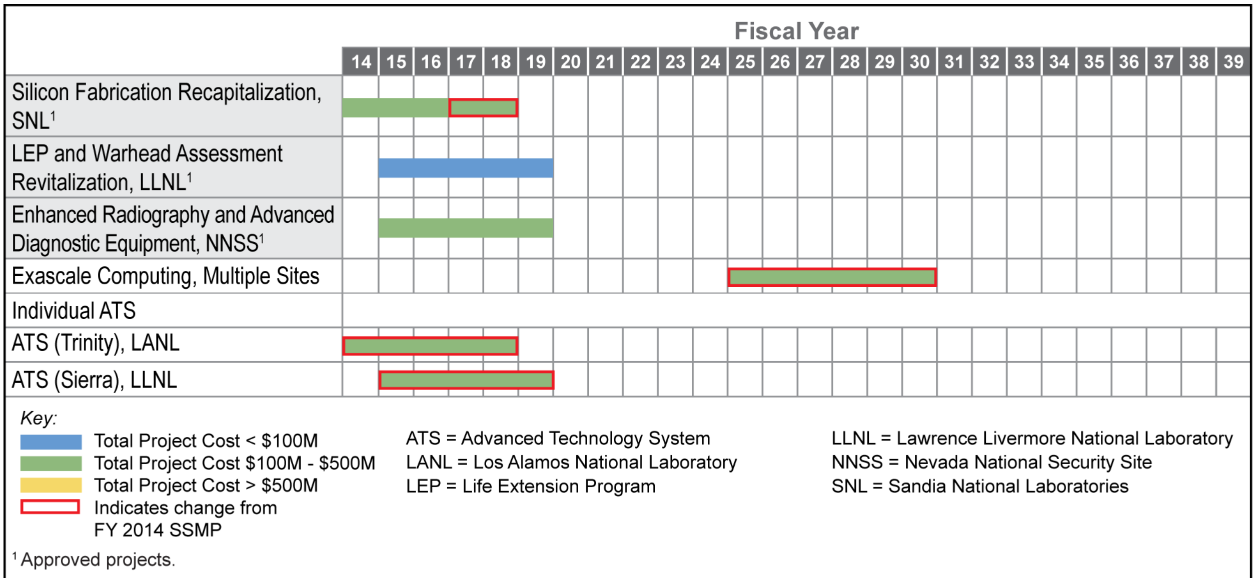


Figure 5–4. Nominal schedule and cost of capital equipment projects

5.4 Reliance on Non-DOE-Owned Facilities and Infrastructure

The KCP NSC is the newest commercially developed, federally leased facility in the nuclear security enterprise. Relocation of personnel and equipment to this Leadership in Energy and Environmental Design (LEED) Gold-certified non-nuclear manufacturing facility is roughly 75 percent complete and is on track to be completed in FY 2014 under the KCRIMS project.

There are no other changes to Section 5.4.

5.5 Disposition of Excess Facilities

A summary of the more significant changes in disposition of excess facilities follows.

In March 2013, NNSA initiated an annual effort to determine which of its facilities pose a risk to mission, workers, public, or the environment, as a result of delayed disposition plans. The risk information provided by the individual sites is being analyzed to determine those risks that must be accepted by NNSA and to develop plans to address the most urgent funding needs associated with these excess facilities.

The Office of Management and Budget issued a memorandum on March 14, 2013, to freeze each agency's total square footage of domestic office and warehouse inventory as compared to an FY 2012 baseline. This "Freeze the Footprint" (FTF) policy is part of the President's commitment to cut waste in Federal Government spending. The FTF baseline consists of facilities predominantly used for offices and warehouses and includes DOE's FY 2012 Federal Real Property Profile submission of DOE-owned and DOE-leased offices and warehouses. In FY 2013, NNSA was in compliance with FTF by not exceeding the FY 2012 baseline.

A conceptual disposition plan has been developed for the Kansas City Plant's Bannister facility following the KCRIMS Project. This plan outlines the actions to comply with applicable rules and regulations regarding the disposition of real and personal property, as well as to deal with permit issues that may arise as part of the process. A third-party development planning partner has been selected and work is continuing to define a real property agreement for economic redevelopment that is expected to yield significant cost savings over the normal asset disposition process.

There are no other changes to Section 5.5. Figure 5–5, NNSA deactivation and disposition projections, has not changed since the FY 2014 SSMP.

5.6 Capabilities for Post-2039 Weapons Infrastructure

There are no changes to Section 5.6.

5.7 Site Stewardship

The Site Stewardship Program ensures the overall health and viability of the nuclear security enterprise and focuses on environmental compliance, nuclear materials disposition, and developing the needed skills and talent for NNSA's workforce at the national security laboratories, nuclear weapons production facilities, and the Nevada National Security Site. Site Stewardship will be restructured in FY 2015 to include only Environmental Projects and Operations, Nuclear Materials Integration, and Minority Serving Institution Partnership Program. In FY 2015, Corporate Project Management will be transferred from Site Stewardship to the NNSA Federal Salaries and Expenses Appropriation (formerly in the Office of the Administrator), consistent with the explanatory statement accompanying Public Law 113-76, Consolidated Appropriation Act for 2014, which directs the NNSA to include future funding requests for corporate project management in NNSA Federal Salaries and Expenses.

5.8 Key Milestones, Objectives, and Future Plans

Key milestones, objectives, and future plans involving physical infrastructure revitalization that have changed in Figure 5–6 of the FY 2014 SSMP are summarized below.

- The WEPAR subproject was descoped from the Uranium Processing Facility due to funding constraints. Therefore, the FY 2014 SSMP schedule to achieve the Y-12 interim PIDAS reduction from 150 acres to 80 acres is no longer valid. The new proposed PIDAS Security Upgrades project alternative as part of the DNS Program will support the 70-acre PIDAS reduction, with a change in the tentative schedule from FY 2020 to FY 2028.
- The Uranium Capabilities Replacement Project is now renamed the Uranium Processing Facility in Figure 5–6 of the FY 2014 SSMP.
- Phases II and III of the Uranium Processing Facility schedule (formerly the Uranium Capabilities Replacement Project schedule) now extends beyond FY 2038 to FY 2039. The Uranium Processing Facility Project is not baselined; therefore, the schedule range in Figure 5–2 is a rough order of magnitude and was adjusted by 1 year.

Chapter 6
Sustaining the Workforce

A skilled and diverse workforce is essential at the national security laboratories, the nuclear weapons production facilities, the Nevada National Security Site, the seven field offices, and NNSA Headquarters to ensure the Nation retains a safe, secure, and effective deterrent. The ability to recruit, develop, and maintain the right skills and to refresh those skills is an ongoing requirement.

Each site has a unique approach to hiring and maintaining essential skills. NNSA will update the reporting and data collection on sustaining the workforce in the FY 2016 SSMP.

> ***FY 2013 Sustaining the Workforce Accomplishments***
>
> - *Completed workforce management study on impact of imposing $1.537 billion in savings over FY 2014 FYNSP. NNSA concluded that the workforce prioritization program, as defined, cannot be responsibly executed.*
> - *NNSA concluded that the sites can staff both the capped and total programs.*
> - *An independent study also concluded that the M&O workforce could meet the FY 2014 FYNSP essential skills needs by internal transfers or external hires.*

6.1 The Nuclear Security Enterprise Workforce

There are no updates to this section.

6.2 Workforce Planning for the Nuclear Security Enterprise

The M&O workforce is sufficient, with increases in focused categories, to maintain essential skills and account for attrition, and to support the 3+2 strategy. However, congressional and NNSA funding decisions for Weapons Activities will largely dictate staffing levels, hiring decisions, and the scope of work that can be accomplished.

The NNSA and DOD joint study to support the FY 2014 FYNSP identified potential workforce prioritization savings totaling $1.537 billion over FY 2014 – FY 2018 to be generated within the Weapons Activities account by realignment of existing M&O contractor staff with the highest priority stockpile work. The subsequent FY 2014 Office of Management and Budget (OMB) passback directed NNSA to conduct a workforce management study to determine how NNSA would accomplish this workforce action, what programs would be affected, and how the savings would be achieved. The study concluded that the resulting workforce prioritization program cannot assure the safety, security, or effectiveness of the stockpile and endangers our future ability to do so.

NNSA also commissioned an independent business analysis that resulted in a second report, *DOE NNSA M&O Contractor Essential Skills Workforce: Assessment of Essential Skill Staffing Capabilities of NSE Sites to Support NNSA Weapons Programs*. That independent report concluded that the sites can satisfy the FY 2014 – FY 2018 essential skills staffing requirements to modernize and sustain the Nation's stockpile. More specifically, the M&O contractors can meet the workforce requirements by transfers of essential skill personnel already working within the weapons or other programs, direct external hires, or reallocation of personnel supporting Work for Others projects.

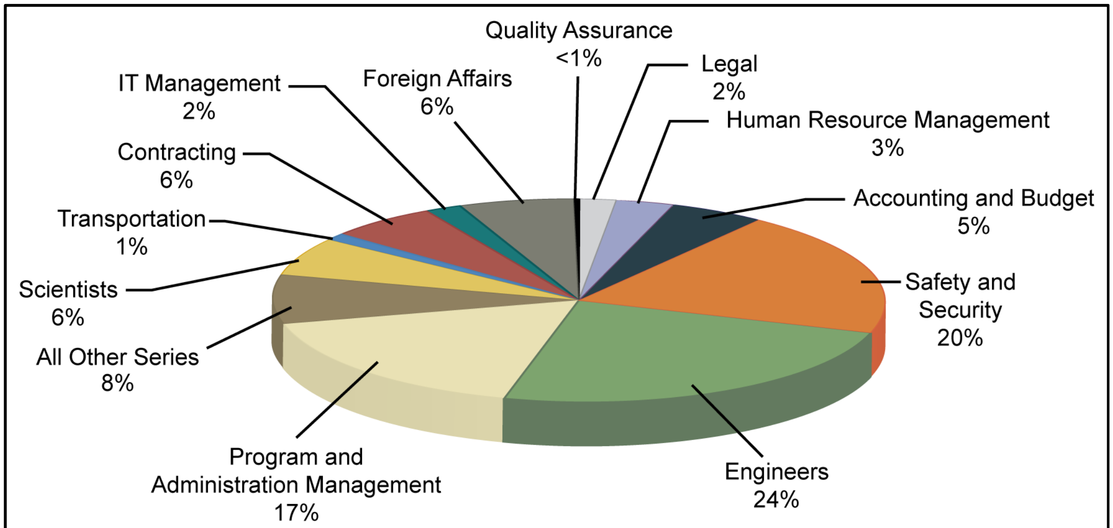
6.2.1 Strategic Workload Drivers

There are no updates to this section.

6.2.2 Federal Workforce Planning

In FY 2012, Federal staff in NNSA's field offices was realigned under the Associate Principal Deputy Administrator in the Office of the Under Secretary for Nuclear Security. The reporting relationship to the top organization within NNSA was designed to improve the oversight and effectiveness of the Government-owned, contractor-operated national security laboratories, the Nevada National Security Site, and the nuclear weapons production facilities.

Staff levels for all NNSA organizations are constantly being reviewed not only because of the current and projected budget constraints, but to ensure that limited resources are dedicated to the highest priority activities at the field offices and Headquarters operations. The National Defense Authorization Act for Fiscal Year 2013 capped the total number of Federal employees at 1,825 by October 1, 2014, in the Office of the Administrator appropriation, not including the Offices of Secure Transportation Asset or Naval Reactors. On-board Federal staff totaled 1,644 as of March 2014. The FY 2014 budget request called for 1,817 full-time equivalents. The field offices have experienced a decline of about 14 percent in staff over the past several years; that downward trend can be traced to initiatives such as the new governance model for oversight of M&O contractors and efforts to leverage resources across the field offices. The Federal workforce for Weapons Activities is comprised of the Office of the Administrator and the Secure Transportation Asset. **Figure 6–1** shows the FY 2014 composition of the Federal workforce in the Office of the Administrator, the NNSA field offices, and the Secure Transportation Asset.



Total employees – 2,248.

Note: Includes all NNSA (Office of the Administrator and Secure Transportation Asset) except Naval Reactors. Percentages may not add to 100% due to rounding.

Figure 6–1. National Nuclear Security Administration workforce for Weapons Activities by occupational series functions

(This figure updates Figure 6–2 in the FY 2014 SSMP.)

The National Defense Authorization Act for FY 2013 encouraged use of the Voluntary Separation Incentive Program to continue reshaping the workforce. NNSA used this authority in FY 2013 to help right-size the Federal workforce. New talent is essential to the long-term success of the stockpile stewardship and management mission; student and entry-level hiring and training programs have been implemented to integrate new hires into the existing workforce.

6.2.3 Management and Operating Contractor Workforce Planning

NNSA's M&O contractors align their staff to perform the highest priority work as defined by NNSA. The contractors augment staffing needs by hiring or shifting essential skill employees from non-Weapons Activities programs. In the FY 2014 SSMP, the total M&O contractor projections for essential skills positions were 19,934 for executing the scope of work in FY 2014. In comparison, as of the beginning of FY 2014, the total for essential skills onboard is 17,350 for Weapons Activities, which is 2,584 personnel below the forecast. At the beginning of FY 2014, over 400 vacancies were reported across the nuclear security enterprise. Funding uncertainties, including continuing resolutions, government shutdown, and sequestration, affect the ability of the site to conduct workforce planning and fill essential skills vacancies. The sites reported they are staffed to support stockpile modernization work and to balance their workforce based on the stability of funding commitments.

The successful implementation of NNSA's nuclear weapons modernization requires a cadre of highly skilled personnel. NNSA commissioned an independent business analysis to assess the ability of the eight M&O contractors to staff essential skills positions and to develop and retain that staff commensurate with the planned upgrades, as identified in the FY 2014 SSMP. The independent assessment, titled *DOE NNSA M&O Contractor Essential Skills Workforce: Assessment of Essential Skill Staffing Capabilities of NSE Sites to Support NNSA Weapons Programs*, concluded that the overall staffing challenge is greatest in the engineer, scientist, technician, and operator categories for essential skills positions. The report also added that the increasing attrition and retirement eligibility rates challenge the future ability to staff essential skills positions even though the sites have taken effective action to reconstitute and actively maintain their recruiting capability and infrastructure. The report also mentions that the supply of candidates with science, technology, engineering, or mathematics degrees is sufficient, but NNSA and the M&O contractors will need to continue to develop and train specialized nuclear scientists and engineers. According to the report, M&O contractors can meet these workforce requirements through transfers of essential skills personnel already working within Weapons Activities or other programs, direct external hires, or reallocation of personnel supporting Work for Others projects. The delays in the cruise missile warhead and the IW-1 LEPs may create challenges and gaps in sustaining essential skills such as weapon physics designers, weapon engineers, radiochemists, and weapon material scientists. Special attention to workload leveling will substantially optimize the use of the workforce and minimize new hiring actions, therefore facilitating stability in site resources.

This ability of the M&O contractors to meet the requirement for essential skills and essential support personnel is enabled through use of effective workforce planning models, which project programmatic requirements, assess them against existing resources (normalized for attrition rates), and identify projected gaps. According to the report, the sites will continue to maintain their performance levels and work quality if budgets and requirements stabilize. However, challenges to staffing levels and skills mix adjustments in a dynamic program environment have been created by sequestration, lapses in Federal funding, and continuing resolutions.

6.2.4 The Non-Management and Operating Contractor Workforce

There are no updates to this section.

6.3 Workforce Sustainment Programs and Strategies

There are no updates to this section.

6.3.1 Recruiting Programs

Intern, entry-level, and outreach programs will serve as tools to maximize our recruitment efforts to attract, develop, and retain talented and career-oriented workers. NNSA conducts an annual assessment to determine the qualifications, educational backgrounds, and special skills that are needed to meet the short-term demand and long-term strategies of the nuclear security enterprise through a suite of programs.

Government-wide changes to student program regulations like the Pathways Program aim to improve recruiting, clear paths to Federal internships for students at all educational levels, and implement meaningful training and career development opportunities for individuals who are at the beginning of their Federal service. In addition, plans to increase the number of excepted service positions through specialized employment programs will enable NNSA to improve its return on investment for entry-level hiring. Leveraging success with Historically Black Colleges and Universities outreach efforts through the Minority Serving Institutions Program and the Minority Serving Institutions Partnership Program will help to expand NNSA efforts to other underserved populations. These programs are useful tools for pipelining high-quality, diverse candidates into specialized employment programs and directly into permanent positions.

6.3.2 Development Programs

There are no updates to this section.

6.3.3 Compensation and Benefits

There are no updates to this section.

6.3.4 Challenges

There are no updates to this section.

6.4 Summary

Attracting and retaining a highly skilled workforce is essential within the nuclear security enterprise to ensure the Nation retains a safe, secure, and effective deterrent. NNSA must continue to balance—and rebalance when necessary—its workforce, to develop and maintain essential skills, and to execute the 3+2 strategy while supporting stockpile modernization and surveillance activities consistent with the *Nuclear Posture Review Report* (DOD 2010). Maintaining the capability to develop the necessary skills and to refresh those skills continuously over time is required.

Chapter 7
Security

Three NNSA programs ensure the security of the Nation's nuclear weapons, special nuclear materials, infrastructure, and sensitive information. These are Secure Transportation Asset, Defense Nuclear Security, and Information Technology and Cyber Security. Two other programs, the Nuclear Counterterrorism Incident Response (NCTIR) Program and the Counterterrorism and Counterproliferation, play leadership roles in defending the Nation from the threat of nuclear terrorism. NCTIR ensures capabilities are in place to respond to any emergency at a DOE/NNSA site and to a nuclear or radiological incident or emergency anywhere in the United States and abroad. Counterterrorism and Counterproliferation develops capabilities to address terrorist incidents involving nuclear threat devices. Details about these two nuclear terrorism-related programs will be described in the FY 2016 SSMP.

FY 2013 Security Accomplishments

- *Explicitly clarified security chain of command.*
- *Deployed secure, wide-area network and agency-wide network for collaboration of NNSA employees.*
- *Began mission transport operations with Boeing 737 aircraft and completed conversion to Federal pilots.*

7.1 Secure Transportation Asset Program

In FY 2015, the Secure Transportation Asset (STA) Program will continue to implement asset modernization and workforce capability initiatives begun in 2013, namely, the design, fabrication, and testing of the Mobile Guardian Transporter (MGT) system prototype(s), phased deployment of the Advanced Radio Enterprise System, the first production unit of the upgrade to the Trailer Communications System, the continued replacement of vehicles and tractors, and restoration of Federal Agent strength levels. In addition, the STA Program will ensure all transport systems remain efficiently integrated to support Defense Programs.

The Trailer Communication System project is a life cycle system upgrade, replacing sunset systems technologies, that supports mission-critical classified communications. The project encompasses replacing current analog radio devices with digital equipment, providing compliance with National Telecommunications and Information Administration directives.

7.1.1 Core Components of the Secure Transportation Asset Program

There are no changes to this section or its subsections.

7.1.2 Major Organizational Efforts of the Secure Transportation Asset Program

There are no changes to this section or its subsections.

7.1.3 Secure Transportation Asset Program Goals

There are no changes to this section or its subsections.

7.1.4 Secure Transportation Asset Program Strategy

There are no changes to this section or its subsections.

7.1.5 Secure Transportation Asset Program Challenges

The STA Program has realigned its resources to address immediate stockpile needs. The challenges are:

- Begin replacing the trailer fleet in 2018.
  - Conduct critical design and testing phase of the MGT during 2015 to maintain the timeline for production startup in 2018. The MGT, like its predecessor, the Safeguards Transporter, may be in service for 20 years.
  - The Safeguards Transporter fleet must be retired beginning in 2018 because of expiring certifications, age-related phenomena, and unavailability of key critical components.
  - If MGT production does not begin in 2018, the mission capacity could be reduced.
- Maintain the Federal Agent strength to meet mission requirements.

7.1.6 FY 2013 Accomplishments

- Completed 109 shipments without compromise or loss of nuclear weapons or components or release of radioactive material.
- Began operating with Boeing 737 aircraft and completed conversion to Federal pilots.
- Validated that the STA Program's Safeguards Security Plan meets the requirements of the Graded Security Protection Policy.

7.2 Defense Nuclear Security Program

In 2013, the DNS program made a calculated transformation to address corrective actions stemming from the 2012 Y-12 incursion. That transformation is in its final phases and, following the Acting NNSA Administrator's guidance, the Chief of Defense Nuclear Security (CDNS) will resume the authority and responsibility previously transferred to the Office of Infrastructure and Operations. After completing the transformation, the CDNS will exercise clearer lines of authority and responsibility to develop the program, planning, budget, and execution of safeguards and security to protect nuclear weapons, nuclear material, classified information, and NNSA facilities and infrastructure and personnel.

The CDNS issues implementation guidance to be executed through the Assistant Managers of Safeguards and Security to the M&O contractor. The new alignment to allow the CDNS to exercise clear authority and responsibility is illustrated in **Figure 7–1** and is consistent with 50 U.S.C. 2422.

The CDNS manages the physical, information, and personnel security of the NNSA national security laboratories, the nuclear weapons production facilities, and the Nevada National Security Site. The DNS program is designed to protect NNSA assets from theft, diversion, sabotage, espionage, unauthorized access, compromise, and other hostile acts that may impact national security, program continuity, and security of employees. The six subprograms responsible for implementing the DNS program are Program Management, Protective Force, Physical Security Systems, Information Security, Personnel Security, and Materials Controls and Accountability.

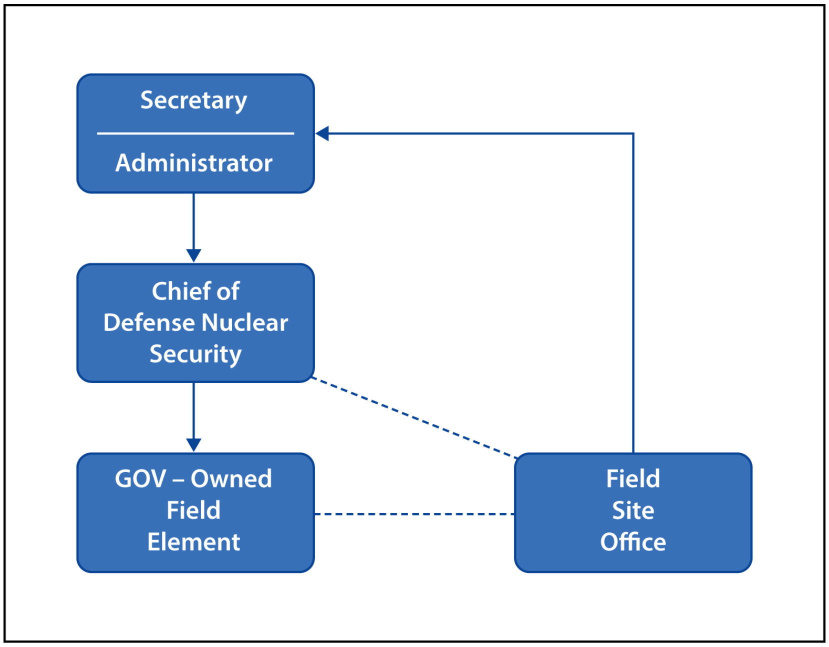


Figure 7–1. New Defense Nuclear Security alignment to provide clarity in safeguards and security

7.2.1 Offices of the Defense Nuclear Security Program

The Office of the Associate Administrator for the Defense Nuclear Security program is structured so that it serves as a line management organization. The five offices within DNS are Resource Management, Security Operations and Programmatic Planning, Classification and Special Access, Nuclear Materials Integration, and Personnel and Facility Clearances. The roles and responsibilities of the Office of Nuclear Material Integration and the Office of Personnel and Facility Clearances are unchanged by this latest reorganization.

7.2.1.1 Office of Resource Management

The Office of Resource Management manages the DNS program budgets and provides the office management functions (*e.g.*, human resources, logistics, and facilities) for DNS. The Office establishes strategic requirements that incorporate security-related national, departmental, and administration guidance; leads security-related NNSA strategic planning; and oversees the Operational Security FS-20 budget resource requirements and allocations.

7.2.1.2 Office of Security Operations and Programmatic Planning

The Office of Security Operations and Programmatic Planning establishes the operational direction of the NNSA security program; evaluates the execution of the Operational Security program requirements; and ensures line management evaluation programs are rigorous and provide high confidence that contractor security programs are operating in an effective manner.

7.2.1.3 Office of Classification and Special Access

The Office of Classification and Special Access serves as the primary point of contact with internal organizations and external organizations and agencies and oversees the nuclear security enterprise-wide Classification and Controlled Information Program. Additionally, the Office exercises the Special Access Program security oversight review; concurs on NNSA classification guidance; and oversees the management of the NNSA Special Access Program Classified Matter Protection Control program.

7.2.1.4 Office of Nuclear Materials Integration

The Office of Nuclear Materials Integration focuses on management, allocation, and forecast of supplies of nuclear materials in support of national security, nuclear energy, and science programs. The Office plays a key role in department-wide efforts to integrate, stabilize, consolidate, and disposition nuclear materials. In cooperation with the Nuclear Regulatory Commission (NRC), the Office operates the Nuclear Materials Management and Safeguards System (NMMSS), which accounts for inventories of nuclear materials at DOE/NNSA and NRC-licensed sites. NMMSS also performs a critical function in support of U.S. nonproliferation objectives through management of peaceful use obligations placed on nuclear materials in the DOE's inventories. The Office ensures integration of its activities through its role as chair of the Nuclear Materials Advisory Board, which includes senior-level representatives from the DOE Headquarters organizations that manage 'accountable' nuclear materials.

7.2.1.5 Office of Personnel and Facility Clearances

The Office of Personnel and Facility Clearances provides direction, support, and guidance on personnel security policy and manages the access authorization portion of the personnel security program in support of approximately 50,000 cleared Federal and contractor personnel at NNSA sites, NNSA Headquarters, and some DOE elements. It ensures that individuals meet the personnel security requirements before accessing special nuclear materials or classified and sensitive information.

7.2.2 Defense Nuclear Security Program Goals

The DNS provides the infrastructure and programs to protect assets vital to execution of long-range plans for the stockpile. This program ensures protection, control, and accountability of materials, including special nuclear material, as well as implementation of policy and integration of responsibilities to manage the life cycles of 'accountable' nuclear materials throughout the nuclear security enterprise. Specific DNS goals, as refined, are summarized below.

- Establish comprehensive implementation guidance for all safeguards and security subprograms.
- Provide security leadership and management excellence for the nuclear security enterprise.
- Provide assurance of effective and efficient performance.
- Ensure a functional and sustainable security workforce and protection program.
- Establish a highly reliable organization adaptive to a dynamic security environment.
- Establish a life cycle planning process for Planning, Programming, Budgeting, and Evaluation.
- Employ risk-based decision making to achieve a balanced and defensible allocation of resources, and manage risks through innovative safeguards and security approaches that are responsive to evolving threats and requirements.

- Ensure an environment characterized by a responsive and modernized security systems infrastructure, effective risk management, operational efficiencies, and advanced technologies.
- Provide technological security systems for the protective force with the capability of countering a wide range of defined threats.

7.2.3 Defense Nuclear Security Program Strategy

The DNS program establishes safeguards and security requirements to eliminate or mitigate problem areas across the nuclear security enterprise. This strategy involves providing additional training of protective forces, acquiring updated weapon systems and support equipment, improving and modernizing the security systems' infrastructure, improving physical barrier systems and standoff distances, and reducing targets of interest.

7.2.4 Defense Nuclear Security Program Challenges

DNS has focused objectives to meet the challenges that were summarized in Section 7.2.4 of the FY 2014 SSMP. The more pertinent of these objectives are:

- Promote standardization to achieve effective and efficient performance of DNS Safeguards and Security methods across the nuclear security enterprise.
- Continually improve the enterprise-wide, mission-essential task-list-based approach that maintains an armed protective force capable of advanced tactics, techniques, and procedures centered on mission accomplishment.
- Establish an enterprise-wide life-cycle management plan for physical security systems.
- Collaborate with DOD, NRC, the United Kingdom, and other agencies in an in-depth assessment of the required protection programs.
- Improve the effectiveness of the Contractor Assurance System and Federal oversight and awareness at all levels.

7.3 Information Technology and Cyber Security Program

The name of the NNSA Chief Information Office Activities Program changed to the Information Technology and Cyber Security Program since the publication of the FY 2014 SSMP. As a result, the title of this section has been changed to Information Technology and Cyber Security Program. Other than this name change, the activities of the program have not changed significantly from the FY 2014 SSMP.

7.3.1 Information Technology

In FY 2013, the Cyber Security Program was integrated with information technology (IT) under the new program entitled Information Technology and Cyber Security. The Office of the Chief Information Officer (OCIO) will continue to focus on transforming the computing environment to support the vision[1] of the Under Secretary for Nuclear Security via these objectives: the NNSA Network Vision (2NV) and the NNSA Classified Network Vision (C2NV) and the Joint Cybersecurity Coordination Center (JC3), with

[1] *That vision is a smaller, safer, more secure, and less expensive nuclear security enterprise that leverages the scientific and technical capabilities of the workforce to meet all NNSA national security requirements.*

the DOE Chief Information Officer (CIO). 2NV and C2NV will provide a secure, mobile, agile, and adaptive IT infrastructure. JC3 will provide understanding of the 'health' of the computing environment from a cybersecurity and network operations perspective.

7.3.2 NNSA Network Vision

There are no updates to this section.

7.3.3 Transformation of Information Technology Architecture

In FY 2013, the Program made progress in supporting the Under Secretary for Nuclear Security's vision. The OCIO deployed a new, secure, wide-area network (OneNNSA Network), which is a first-of-its-kind federated identity management solution and a critical step to full HSPD-12 implementation. The OCIO also provided a unified communications solution and an agency-wide social network for the collaboration of more than 45,000 employees (OneVoice) and a state-of-the-art cloud services broker (YOURcloud).

The OCIO will build on these achievements and make progress on the three objectives of its integrated strategy. 2NV will consolidate data centers using YOURcloud; modernize applications to reduce legacy IT costs and enable a mobile workforce; and consolidate the intranets, websites, and file servers using common platforms to reduce costs. The OCIO will improve classified network monitoring capabilities, monitor 2NV investments, and strengthen the partnership with DOE for unclassified JC3 capabilities.

7.3.4 Joint Cybersecurity Coordination Center

Under the direction of the DOE CIO and the NNSA CIO, JC3 is operational with implementation of the NNSA Security Operation Center/Network Operation Center for classified and unclassified mission IT monitoring and DOE Computer Emergency Response Team situation awareness standup. JC3 (the Information Assurance Response Team and Computer Emergency Response Team) provides information sharing and safeguarding activities for DOE, as directed by the National Security Council Staff. It consolidates disparate cyber response functions and streamlines information sharing, reporting, incident handling, and access to technical resources while preserving the unique requirements of the individual DOE and NNSA organizations. As shown conceptually in **Figure 7–2**, JC3 draws from the wisdom of internal and external stakeholders to create a framework that combines information sharing, reporting, and incident response requirements and practices to improve communications and enhance cybersecurity response capabilities.

7.3.5 Cyber Sciences Laboratory

There is no funding for this activity in FY 2015.

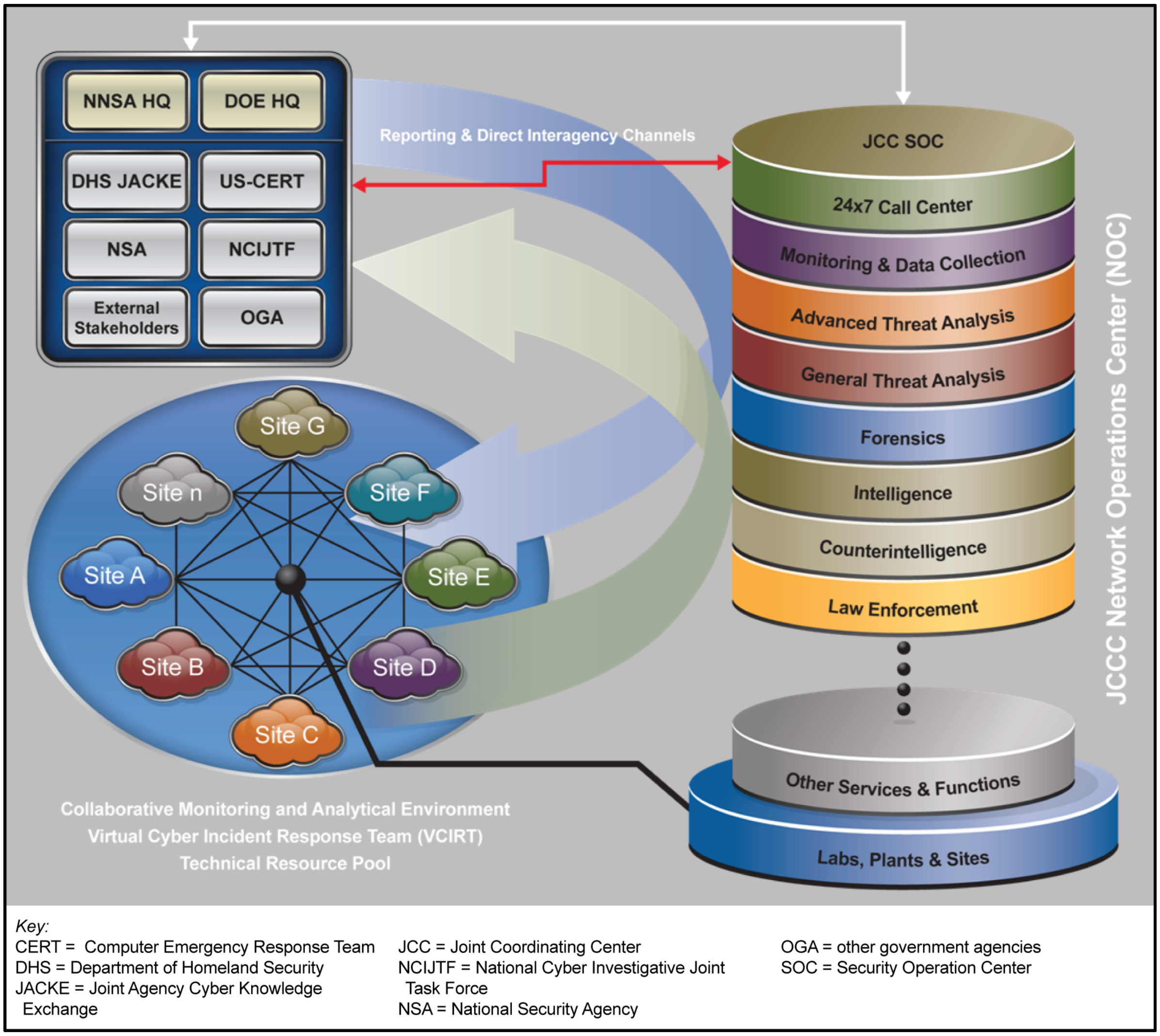


Figure 7–2. Conceptual Joint Cybersecurity Coordination Center framework to improve communications and enhance cyber security

7.3.6 Subprograms of Information Technology and Cyber Security

In FY 2013 the NNSA Office of Associate Administrator for Information Management was restructured to more closely align with the DOE OCIO. That restructure resulted in the following subprograms.

- **Enterprise Architecture.** Enterprise Architecture (EA) provides the foundation for business and IT modernization across NNSA by aligning organizational strategies, business processes, and technologies. EA helps align resources to the NNSA mission, strategic goals, and objectives. Its guiding principles include business transformation to improve performance, delivery of services, communications, collaborations, and partnerships. EA leverages the DOE EA governance framework and collaborates with NNSA program and site offices to develop a strategic path to implement EA across the nuclear security enterprise.

- **Office of Cyber Security and IT Operations.** The Office of Cyber Security and IT Operations directs the implementation and maintenance of cyber security and IT assets within the NNSA classified and unclassified domains. The Office provides an enterprise-wide cyber security posture and assists with the detection, analysis, and mitigation of cyber security threats and incidents. It coordinates and supports DOE functions, including the JC3, Telecommunications Electronics Material Protected from Emanating Spurious Transmissions/Protected Transmission System, and Special Access Program activities in NNSA in addition to serving as the Computer Network Defense Service Provider for the Classified Environment/Secret Networks. It directs the design, development, and maintenance of all aspects of NNSA computing, including but not limited to application, integration, and deployment; application hosting; desktop, voice, and data resources; and video teleconferencing. The Office also oversees all IT processes and services for NNSA staff.

- **Office of Policy and Governance.** The Office of Policy and Governance provides leadership, policy, direction, guidance management, integration, and governance to support the CIO and other NNSA senior managers on the strategic use of IT and cyber security resources. It focuses on development, dissemination, and oversight of NNSA's IT and cyber security policies, standards, and procedures for internal and external needs. The Office uses an industry standard governance model to provide oversight to ensure investments deliver the desired results within cost and schedule thresholds and comply with applicable regulations and best practices.
- **Chief Technology Officer.** The NNSA Chief Technology Officer (CTO) provides technology strategy and direction as the foundation for IT modernization by aligning organizational strategies and business processes with enabling technologies. The CTO leads IT and cyber research and development, engineering, EA, and technology evaluation processes to enable NNSA strategic goals and objectives. The CTO guiding principles include technology transformation to improve performance and reduce costs; delivery of measurable improvements in IT and cyber services; delivery of next-generation architectures to enhance cyber security policies for emerging technologies; infrastructure to enable shared services; and collaboration with NNSA sites, industry, academia, and other government agencies. The CTO aligns with the DOE EA and the governance framework, national drivers, and industry trends to develop and implement strategies for technology transformation across the nuclear security enterprise.

7.3.7 Information Technology and Cyber Security Program Goals

To support the NNSA mission and objectives, the Office of the Associate Administrator for Information Management has the following goals as a result of the restructuring in FY 2013.

- Ensure delivery of high-quality IT and cyber solutions that meet DOE/NNSA customers' needs and enable their mission by
  - Improving delivery of nuclear security enterprise IT and cyber solutions
  - Implementing cloud-based solutions to enhance performance by integrating networks and services
  - Deploying innovative IT and cyber security capabilities
- Safeguard NNSA resources through cost-effective management of IT and cyber solutions by
  - Improving interoperability and strengthening performance via EA, policy, and standards
  - Improving and enhancing decision making by strengthening governance processes
  - Improving project and program management skills and knowledge of the workforce

- Protect data integrity and confidentiality and strengthen NNSA's cybersecurity posture by
  - Implementing Federal requirements for security
  - Developing and implementing cutting-edge technologies to support security architecture
  - Implementing security training requirements

7.3.8 Information Technology and Cyber Security Program Strategy

The OCIO is the principal organization for information management, IT, and cyber security for NNSA. It is responsible for fostering a culture of information sharing and ensuring IT investments and projects are coordinated, have cyber security protection, and align with the NNSA Strategic Plan and DOE needs and objectives. The OCIO ensures IT is acquired and information resources are managed in a manner that implements legislative policies and procedures, including the Paperwork Reduction Act and the Clinger Cohen Act, the E-Government initiative of the President's Management Agenda, and the priorities of the NNSA Administrator and the DOE Secretary of Energy. The OCIO is fully responsible for all aspects of NNSA cyber security, including but not limited to policy and planning, Federal and congressional reporting, and daily operations of classified and unclassified networks and systems.

7.3.9 Information Technology and Cyber Security Program Challenges

There are no updates to this section.

7.4 Milestones, Objectives, and Future Plans

7.4.1 Secure Transportation Asset Program Milestones, Objectives, and Future Plans

To stabilize operating budgets and move to steady-state production, STA adjusted its out-year production plans for all escort vehicles and armored tractors and reevaluated its plans to deploy a high-frequency communication system. Changes to Figure 7–2 of the FY 2014 SSMP are as follows.

- High-frequency requirements and deployment options will be evaluated in 2016. The actual change to Figure 7–2 is to delete "Begin HF (ALE) deployment" (in 2015).
- Escort vehicle light chassis production will transition to refurbishments and steady-state production in 2017. A new model will be introduced in the out years based on actual life cycles. The actual changes to Figure 7–2 are four deletions: "Complete EVLC production" (in 2016), "Begin EVLC refurbishments to extend life-cycle" (in 2017), "Begin EVHC-2 production" (in 2027), and "Begin EVLC-2 production" (in 2031).
- Replacement Armored Tractor (RAT) production will transition to steady-state production in 2019. A new model will be introduced based on actual life cycles. The actual changes to Figure 7–2 are three deletions: "Complete RAT production" (in 2019), "Begin next RAT production" (in 2025), and "Complete next RAT production" (in 2029).

7.4.2 Defense Nuclear Security Program Milestones, Objectives, and Future Plans

In addition to the activities and projects in Figure 7–3 of the FY 2014 SSMP, the following DNS efforts are ongoing:

- Continue to improve the Safeguards and Security Program.
- Assess security implementation efforts by reviewing and updating security plans and performance testing, reviewing vulnerability assessments, and revising threat and vulnerability analyses.
- Transition to and implement the Joint Nuclear Security Collaboration Initiative to provide greater consistency between DOE/NNSA and DOD regarding nuclear weapons and material protection strategies and practices.
- Complete reviews of classified and sensitive information at NNSA Headquarters and field offices.
- Focus on standardizing technologies to provide operational efficiencies for security programs.
- PIDAS Security Upgrades is a new project that supports reducing the protected area at Y-12 from 150 acres to 80 acres. PIDAS Sensor Modernization scope (previously addressed by the WEPAR) has now been incorporated into PIDAS Security Upgrades.
- The PIDAS Reduction and Entry Control Facilities project has been delayed and will be complete when all three phases of the Uranium Processing Facility are complete.

7.4.3 Information Technology and Cyber Security Program Milestones, Objectives, and Future Plans

In July – August 2013, a cyber security breach of the DOE unclassified network occurred. The DOE OCIO is orchestrating the response to this incident. The DOE OCIO, with the assistance of the NNSA OCIO, is implementing procedures to confirm the identities of all human and non-human components that attempt access and to prevent unauthorized access. Non-human components include computing and communication devices, networks, information systems, applications, and data. Procedures are also being implemented to ensure the security of classified networks and responsible sharing and safeguarding of classified information per Executive Order 13587 (October 2011). In addition, the NNSA OCIO is implementing specific activities such as the NNSA Application Modernization Strategy to minimize the creation of disparate business and mission-support IT applications in favor of a platform-based approach to reduce hardware, software, and labor costs and to cultivate enterprise-wide adoption of shared capabilities.

Most Committee on National Security Systems activities have been pushed to the right in Figure 7–4 in the FY 2014 SSMP for full operating capability because of budget constraints (*e.g.*, continuous monitoring of classified networks). Enterprise Secure Network enhancements and normal equipment refresh have also been delayed by budget constraints. Specific changes to the Figure 7–4 timeline are:

- Fully implement Identity, Credential, and Access Management project at NNSA Headquarters and the sites in FY 2015.
- Implement and coordinate Public Key Infrastructure and Committee on National Security Systems requirements in FY 2016.
- Continue to leverage 2NV to increase the efficiency and cost-effectiveness of NNSA IT services from FY 2014 to FY 2017.

Chapter 8 Future Years Nuclear Security Program Budget, Requirements Estimates, and Operations and Effective Business Practices

Chapter 8 provides an overview of the key elements in the Weapons Activities budget for the FY 2015 FYNSP and includes figures that display budgetary information for specific activities associated with these key elements and with projected weapon system life-cycle costs for 20 years beyond the FYNSP. To quantify the decision by the Nuclear Weapons Council to implement the 3+2 strategy as described in the FY 2014 SSMP and this FY 2015 update, a new section has been added to Chapter 8. The new section, Section 8.8.3, compares the cost of the 3+2 strategy with the cost of the life extension strategy envisioned in the FY 2011 SSMP. Chapter 8 also updates the initiatives NNSA is taking to improve the effectiveness and reduce the cost of its operations and business practices.

8.1 Future Years Nuclear Security Program Budget

Table 8–1 shows the FYNSP budget for Weapons Activities. The budget structure aligns with the FY 2014 appropriation; explanations of changes to program funding levels from FY 2014 to FY 2015 can be found in the FY 2015 President's Budget Request.

Table 8–2 on page 8-2 in the FY 2014 SSMP displayed savings targets for workforce prioritization and management efficiencies for FY 2014 – FY 2018. Following the submission of the FY 2014 President's Budget Request, NNSA conducted studies (as summarized in Chapter 6 of this FY 2015 SSMP) on the workforce prioritization. The studies demonstrated that the underlying assumption of limited hiring capacity was invalid and that realigning the workforce would be imprudent. These savings were incorporated into planning the resource levels for the FY 2015 President's Budget Request. The target level of $80 million in management efficiencies savings for FY 2014 was achieved and briefed to congressional staff in February 2014. In the future, NNSA will pursue other management efficiencies as described in Section 8.10.

Figure 8–1 shows how this level of funding in the FY 2015 President's Budget Request over the FYNSP compares with Weapons Activities purchasing power (in 2010 dollars) in prior years.

Figures 8–2 through **8–10** display the pie charts for the FY 2015 budget and the tables that detail the FY 2015 FYNSP breakdown and the reference year FY 2014.

Table 8–1. Overview of Future Years Nuclear Security Program budget for Weapons Activities in fiscal years 2014 through 2019 [a]

Activity	Fiscal Year (dollars in millions)					
	2014 Enacted	2015 Request	2016 Request	2017 Request	2018 Request	2019 Request
Directed Stockpile Work	2,442.0	2,746.6	2,833.5	2,969.5	3,325.7	3,408.8
Science Campaign	369.7	456.4	525.0	526.4	530.6	539.3
Engineering Campaign	149.9	136.0	138.2	133.6	147.7	154.9
Inertial Confinement Fusion Ignition and High Yield Campaign	514.0	512.9	517.6	509.5	512.2	512.7
Advanced Simulation and Computing Campaign	569.3	610.1	651.0	648.9	667.1	709.3
Readiness Campaign	55.4	125.9	135.1	86.9	56.0	61.5
Secure Transportation Asset	210.0	233.8	243.0	255.1	259.7	264.9
Readiness in Technical Base and Facilities	2,067.4	2,055.5	2,458.9	2,770.4	2,645.4	2,764.4
Site Stewardship	87.3	82.4	84.4	84.5	84.5	85.2
Nuclear Counterterrorism Incident Response	228.2	173.4	165.4	169.5	173.6	177.7
Counterterrorism/Counterproliferation Programs	0	76.9	82.1	84.2	86.2	88.2
Defense Nuclear Security	665.0	618.1	652.8	663.1	675.4	689.2
Information Technology and Cyber Security [b]	145.1	179.6	151.7	153.4	155.5	158.7
Legacy Contractor Pensions	279.6	307.1	268.7	206.5	157.1	87.4
Domestic Uranium Enrichment Research, Development and Demonstration	62.0	0	0	0	0	0
Adjustments [c]	(64.0)	0	0	0	0	0
Weapons Activities Total	***7,781.0***	***8,314.9***	***8,907.2***	***9,261.4***	***9,476.6***	***9,702.3***

[a] Totals may not add due to rounding.
[b] Formerly Chief Information Officer Activities.
[c] Adjustments include rescissions and use of prior year balances.

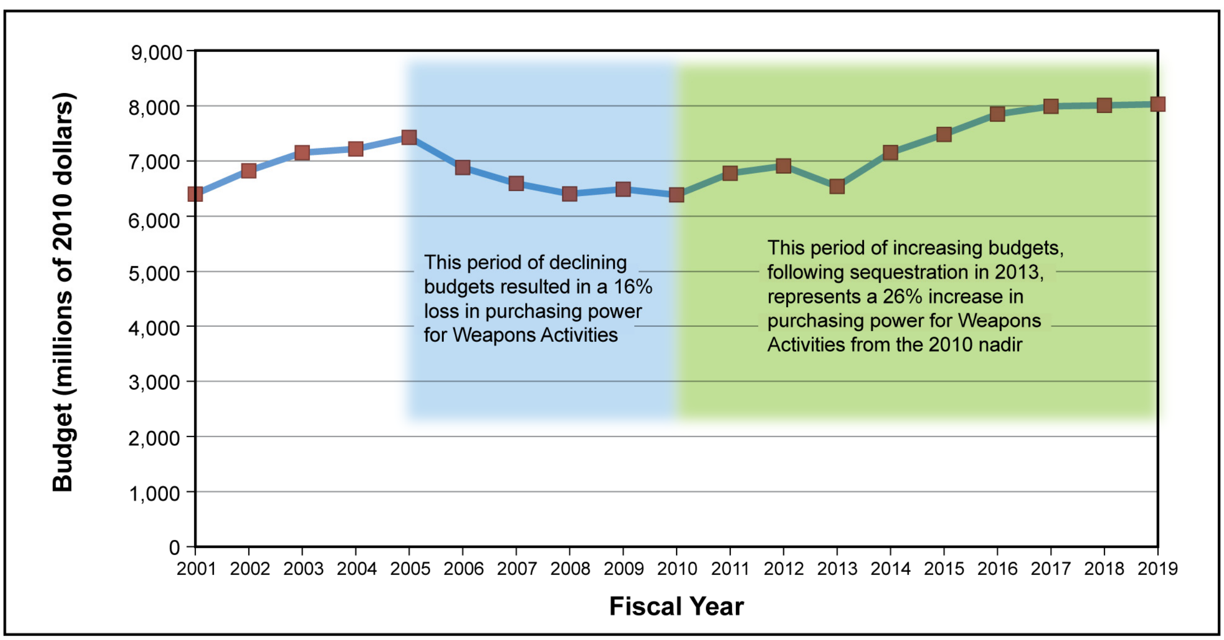
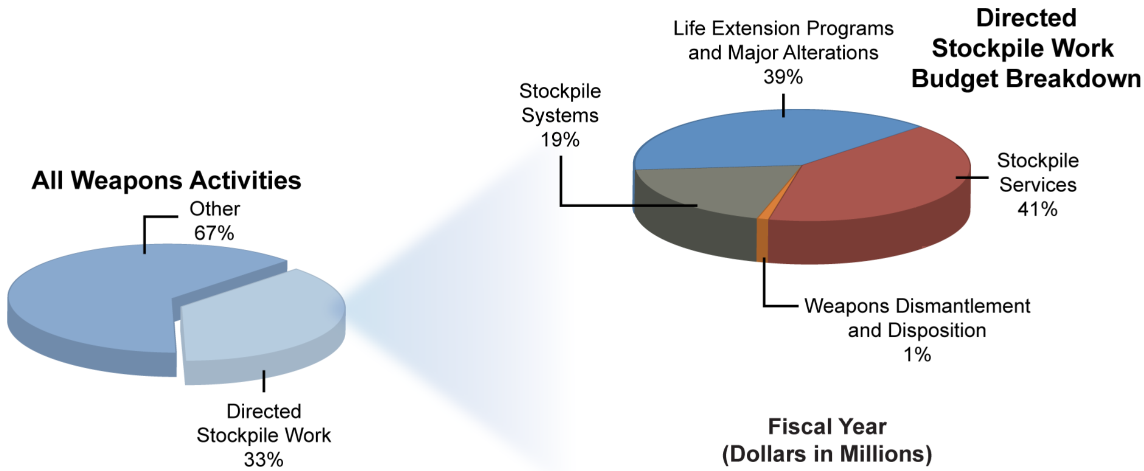


Figure 8–1. Weapons Activities historical purchasing power — fiscal years 2001 through 2019

8.2 Directed Stockpile Work Budget



Fiscal Year (Dollars in Millions)

	2014	2015	2016	2017	2018	2019
Life Extension Programs and Major Alterations	993.0	1,077.0	1,078.6	1,084.2	1,284.6	1,237.6
Stockpile Systems	454.5	531.1	536.1	531.4	563.5	563.9
Weapons Dismantlement and Disposition	54.3	30.0	46.8	47.0	63.6	71.0
Stockpile Services	940.3	1,108.5	1,172.1	1,306.9	1,413.9	1,536.4
Total Directed Stockpile Work	2,442.0	2,746.6	2,833.5	2,969.5	3,325.7	3,408.8

Figure 8–2. Directed Stockpile Work funding schedule for fiscal years 2014 through 2019

The Stockpile Systems and Stockpile Services budget lines in Figure 8–2 include Surveillance Program funding in the amounts shown for FY 2014 through 2019 in **Table 8–2**. Table 8–2 updates Table 8–3 of the FY 2014 SSMP.

Table 8–2. Surveillance Program funding for fiscal years 2010 through 2019
(This table updates Table 8–3 in the FY 2014 SSMP.)

	Fiscal Year (Dollars in Millions)									
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Surveillance Program Funding	181	239	239	217	225	236	246	260	269	291

In the FY 2014 appropriation, funding for the Tritium Readiness subprogram was transferred from the Readiness Campaign to Stockpile Services under Directed Stockpile Work. **Table 8–3,** which replaces Table 8–4 in the FY 2014 SSMP, shows the estimated costs to support the projected increase in tritium requirements.

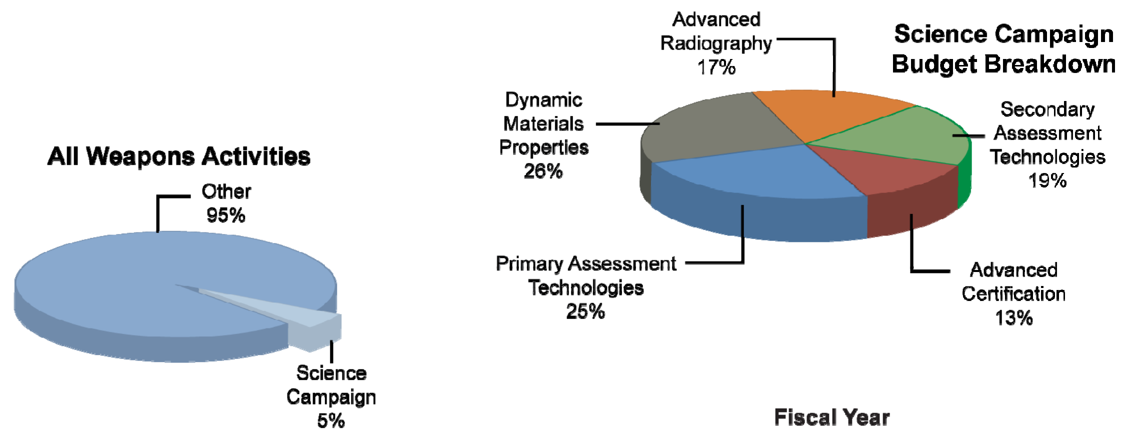
Table 8–3. Estimated tritium readiness resource requirements
(This table updates Table 8–4 in the FY 2014 SSMP.)

	Fiscal Year (dollars in millions)						
	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2015–2019**
Requirements	80.0	140.1	107.4	126.7	140.1	120.4	634.7
President's Budget/Future Years Nuclear Security Program	80.0	140.1	107.4	126.7	140.1	120.4	634.7
Surpluses/shortfalls	0	0	0	0	0	0	0

8.3 Research, Development, Testing, and Evaluation Budget and Readiness Campaign Budget

This section has been renamed from the FY 2014 SSMP, consistent with the new name for Chapter 3, which is Research, Development, Testing, and Evaluation.

8.3.1 Science Campaign

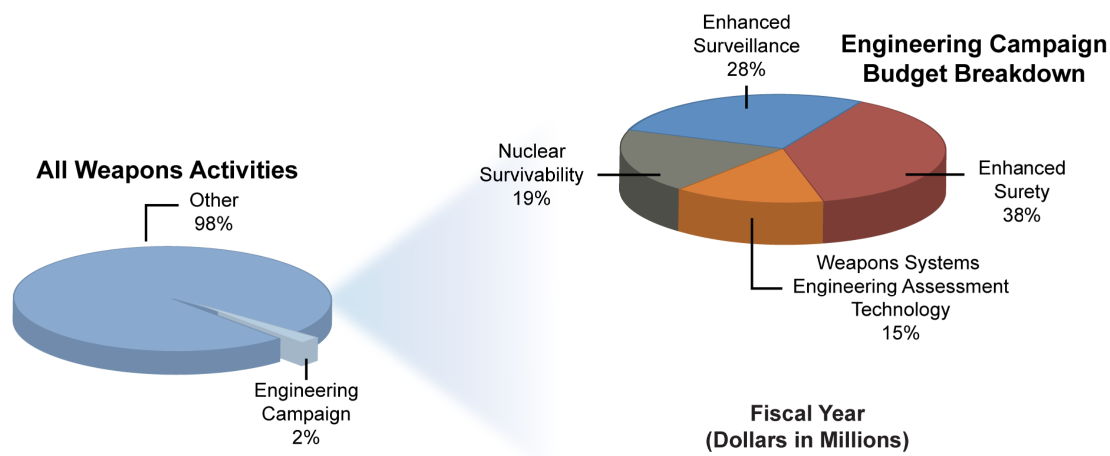


Fiscal Year (Dollars in Millions)

	2014	2015	2016	2017	2018	2019
Advanced Certification	58.7	58.7	64.0	64.1	64.6	65.7
Primary Assessment Technologies	92.0	112.0	122.0	122.1	122.8	124.7
Dynamic Materials Properties	104.0	118.0	128.5	128.9	196.0	210.1
Advanced Radiography	29.5	79.3	114.2	114.8	50.0	40.0
Secondary Assessment Technologies	85.5	88.3	96.2	96.5	97.2	98.8
Total Science Campaign	369.7	456.4	525.0	526.4	530.6	539.3

Figure 8–3. Science Campaign funding schedule for fiscal years 2014 through 2019

8.3.2 Engineering Campaign

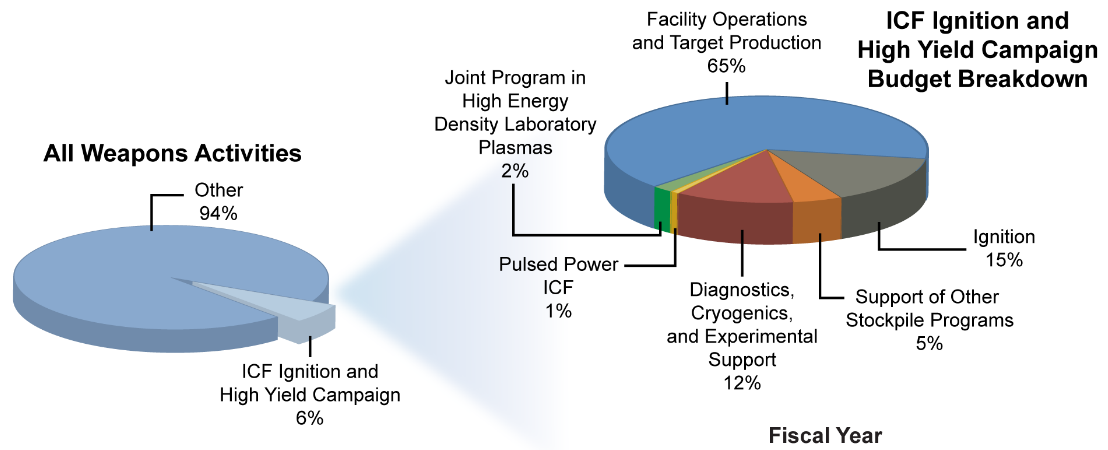


Fiscal Year (Dollars in Millions)

	2014	2015	2016	2017	2018	2019
Enhanced Surety	51.8	52.0	44.4	38.4	43.9	44.9
Weapon Systems Engineering Assessment Technology	23.7	20.8	19.3	19.0	21.3	23.7
Nuclear Survivability	19.5	25.4	26.7	25.6	27.9	30.3
Enhanced Surveillance	54.9	37.8	47.8	50.6	54.5	56.0
Total Engineering Campaign	149.9	136.0	138.2	133.6	147.7	154.9

Figure 8–4. Engineering Campaign funding schedule for fiscal years 2014 through 2019

8.3.3 Inertial Confinement Fusion Ignition and High Yield Campaign

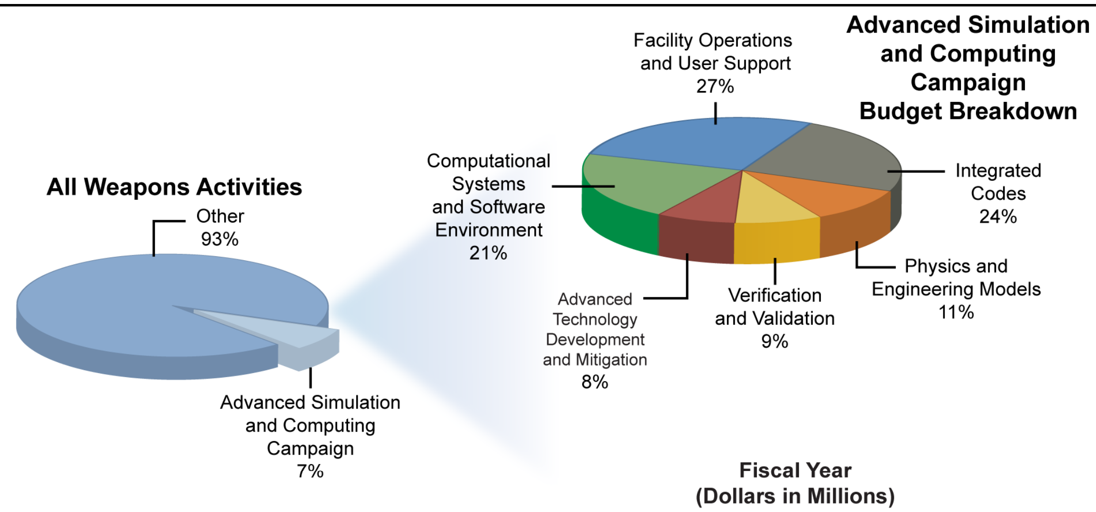


Fiscal Year (Dollars in Millions)	2014	2015	2016	2017	2018	2019
Diagnostics, Cryogenics, and Experimental Support	59.9	61.3	61.3	60.8	62.2	62.0
Pulsed Power ICF	5.0	5.0	5.5	5.5	5.7	5.7
Joint Program in High Energy Density Laboratory Plasmas	8.2	9.1	9.6	9.5	9.9	9.8
Facility Operations and Target Production	345.6	335.9	337.2	330.4	329.0	330.1
Ignition	80.2	78.0	78.0	77.5	78.3	78.0
Support of Other Stockpile Programs	15.0	23.6	26.0	25.8	27.1	27.0
Total ICF Ignition and High Yield Campaign	514.0	512.9	517.6	509.5	512.2	512.7

Key:
ICF = Inertial Confinement Fusion

Figure 8–5. Inertial Confinement Fusion Ignition and High Yield Campaign funding schedule for fiscal years 2014 through 2019

8.3.4 Advanced Simulation and Computing Campaign



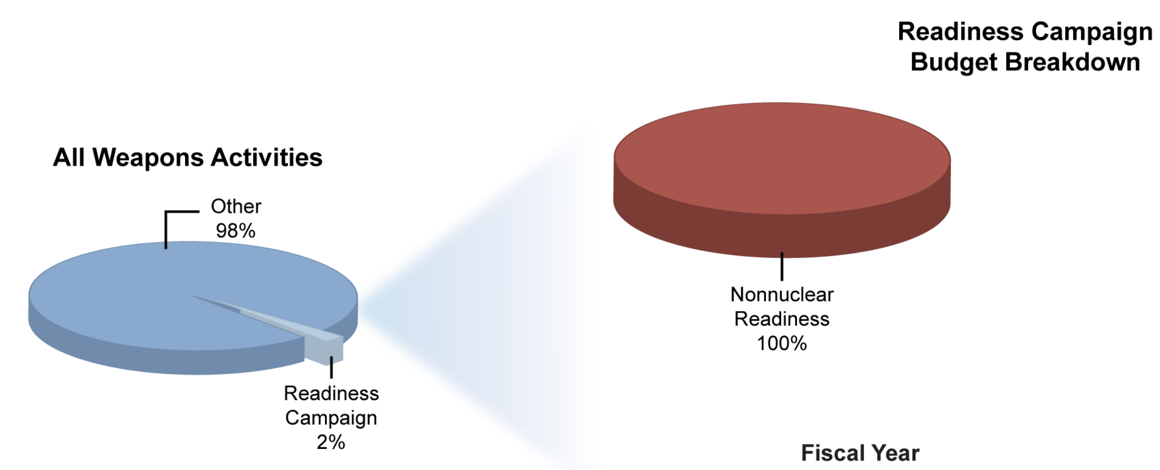
Fiscal Year (Dollars in Millions)	2014	2015	2016	2017	2018	2019
Integrated Codes	143.2	146.0	157.1	158.8	162.3	168.8
Physics and Engineering Models	61.5	69.6	70.3	71.0	71.7	76.0
Verification and Validation	48.9	56.8	57.3	57.9	58.5	62.0
Computational Systems and Software Environment	118.6	125.6	146.2	141.2	149.7	157.5
Facility Operations and User Support	162.2	162.2	165.0	165.0	170.0	180.0
Advanced Technology Development and Mitigation	35.0	50.0	55.0	55.0	55.0	65.0
Total Advanced Simulation and Computing Campaign	569.3	610.1	651.0	648.9	667.1	709.3

Figure 8–6. Advanced Simulation and Computing Campaign funding schedule for fiscal years 2014 through 2019

The Advanced Simulation and Computing Campaign created a new subprogram, Advanced Technology Development and Mitigation, to develop a strategy to acquire the advanced computing technologies needed to support stockpile stewardship. This strategy, which recognizes the need for exascale computing capabilities, is described in Section 3.7.2 of Chapter 3 and in Appendix F of this FY 2015 SSMP.

8.3.5 Readiness Campaign

In the FY 2014 SSMP, the Nonnuclear Readiness subprogram of the Readiness Campaign was called the Component Manufacturing Readiness subprogram to allow for expansion of the scope of its activities to encompass manufacturing development for all components. The FY 2014 appropriation provided funding under Nonnuclear Readiness and this convention is continued in the FY 2015 budget structure and this FY 2015 SSMP. With the transfer, which is also in the FY 2014 appropriation, of the Tritium Readiness Program from the Readiness Campaign to Stockpile Services in Directed Stockpile Work, the Readiness Campaign is now 100 percent Nonnuclear Readiness.

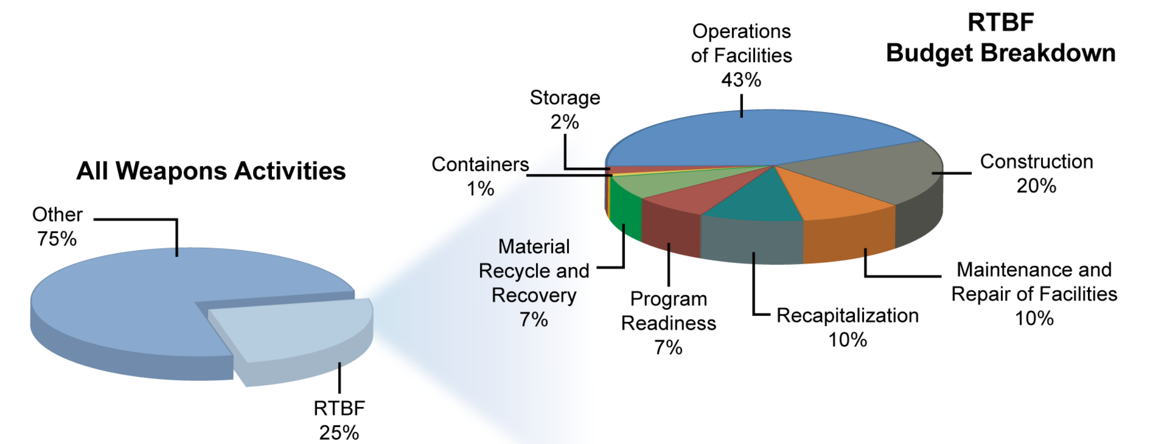


Fiscal Year (Dollars in Millions)	2014	2015	2016	2017	2018	2019
Nonnuclear Readiness	55.4	125.9	135.1	86.9	56.0	61.5
Total Readiness Campaign	55.4	125.9	135.1	86.9	56.0	61.5

Figure 8–7. Readiness Campaign funding schedule for fiscal years 2014 through 2019

8.4 Readiness in Technical Base and Facilities

This section has been renamed Readiness in Technical Base and Facilities (RTBF), consistent with the reconsolidation of Nuclear Programs and Site Stewardship Program infrastructure operations and construction activities in the FY 2014 appropriation. In the FY 2014 SSMP, this section was named Nuclear Security Enterprise Infrastructure and Operations. **Figure 8–8** below replaces Figures 8–8 and 8–9 in the FY 2014 SSMP.



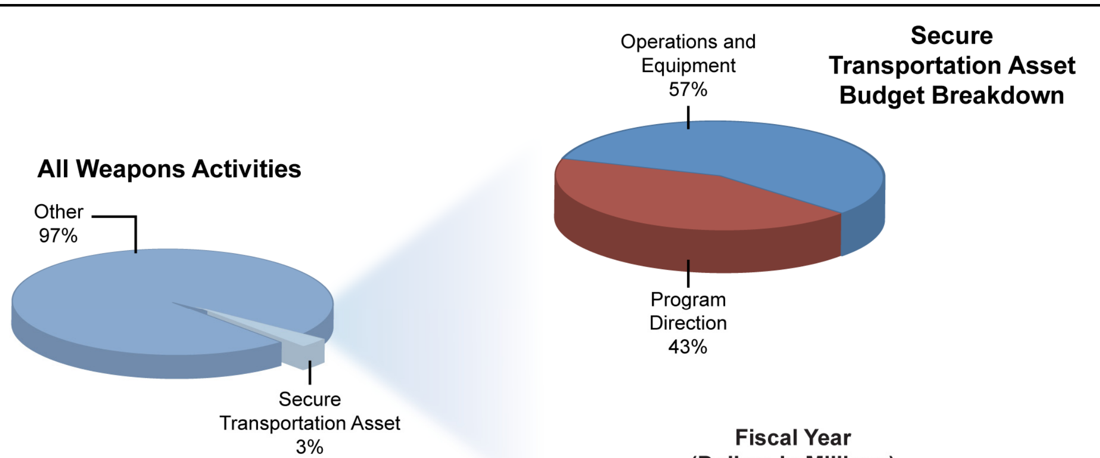
Fiscal Year (Dollars in Millions)

	2014	2015	2016	2017	2018	2019
Operations of Facilities	984.5	896.0	923.0	949.0	960.0	988.0
Program Readiness	67.3	136.7	187.4	190.4	206.8	211.1
Material Recycle and Recovery	125.0	138.9	141.2	142.1	143.1	145.6
Containers	26.0	26.0	27.0	28.0	29.0	30.0
Storage	35.0	40.8	41.4	41.7	43.0	43.8
Maintenance and Repair of Facilities	227.6	205.0	211.0	218.0	224.0	231.0
Recapitalization	180.0	209.3	351.9	513.2	331.9	386.4
Construction	422.1	402.8	576.0	688.0	707.8	728.5
Total RTBF Programs	2,067.4	2,055.5	2,458.9	2,770.4	2,645.4	2,764.4

Key:
RTBF = Readiness in Technical Base and Facilities

Figure 8–8. RTBF funding schedule for fiscal years 2014 through 2019
(This figure updates Figures 8–8 and 8–9 in the FY 2014 SSMP.)

8.5 Secure Transportation Asset Budget

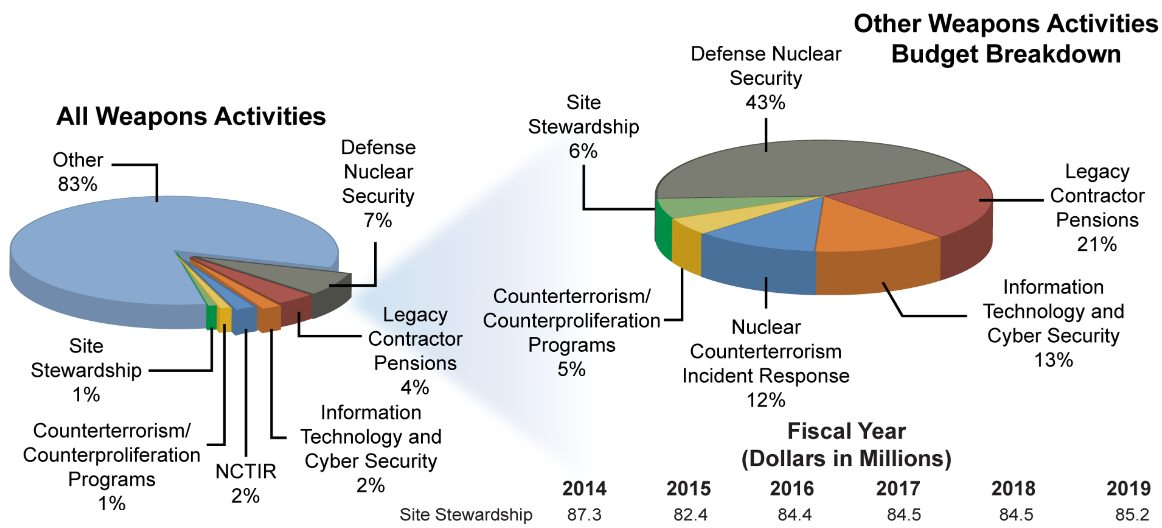


Fiscal Year (Dollars in Millions)

	2014	2015	2016	2017	2018	2019
Operations and Equipment	112.9	132.9	137.7	146.5	149.1	152.1
Program Direction	97.1	101.0	105.3	108.6	110.6	112.8
Total Secure Transportation Asset	210.0	233.8	243.0	255.1	259.7	264.9

Figure 8–9. Secure Transportation Asset funding schedule for fiscal years 2014 through 2019
(This figure updates Figure 8–10 in the FY 2014 SSMP.)

8.6 Other Weapons Activities Budget



Fiscal Year (Dollars in Millions)

	2014	2015	2016	2017	2018	2019
Site Stewardship	87.3	82.4	84.4	84.5	84.5	85.2
Nuclear Counterterrorism Incident Response	228.2	173.4	165.4	169.5	173.6	177.7
Counterterrorism/Counterproliferation Programs	0.0	76.9	82.1	84.2	86.2	88.2
Defense Nuclear Security	665.0	618.1	652.8	663.1	675.4	689.2
Information Technology and Cyber Security	145.1	179.6	151.7	153.4	155.5	158.7
Legacy Contractor Pensions	279.6	307.1	268.7	206.5	157.1	87.4
Domestic Uranium Enrichment Research, Development and Demonstration	62.0	0.0	0.0	0.0	0.0	0.0
Adjustments	(64.0)	0.0	0.0	0.0	0.0	0.0
Total Other Weapons Activities	1,403.2	1,437.6	1,405.0	1,361.2	1,332.5	1,286.4

Key:
NCTIR = Nuclear Counterterrorism Incident Response

Figure 8–10. Other Weapons Activities funding schedules for fiscal years 2014 through 2019
(This figure updates Figure 8–11 in the FY 2014 SSMP.)

8.7 Other Fiscal Issues

8.7.1 Pension Cost Growth and Alternative Mitigation Strategies

The Administration's FY 2015 Budget Request will continue to cover the total pension reimbursement and legacy contractor pension costs, which are estimated to be about $866 million for NNSA in FY 2015. This represents a $24 million increase from the estimated payments for FY 2014 ($842 million).

8.8 Estimates of Requirements Beyond the Future Years Nuclear Security Program

For the cost projections beyond the FYNSP, other than LEPs and other specific projects, an escalation of 2.11 percent per year is assumed (based on numbers provided by OMB for 2013) after FY 2019.[1] For LEPs and other specific projects, cost projections use currently available planning data. **Figure 8–11** shows the Weapons Activities funding in the FY 2015 President's Budget and estimates for budget requirements for FY 2020 – FY 2039.

[1] *Projection of budget requirements for these efforts in this way assumes the continued manageability of whatever risks are present during the FYNSP at the same level of effort.*

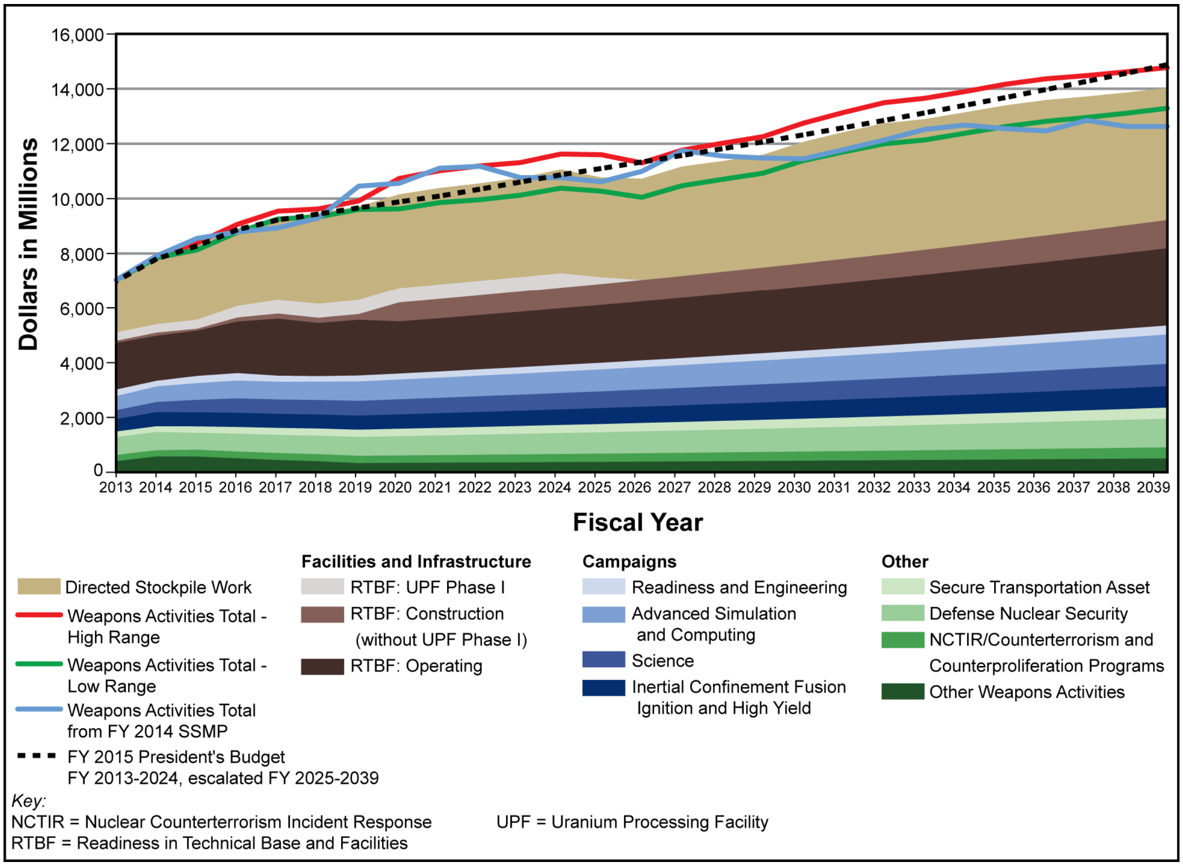


Figure 8–11. Estimate of out-year budget requirements for Weapons Activities of the NNSA in then-year dollars
(This figure updates Figure 8–12 in the FY 2014 SSMP.)

The "RTBF: Construction (without Uranium Processing Facility Phase I)" total shown in Figure 8–11 includes all construction other than Uranium Processing Facility Phase I (which is shown as a separate funding wedge).[2] Funding for the Uranium Processing Facility Phases II and III and for long-term plutonium capability are included in this total but are not displayed as separate wedges because of the immaturity in planning for these efforts. The high versus low lines on the figure reflect uncertainties in the estimated budget requirements for LEPs and the construction projects included in "RTBF: Construction (without UPF Phase I)". While these two categories of activities constitute only approximately 22 percent of total Weapons Activities over FY 2020 – FY 2039, they have the greatest uncertainty. The figure also displays a blue line representing the total shown in the FY 2014 SSMP so that a comparison can be made between Figure 8–11 in this chapter and Figure 8–12 in the FY 2014 SSMP. The dashed black line in Figure 8–11 is the FY 2015 President's Budget for FY 2013-2024 and the FY 2024 total escalated at the same 2.11 percent as used in the estimates for FY 2025-2039 to evaluate the out-year affordability of the total Weapons Activities account. **Figure 8–12** in this section shows greater detail of the uncertainties of the out-year budget requirements for Weapons Activities.

[2] *In January 2014 the Acting NNSA Administrator asked the Oak Ridge National Laboratory Director to lead a team to consider an alternative approach to the Uranium Processing Facility Project. See Chapter 5, Section 5.3.1.2.*

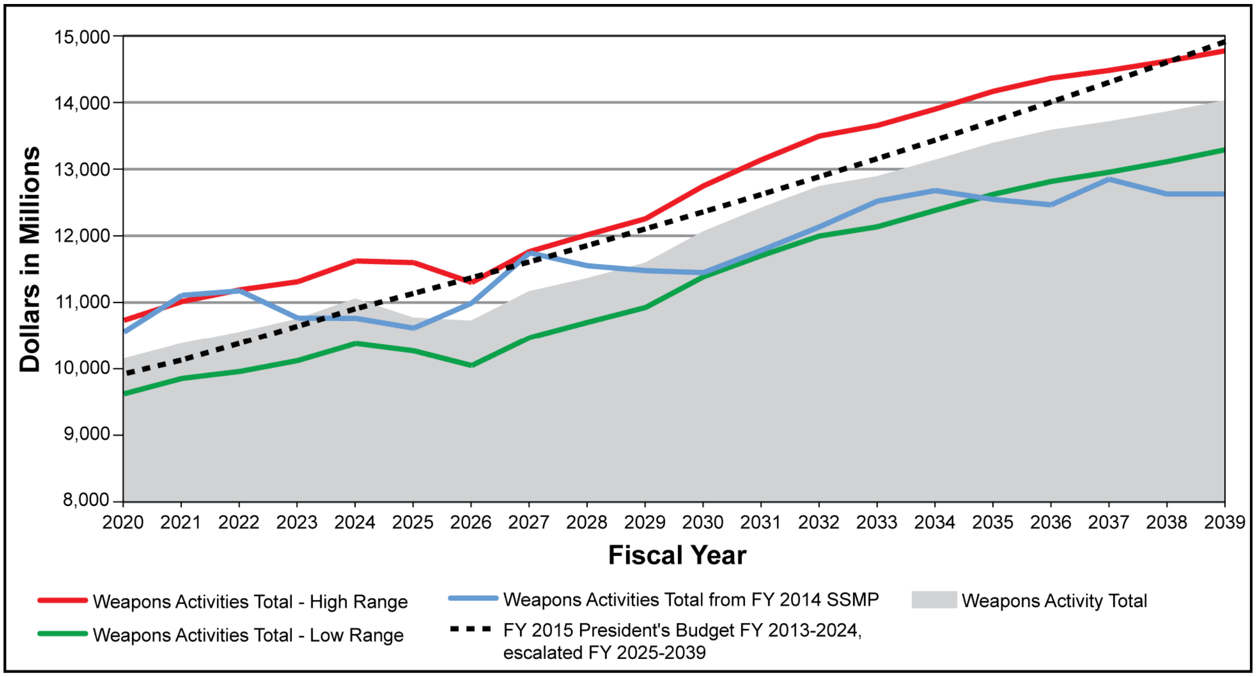


Figure 8–12. Detail of out-year budget requirements for Weapons Activities of the NNSA in then-year dollars
(This figure is new for the FY 2015 SSMP.)

The nominal cost of the overall program for FY 2020 – FY 2039 in Figure 8–12 falls within +/- 2 percent of the escalated (dashed black) FY 2019 line, significantly less than the variation in the FY 2014 SSMP Weapons Activities cost of up to +/- 11 percent. This allows the conclusion that it is, as planned, generally affordable and more executable than the program proposed in the FY 2014 SSMP. However, the uncertainty over this period does vary by +/- 5 to 8 percent per year and therefore constitutes a potentially significant risk to accomplishing the planned program for Weapons Activities.

Four new subsections of Section 8.8 have been added in the FY 2015 SSMP to explain in more detail the cost basis for significant elements in Figure 8–12 above. These are Stockpile Sustainment (Section 8.8.1), Life Extension Programs and Major Alterations (Section 8.8.2), Results of Differential Analysis of FY 2011 SSMP Strategy and FY 2015 3+2 strategy (Section 8.8.3), and Construction Costs (Section 8.8.4).

8.8.1 Stockpile Sustainment

Sustainment costs include assessment activities, limited life component exchanges, required and routine maintenance, safety studies, periodic repairs, resolution and timely closure of SFIs, military liaison work, and surveillance to assure the continued safety, security, and reliability of the stockpile. These costs are incurred every year that a weapon is in the active stockpile.

Figure 8–13 shows the annual sustainment cost for FY 2015 – FY 2039 that can be attributed to a particular warhead and the average cost over FY 2003 – FY 2014. This figure consolidates and updates the warhead sustainment costs that were in Figures 8–13 through 8–19 in Section 8.9 of the FY 2014 SSMP.

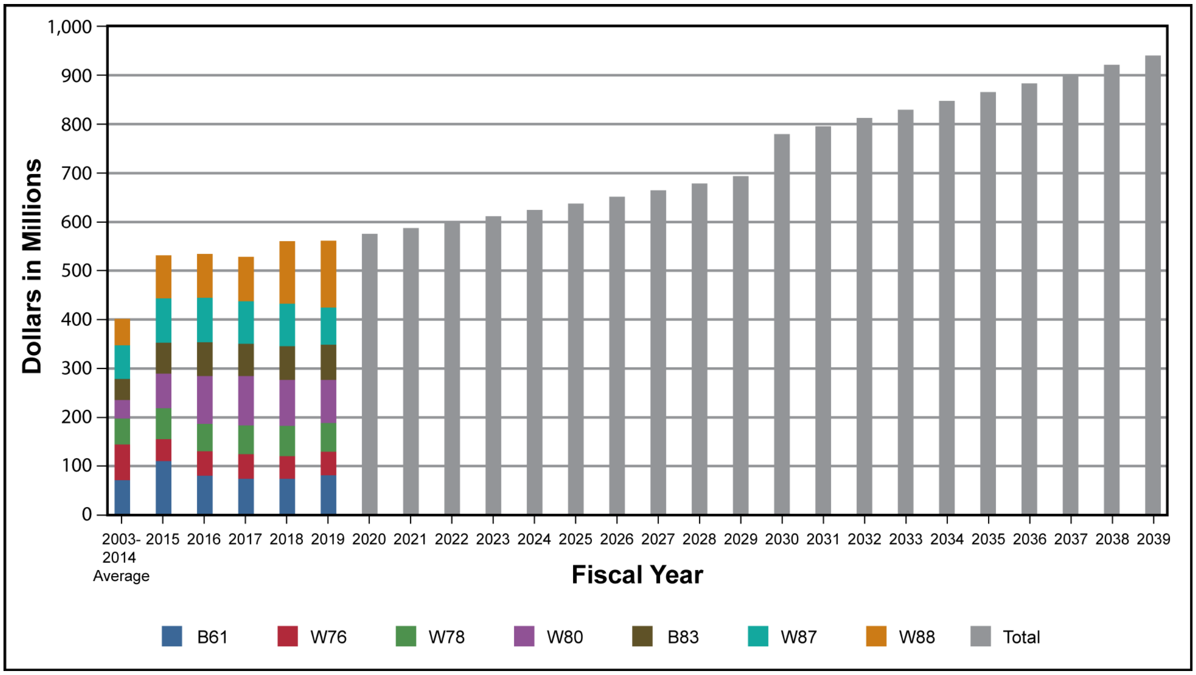


Figure 8–13. Estimate of warhead specific sustainment costs

(This figure updates the sustainment portion of Figures 8–13 through 8–19 in the FY 2014 SSMP.)

The costs for FY 2020 through FY 2039 incorporate a preliminary assessment of the additional sustainment costs to be incurred during the transition to a 3+2 stockpile. See Section 8.8.3 for further discussion.

8.8.2 Life Extension Programs and Major Alterations

LEPs, which are not part of stockpile sustainment, are undertaken as needed to extend the life of a warhead for an additional 20 to 30 years or more. Major alterations make component changes to warheads that have a major total cost. Both LEPs and major alterations may be subject to Selected Acquisition Report (SAR) requirements to Congress.

Figures 8–14 through **8–20** show the estimated cost to NNSA for LEPs or major alterations for the FY 2014 – FY 2039 period. (Figures 8–13 through 8–23 in Section 8.9 of the FY 2014 SSMP displayed both the sustainment and LEP costs, as applicable. In particular, Figures 8–14 through 8–16 in this year's SSMP update the estimated costs of the LEPs or major alterations in Figures 8–13, 8–14, and 8–19 in Section 8.9 of the FY 2014 SSMP, and Figures 8–17 through 8–20 in this year's SSMP update the estimated LEP costs in Figures 8–20 through 8–23 in Section 8.9 of the FY 2014 SSMP.) The high and low lines on each LEP cost figure (if included) reflect the uncertainties in the cost for conducting an assumed point-solution executed under current Administration guidance such as the *Nuclear Posture Review Report* (DOD 2010) rather than the variation in the cost of a range of work scope alternatives.

High and low *planning* independent cost estimates[3] were developed for all LEPs. The independent cost estimate model methodology is based on: W76-1 actual costs to date for RDT&E and Procurement; a standard work breakdown structure with comparisons of RDT&E scope/complexity by LEP program

[3] *The Defense Program's Office of Cost Policy and Analysis is responsible for preparation of these estimates.*

office experts; estimates of Other Program Money (OPM) and DOD costs by program office experts; RDT&E, OPM, and DOD costs distributed using standard, well-known Rayleigh profiles; and Production costs distributed using the non-linear cost growth profile exhibited by the W76-1 actual cost-quantity relationship. The nominal estimates (reflected in the bars on these figures) are the costs from either the Weapon Design and Cost Report, the most recent SAR, or, if the LEP has not yet generated such estimates, based on the mid-point between the high and low model values for the effort. The high and low model-based cost curves have been included on some of the graphs with the Weapon Design and Cost Report and SAR based on nominal values to emphasize that, for those efforts, some amount of cost uncertainty still exists in their execution.

For each figure, an associated table displays the high, low, and nominal estimated total cost to NNSA and DOD[4] in both constant FY 2014 and then-year dollars. These are **Tables 8–4** to **8–10**. The total estimated cost is provided since a number of these efforts fall outside the 25-year window for the FY 2015 SSMP. While the figures are in then-year dollars, the total estimated cost in FY 2014 constant-year dollars is provided in order to compare the costs for LEPs scheduled over different timeframes.

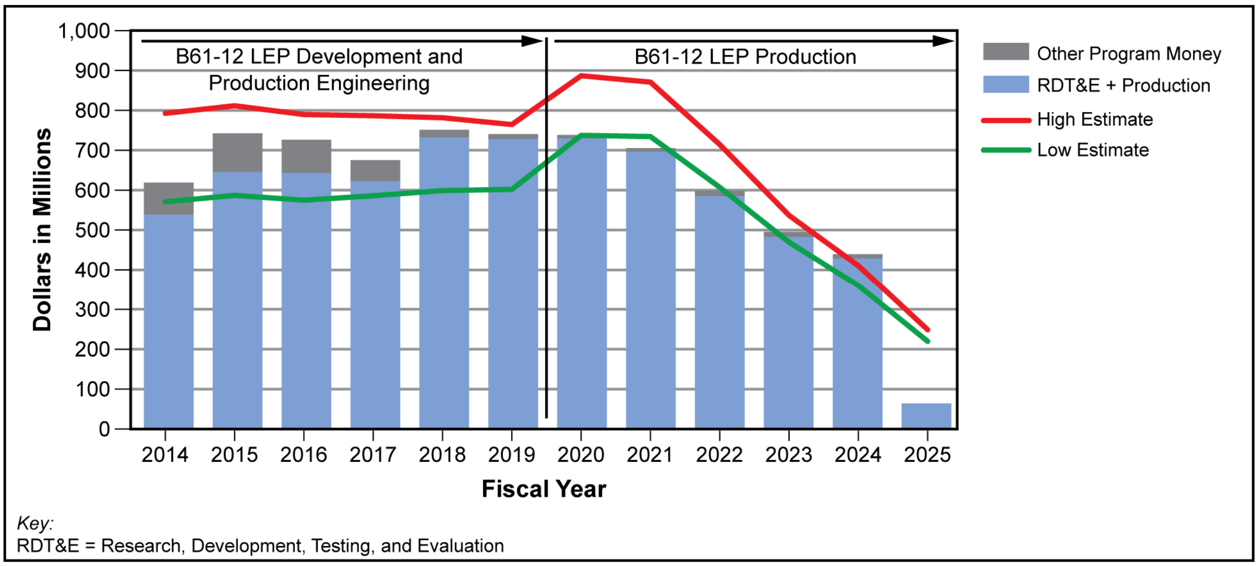


Figure 8–14. B61-12 life extension program cost FY 2014 to completion
(This figure updates the life extension program portion of Figure 8–13 in the FY 2014 SSMP.)

Table 8–4. Total estimated cost for B61-12 life extension program

FY 2009–FY 2025 (Dollars in Millions)	NNSA		DOD	
	FY 2014 Dollars	Then-Year Dollars	FY 2014 Dollars	Then-Year Dollars
High	8,785	9,524	205	274
Low	7,181	7,783	205	274
SAR Value [a]	6,857	7,344	Not in NNSA SAR	Not in NNSA SAR

[a] The B61-12 Selected Acquisition Report (SAR) values are reported in FY 2012 dollars. Those values are converted for this table to FY 2014 dollars. Also, SAR values do not include OPM costs. However, the FY 2013 B61-12 SAR did report a total of $811 million in then-year dollars for multi-systems costs with the B61-12 as first user (*i.e.,* OPM) that should be added to the SAR then-year dollars totals for NNSA to make them comparable.

[4] *The DOD costs are for weapon components for which the DOD is responsible, such as arming and fuzing.*

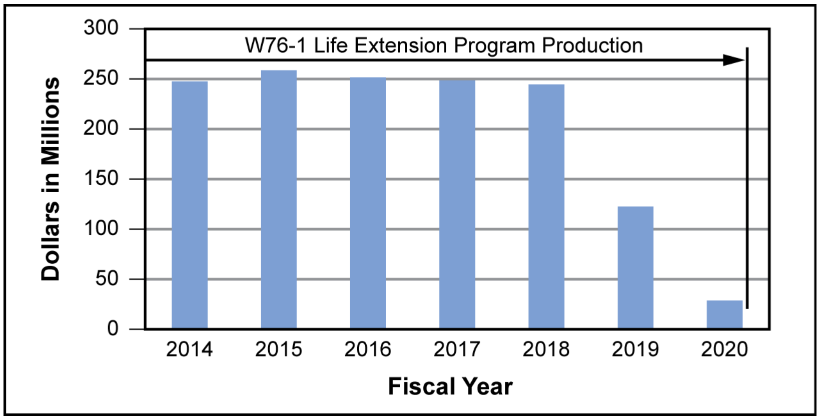


Figure 8–15. W76-1 life extension program cost FY 2014 to completion
(This figure updates the life extension program portion of Figure 8–14 in the FY 2014 SSMP.)

Table 8–5. Total estimated cost for W76 life extension program

FY 1999–FY 2020 (Dollars in Millions)	NNSA		DOD	
	FY 2014 Dollars	Then-Year Dollars	FY 2014 Dollars	Then-Year Dollars
SAR Value [a]	4,117	3,697	Not in NNSA SAR	Not in NNSA SAR

[a] W76-1 Selected Acquisition Report (SAR) values are reported in FY 2002 dollars. Those values are converted for this table to FY 2014 dollars.

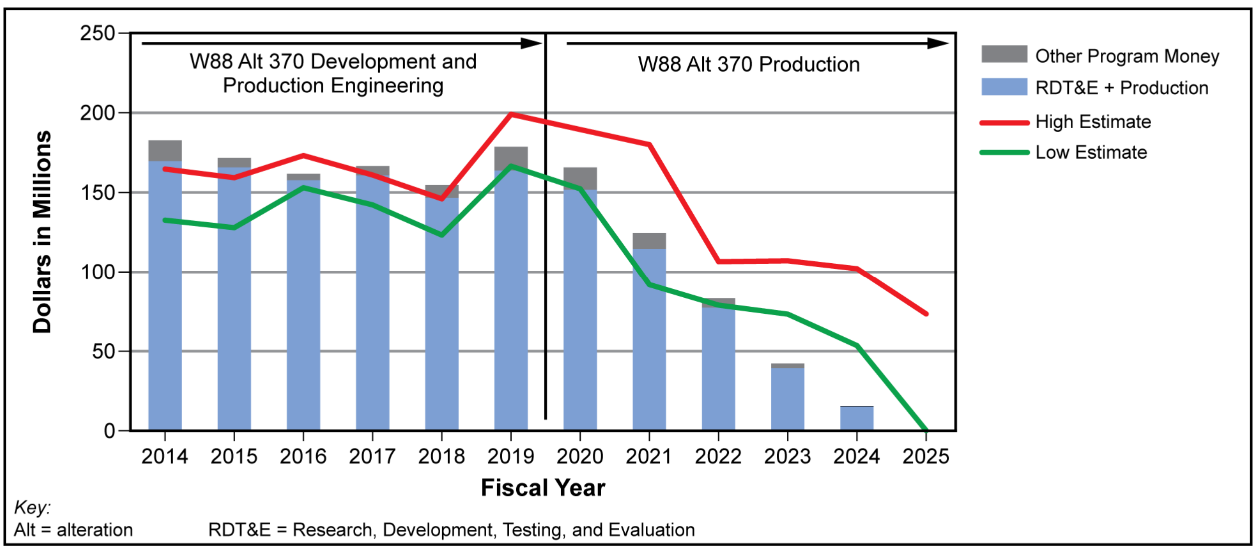


Figure 8–16. W88 Alt 370 cost FY 2014 to completion
(This figure updates the major alteration portion of Figure 8–19 in the FY 2014 SSMP.)

Table 8–6. Total estimated cost for W88 Alt 370

FY 2012–2024 (Dollars in Millions)	NNSA		DOD	
	FY 2014 Dollars	Then-Year Dollars	FY 2014 Dollars	Then-Year Dollars
High	1,805	1,965	999	1,009
Low	1,368	1,472	983	1,045
SAR Value [a]	1,373	1,452	Not in NNSA SAR	Not in NNSA SAR

[a] The W88 Alt 370 Selected Acquisition Report (SAR) is reported in FY 2013 dollars. Those values are converted for this table to FY 2014 dollars. Also, SAR values do not include OPM costs. The original Weapons Design Concept Report for the effort reported approximately $95 million in then-year OPM costs.

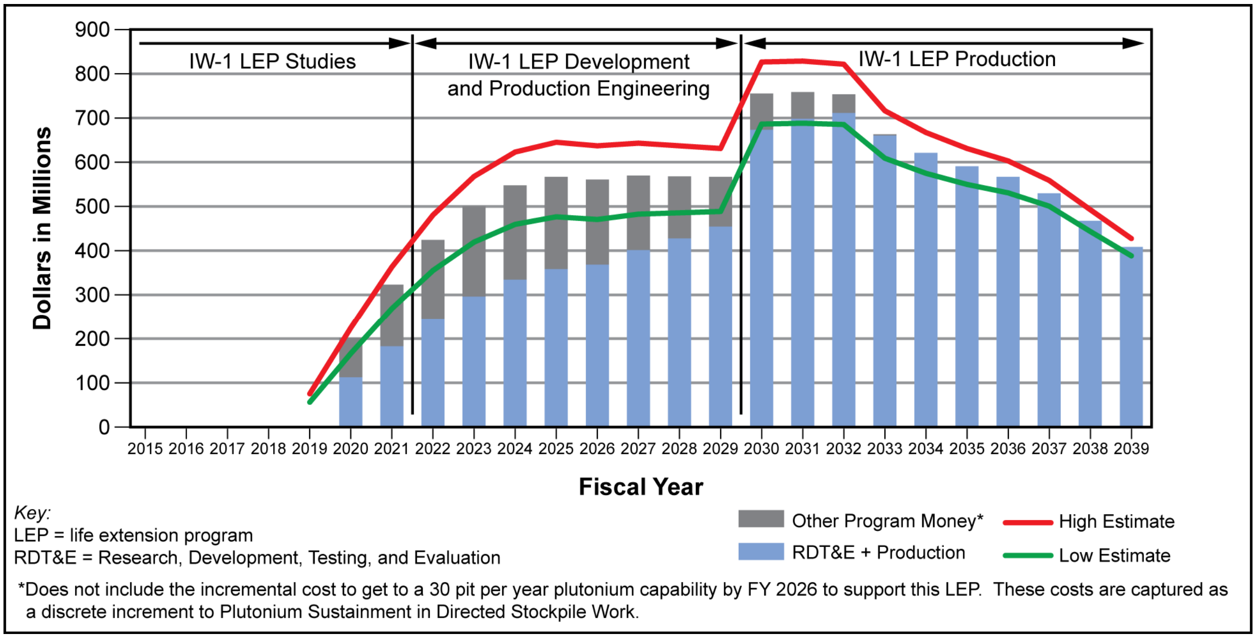


Figure 8–17. IW-1 life extension program cost FY 2020 – FY 2039
(This figure updates Figure 8–20 in the FY 2014 SSMP.)

Table 8–7. Total estimated cost for IW-1 life extension program

FY 2013–2014, FY 2019–2041 (Dollars in Millions)	*NNSA*		*DOD*	
	FY 2014 Dollars	*Then-Year Dollars*	*FY 2014 Dollars*	*Then-Year Dollars*
High	8,963	12,551	834	1,187
Low	7,231	10,228	625	898
Budget Requirement	N/A	11,390	N/A	1,042

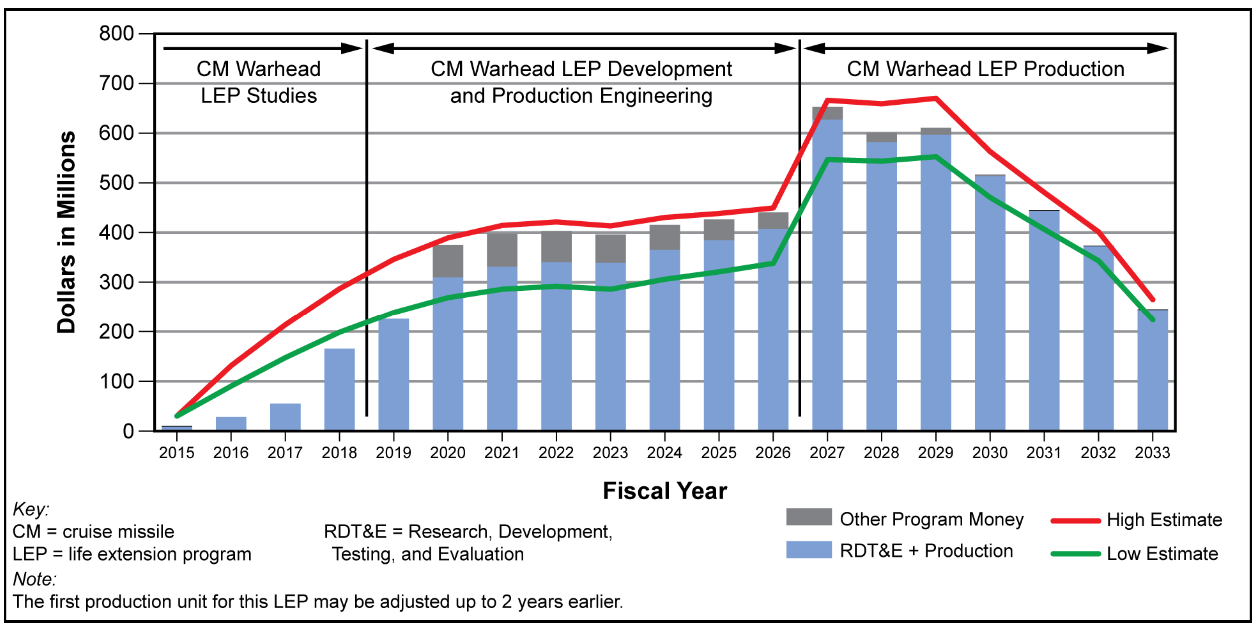


Figure 8–18. Cruise Missile Warhead life extension program cost FY 2014 to completion
(This figure updates Figure 8–21 in the FY 2014 SSMP.)

Table 8–8. Total estimated cost for cruise missile warhead life extension program

FY 2015 – 2033 (Dollars in Millions)	NNSA		DOD	
	FY 2014 Dollars	Then-Year Dollars	FY 2014 Dollars	Then-Year Dollars
High	6,054	7,645	205	261
Low	4,605	5,871	205	263
Budget Requirement	N/A	6,758	N/A	262

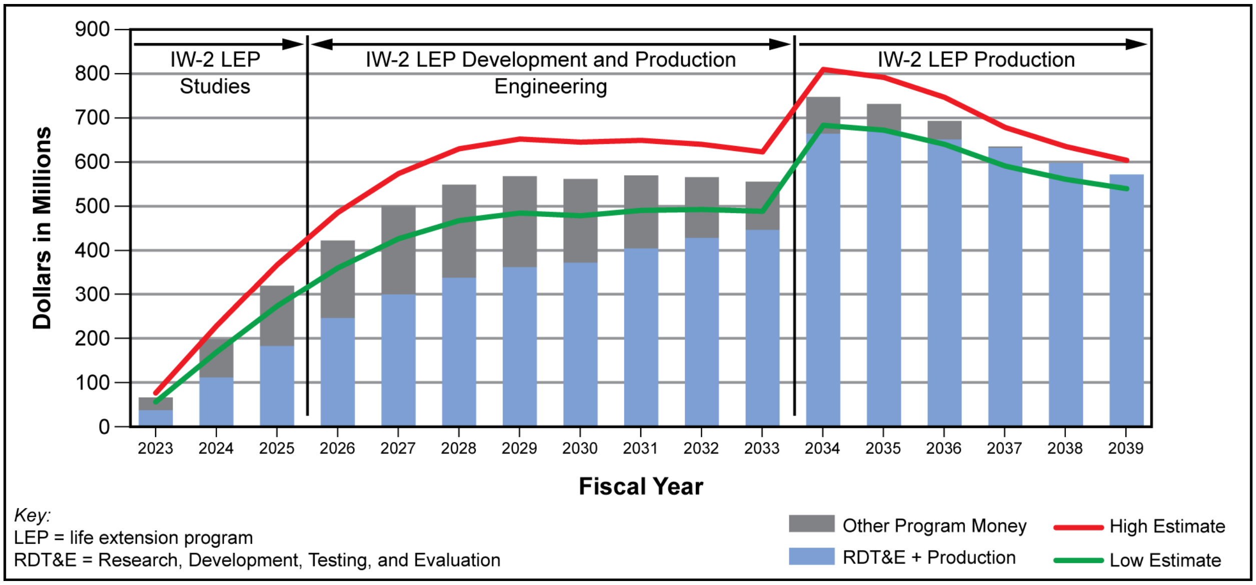


Figure 8–19. IW-2 life extension program cost FY 2014 – FY 2039
(This figure updates Figure 8–22 in the FY 2014 SSMP.)

Table 8–9. Total estimated cost for IW-2 life extension program

FY 2023 – 2051 (Dollars in Millions)	NNSA		DOD	
	FY 2014 Dollars	Then-Year Dollars	FY 2014 Dollars	Then-Year Dollars
High	9,897	15,828	834	1,364
Low	8,283	13,424	625	1,035
Budget Requirement	N/A	14,626	N/A	1,200

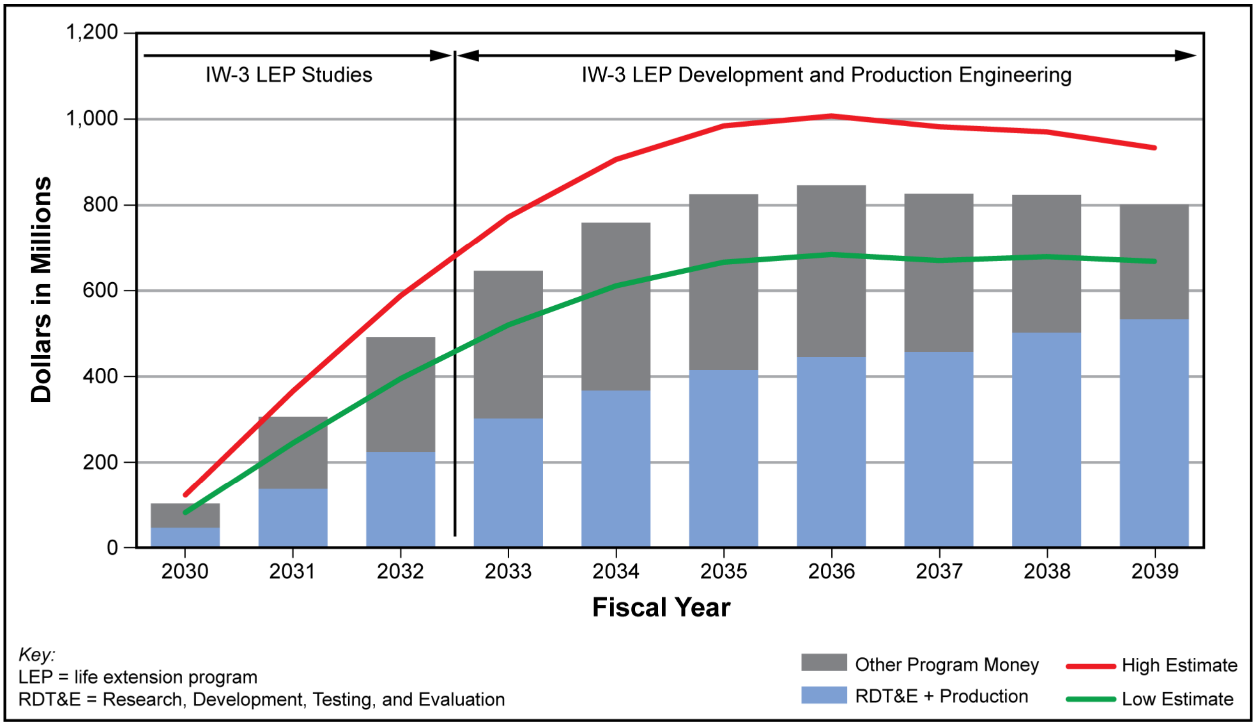


Figure 8–20. IW-3 life extension program cost FY 2014 – FY 2039
(This figure updates Figure 8–23 in the FY 2014 SSMP.)

Table 8–10. Total estimated cost for IW-3 life extension program

FY 2023 – 2051 (Dollars in Millions)	NNSA		DOD	
	FY 2014 Dollars	Then-Year Dollars	FY 2014 Dollars	Then-Year Dollars
High	11,861	21,768	834	1,588
Low	9,419	17,629	625	1,207
Budget Requirement	N/A	19,699	N/A	1,398

Figure 8–21, an update to Figure 8–25 in the FY 2014 SSMP, is a one-chart summary of the total projected nuclear weapons life extension costs from FY 2014 through FY 2039 based on the LEP schedule reflected in Figure 2–2 of the FY 2015 SSMP. Figure 8–21 includes both the direct LEP costs and OPM, both of which are incremental to an adequately funded, operationally essential set of base activities. The dotted line shows the LEP cost reflected in the FY 2014 SSMP. The principal differences between the FY 2014 and FY 2015 estimates are the adjusted timing of the cruise missile and interoperable warheads, the adjustment in the escalation factor from the 3.4 percent value used in the FY 2014 SSMP estimates to the OMB-recommended level (2.11 percent), and improvements in the cost models for future life extensions.

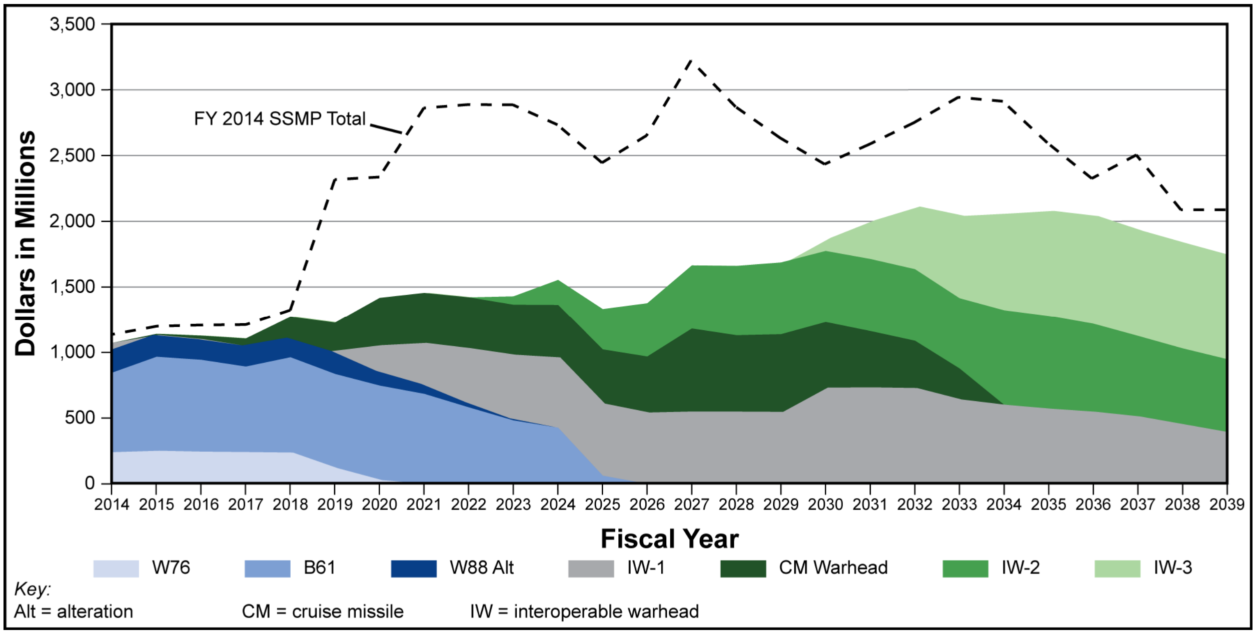


Figure 8–21. Total U.S. projected nuclear weapons life extension costs for fiscal years 2014 through 2039 (then-year dollars)
(This figure updates Figure 8–25 in the FY 2014 SSMP.)

8.8.3 Results of Differential Analysis of FY 2011 SSMP Strategy and 3+2 FY 2015 SSMP Strategy

After the FY 2014 President's Budget Request was submitted, NNSA conducted a study to quantify the difference in the total long-term cost between the 3+2 strategy described in the FY 2014 SSMP and the LEP strategy envisioned in the FY 2011 SSMP. The analysis included both the cost of the first cycle of LEPs (for all warheads to be retained in the stockpile) and the sustainment costs. The cost estimates were generated using the same cost estimating model used to produce the LEP cost estimates in Section 8.8.2 above and produced both high and low estimates based on the uncertainty in the complexity factors used in the model.

The conclusion of the analysis at that time, and now updated based on adjustments described in this SSMP, is that the 3+2 strategy reduces the total long-term NNSA costs through decreased LEP costs. This reduction is driven in part by greater efficiency in hedging with the 3+2 stockpile, which reduces the number of warheads to be refurbished even though the size of the active stockpile is the same for both strategies.[5] These savings are partially offset by increased sustainment costs (about $70 million per year in FY 2014 dollars, as shown in Figure 8–13) during the period of transition to a 3+2 stockpile when both the original and the new interoperable warheads are being sustained. **Figure 8–22** shows the high versus low cost ranges for the FY 2011 SSMP refurbishment-only strategy compared to the FY 2015 SSMP implementation of the 3+2 strategy over the period FY 2014 to FY 2039.

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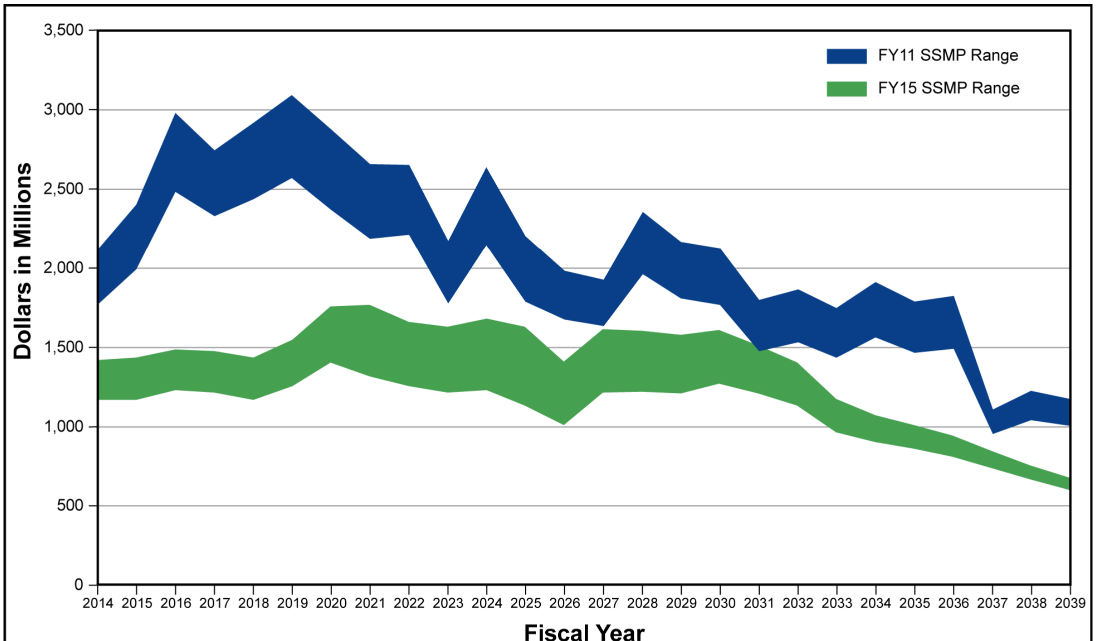
[5] A portion of the savings also comes from the avoidance of a B83 LEP since, under the 3+2 strategy, the B83 could be retired after confidence in the B61-12 has been demonstrated, and no such decision had been made as of the FY 2011 SSMP. The cost of this LEP contributes $7.5–9.5 billion to the difference in LEP costs shown in Table 8–11.



Note:
The FY 2011 SSMP LEP costs included estimates for the B61-12, W76-1, W80, B83, W78, W87, and W88 warheads and W88 Alt 370.
The FY 2014 SSMP LEP costs included estimates for the B61-12, W76-1, CM Warhead, IW-1, and IW-2 LEPs and W88 Alt 370. IW-3 was not included because a significant portion of this would constitute a second cycle in the life extension of the W76.

Figure 8–22. Life extension program annual cost ranges in FY 2014 dollars in millions for FY 2014 – FY 2039
(This figure is new for the FY 2015 SSMP.)

The LEP cost (in FY 2014 dollars) for FY 2014 – FY 2039 and in total (LEP start to completion) for the low versus high ranges for each of these strategies is shown in **Table 8–11** below.

Table 8–11. Life extension program cost comparison of FY 2011 SSMP and FY 2015 SSMP life extension program strategies

Millions of FY 2014 Dollars	*Cost FY 2014 – FY 2039*	*Total Cost*
FY 2011 SSMP Low	46,859	56,066
3+2 High	36,036	45,857
3+2 Minimum Reduction	**10,823**	**10,208**
FY 2011 SSMP High	56,431	66,571
3+2 Low	28,478	37,965
3+2 Maximum Reduction	**27,953**	**28,606**

8.8.4 Construction Costs

The budget requirement estimate for construction in FY 2020 and beyond, as part of the RTBF total included in Figure 8–11, is based on the set of projects in the NNSA Integrated Priority List (shown in Chapter 5, Figure 5–2). Because of the preliminary planning status for many of these projects, they have been binned into one of three cost ranges. For those projects estimated to cost greater than $500 million, upper bounds were estimated based on the best available data. **Table 8–12,** new for the FY 2015 SSMP shows the low, high, and mid point total cost for executing projects on the Integrated Priority List that are scheduled for FY 2020 and beyond.

Table 8–12. Total cost and average annual cost of construction for fiscal years 2020–2039

FY 2014 Dollars in Millions	*Low*	*High*	*Midpoint*
Total Cost	5,690	18,925	12,308
Cost per year over 20 years	285	946	615

The midpoint value, escalated to then-year dollars ($693 million), is used in the RTBF total in Figure 8–11. This represents a significant increase over the figure used in the FY 2014 SSMP ($306 million). Much of this increase results from the inclusion of funding for the long-term plutonium strategy and the Uranium Processing Facility Phases II and III. The low and high average annual costs were used along with the low and high costs for LEPs to generate the low and high lines on that same figure in order to introduce some sense of the uncertainty in the total budget requirements, based on these two components of the construction costs for which there is the greatest uncertainty.

8.9 Estimates for Stockpile Management

In the FY 2014 SSMP, the cost estimates for annual stockpile sustainment and life extension of weapons in the active stockpile were in Section 8.9 of Chapter 8. In this FY 2015 SSMP update to the FY 2014 SSMP, the text and figures that update those estimated costs are contained in Sections 8.8.1 and 8.8.2 of Section 8.8, respectively. For a general discussion of the life-cycle costs of weapons in the stockpile, see the first three paragraphs in Section 8.9 of the FY 2014 SSMP.

8.10 Operations and Effective Business Practices

This section replaces Section 8.10 in the FY 2014 SSMP. NNSA is formalizing, prioritizing, and implementing a number of initiatives for improved management systems, IT, and business and project management tools. A major objective is to reduce indirect and overhead costs to enable NNSA to focus more of its human and financial resources on its core mission. An example is a new acquisition strategy being used to merge the Pantex and Y-12 M&O contracts. Such efforts will continue to streamline the governance and organizational structure. Moreover, best practices developed by the sites and contractors will be applied to the entire nuclear security enterprise.

The efforts listed in **Table 8–13** reflect NNSA's overall commitment to identify specific efficiencies wherever possible in addition to other efforts to identify cost savings.

8.10.1 International Organization for Standardization Management Systems Standards

This is the last year to be reported. There are no other updates to this section.

Table 8–13. Efficiency initiatives

Efficiency Initiative Name	*Targeted Savings*	*Schedule*	*Change/Comment(s)*
NNSA ISO Standards	Efficiency not quantified	N/A	This is the last year to report on ISO Standards.
Governance Model	Efficiency not quantified	FY 2014	A congressionally driven panel will develop an FY 2014 report. Other changes are presented in Section 8.10.2.
Wireless Technology	Up to $280 M	Paused	Project is on hold because of funding constraints.
One Identification Access Control	$3.75 – $7.5 K (in FY 2012 dollars)	FY 2014	Pilot phase is underway. Savings will be realized when the project is fully implemented.
NNSA Network Vision (2NV)	Estimated average annual $185 M benefit	Multi-year	Requires implementation of a suite of information technology initiatives to realize annual benefit. See Section 8.10.5 for additional details.
Business Management Advisory Council (BMAC)	Efficiency not quantified	N/A	BMAC was replaced by the NNSA Operations Council. This is the last year to report on BMAC.
DP Enterprise Portfolio Analysis Tool (EPAT)	Efficiency not quantified	N/A	EPAT enhancements from FY 2014 SSMP have been implemented, *e.g.*, EPAT integration with the DOE Standard Accounting and Reporting System (STARS). This is the last year to report on EPAT.
Defense Programs Work Breakdown Structure	Efficiency not quantified	N/A	No change. This is the last year to report on Defense Programs Work Breakdown Structure.
NNSA Operations Council	$80 M	FY 2014	New – See Section 8.10.9.
Builder Sustainment Management System (BSMS)	Efficiency not quantified	N/A	New – See Section 8.10.10.
Expansion of Strategic Procurement	Efficiency not quantified	N/A	New – See Section 8.10.11.
Generation 2 Program Management System	Efficiency not quantified	N/A	New – See Section 8.10.12.

ISO = International Organization for Standardization

8.10.2 Governance Model

The NNSA governance model is being examined and revamped, where appropriate. As part of the effort to create stable, repeatable processes and standardize how business is done across the nuclear security enterprise, NNSA has begun to implement a series of IT initiatives, such as automated management of program direction funds, which will allow the field offices and Headquarters to operate in a common environment. NNSA also created the Nuclear Production Office to replace the separate Amarillo, Texas, and Oak Ridge, Tennessee, offices. This new office will provide a management structure appropriate for the forward-leaning strategy of a single contractor to operate both nuclear weapons production facilities. These are key examples of how NNSA is streamlining its governance model and moving from ‘initiatives’ to actions and continuous improvement. The Strategic Program Evaluation Plan is implementing the collective governance and oversight reform principles as expressed by the Secretary of Energy and the NNSA Administrator and is defining the most important NNSA objectives. As a result, the governance model:

- Establishes priorities through five standardized performance objectives;
- Promotes a strategic Governance and Oversight framework based on prudent management of risk, accountability, transparency, and trust;
- Increases contractor accountability to demonstrate performance through compelling evidence; and
- Applies a consistent nuclear security enterprise-wide approach to evaluating contractor performance.

There are no other updates to this section.

8.10.3 Wireless Technology

The project is on hold because of funding constraints. There are no other updates to this section.

8.10.4 One Identification Access Control

A visitor registration and physical access solution that integrates clearance and General Services Administration credential data with site-specific human resource data was successfully piloted. NNSA will continue the pilot stage with a plan to have initial operating capability by May 2014 and full operating capability by the summer of 2014. Savings will be realized when the project is fully implemented.

There are no other updates to this section.

8.10.5 NNSA Network Vision

NNSA Network Vision (2NV) requires implementing a suite of IT initiatives to realize the annual benefit. 2NV will provide a state-of-the-art technology infrastructure supporting shared services across the nuclear security enterprise. The initiative will create a new architecture for NNSA's IT environment to provide a secure set of capabilities, including unified networking, federated identity services, agile cloud infrastructure, and next-generation collaboration services.

2NV will provide utility services that can be leveraged by future Federal or contractor investments to improve the security of sensitive unclassified NNSA data and to lower IT costs. In addition, 2NV will provide a dramatic step forward in collaboration capabilities by delivering a federated, unclassified, unified communications capability and deploying a secure, agency-wide, internal social network.

There are no other updates to this section.

8.10.6 Business Management Advisory Council

The Business Management Advisory Council was discontinued and replaced by the NNSA Operations Council (see Section 8.10.9). This is the last year to report the Business Management Advisory Council.

There are no other updates to this section.

8.10.7 Defense Programs Enterprise Portfolio Analysis Tool

Enterprise Portfolio Analysis Tool (EPAT) enhancements from FY 2014 SSMP have been implemented, *e.g.*, EPAT integration with the DOE Standard Accounting and Reporting System. This is the last year to report on EPAT.

There are no other updates to this section.

8.10.8 Defense Programs Work Breakdown Structure

There are no updates to this section.

8.10.9 NNSA Operations Council

The NNSA Operations Council was established in 2013 to evaluate ideas for achieving efficiencies within NNSA while minimizing impacts on mission deliverables. The NNSA Operations Council includes the Chief Operating Officers from each of NNSA's M&O partners and senior Federal leaders from NNSA. At the September 2013 meeting, the Council identified specific options to achieve cost savings in FY 2014 totaling approximately $80 million. These savings consisted, for example, of staffing reductions at several nuclear security enterprise sites and reductions in M&O travel.

8.10.10 Builder Sustainment Management System

NNSA is implementing the Builder Sustainment Management System (BSMS) to assess and track the condition of its infrastructure at the nuclear security enterprise level. BSMS is a knowledge-based management system as recommended in the National Academy of Sciences' most recent report on Federal infrastructure, *Predicting Outcomes of Investments in Maintenance and Repair of Federal Facilities*, and as recently directed by DOD for all defense agencies and military services. BSMS will augment NNSA's financially based understanding of projected infrastructure conditions by adding a quantified, risk-informed analysis that is easily correlated to mission commitments. NNSA will integrate BSMS with existing site condition assessment systems to the greatest extent possible. BSMS will enable NNSA to quantify and communicate more clearly the risks it accepts at current levels of direct and indirect funded maintenance and to project those risks forward for different budget scenarios. BSMS will support risk-informed allocation of limited direct and indirect infrastructure funding and identify opportunities to use direct and indirect funds in targeted acquisition strategies and programmatic efforts.

8.10.11 Expansion of Strategic Procurements

The Roof Asset Management Program (RAMP) is an example of a model for strategic NNSA-wide procurement. RAMP is a unique, corporate approach to manage roofs across the nuclear security enterprise. By treating roofs at multiple sites as an aggregate portfolio and earmarking a reliable funding stream, attracting the technical expertise of 'best of class' national roofing consultants and contractors, NNSA is achieving greater consistency of condition assessments and economies of scale in roof repairs and replacements. Through this program, resources have been directed to the most compelling roofing deficiencies, resulting in significant savings and enhancement of the value added to the facilities portfolio through optimal repairs. The program has executed timely assessment and repair of major storm damages at Pantex, and the shared lessons learned have improved safety and scheduling and reduced overhead at all participating sites. Because of the effectiveness of the partnership among Headquarters, the field offices, and the M&Os, the RAMP contract has been renewed with a nationally recognized contractor. Economies of scale and overhead savings are achieved by directing the work for all participating sites to that contractor through a single site M&O. NNSA's goal is to apply the RAMP model to other common acquisitions to achieve greater efficiency in numerous infrastructure procurements that are currently made via individual contracts at each site.

8.10.12 Generation 2 Program Management System

The Program Executive Office is in the early stages of applying the Enterprise Management Information System Generation 2 (G2) to improve select business processes and efficiencies. Initially developed in 2007 as a tool to manage projects and programs for the Global Threat Reduction Initiative, G2 now serves as a vehicle to manage workflow, track financial performance, and provide reports to the NNSA Office of Infrastructure and Operations on operational initiatives and the status of some infrastructure activities. The system will ultimately be used by the Office of Infrastructure and Operations and the field offices to pilot methods to improve activities such as federally funded travel, executive site status reports, project schedules, and contractor performance evaluations. G2 allows NNSA to track and forecast performance objectively and consistently against requirements to prioritize the investment of scarce resources.

Chapter 9
Conclusion

This FY 2015 SSMP, including its classified Annex, captures the activities to be conducted across the programs and organizations of the nuclear security enterprise over the next 25 years. This FY 2015 SSMP is a summary of the plan, including a discussion of updates to the *Fiscal Year 2014 Stockpile Stewardship and Management Plan*. Its purpose is to define the strategy to ensure the Nation's nuclear deterrent continues to be safe, secure, and effective without underground nuclear tests. Along with its predecessor, the FY 2014 SSMP, this year's plan comprises the total Stockpile Stewardship Program. It was produced by NNSA's Federal workforce in collaboration with the national security laboratories, the nuclear weapons production facilities, and the Nevada National Security Site, whose workforce will execute the technical activities. Also, it was closely coordinated with the Department of Defense[1] (DOD) via the Nuclear Weapons Council.

The plan balances the capabilities (1) to assess, surveil, and maintain the stockpile, conduct life extension programs, and dismantle retired weapons; (2) to conduct research, development, testing, and evaluation using experimental facilities and simulation codes to understand weapons performance and the effects of anomalies, material property changes, and component aging and to develop leading edge technologies; (3) to certify with confidence all changes to the stockpile owing to alterations, modifications, and life extension programs; and (4) to sustain and modernize the infrastructure that supports design, qualification, assessment, and production of the stockpile. To balance these four elements, NNSA must continue to recruit new stockpile stewards and to develop, maintain, and refresh the essential skills of its Federal and contractor workforce; must ensure safety and security of the Nation's nuclear weapons, nuclear materials, infrastructure, personnel, and sensitive data; and must identify and implement business efficiencies to increase the focus of its resources on the core stockpile mission. Moreover, NNSA must be mindful of the need to mitigate the effects of technological obsolescence. Obsolescence results in legacy weapon components that can no longer be manufactured. In addition, advances in high performance computing are moving beyond the massively parallel processing technology on which predictive, integrated weapon simulation codes have relied since 1995. Technological obsolescence also presents numerous challenges with regard to infrastructure sustainment and modernization.

Through the Nuclear Weapons Council, DOE and DOD are continuing to implement the 3+2 strategy. This comprehensive strategy puts the Nation on the path to a smaller stockpile with fewer weapon types to be maintained and serviced. Since the 3+2 strategy includes interoperability on different delivery platforms, it will still provide sufficient performance diversity. The strategy for stockpile modernization requires applying predictive science, modernizing the physical infrastructure, employing a highly skilled workforce, and sustaining the stockpile. This strategy will reduce the 12 distinct warhead types to three interoperable warheads deployed on both the submarine-launched and the intercontinental ballistic missile legs of the Triad and to two interoperable air-delivered weapons (one bomb type and one cruise missile type). The 3+2 strategy with respect to the B61-12 will, for example, greatly reduce the number

[1] *DOD establishes the military requirements; designs, tests, and produces the delivery systems; secures and maintains weapons in its custody; and is accountable for operating weapons systems.*

and types of bombs in the air leg of the Triad and will allow the option to retire the B83. The long-term strategy for the Nation's stockpile will also incorporate new safety and security features (*e.g.*, the use of insensitive high explosives, which are much less sensitive to inadvertent initiation as a result of unintended shock and heat exposure and to unauthorized detonation) and will allow for a decreased stockpile hedge without increasing the risk.

The policy framework for the stockpile has not changed since the FY 2014 SSMP. Completion of the W76-1 production to replace aged warheads is on schedule for 2019. However, a number of changes have occurred that reflect the reality of budget constraints. The date for the first production unit of the W88 Alt 370 to modernize the arming, fuzing, and firing system and improve surety has slipped from FY 2019 to FY 2020. The first production unit for the B61-12, which will consolidate and replace the B61-3, -4, -7, and -10, has moved from FY 2019 to FY 2020, with completion of production at the end of FY 2024.[2] The first production unit for the W78/88-1 (the first interoperable warhead, the IW-1) has shifted to FY 2030, in deference to the Air Force cruise missile warhead, with the FY 2014 and FY 2015 IW-1 activities being focused on congressionally directed alternative studies. The first production unit for the cruise missile warhead (also known as the 'long range standoff' system) is planned for FY 2027, although a change to the funding profile would allow this to occur up to 2 years earlier. Both the IW-1 and the cruise missile warhead life extension programs will make use of the non-nuclear technologies designed and developed for the B61-12. The first production unit for the IW-2 and IW-3 are tentatively scheduled for FY 2034 and FY 2041, respectively. Furthermore, the schedules for the Integrated Priority List for capital construction (Figure 5–2) and the Defense Nuclear Security Projects (Figure 5–3) have been updated to reflect delays or deferrals. Budget constraints will delay the completion of several approved projects on the Integrated Priority List by 1–3 years. In addition, the delay of several projects for a number of years will potentially increase the cost and risk and impact the availability of unique mission-required capabilities.

NNSA is assessing a methodical, revised approach to the plutonium strategy to end operations by 2019 in the Chemistry and Metallurgy Research facility (which was built in 1952) and to optimize the plutonium capability. This revised plutonium strategy includes a three-step approach that maximizes use of the Radiological Laboratory Utility Office Building (RLUOB) for analytical chemistry work, repurposes laboratory space in the Plutonium Facility (PF-4), and may construct modular additions to PF-4 for high-risk plutonium operations. This approach would result in a cost-effective solution to enhancing the plutonium capability and an alternative to constructing the Chemistry and Metallurgy Research Replacement Nuclear Facility (CMRR-NF). The approach is also responsive to planned life extension programs such as the IW-1 that delays the need to ramp up to 30 pits per year until FY 2026. Until the analysis is complete, NNSA has postponed the start of two approved projects: the construction of a tunnel from PF-4 to RLUOB and the construction of CMRR-NF.

A significant addition to the FY 2015 SSMP since last year's SSMP is initiation of a strategy to develop a ten-year plan, as requested by Congress in the National Defense Authorization Act for Fiscal Year 2014, in order to acquire an exascale computing capability, which will be a thousand times faster than NNSA's present capability. Appendix F discusses the need for such a capability and NNSA's initial approach to developing a strategy to acquire advanced computing technologies to support stockpile stewardship. In addition, a mission needs statement was prepared to enhance the capabilities to diagnose plutonium behavior in the late stages of a primary implosion using deeper-penetrating flash radiography and neutron reactivity on subcritical experiments in Nevada.

[2] *There will be component production and closeout activities in FY 2025.*

With these updates, NNSA has a fully coordinated, long-term plan for a safe, secure, and effective nuclear deterrent without underground nuclear testing. The stockpile portion of this plan supports all DOD requirements. While managing increased risk in the infrastructure, this plan takes steps forward in achieving a responsive infrastructure. The science of stewardship is supported at a level sufficient for the immediate requirements of the stockpile, but stewardship activities may need to increase in the future to provide options to address stockpile requirements. While this plan will almost certainly have to be adjusted in the future, it currently represents the best combined judgment of the experts who manage the Nation's stockpile. Equally important, it provides exciting and incredibly challenging work for the people who have devoted a significant part of their lives to providing a safe, secure, and effective deterrent as long as nuclear weapons exist.

Appendix A
Requirements Mapping

A.1 National Nuclear Security Administration Response to Statutory Reporting Requirements and Related Requests

The FY 2015 SSMP consolidates a number of statutory reporting requirements and related congressional requests. This appendix maps the statutory and congressional requests to their respective SSMP chapter and section.

FY 2014 National Defense Authorization Act, Pub. L. 113-66, Sec. 3129	*FY 2014 Response*	*FY 2015 Response/Updates*
SEC. 3129. PLAN FOR DEVELOPING EXASCALE COMPUTING AND INCORPORATING SUCH COMPUTING INTO THE STOCKPILE STEWARDSHIP PROGRAM.		
(a) PLAN REQUIRED.—The Administrator for Nuclear Security shall develop and carry out a plan to develop exascale computing and incorporate such computing into the stockpile stewardship program under section 4201 of the Atomic Energy Defense Act (50 U.S.C. 2521) during the 10-year period beginning on the date of the enactment of this Act.	*N/A*	*Unclassified* Chapter 3, Sections 3.5.3, 3.7.2; Appendix F
(b) MILESTONES.—The plan required by subsection (a) shall include major programmatic milestones in— (1) the development of a prototype exascale computer for the stockpile stewardship program; and (2) mitigating disruptions resulting from the transition to exascale computing.	*N/A*	*Unclassified* Chapter 3, Sections 3.5.3, 3.7.2; Appendix F
(c) COORDINATION WITH OTHER AGENCIES.—In developing the plan required by subsection (a), the Administrator shall coordinate, as appropriate, with the Under Secretary of Energy for Science, the Secretary of Defense, and elements of the intelligence community (as defined in section 3(4) of the National Security Act of 1947 (50 U.S.C. 3003(4))).	*N/A*	*Unclassified* Chapter 3, Section 3.7.2
(d) INCLUSION OF COSTS IN FUTURE-YEARS NUCLEAR SECURITY PROGRAM.—The Administrator shall— (1) address, in the estimated expenditures and proposed appropriations reflected in each future-years nuclear security program submitted under section 3253 of the National Nuclear Security Administration Act (50 U.S.C. 2453) during the 10-year period beginning on the date of the enactment of this Act, the costs of— (A) developing exascale computing and incorporating such computing into the stockpile stewardship program; and (B) mitigating potential disruptions resulting from the transition to exascale computing; and (2) include in each such future-years nuclear security program a description of the costs of efforts to develop exascale computing borne by the National Nuclear Security Administration, the Office of Science of the Department of Energy, other Federal agencies, and private industry.	*N/A*	*Unclassified* Chapter 8, Section 8.3.4

FY 2014 National Defense Authorization Act, Pub. L. 113-66, Sec. 3129	*FY 2014 Response*	*FY 2015 Response/Updates*
(e) SUBMISSION TO CONGRESS.—The Administrator shall submit the plan required by subsection (a) to the congressional defense committees with each summary of the plan required by subsection (a) of section 4203 of the Atomic Energy Defense Act (50 U.S.C. 2523) submitted under subsection (b)(1) of that section during the 10-year period beginning on the date of the enactment of this Act.	*N/A*	
(f) EXASCALE COMPUTING DEFINED.—In this section, the term ''exascale computing'' means computing through the use of a computing machine that performs near or above 10 to the 18th power floating point operations per second.	*N/A*	

A.2 Ongoing Requirements

50 U.S. Code Sec. 2521	*FY 2014 Response*	*FY 2015 Response/Updates*
Sec. 2521. Stockpile stewardship program (a) Establishment The Secretary of Energy, acting through the Administrator for Nuclear Security, shall establish a stewardship program to ensure – (1) the preservation of the core intellectual and technical competencies of the United States in nuclear weapons, including weapons design, system integration, manufacturing, security, use control, reliability assessment, and certification; and (2) that the nuclear weapons stockpile is safe, secure, and reliable without the use of underground nuclear weapons testing.	*Unclassified* Chapters 2, 3 ——— *Classified* Chapters 2, 3	*Unclassified* Chapters 2, 3 ——— *Classified* Chapters 2, 3
(b) Program elements The program shall include the following:	*Unclassified* Chapters 2, 3	*Unclassified* Chapters 2, 3
(1) An increased level of effort for advanced computational capabilities to enhance the simulation and modeling capabilities of the United States with respect to the performance over time of nuclear weapons.	*Unclassified* Chapter 2, Section 2.6; Chapter 3 ——— *Classified* Chapter 3, Section 3.4	*Unclassified* Chapter 2, Section 2.6; Chapter 3 ——— *Classified* Chapter 3, Section 3.4
(2) An increased level of effort for above-ground experimental programs, such as hydrotesting, high-energy lasers, inertial confinement fusion, plasma physics, and materials research.	*Unclassified* Chapter 2, Section 2.6; Chapter 3 ——— *Classified* Chapter 3, Sections 3.4, 3.8.1, 3.8.2	*Unclassified* Chapter 2, Section 2.6; Chapter 3 ——— *Classified* Chapter 3, Sections 3.4, 3.8.1, 3.8.2
(3) Support for new facilities construction projects that contribute to the experimental capabilities of the United States, such as an advanced hydrodynamics facility, the National Ignition Facility, and other facilities for above-ground experiments to assess nuclear weapons effects.	*Unclassified* Chapter 5, Section 5.1, 5.3.1, Table 5-1, Figure 5-2	*Unclassified* Chapter 5, Section 5.1, 5.3.1, Table 5-1, Figure 5-2

50 U.S. Code Sec. 2521	*FY 2014 Response*	*FY 2015 Response/Updates*
(4) Support for the use of, and experiments facilitated by, the advanced experimental facilities of the United States, including - (A) the National Ignition Facility at Lawrence Livermore National Laboratory; (B) the Dual Axis Radiographic Hydrodynamic Testing facility at Los Alamos National Laboratory; (C) the Z Machine at Sandia National Laboratories; and (D) the experimental facilities at the Nevada National Security Site.	*Unclassified* Chapter 3, Sections 3.4, 3.5 ——— *Classified* Chapter 3, Section 3.4	*Unclassified* Chapter 3, Section 3.5 ——— *Classified* Chapter 3, Section 3.4
(5) Support for the sustainment and modernization of facilities with production and manufacturing capabilities that are necessary to ensure the safety, security, and reliability of the nuclear weapons stockpile, including - (A) the nuclear weapons production facilities; and (B) production and manufacturing capabilities resident in the national security laboratories.	*Unclassified* Chapter 2, Sections 2.5, 2.6.4; Chapter 5, Sections 5.1, 5.2, 5.3, Figure 5-2 ——— *Classified* Chapter 2, Sections 2.4.2, 2.4.3	*Unclassified* Chapter 2, Sections 2.5, 2.6; Chapter 5, Sections 5.1, 5.2, 5.3, Figure 5-2 ——— *Classified* Chapter 2, Sections 2.4.2, 2.4.3

50 U.S. Code Sec. 2522	*FY 2014 Response*	*FY 2015 Response/Updates*
Sec. 2522. Report on stockpile stewardship criteria		
(a) Requirement for criteria The Secretary of Energy shall develop clear and specific criteria for judging whether the science-based tools being used by the Department of Energy for determining the safety and reliability of the nuclear weapons stockpile are performing in a manner that will provide an adequate degree of certainty that the stockpile is safe and reliable.	*Unclassified* Chapter 2, Section 2.3.2 ——— *Classified* Chapter 2, Section 2.2	*Unclassified* Chapter 2, Section 2.3 ——— *Classified* Chapter 2, Section 2.2
(b) Coordination with Secretary of Defense The Secretary of Energy, in developing the criteria required by subsection (a), shall coordinate with the Secretary of Defense.	*Unclassified* Chapter 2, Section 2.3.2	*Unclassified* Chapter 2, Section 2.3

50 U.S. Code Sec. 2523	*FY 2014 Response*	*FY 2015 Response/Updates*
Sec. 2523. Nuclear weapons stockpile stewardship, management, and infrastructure plan		
(a) Plan requirement The Administrator, in consultation with the Secretary of Defense and other appropriate officials of the departments and agencies of the Federal Government, shall develop and annually update a plan for sustaining the nuclear weapons stockpile. The plan shall cover, at a minimum, stockpile stewardship, stockpile management, stockpile surveillance, program direction, infrastructure modernization, human capital, and nuclear test readiness. The plan shall be consistent with the programmatic and technical requirements of the most recent annual Nuclear Weapons Stockpile Memorandum.		
(b) Submissions to Congress		
(1) In accordance with subsection (c), not later than March 15 of each even-numbered year, the Administrator shall submit to the congressional defense committees a summary of the plan developed under subsection (a).		

50 U.S. Code Sec. 2523	*FY 2014 Response*	*FY 2015 Response/Updates*
(2) In accordance with subsection (d), not later than March 15 of each odd-numbered year, the Administrator shall submit to the congressional defense committees a detailed report on the plan developed under subsection (a).		
(3) The summaries and reports required by this subsection shall be submitted in unclassified form, but may include a classified annex.		
'**(c) ELEMENTS OF BIENNIAL PLAN SUMMARY**.—Each summary of the plan submitted under subsection (b)(1) shall include, at a minimum, the following:	N/A	Unclassified Chapters 2, 3, 4, 5, 6, 8
(1) A summary of the status of the nuclear weapons stockpile, including the number and age of warheads (including both active and inactive) for each warhead type.	N/A	Unclassified Chapter 2, Sections 2.2, 2.3, 2.6
(2) A summary of the status, plans, budgets, and schedules for warhead life extension programs and any other programs to modify, update, or replace warhead types.	N/A	Unclassified Chapter 2, Sections 2.2, 2.4, 2.6, 2.7; Chapter 8
(3) A summary of the methods and information used to determine that the nuclear weapons stockpile is safe and reliable, as well as the relationship of science-based tools to the collection and interpretation of such information.	N/A	Unclassified Chapter 2, Section 2.2, 2.3; Chapter 3, Sections 3.2, 3.2.3, 3.5, 3.7
(4) A summary of the status of the nuclear security enterprise, including programs and plans for infrastructure modernization and retention of human capital, as well as associated budgets and schedules.	N/A	Unclassified Chapter 5; Chapter 6, Sections 6.2, 6.2.2, 6.2.3, 6.3.1
(5) Identification of any modifications or updates to the plan since the previous summary or detailed report was submitted under subsection (b).	N/A	Chapters 1, 2, 3, 5, 6, 7, 8; Appendix F
(6) Such other information as the Administrator considers appropriate.	N/A	Chapter 1
(d) ELEMENTS OF BIENNIAL DETAILED REPORT.—Each detailed report on the plan submitted under subsection (b)(2) shall include, at a minimum, the following:	*Unclassified* Chapters 2, 3, 4, 5, 6, 8 ——— *Classified 2, 3*	
(1) With respect to stockpile stewardship and management—		
(A) the status of the nuclear weapons stockpile, including the number and age of warheads (including both active and inactive) for each warhead type;	*Unclassified* Chapter 2, Sections 2.2.1, 2.2.2 ——— *Classified* Chapter 2, Sections 2.1, 2.2, 2.3, 2.4	*Unclassified* Chapter 2, Section 2.2 ——— *Classified* Chapter 2, Sections 2.1, 2.2, 2.3, 2.4

50 U.S. Code Sec. 2523	*FY 2014 Response*	*FY 2015 Response/Updates*
(B) for each five-year period occurring during the period beginning on the date of the report and ending on the date that is 20 years after the date of the report— (i) the planned number of nuclear warheads (including active and inactive) for each warhead type in the nuclear weapons stockpile; and (ii) the past and projected future total lifecycle cost of each type of nuclear weapon;	*Unclassified* Chapter 2, Sections 2.3, 2.6, 2.6.4; Chapter 8, Sections 8.8, 8.9 ——— *Classified* Chapter 2, Section 2.1.2	*Unclassified* Chapter 2, Sections 2.3, 2.6; Chapter 8, Sections 8.8, 8.9 ——— *Classified* Chapter 2, Section 2.1.2
(C) the status, plans, budgets, and schedules for warhead life extension programs and any other programs to modify, update, or replace warhead types;	*Unclassified* Chapter 2, Sections 2.1, 2.2, 2.4, 2.6 ; Chapter 3, Sections 3.2.1, 3.2.2, 3.2.3, 3.3; Chapter 8, Section 8.9 ——— *Classified* Chapter 2, Sections 2.5, 2.6	*Unclassified* Chapter 2, Sections 2.1, 2.2, 2.4, 2.6 ; Chapter 3, Sections 3.2.1, 3.2.2, 3.2.3 ; Chapter 8, Section 8.9 ——— *Classified* Chapter 2, Sections 2.5, 2.6
(D) a description of the process by which the Administrator assesses the lifetimes, and requirements for life extension or replacement, of the nuclear and non-nuclear components of the warheads (including active and inactive warheads) in the nuclear weapons stockpile;	*Unclassified* Chapter 2, Sections 2.2, 2.3, 2.6; Chapter 3, Sections 3.2, 3.3, 3.4	*Unclassified* Chapter 2, Sections 2.2, 2.3, 2.6; Chapter 3, Sections 3.2, 3.3,
(E) a description of the process used in recertifying the safety, security, and reliability of each warhead type in the nuclear weapons stockpile;	*Unclassified* Chapter 2, Sections 2.2, 2.3, Figure 2-5; Chapter 3, Sections 3.2.3, 3.4 ——— *Classified* Chapter 2, Section 2.3; Chapter 3, Section 3.4	*Unclassified* Chapter 2, Sections 2.2, 2.3; Chapter 3, Section 3.2.3 ——— *Classified* Chapter 2, Section 2.3; Chapter 3, Section 3.4
(F) any concerns of the Administrator that would affect the ability of the Administrator to recertify the safety, security, or reliability of warheads in the nuclear weapons stockpile (including active and inactive warheads);	*Classified* Chapter 2, Section 2.2	*Classified* Chapter 2
(G) mechanisms to provide for the manufacture, maintenance, and modernization of each warhead type in the nuclear weapons stockpile, as needed;	*Unclassified* Chapter 2, Sections 2.4, 2.6; Chapter 3, Sections 3.2, 3.3 ——— *Classified* Chapter 2, Section 2.5	*Unclassified* Chapter 2, Sections 2.4, 2.6; Chapter 3, Sections 3.2 ——— *Classified* Chapter 2, Section 2.5
(H) mechanisms to expedite the collection of information necessary for carrying out the stockpile management program required by section 2524 of this title, including information relating to the aging of materials and components, new manufacturing techniques, and the replacement or substitution of materials;	*Unclassified* Chapter 2, Sections 2.2.3, 2.6.3; Chapter 3, Sections 3.3, 3.4.3	*Unclassified* Chapter 2, Sections 2.2, 2.6

50 U.S. Code Sec. 2523	*FY 2014 Response*	*FY 2015 Response/Updates*
(I) mechanisms to ensure the appropriate assignment of roles and missions for each national security laboratory and nuclear weapons production facility, including mechanisms for allocation of workload, mechanisms to ensure the carrying out of appropriate modernization activities, and mechanisms to ensure the retention of skilled personnel;	*Unclassified* Chapter 2, Sections 2.5, 2.6.4; Chapter 6, Sections 6.2.1, 6.2.3, 6.3, 6.3.2; Chapter 8, Section 8.10.2; Appendix E	*Unclassified* Chapter 2, Sections 2.5, 2.6; Chapter 6, Section 6.2.3; Chapter 8, Section 8.9.2
(J) mechanisms to ensure that each national security laboratory has full and complete access to all weapons data to enable a rigorous peer-review process to support the annual assessment of the condition of the nuclear weapons stockpile required under section 2525;	*Unclassified* Chapter 2, Section 2.2.2	*No updates*
(K) mechanisms for allocating funds for activities under the stockpile management program required by section 4204, including allocations of funds by weapon type and facility; and	*Unclassified* Chapter 5; Chapter 8, Sections 8.1, 8.9, Table 8-1	*Unclassified* Chapter 5; Chapter 8
(L) for each of the five fiscal years following the fiscal year in which the report is submitted, an identification of the funds needed to carry out the program required under section 2524.	*Unclassified* Chapter 8	*Unclassified* Chapter 8
(2) With respect to science-based tools—		
(A) a description of the information needed to determine that the nuclear weapons stockpile is safe and reliable;	*Unclassified* Chapter 2, Sections 2.2, 2.3; Chapter 3, Section 3.4 ——— *Classified* Chapter 2, Sections 2.2, 2.3; Chapter 3, Section 3.4	*Unclassified* Chapter 2, Sections 2.2, 2.3 ——— *Classified* Chapter 2, Sections 2.2, 2.3; Chapter 3, Section 3.4
(B) for each science-based tool used to collect information described in subparagraph (A), the relationship between such tool and such information and the effectiveness of such tool in providing such information based on the criteria developed pursuant to section 2522(a) of this title; and	*Unclassified* Chapter 3, Section 3.5 ——— *Classified* Chapter 2, Section 2.3.1; Chapter 3, Section 3.4	*Unclassified* Chapter 3, Section 3.5 ——— *Classified* Chapter 2, Section 2.3.1; Chapter 3, Section 3.4
(C) the criteria developed under section 2522(a) of this title (including any updates to such criteria).		

50 U.S. Code Sec. 2523	*FY 2014 Response*	*FY 2015 Response/Updates*
(3) An assessment of the stockpile stewardship program under section 2521 (a) of this title by the Administrator, in consultation with the directors of the national security laboratories, which shall set forth—	*Unclassified* Chapters 2, 3	*Unclassified* Chapters 2, 3
(A) an identification and description of— (i) any key technical challenges to the stockpile stewardship program; and (ii) the strategies to address such challenges without the use of nuclear testing;	*Unclassified* Chapter 2, Section 2.6; Chapter 3, Section 3.4 ——— *Classified* Chapter 2, Sections 2.2, 2.3; Chapter 3, Section 3.4	*Unclassified* Chapter 2, Section 2.6 ——— *Classified* Chapter 2, Sections 2.2, 2.3; Chapter 3, Section 3.4
(B) a strategy for using the science-based tools (including advanced simulation and computing capabilities) of each national security laboratory to ensure that the nuclear weapons stockpile is safe, secure, and reliable without the use of nuclear testing;	*Unclassified* Chapter 2, Section 2.6; Chapter 3, Sections 3.4, 3.5 ——— *Classified* Chapter 3, Section 3.4	*Unclassified* Chapter 2, Section 2.6; Chapter 3, Section 3.5 ——— *Classified* Chapter 3, Section 3.4
(C) an assessment of the science-based tools (including advanced simulation and computing capabilities) of each national security laboratory that exist at the time of the assessment compared with the science-based tools expected to exist during the period covered by the future-years nuclear security program; and	*Unclassified* Chapter 3, Section 3.5 ——— *Classified* Chapter 3, Section 3.4, 3.8.1, 3.8.2	*Unclassified* Chapter 3, Section 3.5 ——— *Classified* Chapter 3, Section 3.4, 3.8.1, 3.8.2
(D) an assessment of the core scientific and technical competencies required to achieve the objectives of the stockpile stewardship program and other weapons activities and weapons-related activities of the Administration, including—	*Unclassified* Chapter 6	*Unclassified* Chapter 6
(i) the number of scientists, engineers, and technicians, by discipline, required to maintain such competencies; and	*Unclassified* Appendix E	*No updates*
(ii) a description of any shortage of such individuals that exists at the time of the assessment compared with any shortage expected to exist during the period covered by the future-years nuclear security program.	*Unclassified* Appendix E	*No updates*
(4) With respect to the nuclear security infrastructure—	*Unclassified* Chapters 1, 5	*Unclassified* Chapters 1, 5
(A) a description of the modernization and refurbishment measures the Administrator determines necessary to meet the requirements prescribed in—	*Unclassified* Chapter 5	*Unclassified* Chapter 5
(i) the national security strategy of the United States as set forth in the most recent national security strategy report of the President under section 404a of this title if such strategy has been submitted as of the date of the plan;	*Unclassified* Chapter 5	*Unclassified* Chapter 5

50 U.S. Code Sec. 2523	*FY 2014 Response*	*FY 2015 Response/Updates*
(ii) the most recent quadrennial defense review if such strategy has not been submitted as of the date of the plan; and	*Unclassified* Chapter 5	*Unclassified* Chapter 5
(iii) the most recent Nuclear Posture Review as of the date of the plan;	*Unclassified* Introduction; Chapter 5	*Unclassified* Introduction; Chapter 5
(B) a schedule for implementing the measures described under subparagraph (A) during the 10-year period following the date of the plan; and	*Unclassified* Chapter 5, Section 5.3.1, Figure 5-2	*Unclassified* Chapter 5, Section 5.3.1, Figure 5-2
(C) the estimated levels of annual funds the Administrator determines necessary to carry out the measures described under subparagraph (A), including a discussion of the criteria, evidence, and strategies on which such estimated levels of annual funds are based.	*Unclassified* Chapter 8	*Unclassified* Chapter 8
(5) With respect to the nuclear test readiness of the United States**—**	*Unclassified* Chapters 2, 4; Appendix C	*No updates*
(A) an estimate of the period of time that would be necessary for the Administrator to conduct an underground test of a nuclear weapon once directed by the President to conduct such a test;	*Unclassified* Chapter 4, Sections 4.1, 4.2, 4.3; Appendix C, Section C.1 ——— *Classified* Chapter 2, Section 2.2	*No updates*
(B) a description of the level of test readiness that the Administrator, in consultation with the Secretary of Defense, determines to be appropriate;	*Unclassified* Chapter 4, Sections 4.1, 4.4; Appendix C, Section C.1 ——— *Classified* Chapter 2, Section 2.2	*No updates*
(C) a list and description of the workforce skills and capabilities that are essential to carrying out an underground nuclear test at the Nevada National Security Site;	*Unclassified* Appendix C, Section C.2.1, Tables C-2, C-3, C-4 ——— *Classified* Chapter 2, Section 2.2	*No updates*
(D) a list and description of the infrastructure and physical plants that are essential to carrying out an underground nuclear test at the Nevada National Security Site; and	*Unclassified* Chapter 5, Sections 5.1, 5.2, Table 5-1; Appendix E	*Unclassified* Chapter 5, Sections 5.1, 5.2, Table 5-1
(E) an assessment of the readiness status of the skills and capabilities described in subparagraph (C) and the infrastructure and physical plants described in subparagraph (D).	*Unclassified* Appendix C, Section C.2.1	*No Updates*

50 U.S. Code Sec. 2523	*FY 2014 Response*	*FY 2015 Response/Updates*
(6) A strategy for the integrated management of plutonium for stockpile and stockpile stewardship needs over a 20-year period that includes the following:	*Requirement for Biennial Detailed Report (FY 2016 SSMP)*	*Requirement for Biennial Detailed Report (FY 2016 SSMP)*
(A) An assessment of the baseline science issues necessary to understand plutonium aging under static and dynamic conditions under manufactured and nonmanufactured plutonium geometries.	*N/A*	*N/A*
(B) An assessment of scientific and testing instrumentation for plutonium at elemental and bulk conditions.	*N/A*	*N/A*
(C) An assessment of manufacturing and handling technology for plutonium and plutonium components.	*N/A*	*N/A*
(D) An assessment of computational models of plutonium performance under static and dynamic loading, including manufactured and nonmanufactured conditions.	*N/A*	*N/A*
(E) An identification of any capability gaps with respect to the assessments described in subparagraphs (A) through (D).	*N/A*	*N/A*
(F) An estimate of costs relating to the issues, instrumentation, technology, and models described in subparagraphs (A) through (D) over the period covered by the future-years nuclear security program under section 2453 of this title.	*N/A*	*N/A*
(G) An estimate of the cost of eliminating the capability gaps identified under subparagraph (E) over the period covered by the future-years nuclear security program.	*N/A*	*N/A*
(H) Such other items as the Administrator considers important for the integrated management of plutonium for stockpile and stockpile stewardship needs.	*N/A*	*N/A*
(7) Identification of any modifications or updates to the plan since the previous summary or detailed report was submitted under subsection (b).	*Unclassified* Introduction; Chapter 1	*Unclassified* Introduction; Chapter 1
(f) DEFINITIONS.—In this section: (1) The term 'budget', with respect to a fiscal year, means the budget for that fiscal year that is submitted to Congress by the President under section 1105(a) of Title 31. (2) The term 'future-years nuclear security program' means the program required by section 2453 of this Title.		
(3) The term 'nuclear security budget materials', with respect to a fiscal year, means the materials submitted to Congress by the Administrator in support of the budget for that fiscal year. (4) The term 'quadrennial defense review' means the review of the defense programs and policies of the United States that is carried out every four years under section 118 of Title 10. (5) The term 'weapons activities' means each activity within the budget category of weapons activities in the budget of the Administration.		
(6) The term 'weapons-related activities' means each activity under the Department of Energy that involves nuclear weapons, nuclear weapons technology, or fissile or radioactive materials, including activities related to— (A) nuclear nonproliferation; (B) nuclear forensics; (C) nuclear intelligence; (D) nuclear safety; and (E) nuclear incident response.''		

50 U.S. Code Sec. 2524	*FY 2014 Response*	*FY 2015 Response/Updates*
Sec. 2524. Stockpile management program (a) Program required		
The Secretary of Energy, acting through the Administrator for Nuclear Security and in consultation with the Secretary of Defense, shall carry out a program, in support of the stockpile stewardship program, to provide for the effective management of the weapons in the nuclear weapons stockpile, including the extension of the effective life of such weapons. The program shall have the following objectives:		
(1) To increase the reliability, safety, and security of the nuclear weapons stockpile of the United States.	*Unclassified* Chapter 2, Section 2.6 ——— *Classified* Chapter 2, Section 2.6	*Unclassified* Chapter 2, Section 2.6 ——— *Classified* Chapter 2, Section 2.6
(2) To further reduce the likelihood of the resumption of underground nuclear weapons testing.	*Unclassified* Chapter 3, Section 3.4 ——— *Classified* Chapter 3, Section 3.4	*No updates*
(3) To achieve reductions in the future size of the nuclear weapons stockpile.	*Unclassified* Chapter 2, Section 2.6 ——— *Classified* Chapter 2, Section 2.1.3, 2.6	*Unclassified* Chapter 2, Section 2.6 ——— *Classified* Chapter 2, Section 2.1.3, 2.6
(4) To reduce the risk of an accidental detonation of an element of the stockpile.	*Unclassified* Chapter 2, Section 2.6.3; Chapter 3, Sections 3.3.3, 3.4.2 ——— *Classified* Chapter 2, Section 2.5.2; Chapter 3, Section 3.4.2	*No updates*
(5) To reduce the risk of an element of the stockpile being used by a person or entity hostile to the United States, its vital interests, or its allies.	*Unclassified* Chapter 2, Section 2.8; Chapter 3, Section 3.3.3; Chapter 7, Section 7.2 ——— *Classified* Section 3.4.2	*Unclassified* Chapter 7, Section 7.2 ——— *Classified* Section 3.4.2

50 U.S. Code Sec. 2524	*FY 2014 Response*	*FY 2015 Response/Updates*
(b) Program limitations In carrying out the stockpile management program under subsection (a), the Secretary of Energy shall ensure that -		
(1) any changes made to the stockpile shall be made to achieve the objectives identified in subsection (a); and	*Unclassified* Chapter 2, Section 2.6 ——— *Classified* Chapter 2, Sections 2.5, 2.6	*Unclassified* Chapter 2, Section 2.6 ——— *Classified* Chapter 2, Sections 2.5, 2.6
(2) any such changes made to the stockpile shall - (A) remain consistent with basic design parameters by including, to the maximum extent feasible, components that are well understood or are certifiable without the need to resume underground nuclear weapons testing; and (B) use the design, certification, and production expertise resident in the nuclear security enterprise to fulfill current mission requirements of the existing stockpile.	*Unclassified* Chapter 2, Section 2.6; Chapter 3, Sections 3.3, 3.4 ——— *Classified* Chapter 2, Section 2.6; Chapter 3, Section 3.4	*Unclassified* Chapter 2, Section 2.6 ——— *Classified* Chapter 2, Section 2.6; Chapter 3, Section 3.4
(c) Program budget In accordance with the requirements under section 2529 of this Title, for each budget submitted by the President to Congress under section 1105 of Title 31, the amounts requested for the program under this section shall be clearly identified in the budget justification materials submitted to Congress in support of that budget.	*Unclassified* Chapter 8, Section 8.1, Table 8-1	*Unclassified* Chapter 8

A.3 Other Requirements

No additional requirements for this FY 2015 SSMP.

Appendix B
Science, Technology, and Engineering Campaigns Subprograms

There are no updates to this appendix.

Appendix C
Nuclear Test Readiness

There are no updates to this appendix.

Appendix D
Physical Infrastructure Updates

There are no updates to this appendix.

Appendix E
Site Workforce Data

There are no updates to this appendix.

Appendix F
Exascale Computing

The ASC Campaign has created a new subprogram to develop a strategy to acquire the advanced computing technologies needed to support the Stockpile Stewardship Program in the future. This appendix discusses the need for an exascale capability and the strategy for advancing HPC for the stockpile.

F.1 Mission Need

The ASC Campaign's mission is to provide the simulation capabilities—that is, HPC, multi-physics IDCs, and physics and engineering models—required by NNSA for current and future stockpile work. The simulation capabilities developed by the ASC Campaign in the form of IDCs are a key integrating element used for weapon physics and engineering assessments of the Nation's stockpile. IDCs support design studies, maintenance analyses, the Annual Assessment Reports, LEPs, SFIs, warhead safety assessments, and weapons dismantlement. Much of the experimental data obtained by NNSA since the 1992 nuclear test moratorium, together with legacy underground nuclear tests and the accumulated experience of the DSW community, are embodied in IDCs and in the models, algorithms, and related physical databases developed for those codes and validated by high energy density experiments. IDCs are therefore a foundational and critical component for accomplishing the stockpile stewardship mission.

ASC fully recognizes the need for technological advances to acquire exascale computing capabilities, although that goal must currently be met within available programmatic resources. The present predictive capability of IDCs is sufficient for today's mission. However, as the life of the stockpile is extended and changes caused by aging, alterations, or LEPs move the stockpile further from the data collected in underground tests prior to 1992, maintaining the stockpile will require IDCs to be more predictive. Predictive capability is currently limited by insufficient fidelity in physics models (and hence requires additional data and theoretical insights) or by the spatial scale of simulations (and hence requires greater computational capabilities). These limitations drive the need to increase the complexity of codes and the number of simulations that, in turn, may ultimately require exascale-class computing.

F.2 Technical Hurdles

The simulation of nuclear weapons has evolved through three eras of computing: mainframe serial processing (1955–1979), vector processing (1979–1995), and the current massively parallel processors. The transitions for HPC and IDCs between these periods were challenging and occasionally turbulent. Each era required rethinking the models and algorithms, as well as adapting to dramatic changes in hardware architectures.

Since the dawn of massively parallel processors, IDCs have benefitted from a predictable evolution in computer technologies suitable for HPC. Unfortunately that era is rapidly ending. For the first time, the nuclear security enterprise's IDCs are at risk of performing more poorly on individual processors in a new computer than on individual processors of the computer it replaced; as a result, processors could be starved for data. This change is a result of continued applicability of Moore's Law (the observation that transistor density on integrated circuits increases at a geometric rate) and the end of Dennard Scaling (the progressive increase in the operating frequency of those transistors). Consequently, to continue to increase the peak capability of computers, multiple cores are being put onto a single chip. Unfortunately, memory systems are not keeping pace. The HPC industry is using millions of these multiple-core, memory-starved chips, often augmented by heterogeneous accelerators, in an attempt to achieve continued performance gains. However, the rate at which data can move from memory to cores is insufficient to keep the cores busy, resulting in a computing speed that is severely diminished relative to its theoretical peak. The decrease in single-processor performance will require purchasing significantly larger computers with more processors than would otherwise have been needed had the technology not significantly changed. This phenomenon is now so severe that, while peak speeds are increasing, the computing speeds are stagnating. NNSA's IDCs must be either redesigned or replaced to run efficiently on these new architectures; otherwise, the predictive capability to address stockpile stewardship requirements will be significantly impacted.

Two additional issues accompany this new era: electrical power consumption and the mean time to failure. The power required to store and move data from the file system to memory, and from memory to processors, has not decreased rapidly enough to keep pace with peak system performance. Various strategies such as memory hierarchies and algorithms are being investigated to minimize data movement and reduce power consumption. In addition, as the system scales to billions of components the fault tolerance becomes difficult to maintain. System software and IDCs will require modification to account for increased faults.

Without fundamental changes to the IDCs, execution run times will continue to deteriorate on the computer architectures that are coming to market. In short, progress in simulations, and hence in improving the quality of the results necessary to sustain the stockpile, will stall.

F.3 Objectives to Overcome Technical Hurdles

Given the issues above for increasing the IDC performance and sustaining a virtual testing capability, ASC must focus its effort on navigating the technology changes currently being driven by industry. The end of the massively parallel processor era has brought four key technical challenges to the forefront:

- Exploit exponentially growing parallelism.
- Reduce data movement.
- Manage power from component to system levels.
- Increase resiliency for faults at unprecedented scales.

ASC will focus on these four technical challenges through the following highly coordinated objectives:

- Build new algorithms and adapt IDCs to the new-era platforms.
- Work with industry to develop novel solutions for stewardship applications.
- Work with vendors to introduce new technology solutions into the platforms.

Based on past experience with transitions between different computing eras, NNSA must work closely with industry to ensure current IDCs will function on the new architectures, even if initially only at minimally efficient levels, until a new generation of IDCs is developed. While IDC development activities have traditionally involved interaction with vendors, NNSA will employ a more formal, encompassing approach going forward. Co-design centers will work with vendors to provide a comprehensive understanding of problems and potential solutions since the path forward is not clearly defined.

Technical challenges will be addressed by the new ASC subprogram, Advanced Technology Development and Mitigation, in the absence of a national exascale initiative. This subprogram will focus the efforts of the nuclear security enterprise on developing a strategy to acquire the advanced computing technologies. Within the Advanced Technology Development and Mitigation subprogram, an effort on next-generation codes will seek to accelerate development and implementation of new codes and algorithms that take advantage of emerging HPC architectures and trends. Similarly, a next-generation systems effort will work with vendors to influence and accelerate the introduction of features in future HPC systems for nuclear security missions. Some existing ASC efforts, notably co-design and Fast Forward/Design Forward will be moved into the new subprogram. Also, some non-recurring engineering[1] for future HPC platforms will also be included within this focus area.

Because of the disruptive changes to HPC resulting from this fourth epoch in computing, the Advanced Technology Development and Mitigation subprogram will be a priority. If necessary, other ASC efforts will be scaled back or sacrificed so these technical challenges can be met.

In the coming year, ASC will also develop a 10-year plan to achieve exascale computing for the stockpile. Given the magnitude of the exascale challenge, this plan will be coordinated with the DOE Office of Science in consultation with other Federal agencies.

F.4 Progression of Platform Procurements to Achieve Objectives

Since the start of the original ASC Initiative, advances in HPC have been predictably exponential, based on ever-increasing floating point operations per second (flops) as measured by the Top 500 list. Platforms to support stockpile stewardship in the future will seek to achieve the best balance between flops, memory capacity, and data movement, rather than to maximize flops, thereby achieving the best possible system for IDCs. As the relative cost of flops drops, memory capacity and power consumption will become the dominant considerations in procurements. Consequently, for the essentially fixed investments made by ASC, the historical mandate to seek a growth in flops is abating. In current plans, Sequoia is likely the last system that will compete at the top of the Top 500 list. Trinity, a platform to replace Roadrunner and Cielo in 2015, will have a theoretical peak between 60 and 100 petaflops. Sierra, the Sequoia replacement, will likely be between 80 and 160 petaflops in 2017. These values are well below those projected even 2 years ago. If these trends continue, a system delivered in the 2019–2020 timeframe for stockpile stewardship should be in the range of 120–250 petaflops. But it must have sufficient memory and low power consumption to deliver on the required mission.

[1] Non-recurring engineering is a mechanism by which ASC will accelerate the introduction of technology in platform acquisitions beyond what is currently on the vendor's roadmaps.

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Fiscal Year 2015 Stockpile Stewardship and Management Plan

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National Nuclear Security Administration

National Nuclear Security Administration
1000 Independence Avenue, SW
Washington, DC 20585