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Report to the Subcommittee on Energy and Water Development, Committee on Appropriations, U.S. Senate

April 2014

NUCLEAR WEAPONS

Actions Needed by NNSA to Clarify Dismantlement Performance Goal

GAO-14-449

GAO Highlights

Highlights of GAO-14-449, a report to the Subcommittee on Energy and Water Development, Committee on Appropriations, U.S. Senate

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Why GAO Did This Study

NNSA is responsible for the nation's nuclear weapons programs. As part of this mission, it oversees dismantlement of retired nuclear weapons and disposition of their components. Dismantlement occurs at NNSA's Pantex Plant, and disassembly of CSAs from dismantled weapons occurs at the Y-12 site. GAO was asked to assess NNSA's weapons dismantlement and component disposition efforts.

This report examines, among other things, (1) how NNSA measures progress toward its fiscal year 2022 dismantlement performance goal, as well as any challenges it might face in achieving the goal; (2) the schedule for and any challenges in dismantling weapons to be retired as a result of the New START treaty; (3) physical capacity available at Pantex to meet or accelerate planned dismantlement workload; and (4) any challenges in disassembling and disposing of weapon components. GAO analyzed NNSA's future dismantlement schedule, observed weapons dismantlement and component disposition activities at Pantex and Y-12, and interviewed NNSA officials. This report summarizes the findings of GAO's classified report on nuclear weapons dismantlement.

What GAO Recommends

GAO recommends that NNSA (1) clarify the dismantlement performance goal and (2) consider extending the goal to avoid a dismantlement workload gap. NNSA generally agreed with these recommendations.

View GAO-14-449. For more information, contact David C.Trimble at (202) 512-3841or trimbled@gao.gov.

What GAO Found

How the National Nuclear Security Administration (NNSA) measures progress toward its performance goal of dismantling all weapons retired prior to fiscal year 2009 by the end of fiscal year 2022 is unclear for two reasons. First, NNSA does not track the actual date that dismantled weapons were retired and may be counting some dismantled weapons retired after fiscal year 2009 as equivalent to weapons retired prior to fiscal year 2009. Second, NNSA will not dismantle some weapons retired prior to fiscal year 2009 but will reinstate them to the stockpile to save on rebuilding other weapons and count the reinstated weapons as equivalent dismantlements. Having clear goals and measures is a key element of program management. Because the dismantlement performance goal does not make these practices clear, NNSA risks providing misleading information about progress related to its goal.

NNSA has a schedule for future weapon dismantlements but has not scheduled for dismantlement any weapons to be removed from the stockpile resulting from implementation of the 2010 New Strategic Arms Reduction Treaty (New START). These weapons are not expected to be retired until the late 2020s or early 2030s. The deferred retirement of these weapons could result in a significant dismantlement workload gap during the mid-2020s. Such a gap could result in the loss of certified dismantlement personnel because dismantlement technicians at Pantex lose their certifications if they have not worked on a weapon type in the past year. By extending the fiscal year 2022 dismantlement performance goal, NNSA could allow the current dismantlement workload to be leveled and extended through the mid-2020s to sustain its dismantlement workforce.

The physical capacity at the Pantex Plant in Texas should be sufficient to meet NNSA's planned dismantlement workload and other stockpile commitments through fiscal year 2022. According to NNSA officials and Pantex site contractors, the site's ability to significantly accelerate its dismantlement rates and complete planned workload earlier than fiscal year 2022 could be costly, and it is unclear whether the site would have sufficient capacity to do so.

GAO identified policy and technical challenges complicating NNSA's disassembly and disposition of nuclear and nonnuclear components from dismantled nuclear weapons. For instance, the Y-12 National Security Complex in Tennessee disassembles canned subassemblies (CSA)—a major nuclear component that can contain highly enriched uranium (HEU), which is uranium enriched in the isotope uranium-235 to 20 percent or greater. NNSA is retaining many CSAs, leaving far fewer of them for disassembly, and creating challenges for Y-12's ability to plan its disassembly workload. However, NNSA bases its retention decisions on national security considerations and not Y-12 workload. Moreover, NNSA's ability to effectively manage a contingency inventory of millions of nonnuclear components at Pantex is complicated by decisions to retain many components for potential reuse in weapons, including old parts for weapons no longer in the stockpile, and by limitations in Pantex's previous component inventory management system. GAO is not making a recommendation on these matters because of efforts already under way at Pantex to address the need to retain older parts and to upgrade its component inventory management system.

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Abbreviations

ALCM	air-launched cruise missile
CSA	canned subassembly
DEQ	dismantlement equivalent unit
DOD	Department of Defense
DOE	Department of Energy
DQ	difficulty quotient
HEU	highly enriched uranium
ICBM	intercontinental ballistic missile
KCP	Kansas City Plant
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
LRPPM	Long Range Production Planning Model
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
RTBF	Readiness in Technical Base and Facilities
SLBM	submarine-launched ballistic missile
SNL	Sandia National Laboratories
SS-21	Seamless Safety for the 21st Century
START	Strategic Arms Reduction Treaty
WDD	Weapons Dismantlement and Disposition

U.S. GOVERNMENT ACCOUNTABILITY OFFICE
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April 30, 2014

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

Nuclear weapons remain an essential element of U.S. national security. However, the number of nuclear weapons needed by the United States to maintain deterrence has shifted dramatically since the end of the cold war and the dissolution of the Soviet Union in December 1991. Since the early 1990s, the United States has greatly reduced its nuclear forces through arms control treaties with the Soviet Union and Russia—including the 1991 Strategic Arms Reduction Treaty (START) I and the 2002 Strategic Offensive Reductions Treaty.[1]

As a result of these force reductions and other initiatives reducing the size of the U.S. nuclear weapons stockpile,[2] thousands of weapons have been retired from service and made available for dismantlement.[3] By overseeing the dismantlement of nuclear weapons, the Department of Energy's (DOE) National Nuclear Security Administration (NNSA) helps ensure that the United States is not maintaining more nuclear weapons

[1]The formal titles of these treaties are, respectively: The Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms, and the Treaty Between the United States of America and the Russian Federation on Strategic Offensive Reductions.

[2]For instance, in September 1991, the President announced several unilateral initiatives to reduce the U.S. nonstrategic nuclear weapons arsenal. The following month, the Soviet President responded that the Soviet Union would reduce its nonstrategic nuclear weapons. In addition, as part of the annual presidential stockpile review process, in 2004, the President directed that the U.S. nuclear weapons stockpile be reduced by more than 40 percent by 2012 and, in 2007, he directed an additional reduction of the stockpile, making it roughly one-quarter the size of cold war-era levels.

[3]The United States had 19,008 nuclear weapons in the stockpile at the end of fiscal year 1991 and approximately 5,000 weapons at the end of fiscal year 2012.

than necessary and is meeting international treaty commitments.[4] From fiscal year 1992 through fiscal year 2012, NNSA and DOE dismantled more than 12,000 retired nuclear weapons. However, there are several thousand retired weapons awaiting dismantlement, and additional weapons will enter the dismantlement queue as a result of ongoing weapon retirement decisions. Moreover, further stockpile reductions are expected as a result of the New Strategic Arms Reduction Treaty, known as New START, signed by the United States and Russia in 2010.[5]

The dismantlement of nuclear weapons also supports U.S. nonproliferation objectives. NNSA and Department of State officials have noted the importance of U.S. nuclear weapons dismantlement in demonstrating the nation's commitment to disarmament under the 1970 Treaty on the Nonproliferation of Nuclear Weapons, and NNSA officials and documents have stated that dismantlement represents a concrete step toward the President's long-term goal of a world without nuclear weapons.[6] Other organizations—including the Secretary of Energy Advisory Board—have recommended that NNSA accelerate its dismantlement of retired nuclear weapons to further demonstrate the United States' commitment to nuclear weapons reductions.[7] The 2010 Nuclear Posture Review—which provides a road map for implementing the President's agenda for reducing nuclear risks to the United States—also highlights nuclear weapons dismantlement and the administration's intention to consider accelerating the pace of dismantlement.

[4]NNSA is a semiautonomous agency within DOE created in 1999 with responsibility for the nation's nuclear weapons, nonproliferation, and naval reactors programs.

[5]The formal title of this treaty is the Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms.

[6]Among other things, parties to the treaty, including the United States, agree to undertake to pursue negotiations in good faith on effective measures relating to nuclear disarmament, and nonnuclear weapon state parties agree not to manufacture or otherwise acquire nuclear weapons or seek or receive assistance in the manufacture of nuclear weapons or other nuclear explosive devices.

[7]The Secretary of Energy Advisory Board provides advice and recommendations to the Secretary of Energy on the department's basic and applied research and development activities, economic and national security policy, educational issues, operational issues, and any other activities and operations of DOE as the Secretary may direct.

NNSA's Office of Defense Programs oversees the maintenance, refurbishment,[8] surveillance,[9] and dismantlement of nuclear weapons. Within this office, the Weapons Dismantlement and Disposition (WDD) program oversees, among other things, nuclear weapons dismantlement and the further disassembly of major weapon components, "characterization" of components to identify hazards and security concerns, and disposal of most weapon-system components. The WDD program's performance goal is to dismantle all nuclear weapons that were retired prior to fiscal year 2009 by the end of fiscal year 2022.

The physical work of dismantling weapons and disassembling and disposing of weapon components is performed by contractors operating facilities in NNSA's nuclear security enterprise.[10] In general, *dismantlement* of a nuclear weapon involves reducing it to its component parts and takes place at the Pantex Plant in Texas. NNSA defines a weapon as dismantled when the high explosive surrounding the weapon's fissile core, known as the "pit," is removed.[11] The dismantlement of a weapon results in nuclear components, such as the pit, and numerous nonnuclear components of various types and sizes, from screws to parachutes. Figure 1 depicts some of the components from a B61 bomb.

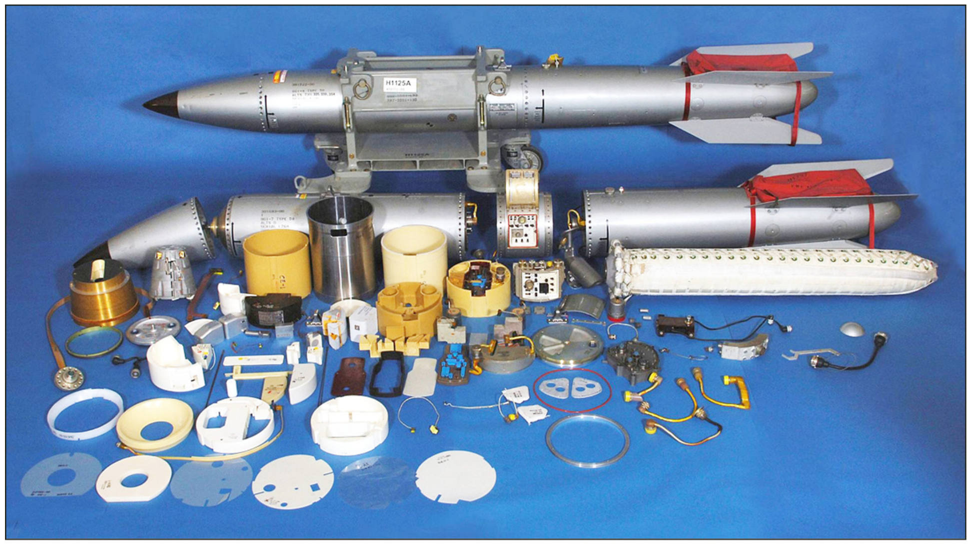
[8]Since the end of the cold war, in lieu of designing, testing, and producing new nuclear weapons, NNSA has sought to extend the lifetimes that existing nuclear weapons can safely and reliably remain in the stockpile through a refurbishment process known as a life extension program.

[9]NNSA's stockpile surveillance program includes two elements: the stockpile evaluation program, which conducts surveillance evaluations of the active and inactive stockpile and new production units, and an enhanced surveillance program, which provides diagnostics, methodologies, and other tools to enable prediction and detection of weapon defects. Surveillance is performed at various levels, including testing and evaluation of full weapons, major assemblies and components, and the materials that compose the components. Under this program, samples of weapons from each system in the stockpile are chosen annually and sent to the Pantex Plant for disassembly, inspection, reconfiguration, and testing by the national laboratories. The surveillance process can include destructive testing of components, resulting in the dismantlement of some weapons.

[10]NNSA's nuclear security enterprise—formerly known as the nuclear weapons complex—consists of the laboratories, production plants, and a test site that carry out missions to support NNSA's programs.

[11]Nuclear weapons dismantlement generally takes place in "campaigns," in which a type of weapon is sent to Pantex for dismantlement over a period of months.

Figure 1: B61 Nonnuclear Components



Source: Pantex.

Some components from the dismantled weapon require further *disassembly*. For instance, after Pantex has dismantled a weapon, a major nuclear component called the canned subassembly (CSA), which can contain highly enriched uranium (HEU) and other materials, is packaged and sent to the Y-12 National Security Complex in Tennessee for additional disassembly and disposition.[12]

Nuclear components from dismantled weapons may be retained for eventual reuse, disposed of, or retained as a "strategic reserve" to ensure an adequate supply of material for the weapons program in the future. For example, pits from dismantled weapons are stored at Pantex pending decisions regarding their potential reuse in refurbished weapons or decisions regarding further disassembly and disposition, or to compose part of the U.S. strategic reserve of plutonium. In addition, some CSAs are retained at Y-12 for potential reuse in refurbished weapons, disassembled to recover HEU that may be recycled into fuel to supply the

[12]HEU is uranium enriched in the isotope uranium-235 to 20 percent or greater. Low-enriched uranium contains uranium-235 in a concentration of less than 20 percent and greater than 0.7 percent.

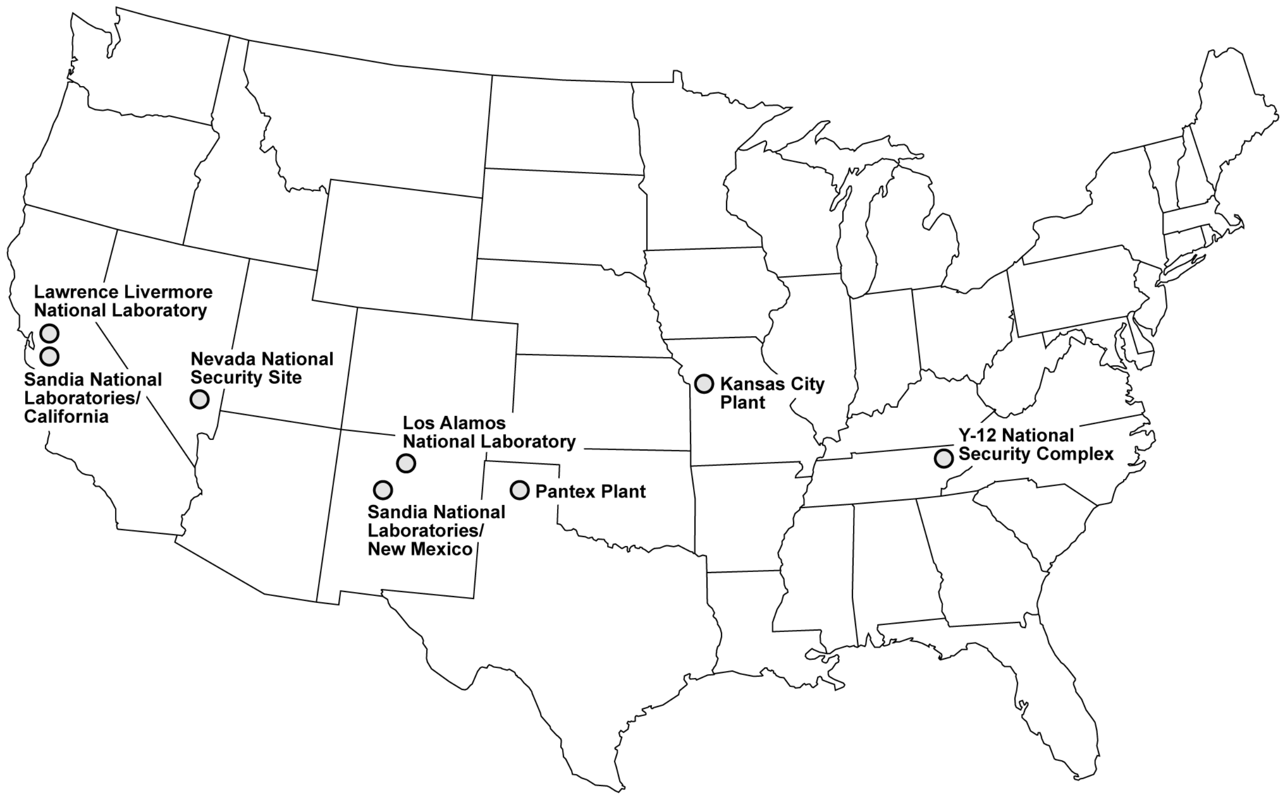
U.S. Naval Reactors Program,[13] among others, or as part of the U.S. strategic reserve of HEU.

Nonnuclear components may also be disposed of or saved for reuse. However, some nonnuclear components may be classified or radioactively contaminated and therefore require extra precautions to securely and safely dispose of them. Nonnuclear components from types of weapons still in the stockpile may be retained at Pantex for potential reuse in refurbished weapons. In addition to managing retained components for weapons still in the stockpile, Pantex has a backlog of components from the dismantlement of types of weapons that are no longer in the stockpile—referred to as “legacy” components—which it is working to characterize and dispose of.

The Kansas City Plant (KCP) in Missouri stores some nonnuclear components, and the Nevada National Security Site (NNSS) disposes of other classified or radiologically contaminated components. Technical support for the dismantlement process—including responding to any problems Pantex encounters while dismantling a weapon—is provided by the national laboratories involved in nuclear weapons design: the Lawrence Livermore National Laboratory (LLNL) in California, the Los Alamos National Laboratory (LANL) in New Mexico, and Sandia National Laboratories (SNL) in California and New Mexico. Figure 2 shows the locations of NNSA facilities involved in the dismantlement process and briefly describes their roles.

[13] The U.S. Naval Reactors Program, run jointly by the U.S. Navy and DOE, ensures an adequate supply of HEU as fuel for U.S. nuclear-powered naval vessels, among other things.

Figure 2: NNSA Sites Involved in the Nuclear Weapons Dismantlement Process



Kansas City Plant
- Storage and testing of nonnuclear components

Lawrence Livermore National Laboratory
- Technical support for weapons dismantlement process

Los Alamos National Laboratory
- Technical support for weapons dismantlement process

Nevada National Security Site
- Disposal and permanent burial of some nonnuclear components

Pantex Plant
- Dismantlement of nuclear weapons
- Storage of pits (fissile cores of weapons)
- Disposal of high explosives
- Characterization and disposition of nonnuclear components

Sandia National Laboratories (California and New Mexico)
- Technical support for weapons dismantlement process
- Maintenance of the Stockpile Dismantlement Database

Y-12 National Security Complex
- Disassembly of canned subassemblies (component that can contain highly enriched uranium and other materials)
- Storage of canned subassemblies, highly enriched uranium, and lithium

Sources: GAO and National Nuclear Security Administration (text); copyright © Corel Corp., all rights reserved (map).

You asked us to report on issues associated with NNSA's nuclear weapons dismantlement and component disposition efforts. Our objectives were to assess (1) the extent to which the annual inventories of weapons awaiting dismantlement and NNSA's annual dismantlement rates have changed over time, and, if so, the reasons why; (2) how NNSA measures progress toward achieving its performance goal of dismantling all weapons retired prior to fiscal year 2009 by the end of fiscal year 2022, and any challenges it might face in meeting the goal; (3) NNSA's schedule for dismantlement of weapons retired as a result of the New START treaty and the challenges, if any, NNSA faces in dismantling those weapons; (4) the physical capacity available at Pantex to meet NNSA's planned future dismantlement workload and to potentially accelerate dismantlement; and (5) the challenges, if any, affecting disassembly and disposition of components from dismantled weapons. In February 2014, we reported to you on the results of our work in a classified report. This report summarizes certain aspects of our classified work.

In general, we addressed these objectives by reviewing relevant nuclear weapons stockpile guidance and planning documents; interviewing NNSA officials on issues related to dismantlement and component management; interviewing officials from the Department of Defense (DOD) and the military services on nuclear weapons retirement and dismantlement interactions with NNSA; and conducting site visits to the two sites that carry out the two major steps of weapons dismantlement and disposition, the Pantex and Y-12 sites. On our site visits, we observed weapons dismantlement and CSA disassembly operations for several weapon systems; viewed component processing and storage facilities; and interviewed Pantex and Y-12 site operating contractors on issues relating to dismantlement operations and component management processes, as well as site weapon engineers on issues affecting dismantlement and CSA disassembly of seven different weapon systems.

To assess the extent to which and the reasons why the annual inventories of weapons awaiting dismantlement and NNSA's annual dismantlement rates have changed over time, we analyzed data from NNSA on the annual inventories of retired weapons available for dismantlement and on annual numbers of weapons dismantled for fiscal year 1992 through fiscal year 2012. We selected this period for several reasons, including that it allowed us to assess weapon retirements and dismantlements since the dissolution of the Soviet Union in December 1991 and resulting from stockpile reductions through strategic arms control treaties and presidential initiatives. We also interviewed NNSA and DOD officials and Pantex site contractors on issues affecting retired inventories of weapons and annual dismantlement rates. To assess how NNSA is measuring progress toward achieving its performance goal, and the challenges it faces in doing so, we analyzed a March 2013 draft schedule for the dismantlement or other disposition of all retired weapons from fiscal year 2013 through fiscal year 2022—including the dismantlement schedule for the remaining weapons retired prior to fiscal year 2009—and interviewed NNSA and DOD officials on issues that could affect this dismantlement schedule. To assess NNSA's schedule for dismantlement of weapons retired as a result of the New START treaty and the challenges, if any, NNSA faces in dismantling those weapons, we interviewed DOD officials on the numbers of weapons expected to be retired and when they would be retired as a result of the treaty and interviewed NNSA officials on challenges related to management of this future dismantlement workload. To assess the physical capacity available at Pantex to meet NNSA's planned future dismantlement workload, and to potentially accelerate dismantlement, we analyzed data on the physical capacity at Pantex available to meet the future dismantlement schedule and all other future stockpile production commitments and analyzed data and interviewed NNSA officials and Pantex site contractors on the site's ability to accelerate dismantlement work. To assess the challenges affecting disassembly and disposition of components from dismantled weapons, we reviewed NNSA data and interviewed NNSA officials and Pantex site contractors on the management of plutonium pit inventories, and we reviewed NNSA data and interviewed NNSA officials and Y-12 site contractors on CSA inventory management, disassembly schedules, and the potential effect on HEU supply commitments. We also analyzed data from Pantex and interviewed NNSA officials and Pantex site contractors on the nonnuclear component inventory and the issues affecting the management, retention, and disposition of these components. We assessed the reliability of data on the inventories of retired weapons available for dismantlement and the annual numbers of weapons dismantled for fiscal year 1992 through fiscal year 2012, future capacity requirements at Pantex, and nonnuclear component inventories. We analyzed the data for accuracy by, among other things, manually testing the data for errors and missing data, and interviewed knowledgeable officials about the data. We determined that the data were of sufficient reliability for our purposes. Additional details on our objectives, scope, and methodology can be found in appendix I.

We conducted this performance audit from January 2012 to April 2014 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

This section discusses the U.S. nuclear weapons stockpile; the stockpile planning and retirement process; nuclear weapons design and components; nuclear weapons dismantlement planning, facilities, supporting programs, and budget; and the nuclear weapons dismantlement process.

U.S. Nuclear Weapons Stockpile

Since 1945, the United States has fielded more than 70 different nuclear weapon systems; currently, the U.S. nuclear weapons stockpile consists of 8 such systems. These systems can be strategic or nonstrategic, and can include gravity bombs deliverable by long-range bombers and dual-capable aircraft, as well as warheads deliverable by submarine-launched ballistic missiles (SLBM), intercontinental ballistic missiles (ICBM), and air-launched cruise missiles (ALCM).[14]

For some systems in the stockpile—such as the B61 bomb—there may be multiple versions as a result of modifications, or "mods," that change weapon components related to their operational characteristics, safety, or control features.[15] Life extension programs have been initiated for some weapons to address aging and enhance the safety, security, and reliability of the weapons in the stockpile.[16] Table 1 shows the weapon

[14]DOD identifies strategic weapons as those delivered by ICBMs, SLBMs, or heavy bombers. All other weapons are nonstrategic, or tactical, nuclear bombs delivered by nonstrategic aircraft—usually dual-capable aircraft that can be used for nuclear and conventional missions. In the past, nonstrategic U.S. nuclear weapons were available for delivery through other means, including as warheads on cruise missiles delivered by nonstrategic aircraft; warheads delivered on sea- or ground-launched cruise missiles; warheads on ground-launched ballistic missiles with ranges less than 5,500 kilometers; warheads fired from cannon artillery; atomic demolition munitions; and antisubmarine nuclear depth bombs.

[15]In addition to "mods," other alterations, or "alts" to weapons may be made that do not affect their military characteristics. For example, an alt was completed on B61-3, -4, -7, and -11 bombs to replace spin rocket motors, which accelerate the rotation of a weapon after it is released from a delivery aircraft and produce thrust to arm the weapon.

systems in the U.S. stockpile, including information on their delivery systems and missions, responsible military services, and dates of entry into the stockpile.

Table 1: Nuclear Weapon Systems in the U.S. Stockpile, as of September 2012

Weapon system	Description	Delivery system	Mission	Military service	Entry into service
W76-0/1	Submarine-launched ballistic missile (SLBM) warhead	D5 missile, Trident submarine	Underwater to surface	Navy	1978 (mod 0) 2009 (mod 1)
W78-0	Intercontinental ballistic missile (ICBM) warhead	Minuteman III ICBM	Surface to surface	Air Force	1979
W87-0	ICBM warhead	Minuteman III ICBM	Surface to surface	Air Force	1986
W88-0	SLBM warhead	D5 missile, Trident submarine	Underwater to surface	Navy	1989
B61-3/4/10	Nonstrategic bomb	F-15, F-16, and certified NATO aircraft	Air to surface	Air Force	1979 (mod 3) 1979 (mod 4) 1990 (mod 10)
B61-7/11	Strategic bomb	B-52, B-2	Air to surface	Air Force	1985 (mod 7) 1997 (mod 11)
B83-1	Strategic bomb	B-52, B-2	Air to surface	Air Force	1993
W80-1	Air-launched cruise missile (ALCM) warhead	B-52	Air to surface	Air Force	1982

Source: National Nuclear Security Administration.

Note: The suffix associated with each warhead or bomb (e.g., the -0/1 for the W76) represents the mod associated with the respective weapon.

The nuclear weapons stockpile is configured into “active” and “inactive” categories, and individual nuclear weapons are identified as being in 1 of 10 states of readiness across both categories.[17] Active weapons maintained at the top readiness state are operationally deployed weapons; the numbers of these weapons have been limited under strategic arms control treaties, such as New START. Inactive weapons

[16]For instance, some W76-0 warheads are currently going through a life extension program, resulting in refurbished W76-1 units. For more information on life extension programs, see GAO, *Nuclear Weapons: NNSA and DOD Need to More Effectively Manage the Stockpile Life Extension Program*, GAO-09-385 (Washington, D.C.: Mar. 9, 2009).

[17]DOD officials told us in June 2013 that the readiness states for the stockpile were changing, but that the new categories had not yet been released.

are normally maintained at a depot in a nonoperational status.[18] Some nondeployed weapons are "hedge" weapons, maintained in both the active and inactive categories and retained both for technical hedge purposes (i.e., to hedge against an unforeseen catastrophic failure in a weapon type or family) and for geopolitical hedge purposes (i.e., to hedge against a reversal in the geopolitical situation that would require more weapons to be available for use).

Retired nuclear weapons have been removed from their delivery platforms and are no longer part of the stockpile. Retired weapons fall into one of the following two categories:

- *Weapons released for dismantlement.* These weapons have been released for dismantlement, consistent with the capacity available at NNSA facilities and DOD requirements. Some of these weapons may be "reinstated" to the stockpile in lieu of being dismantled. Specifically, the Nuclear Weapons Council has approved a practice that allows NNSA to reinstate some retired weapons awaiting dismantlement to the stockpile to replace weapons that have been disassembled and inspected under the stockpile surveillance program.[19]
- *Weapons in managed retirement.* These weapons have been removed from the stockpile but have not been approved for dismantlement. These weapons are maintained in such a way that they could be reactivated should there be a catastrophic failure in the stockpile necessitating such action. The Nuclear Weapons Council Standing and Safety Committee must approve dismantlement of these weapons.

[18]Inactive stockpile weapons are not available to be uploaded on a delivery vehicle. They have certain components removed and other limited-life components of inactive stockpile weapons are not replaced unless the weapons are reactivated and moved to the active stockpile.

[19]The Nuclear Weapons Council, established by Congress in 1986, is a joint DOD/DOE organization that facilitates high-level coordination to secure, maintain, and sustain the nuclear stockpile. See Pub. L. No. 99-661, § 3137 (1986). The council consists of five members: the Undersecretary of Defense for Acquisition, Technology, and Logistics; the Undersecretary of Defense for Policy; the Vice Chairman of the Joint Chiefs of Staff; the Commander of the U.S. Strategic Command; and the NNSA Administrator. The Nuclear Weapons Council Standing and Safety Committee is a subordinate body to the Nuclear Weapons Council, which advises and assists it, and provides preliminary approval for many of the council's activities. It is a joint DOD-DOE senior executive or flag-level committee that conducts transactions between DOD and DOE on behalf of the council.

In addition, NNSA also characterizes retired nuclear weapons as either "war reserve" weapons or "quality assurance" weapons. Retired war reserve weapons are those withdrawn from the active or inactive stockpile categories that are surplus to defense needs and that could be reinstated to the stockpile if not dismantled. Retired quality assurance weapons are those that have been retired from the active or inactive stockpile categories for surveillance purposes—specifically, some of their components are destructively tested as part of the surveillance process, and these weapons are subsequently dismantled rather than being rebuilt. In discussing its future dismantlement schedule, NNSA tends to focus on the inventory of war reserve weapons because this inventory includes a large number of weapons that have been retired and accumulated in inventory over time and are weapons to be counted toward NNSA's dismantlement performance goal. The number of retired quality assurance weapons is generally small and consistent from year to year, and the dismantlement of all quality assurance weapons is generally completed within the year they are retired.

Nuclear Weapons Stockpile Planning and Retirement Process

The decision to retire and subsequently dismantle nuclear weapons is tied to a high-level policy-making process establishing the U.S. nuclear stockpile's size and composition. This process begins with nuclear weapons policy and strategy guidance provided by the President in the form of a Presidential Policy Directive. Based on this presidential directive and other inputs—including guidance from the Secretary of Defense in the form of DOD directives and planning guidance—the military services, combatant commanders, and Joint Chiefs of Staff develop nuclear weapons requirements.

These requirements are submitted to the Nuclear Weapons Council staff and, combined with other inputs, inform the development of a nuclear weapons *Requirements and Planning Document*, which specifies nuclear weapon policies, military requirements, joint DOD and DOE planning factors, long-term planning considerations that affect the future of the stockpile, and supporting programmatic details. The *Requirements and Planning Document* provides detailed technical information and analyses that support the development of a *Nuclear Weapons Stockpile Memorandum* and a proposed presidential directive containing a proposed *Nuclear Weapons Stockpile Plan*. The *Nuclear Weapons Stockpile Memorandum* is an annual memorandum from the Secretary of Defense and Secretary of Energy that transmits the proposed directive, which, if approved, becomes the *Nuclear Weapons Stockpile Plan*. The *Nuclear Weapons Stockpile Plan* specifies the size and composition of the stockpile for a projected multiyear period. The coordination process for these documents serves as the key forum in which DOD and DOE resolve issues concerning DOD nuclear weapon requirements and DOE capacity and capability to support those requirements. Once the President signs the directive, the Nuclear Weapons Council is authorized to approve changes in the stockpile within certain percentage limits specified by the President.

Nuclear weapons are retired from the stockpile by the Nuclear Weapons Council in accordance with the presidential guidance in the *Nuclear Weapons Stockpile Plan*. Project Officers Groups—which are joint DOD-DOE committees established for each weapon type to coordinate on technical matters relating to the weapon—develop prioritized retirement plans for the weapon systems identified for retirement in the *Requirements and Planning Document*.[20]

NNSA uses the information from each *Nuclear Weapons Stockpile Plan* and the *Requirements and Planning Document* to develop a *Nuclear Weapons Production and Planning Directive*, which includes long-term schedules for weapons dismantlement at Pantex and CSA disassembly at Y-12, as well as plans for nuclear weapon life extension programs, surveillance, and other stockpile-related activities executed by the agency.[21] Dismantlement scheduling details are elaborated by NNSA in specific weapon *Program Control Documents* used to manage the workload outlined in the *Production and Planning Directives*. NNSA coordinates with the Navy and the Air Force to arrange delivery of specific weapons to the Pantex Plant for dismantlement, consistent with the *Production and Planning Directive* and the *Program Control Documents*.

[20]The Nuclear Weapons Council charters a Project Officers Group for each weapon system to provide a technical forum for weapon development and management activities. Each Project Officers Group is led by a project officer from either the Navy or Air Force—the two military services that maintain and operate nuclear weapons.

[21]NNSA issued a 2012 *Production and Planning Directive* that amended or updated certain information in the 2011 directive. According to NNSA officials, the 2012 version was not considered a full *Production and Planning Directive* and, among other things, did not include an updated dismantlement schedule. The 2013 *Production and Planning Directive* was not available at the time of our review.

Nuclear Weapons Design and Components

All weapons in the U.S. nuclear stockpile are two-stage nuclear weapons, sometimes referred to as thermonuclear weapons, involving fission and fusion reactions to achieve the explosive yield.[22] The first stage, known as the primary, consists of a hollow pit—containing a central shell of fissile material typically made of plutonium or of plutonium and uranium inside a tamper shell—surrounded by high explosives. The second stage, or secondary, is encased inside a CSA that can contain HEU and other materials. The primary and the CSA are referred to as the weapon's nuclear explosive package.

Outside of the nuclear explosive package, a nuclear weapon contains other nonnuclear components that control the use, arming, and firing of the weapon, including arming, fuzing, and firing systems; reservoirs of tritium and deuterium gas that are injected into the pit through gas transfer systems to boost the nuclear reaction during detonation; neutron generators that produce neutrons for primary detonation; and other nonnuclear components such as radars, batteries, and parachutes (for gravity bombs dropped from aircraft).

Nuclear Weapons Dismantlement Planning, Facilities, Supporting Programs, and Budget

Nuclear weapons dismantlement is a multistage process that requires extensive planning, utilizes a mix of facilities at Pantex, and relies on a number of supporting NNSA programs. For fiscal years 2008 through 2012, the WDD program budget generally ranged from approximately $50 million to $60 million per year.

Planning for Dismantlement

Before a weapon system can be dismantled, Pantex must conduct planning to identify and analyze potential hazards, locate or create appropriate tools, train its workforce, identify disposition pathways for nuclear and nonnuclear components, allocate time and facilities for dismantlement activities, ensure space is available to receive and store, or "stage," the weapons, identify on-site storage for pits, and coordinate transport of CSAs recovered from the weapons to Y-12 for further disassembly.

[22]Fission occurs when the nucleus of a heavy unstable atom (such as uranium-235 or plutonium-239) is split into two lighter parts, releasing neutrons and producing large amounts of energy. Fusion occurs when the nuclei of two light atoms (such as deuterium and tritium) are joined, or fused, to form a heavier atom, with an accompanying release of a neutron and large amounts of energy.

Since 1999, Pantex has managed the planning for dismantlement of weapons through an integrated safety management process known as Seamless Safety for the 21st Century (SS-21). Among other things, this process ensures that appropriate safety authorizations have been developed, reviewed, and approved for each weapon system before it is dismantled. The SS-21 process is unique to Pantex and comprises several steps, including: (1) hazard analysis to review all possible hazards at each step, such as the risk of electrostatic discharge within a dismantlement facility and the number of times a warhead must be lifted and moved; and (2) tooling preparation to ensure that workers have the necessary specialized tooling designed to mitigate the hazards; and (3) reviews, safety analyses, and readiness assessments, which must be completed before dismantlement authorization is given.

Pantex Facilities for Dismantlement

Dismantlement operations at Pantex occur at a secure area of the site—referred to as Zone 12—inside specialized bays and cells authorized for nuclear explosive operations.[23] Intact nuclear weapons on-site awaiting dismantlement are stored inside magazines, located in a separate secure area of the plant—known as Zone 4. Zone 12 contains 37 *bays* where mechanical dismantlement of weapons and dismantlement of nuclear explosive packages utilizing insensitive high explosives may be conducted, as well as 10 *cells* that are reserved for nuclear explosive operations involving conventional high explosives.[24] Pantex refers to these 47 facilities as nuclear explosive production facilities.

Physical capacity available at any given time at Pantex is influenced by several factors, including the physical size of the weapons, whether they use conventional or insensitive high explosives, weight limitations within facilities, and the time requirements to perform dismantlement operations, which vary from weapon system to weapon system. Furthermore, physical capacity at the site to dismantle weapons is limited, and it must be balanced against other stockpile-related operations at Pantex that require use of bays and cells. Other stockpile-related operations that use

[23]Nuclear explosive operations are activities involving a nuclear explosive, including activities in which the main charge high-explosive parts and pit are collocated.

[24]Compared with conventional high explosives, insensitive high explosives are highly insensitive to shock, heat, and impact and are highly resistant to accidental detonation. Cells have a higher level of explosive containment than bays, to reduce the potential for release of radioactive material in the event of the accidental explosion of conventional high explosives.

the site's bays and cells include temporarily staging weapons brought into Zone 12 from Zone 4 prior to being worked on, life extension program work, and weapon surveillance work. In addition, nuclear explosive operations at the site halt during thunderstorms that occur nearby—to minimize electrostatic detonation risks inside bays and cells during weapons assembly and disassembly. According to Pantex site contractors, the site plans for a small loss of capacity each year in the form of facility downtime due to lightning risks.

NNSA Programs Supporting Dismantlement

The WDD program relies on several other NNSA programs to support the dismantlement mission. For instance, funding from NNSA's Readiness in Technical Base and Facilities (RTBF) program provides the facilities, infrastructure, and base capabilities that indirectly support the WDD program. RTBF funds also provide storage and material recycle and recovery support to WDD efforts.[25] NNSA's Office of Secure Transportation pays for transportation of weapons to Pantex for dismantlement and transportation of resulting components to other sites for further disassembly or processing, utilizing specialized vehicles called Safeguards Transporters. NNSA's Stockpile Services Production Support program supports shipping, receiving, equipment maintenance and calibration services, and other activities that facilitate dismantlement and other weapons-related work.

Dismantlement Budget

In general, for fiscal years 2008 through 2012, the WDD program budget has ranged from approximately $50 million to $60 million per year.[26] The WDD budget supports weapons dismantlement, characterization of components to identify hazards and classification issues, disposition of components, and other activities. According to an NNSA official,

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[25]Through a range of subprograms, the RTBF program provides the facilities and infrastructure needed to support NNSA's national security and operational mission requirements. In its fiscal year 2014 budget request, NNSA proposed eliminating the RTBF program and splitting its activities between an existing Site Stewardship program and a new Nuclear Programs unit that will continue to support the nuclear material recycle and recovery activities that were supported by RTBF. For further information on the RTBF program, see GAO, *Nuclear Weapons: Actions Needed to Identify Total Costs of Weapons Complex Infrastructure and Research and Production Capabilities*, GAO-10-582 (Washington, D.C.: June 21, 2010).

[26]For weapons going through life extension programs, the process involves replacing multiple components and includes dismantling and reassembling the weapons. The WDD program does not fund dismantlement of weapons associated with life extension programs, but it does fund dismantlement of weapons subjected to destructive component testing under the stockpile surveillance program.

approximately 80 percent of the current and anticipated future program budget is allocated to weapons dismantlement and disassembly, with the remaining funding allocated to component characterization, disposition, and other activities.

NNSA does not track the indirect dismantlement costs incurred by other NNSA supporting programs because these programs do not separately account for or apportion their costs between support for WDD and other stockpile support activities. For instance, the Office of Secure Transportation provides transportation support for programs across the NNSA nuclear security enterprise but does not collect or maintain accounting data based on weapon type or functional workload for weapons.

Nuclear Weapon Dismantlement Process

The dismantlement process begins when a weapon is transferred from a storage magazine in Zone 4 to a dismantlement bay in Zone 12. In the bay, the nuclear explosive package containing the primary and CSA; the arming, fuzing and firing system; and other nonnuclear components are removed from the weapon. Nuclear explosive packages that contain conventional high explosives are transferred to a cell for further dismantlement, while those with insensitive high explosives may be dismantled in a bay. Within the bay or cell, the high explosive is separated from the pit, and the weapon is considered officially dismantled.

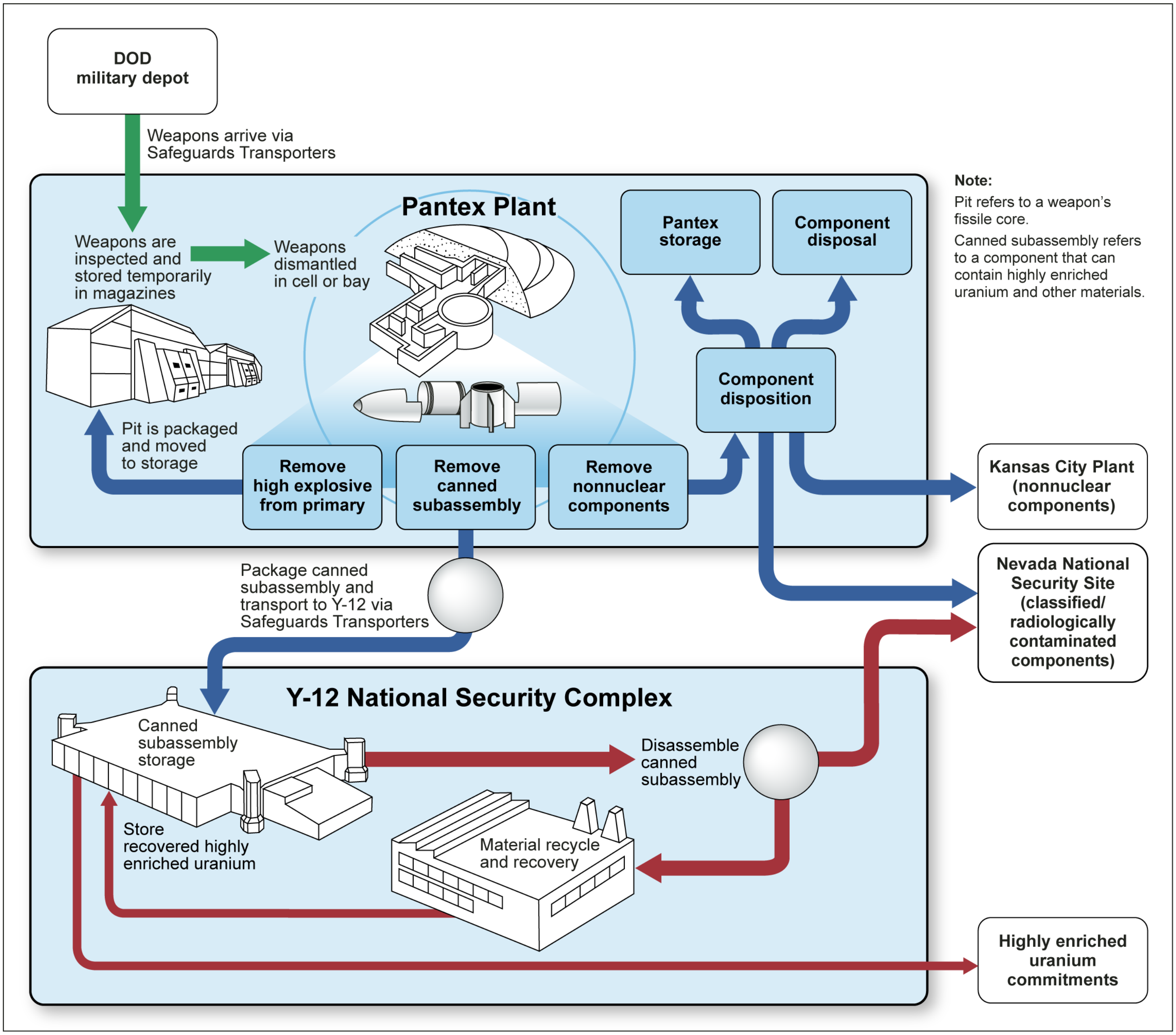
From this stage forward, nuclear and nonnuclear components are accounted for individually, and each component has an established disposition path—it may be stored, recycled, or disposed of. The pit is packaged and returned to Zone 4 at Pantex and is stored pending either reuse in refurbished weapons or eventual disposal as part of NNSA's plutonium disposition program. The high explosives are disposed of at Pantex through open-air burning. Other components recovered are returned to their original manufacturer—such as nonnuclear components sent to KCP for further disposition. Some classified or radiologically contaminated components may be disposed of through burial at the

NNSS. Nonnuclear components may be returned to KCP; demilitarized, sanitized, and disposed of at Pantex;[27] or stored at Pantex for reuse.

The CSAs from dismantled weapons are sent to Y-12 for disassembly to recover HEU and other materials they contain. Because Y-12 is the sole national supplier of HEU, disassembly of CSAs is critical in supplying HEU for refurbished weapons and meeting HEU supply commitments for fuel for naval reactors and research reactors. The HEU retrieved from the CSAs is stored at Y-12 in the Highly Enriched Uranium Materials Facility, and other recovered materials are stored elsewhere on site. Materials that are not suitable for recycling or reuse are sent for burial at NNSS. See figure 3 for a general illustration of the nuclear weapons dismantlement process workflow.

[27] Demilitarization refers to the process whereby a component is rendered unusable for weapons purposes. Sanitization refers to removing or destroying any classified characteristics of a component, such as by crushing or shredding.

Figure 3: Nuclear Weapon Dismantlement Process Workflow



Source: GAO analysis of National Nuclear Security Administration information.

Weapons Inventory to Be Dismantled Shrank Then Increased, While NNSA's Annual Dismantlement Rates Generally Declined

After generally declining from fiscal year 1992 through the early 2000s, the inventory of retired nuclear weapons awaiting dismantlement increased following nuclear stockpile reductions and significant additional weapon retirements in 2004 and 2007. At the same time, the number of weapons dismantled annually—NNSA's annual dismantlement rate—generally declined over the past 20 years because of a greater emphasis on dismantlement safety and increased weapon complexity.

Inventory of Weapons Awaiting Dismantlement Declined Until the Early 2000s but Then Increased Following Substantial Additional Weapon Retirements

In the early 1990s, following the end of the cold war, the United States had a large inventory of retired nuclear weapons awaiting dismantlement.[28] This inventory shrank through the mid-1990s and early 2000s. However, according to NNSA and DOD officials, significant stockpile reductions stemming from presidential direction in 2004 and 2007 resulted in large numbers of additional weapons being declared surplus to defense needs and retired. For instance, in 2004, the President directed that the stockpile be reduced by nearly one-half by fiscal year 2012. In 2007, the President directed substantial additional reductions in the stockpile. These decisions resulted in substantial growth in the inventory of retired weapons awaiting dismantlement. NNSA has reduced this inventory since that time. However, at the end of fiscal year 2012, the inventory of retired weapons that were awaiting dismantlement was similar in size to the inventory of weapons awaiting dismantlement in the mid-1990s.

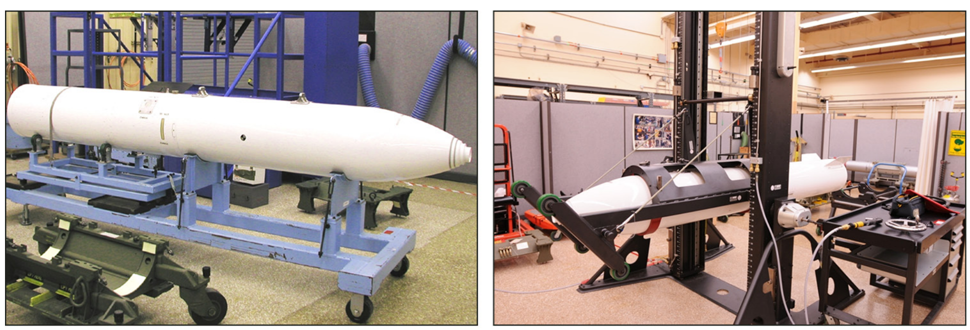
[28] We agreed with NNSA officials to use the annual retired inventory of weapons as an approximate measure of the number of weapons awaiting dismantlement from year to year, from fiscal year 1992 through fiscal year 2012. For more information, see appendix I.

NNSA's Annual Dismantlement Rate Has Generally Decreased over the Past 20 Years as a Result of Increased Safety Emphasis and Weapon Complexity

According to our analysis of dismantlement data, since the early 1990s, NNSA's dismantlement rates have generally decreased, with NNSA dismantling about 1,000 fewer weapons annually in recent years than it was dismantling in the mid-1990s. In addition, in some years, only one or two types of retired war reserve weapons were dismantled.

NNSA officials and Pantex site contractors attributed the overall decline in dismantlement rates in part to an increased emphasis on safety in nuclear explosive operations performed at the Pantex site. The initiation of the SS-21 process at Pantex in 1999 provided a more comprehensive framework for evaluating and mitigating the hazards associated with nuclear weapon activities, including dismantlement.[29] According to NNSA officials and Pantex site contractors, the SS-21 process also led to greater efficiency in dismantling individual weapons. For example, the SS-21 redesign of the B83 dismantlement process included development of a new work stand that holds the bomb throughout the dismantlement process, allowing Pantex to mitigate both the safety risks and time losses previously experienced in moving the weapon from one work stand to another. Figure 4 shows the old and new B83 work stands.

Figure 4: SS-21 Improvements—Old and New B83 Bomb Work Stands



Source: Pantex.

[29]In an October 1993 report on nuclear weapons dismantlement, we found that Pantex had completed fewer than half of the required safety analysis reports for its facilities and operations; see GAO, *Nuclear Weapons: Safety, Technical, and Manpower Issues Slow DOE's Disassembly Efforts*, GAO/RCED-94-9 (Washington, D.C.: Oct. 20, 1993). According to NNSA and Pantex officials, the SS-21 process was instituted to correct these deficiencies and improve the overall safety of operations at Pantex, and Pantex is certified to work on all weapon types in the U.S. stockpile under this process.

However, according to NNSA officials and Pantex site contractors, the new emphasis on safety stemming from SS-21 led Pantex to suspend the practice of dismantling multiple weapons within one bay or cell—a practice referred to as multiunit dismantlement. Some weapon systems are currently authorized for different types of multiunit dismantlement but, as a matter of practice, Pantex is not dismantling multiple weapons within individual bays and cells.[30] According to Pantex site contractors, this move away from multiunit processing offset other processing efficiencies, resulting in a significant decline in the number of weapons dismantled by the site annually. For instance, Pantex site contractors told us that throughout the 1990s, the site was processing multiple weapons in a bay or cell at a time, which enabled the site to typically dismantle 1,000 to 2,000 weapons per year. With suspension of multiunit dismantlement, Pantex site contractors told us that it was unlikely the site could achieve a comparable rate of dismantlement today. Pantex site contractors provided us with data showing that, in the 1990s, some weapon systems were dismantled three- or four-at-a-time within a bay or cell, including the following systems:

- W48 warheads: dismantled two per cell, three per bay;
- B57 bombs: dismantled two per cell, four per bay;
- W68 warheads: dismantled three per cell, four per bay;
- W70 warheads: dismantled three per cell, four per bay; and
- W79 warheads: dismantled two per cell, four per bay.

According to NNSA officials and Pantex site contractors, as a result of the reevaluation of safety at Pantex, NNSA concluded that the potential additional risk during multiunit dismantlement processing outweighed the benefits of dismantling multiple weapons within one bay or cell at a time.

NNSA officials and Pantex site contractors also told us that dismantlement rates have generally decreased over time because weapons dismantled recently have tended to be more difficult and time-consuming to dismantle than weapons dismantled in the 1990s. More specifically, an NNSA official told us that many of the weapons

[30]For example, the B61 is authorized for dismantlement of two weapons simultaneously by two separate work crews within one bay or cell, though operations are currently conducted on a single-unit basis. Other weapons are authorized for multiunit processing, including the W87—which is authorized for one work crew to work on two weapons in a bay simultaneously—and the W80—which is authorized for dismantlement of one unit while another is staged in a transport canister within the bay.

dismantled in the 1990s were smaller, less complex tactical nuclear weapons, such as nuclear artillery shells that were retired as a result of the 1991 presidential nuclear initiatives, and that more recently dismantled weapons—such as the B53 and B83 strategic bombs—have tended to be larger, more complex weapon systems.

Pantex site contractors told us that each weapon system comes apart differently and poses different dismantlement challenges. These variations affect the length of dismantlement time. Pantex has developed data to measure the time requirements in dismantling different weapon systems, referred to as dismantlement "difficulty quotients" (DQ). According to Pantex officials, dismantlement DQs are not measures of technical difficulty per se in dismantling a weapon, but they are measures of the amount of time involved in the dismantlement operation. These DQs are developed by Pantex planning staff who work with individual weapon program engineers to determine the number of hours required for each dismantlement activity associated with the weapon in question. These hours are rolled up for each weapon type and then divided by the number of hours required for a "standard" life extension program involving disassembly, inspection, refurbishment, and rebuilding of the weapon. NNSA has used the DQ data to establish "dismantlement equivalent units" (DEQ) for each weapon type, in order to measure the relative dismantlement time requirements among different weapon systems. The DEQs are derived by dividing a weapon's DQ against the DQ of a dismantlement base case. According to NNSA officials and Pantex site contractors, and based on our review of DQ and DEQ data, some weapon systems that have recently been dismantled in large numbers were more time-consuming to dismantle than other weapons due to their complexity and size, and these have high DEQs.

How NNSA Measures Progress Toward Its Dismantlement Performance Goal May Be Misleading, and NNSA Is Unlikely to Achieve This Goal

How NNSA measures progress toward its performance goal of dismantling all weapons retired prior to fiscal year 2009 by the end of fiscal year 2022 is unclear and may make its reported progress misleading, including its practice of not tracking the actual date of retirement of individual dismantled weapons and its plans to reinstate to the stockpile—rather than dismantle—certain weapons retired prior to fiscal year 2009. In addition, NNSA faces challenges in managing planned dismantlement workload and is unlikely to achieve its dismantlement performance goal because a large number of weapons retired prior to fiscal year 2009 are in managed retirement status, and it is uncertain whether these weapons will be released for dismantlement in time for NNSA to meet its dismantlement goal.

How NNSA Measures Dismantlement Progress May Be Misleading

In 2006, NNSA established a performance goal for the WDD program to dismantle all weapons retired prior to fiscal year 2009 by the end of fiscal year 2022. This goal was established to demonstrate to Congress that NNSA had a plan for timely, safe, and secure dismantlement of nuclear weapons. In March 2013, we obtained a draft of NNSA's future dismantlement schedule for all retired war reserve weapons, which included the schedule for the dismantlement, or other disposition, of the subset of weapons retired prior to fiscal year 2009. Our analysis of NNSA's dismantlement schedule for weapons retired prior to fiscal year 2009 and interviews with NNSA officials indicate that how NNSA measures progress toward this performance goal is unclear and may be misleading for two reasons.

First, the way in which NNSA measures progress toward its dismantlement performance goal is unclear and may be misleading because NNSA as a matter of practice does not identify and track the actual retirement date of individual weapons that are dismantled. According to an NNSA official, NNSA knows how many weapons of each system type were retired prior to fiscal year 2009. However, NNSA and Pantex do not track the date of retirement of individual weapons when they are dismantled at the Pantex Plant. Instead, whenever Pantex dismantles an individual retired weapon of a system type represented in the pre-fiscal year 2009 inventory—regardless of that weapon's actual date of retirement—NNSA counts that dismantlement as being equivalent to a weapon retired prior to fiscal year 2009 and counts it toward the fiscal year 2022 goal. Because of this approach, it is possible, according to an NNSA official, that NNSA is counting weapons toward the achievement of its performance goal that were retired *after* fiscal year 2009. This official told us that while individual retired weapons in storage at military facilities can be tracked by retirement date, weapons retired prior to fiscal year 2009 are not marked or designated for priority dismantlement. However, this official stated that, in general, it is unlikely that a more recently retired weapon would be selected for dismantlement if older retired weapons of the same type are available.

An NNSA official also commented that there may be technical reasons why an individual weapon retired after fiscal year 2009 may be transferred to NNSA for dismantlement before a weapon retired prior to fiscal year 2009. For instance, an NNSA official told us that NNSA's stockpile surveillance program might identify potential problems with a specific component, such as a capacitor, that might apply only to individual weapons retired after fiscal year 2009 and not to those retired before, making dismantlement of the weapons retired after fiscal year 2009 a higher priority.

Second, how NNSA measures progress toward its dismantlement performance goal is also unclear and may be misleading because some weapons retired prior to fiscal year 2009 are reinstated to the stockpile rather than dismantled. Specifically, in our analysis of NNSA's dismantlement schedule as of March 2013 for weapons retired prior to fiscal year 2009, we found that approximately 9 percent of the weapons retired prior to fiscal year 2009 are scheduled to be reinstated during fiscal year 2013 through fiscal year 2022 or later.

According to NNSA officials, NNSA plans to reinstate these weapons, in part, to offset the costs of rebuilding weapons disassembled under the stockpile surveillance program. Through this program, in a given year, a random sample of weapons from each weapon system is selected and withdrawn from the stockpile, disassembled, and inspected, and usually one weapon in each weapon system sample is subjected to nonnuclear, destructive testing of its nuclear components and cannot be rebuilt. The destructively tested units are replaced by weapons kept in readiness states in the inactive category of the stockpile, known as quality assurance and reliability testing replacement weapons. The remaining weapons from the sample set could be rebuilt following inspection and returned to the stockpile. However, in lieu of rebuilding all of the disassembled weapons, NNSA replaces some of them by reinstating retired war reserve weapons to the stockpile. According to NNSA officials, this is a cost-effective practice that avoids the costly rebuilding of weapons evaluated under the surveillance program and also reduces the number of weapons in the dismantlement queue.

An NNSA official told us that it is technically correct that under this practice some weapons retired prior to fiscal year 2009 are not expected to be dismantled but reinstated to the stockpile instead. However, this official noted that, under the reinstatement practice, NNSA is still dismantling a weapon for each weapon that is reinstated to the stockpile—that is, the weapon in the stockpile that is disassembled and inspected under the surveillance program. Thus, the reinstatement practice represents an equivalent dismantlement that has a neutral impact on the size of the stockpile.[31]

We have found in our prior work that having clear performance goals and measures is a key element of effective program management.[32] Performance goals or measures that are not clearly stated may be confusing or misleading. Neither NNSA's dismantlement performance goal as currently written, nor the way that progress toward the goal is measured, makes it clear that NNSA is counting equivalent numbers of weapons dismantled. Without such clarity, Congress and other users of this performance information may not understand the age or types of weapons that NNSA is counting toward achievement of the performance goal.

Uncertainties Related to Weapons in Managed Retirement Make It Unlikely That NNSA Will Achieve Its Dismantlement Goal

The uncertainties surrounding when weapons in managed retirement—retired weapons that have not been approved by the Nuclear Weapons Council for dismantlement—may be released for dismantlement present challenges for NNSA in scheduling future dismantlement workload and make it unlikely that NNSA will achieve its goal of dismantling all weapons retired prior to fiscal year 2009 by the end of fiscal year 2022. During our review, weapons from three different weapon systems were in managed retirement. These include some

- W84-0s retired in fiscal year 2006,
- W80-1s retired in fiscal year 2007, and

[31]During our review, DOD and military service officials raised concerns about the practice of reinstating retired weapons to the stockpile and its potential implications for stockpile reliability. NNSA officials provided us with additional information about the reinstatement practice and how NNSA addresses potential reliability concerns associated with weapons that could be reinstated, and they noted that reinstatements are conducted with the full cognizance of the joint DOD-DOE Project Officers Group responsible for weapon systems that are reinstated.

[32]For additional information on developing performance goals and measures, see GAO, *Managing for Results: GPRA Modernization Act Implementation Provides Important Opportunities to Address Government Challenges*, GAO-11-617T (Washington, D.C.: May 10, 2011); *Agency Performance Plans: Examples of Practices That Can Improve Usefulness to Decisionmakers*, GAO/GGD/AIMD-99-69 (Washington, D.C.: February 1999); *The Results Act: An Evaluator's Guide to Assessing Agency Annual Performance Plans*, GAO/GGD-10.1.20 (Washington, D.C.: April 1998); and *Executive Guide: Effectively Implementing the Government Performance and Results Act*, GAO/GGD-96-118 (Washington, D.C.: June 1996).

- W76-0s retired from fiscal years 2004 through 2012.

The W84-0s and W80-1s currently in managed retirement may not be available to NNSA for dismantlement prior to fiscal year 2022 because both of these systems are being held in managed retirement as candidates for potential reuse as the warhead on a future long-range standoff missile to replace the Air Force's current ALCM.[33] NNSA and DOD officials told us that release of the W84-0s and W80-1s in managed retirement for dismantlement is contingent on a future Nuclear Weapons Council selection of a warhead for potential reuse on the future missile. However, the timing of the future Nuclear Weapons Council's decision, whether it will select the W84-0 or W80-1 for the long-range standoff missile, and when weapons will be released for dismantlement remains uncertain, according to NNSA and DOD officials.

According to an NNSA official, if the W80-1 is selected for reuse on the future missile, NNSA could move the W84-0s back into its dismantlement schedule in the future. Depending on the timing, such a decision could present challenges to NNSA and Pantex in meeting the fiscal year 2022 dismantlement goal, as the W84-0 is considered a relatively difficult, or time-consuming, weapon to dismantle based on our review of DQ and DEQ data. However, this official told us that the W84-0 has many modern features. For this reason, there is a possibility that, even if this weapon system is not selected for reuse as the long-range standoff missile warhead, NNSA and the national labs may seek to retain the W84-0s indefinitely for other potential future warhead reuse options. Because of these uncertainties, NNSA had not scheduled dismantlement of any W84-0s—including those in managed retirement—in the dismantlement schedule we reviewed, as of March 2013, and NNSA officials told us that these weapons will be addressed in one way or another after fiscal year 2022. Given this time frame, and since all W84-0s in managed retirement were retired in fiscal year 2006, NNSA is unlikely to achieve its goal of dismantling all weapons retired prior to fiscal year 2009 by the end of fiscal year 2022 unless these weapons are released from managed retirement, and a decision is made to dismantle them.

Alternatively, if the W84-0 is selected for reuse on the future missile, the time frame for dismantlement of the W80-1s in managed retirement

[33]In addition, B61 bombs are also being evaluated for reuse as the warhead for the long-range standoff missile, though no B61s are currently in managed retirement.

remains uncertain. NNSA has tentatively scheduled the W80-1s for dismantlement before fiscal year 2020. However, DOD officials told us that, given the need to sustain the ALCM through the mid-2020s, it is unlikely that the W80-1s in managed retirement would be released for dismantlement before the first warhead is produced for the new missile and before the missile achieves initial operating capability, projected for later in the 2020s.

Uncertainties also surround the W76-0s in managed retirement and when they might be released for dismantlement, which could pose challenges for NNSA in meeting its dismantlement performance goal. NNSA is currently conducting a W76 life extension program under which W76-0 warheads in the stockpile are replaced with refurbished W76-1 warheads. NNSA expects to complete this life extension program by fiscal year 2019. As a hedge against technical problems in the life extension program process and in the refurbished warheads, however, the W76-0s are to remain in managed retirement and be unavailable for dismantlement until the life extension program processes and W76-1 unit reliability are "satisfactorily established," according to the fiscal year 2011 nuclear weapons *Requirements and Planning Document*. However, the criteria for "satisfactory establishment" of the W76 life extension program process and W76-1 unit reliability are unclear, creating uncertainty as to whether the W76-0s in managed retirement will be released to NNSA in time for dismantlement by the end of fiscal year 2022.

This uncertainty is driven by concerns about the life extension program that have been raised by DOE and DOD officials. For instance, in 2006 and 2012, the DOE Inspector General reported on delays in the W76-1 life extension program that put program startup and production goals at risk. In March 2013, DOD officials expressed concerns to us about the W76-1 life extension program, including that NNSA has been unable to produce consistent quantities of W76-1 warheads, and they told us that there are no formal criteria for the Nuclear Weapons Council's decision to release the W76-0s in managed retirement. These officials stated that it would be difficult to predict the completion of the W76-1 life extension program given inconsistent production, and that it was impossible to say whether the W76-0s in managed retirement could be released for dismantlement prior to fiscal year 2019 without additional confidence in NNSA's production capability.

Deferred Retirement of Weapons under New START Will Pose Challenges to NNSA's Management of Future Dismantlement Workload and Workforce

According to DOD officials we interviewed, the 2010 New START treaty may eventually result in the retirement of additional weapons from the U.S. stockpile. However, DOD officials told us it is unlikely that entry into force of New START will lead immediately to additional warhead retirements and increased dismantlement workload for NNSA. Instead, DOD officials said that the United States will meet the New START ceiling—1,550 operationally deployed nuclear weapons—to be in force by 2018 by transitioning currently deployed nuclear weapons to nondeployed "hedge" status without any significant change in the total stockpile size.

DOD officials told us that the retirement of additional weapons from the stockpile stemming from New START will be predicated on the successful restoration of the NNSA weapons production infrastructure, including the construction and operation of new NNSA facilities supporting nuclear weapons production—the Chemistry and Metallurgy Research Replacement Nuclear Facility at LANL, and the Uranium Production Facility at Y-12—which they did not believe could be achieved until the late 2020s or early 2030s.[34] Because of these conditions, it remains unclear when the weapons associated with the New START reductions will be retired. Due to the uncertainty on the timing of these retirements NNSA has not yet scheduled for dismantlement any weapons that may be removed from the stockpile under New START.

The deferred retirement of weapons following entry into force of the New START treaty until the late 2020s or early 2030s could present challenges to NNSA in managing its future dismantlement schedule and workforce. Specifically, there could be a significant gap in dismantlement work during the mid- to late-2020s, between the end of fiscal year 2022, when NNSA expects to complete most of its planned dismantlement workload, and the time when a large number of additional weapons would be available for dismantlement resulting from New START. This gap could affect NNSA's ability to manage the dismantlement workforce, posing challenges for NNSA in dismantling weapons retired as a result of the treaty. In particular, an NNSA official expressed concern that this gap in

[34]The Chemistry and Metallurgy Research Replacement Nuclear Facility is intended to provide LANL with a modernized capability to analyze and store plutonium. However, NNSA has deferred construction of this facility until at least fiscal year 2019. The Uranium Production Facility is intended to provide Y-12 with a single consolidated uranium processing and component production facility. This facility was renamed the Uranium Capabilities Replacement Project and is scheduled to be completed in three phases through the mid-2030s.

dismantlement workload in the mid-2020s could result in the loss of certified dismantlement personnel because dismantlement technicians at Pantex lose their certifications if they have not worked on a weapon type within the past year. As a result, Pantex may need to retrain and recertify sufficient numbers of new dismantlement personnel in the late 2020s to resume dismantlement efforts to address retired weapons stemming from New START.

According to an NNSA official we interviewed, relaxing the fiscal year 2022 dismantlement performance goal could allow the dismantlement workload to be leveled, and a steady dismantlement workforce to be maintained at Pantex through the mid-2020s. Pantex site contractors agreed with this view and stated that they were working with the WDD program manager to avoid a potential dismantlement workload gap. An NNSA official also told us that stretching out the dismantlement workload beyond fiscal year 2022 could free up program resources—assuming future WDD program budgets are comparable in size to the current budget of approximately $50 million per year—to allow the program to focus greater attention on disposing of a large inventory of legacy components from weapons dismantled long ago that are no longer in the current stockpile.

Pantex Capacity Sufficient to Meet NNSA's Planned Dismantlement Workload but Accelerating Dismantlement Could Be Costly

Our analysis of Pantex data indicates that the physical capacity at Pantex should be sufficient to allow the site to meet NNSA's planned dismantlement workload through fiscal year 2022 and to meet all other stockpile commitments, including surveillance and life extension program activities. NNSA's ability to significantly accelerate dismantlement and complete planned workload earlier than fiscal year 2022 could be costly, and it is unclear whether Pantex would have sufficient capacity to do so.

Physical Capacity at Pantex Should Be Sufficient to Meet NNSA's Planned Dismantlement Workload and Other Stockpile Commitments

In April 2013, we obtained and analyzed data on the physical capacity at Pantex to address NNSA's long-term dismantlement schedule and other stockpile plans as of March 2013 and found that sufficient bay and cell capacity should be available to meet these commitments. Specifically, we analyzed data from a computer-based system, known as the Long Range Production Planning Model (LRPPM), that Pantex uses to forecast the numbers of bays and cells needed to address future planned workload at the site—including dismantlement, surveillance, maintenance, staging, and life extension program activities.

The LRPPM also provides a tool to NNSA to evaluate the capacity available at Pantex to support different potential stockpile plans and scenarios—such as the effect of a delay in completing or initiating a life extension program for a certain weapon system, or the impact of accelerating the dismantlement of certain weapons. On the basis of the workload schedules at any given time, Pantex site contractors can use the LRPPM to calculate the amount of time and the numbers of bays and cells needed to complete annual workload from year to year.[35] We used data generated by the LRPPM to assess the future bay and cell requirements for dismantlement and other stockpile related activities at Pantex on the basis of NNSA's dismantlement schedule and other long-term stockpile plans as of March 2013.[36] We did not validate the LRPPM system itself.

[35]The LRPPM converts workload by year—i.e., the numbers of weapons to be processed under one activity or another in a given fiscal year—into annual bay and cell requirements through a series of calculations. First, the system calculates the total number of hours needed to complete a discrete workload activity, such as dismantlement of B61-3 bombs, in a given fiscal year by multiplying the number of weapons to be processed that year by the estimated amount of time needed to complete that activity for a single weapon. The system then divides this total time to complete the planned activity by 2,080—the number of hours available in a single facility (bay or cell) at one work shift, during the course of a year. This results in the total numbers of bays or cells needed to complete that activity in that year. For example, if 100 weapons of a given type are to be dismantled in a given fiscal year, and it takes an estimated 30 hours to complete dismantlement of a single unit, the bay requirements for this activity over the course of the year would be 1.44 (or 3,000 divided by 2,080). The LRPPM adds bay and cell requirements for all planned workload activities (e.g., dismantlement, surveillance, and life extension programs) to determine the total bay and cell requirements.

[36]NNSA and Pantex officials told us in April 2013 that the capacity projections generated by the LRPPM are subject to change and are often updated because stockpile requirements and resources can frequently change after a *Production and Planning Directive* is issued—such as a decision to accelerate dismantlement of one system and defer another.

Based on the LRPPM data, sufficient bay and cell capacity should be available to meet NNSA's planned weapon dismantlement, life extension program, and surveillance workload from fiscal year 2013 through fiscal year 2022.[37] In many years, the total number of bays and cells needed to complete total planned workload at the site exceeds the capacity limit at one work shift but does not require a second work shift. Pantex site contractors told us in those cases that they could address excess workload through overtime pay or a partial second shift, which they believed would be less expensive than maintaining a larger workforce to sustain the use of two work shifts.

Notwithstanding these projections of sufficient capacity, as of April 2013, NNSA officials cautioned that there are dozens of issues that could significantly change stockpile workload schedules and capacity requirements at Pantex in the future. These factors include reduced long-term funding levels for all NNSA stockpile-related work stemming from sequestration; potential new nuclear weapon requirements generated by the U.S. Strategic Command;[38] potential loss of military interest in a future planned common, or interoperable, warhead to replace the W78 and W88; new presidential guidance that could call for significantly reduced stockpile levels; and delays in startup of new NNSA facilities supporting nuclear weapons refurbishment.

NNSA's Ability to Significantly Accelerate Dismantlement and Complete Planned Workload Earlier Than Planned Could Be Costly

NNSA officials and Pantex site contractors said that they believe that significantly accelerating future dismantlement workload—to complete total planned workload earlier than fiscal year 2022—could be costly and that it is unclear whether the site would have sufficient capacity to do so. However, NNSA officials and Pantex site contractors told us that Pantex can and has accelerated some planned dismantlement work in response to changing military needs and to annual financial performance incentives provided by NNSA to the Pantex site operating contractor.

[37]After fiscal year 2022, the only dismantlement workload that NNSA and Pantex had scheduled in the LRPPM data we reviewed were W76-0 dismantlements.

[38]The U.S. Strategic Command, part of the Department of Defense, has primary responsibility for targeting nuclear weapons, preparing the U.S. strategic nuclear war plan, and, if ordered by the President, executing the war plan.

Capacity to Significantly Accelerate Future Dismantlement Workload Is Uncertain and Would Likely Entail Significant Costs

NNSA has assessed the capacity at the Pantex site and the costs to significantly accelerate the dismantlement schedule in order to dismantle all weapons retired prior to fiscal year 2009 earlier than the end of fiscal year 2022. Specifically, in March 2011, the Office of the Vice President asked NNSA to assess the possibility of accelerating its dismantlement schedule, to dismantle all weapons retired prior to fiscal year 2009 by fiscal year 2018, or 4 years earlier than the performance goal date. In December 2011, the Office of the Secretary of Defense also asked NNSA to evaluate this scenario and a second scenario for completing dismantlement of all weapons retired prior to fiscal year 2009 by fiscal year 2020, or 2 years earlier than the performance goal date. In response to these inquiries, in fiscal year 2011, NNSA identified the requirements and estimated the costs of increasing annual dismantlement rates.

To achieve the rate of dismantlement associated with either scenario, NNSA identified the need for certain technical improvements at Pantex, including bringing one bay and one cell that were unavailable for dismantlement operations back online, among other things. In addition, NNSA estimated at the time that approximately $212 million in additional funding on top of the projected baseline budgets for WDD and other NNSA programs supporting WDD for fiscal year 2012 through fiscal year 2018 would be needed to achieve the fiscal year 2018 dismantlement scenario. Alternatively, NNSA estimated that $265 million in additional funding on top of the projected baseline budgets for WDD and other NNSA programs supporting WDD for fiscal year 2012 through fiscal year 2020 would be needed to achieve the fiscal year 2020 scenario. We did not verify the accuracy of these funding estimates. See table 2 for more information on NNSA's estimated annual funding needs associated with these dismantlement acceleration scenarios.

Table 2: NNSA Estimated Additional Funding to Achieve Fiscal Year 2022 Dismantlement Performance Goal by Fiscal Year 2018 or Fiscal Year 2020

(Dollars in millions)	
Program	**Total**
Increased funding to achieve fiscal year 2018 dismantlement scenario goal	
WDD program	$119.8
Other NNSA programs supporting WDD	$91.6
Total	**$211.5**
Increased funding to achieve fiscal year 2020 dismantlement scenario goal	
WDD program	$142.7
Other NNSA programs supporting WDD	$122.4
Total	**$265.0**

Source: GAO analysis of NNSA data.

Note: Amounts may not total due to rounding.

Under NNSA's 2011 estimate, achieving either of these acceleration scenarios was predicated on additional funding being made available to the WDD program and the other supporting NNSA programs beginning in fiscal year 2012. According to an NNSA official, no additional funding was provided by Congress to NNSA in fiscal year 2012 or 2013 to support either the 2018 or 2020 dismantlement acceleration scenario. NNSA officials and Pantex site contractors told us that, since the 2011 estimate, they have not reassessed the costs of accelerating its dismantlement schedule and have not reevaluated the constraints—including bay and cell capacity, and the numbers of certified workers available—or the impact on the site's other scheduled stockpile life extension program and surveillance work that would be associated with accelerating dismantlement rates to meet the fiscal year 2018 or 2020 dismantlement scenario. NNSA officials and Pantex site contractors told us they were reluctant to undertake such a reevaluation without a clear signal of new congressional interest in accelerated dismantlement. As a result, we could not determine whether it would be possible for NNSA to accelerate dismantlement workload to complete dismantlement of all weapons retired prior to fiscal year 2009 earlier than fiscal year 2022.

NNSA officials and Pantex site contractors told us that they believed it would not be possible to complete dismantlement of the remaining weapons retired prior to fiscal year 2009 by fiscal year 2018 without compromising the site's planned stockpile life extension program and surveillance workload. However, an NNSA official told us that completing dismantlement work 2 years early, or by the end of fiscal year 2020, might be possible if (1) Congress provided additional funding to the WDD program and supporting NNSA programs beginning in fiscal year 2014 and (2) other conditions were met, including timely Nuclear Weapons Council decisions on the release of weapons in managed retirement and rehabilitation of the additional bay and cell at Pantex. To accelerate dismantlement to meet a fiscal year 2020 goal, an NNSA official estimated that additional funding of approximately $212 million, as a rough order of magnitude, would likely be required on top of current projected baseline budgets for WDD and supporting NNSA programs—that is, the amount of additional funding NNSA estimated in 2011 that would be needed to achieve the dismantlement rates for the fiscal year 2018 acceleration scenario described above.

Pantex Has Accelerated Dismantlement of Some Weapons in Response to Military Needs and Financial Performance Incentives

Even though NNSA and Pantex have not formally reassessed the costs and capacity constraints of accelerating dismantlement to complete planned workload earlier than fiscal year 2022, according to NNSA officials and Pantex site contractors, the Pantex site is generally able to accelerate dismantlement work. Specifically, Pantex has regularly exceeded annual dismantlement targets established in the *Production and Planning Directives* and *Program Control Documents* by running extra dismantlement shifts and allowing overtime pay. Based on our analysis of NNSA data for fiscal year 2008 through fiscal year 2012, the Pantex site exceeded the annual planned dismantlement rates every year by approximately 14 percent on average.[39]

Pantex has accelerated some dismantlement work in response to changing military needs that have required some weapons to be dismantled more quickly. For instance, in 2011, NNSA agreed to a Navy request to accelerate dismantlement of retired W76-0 warheads at the rate of 100 units per year, with the goal of dismantling 500 warheads by the end of fiscal year 2016. At the time, NNSA had not planned for significant and consistent dismantlement of W76-0 warheads until fiscal year 2015. According to Navy officials we interviewed, accelerating dismantlement of retired W76-0 warheads allowed the Navy to avoid

[39]NNSA officials stated that the high annual rates of dismantlement would not necessarily lead NNSA to complete planned dismantlement workload earlier than fiscal year 2022, as dismantlement workload is dynamic and adjusted for increases or decreases in the planned quantities of weapons available for dismantlement, and because dismantlement workload must be balanced with component disposition work.

constructing new weapon storage facilities, saving the Navy approximately $190 million in estimated construction costs.

NNSA has also provided financial performance incentives to the Pantex site operating contractor to encourage the site to pursue accelerated rates of dismantlement. NNSA has included dismantlement-related financial incentives in the annual performance evaluation plans that set forth the criteria used by NNSA to evaluate the Pantex site operating contractor’s performance and determine the total fee the contractor earned. For example, the fiscal year 2012 performance evaluation plan included five dismantlement-related performance incentives, as follows:

- exceed planned dismantlements of B53s,
- complete scheduled W76-0 dismantlement quantities,
- exceed scheduled W76-0 dismantlement quantities,
- complete dismantlement of at least 14 W31 trainer units from Y-12, and
- exceed scheduled W80-0 dismantlement quantities.

NNSA determined, in its fiscal year 2012 performance evaluation report, that the Pantex site operating contractor substantially exceeded each of these goals. On the basis of this performance, along with the site’s performance in meeting other objectives not related to dismantlement, the site contractor earned over $16.5 million in award fees for defense program-related work that year.[40]

In addition to accelerating dismantlement activities at Pantex, NNSA officials told us that consideration had been given in the past to augmenting dismantlement capacity by using a similar weapons assembly/disassembly facility, known as the Device Assembly Facility, located at the NNSS. Using this facility in such a way would be similar to an approach to increase dismantlement capacity recommended by the

[40]According to NNSA officials, because of the way the incentives are structured in the performance evaluation plans, it is not possible to determine the total earned fee in a fiscal year resulting directly from dismantlement performance. Specifically, while there are some dismantlement-specific performance incentives, in other cases, the dismantlement performance targets can be one component of a composite, Pantex-wide performance goal. In those cases, the amount of the fee attributable to the dismantlement portion cannot be determined, according to NNSA officials, because fee amounts are not generally allocated to specific targets in the composite performance goal.

Secretary of Energy Advisory Board in 2005.[41] However, NNSA officials told us that using the Device Assembly Facility for nuclear weapons dismantlement operations could carry significant costs. According to NNSA officials, the facility currently does not have the necessary safety authorizations, sufficient numbers of certified technicians and security personnel, and other required tooling and resources to perform dismantlement operations there. For example, because the SS-21 process is a Pantex-specific plan for dismantlement that takes into account the unique features of the site, Pantex site contractors told us the SS-21 process would need to be recreated at the Device Assembly Facility to adjust for features specific to that facility and the weapons to be dismantled there. NNSA officials said that they believed meeting these requirements could take a significant amount of time, so that the augmented dismantlement capacity at the facility might be operational for only a few years before the planned dismantlement workload is expected to be completed.

Disassembly and Disposition of Some Nuclear and Nonnuclear Components from Dismantled Weapons Is Complicated by Policy and Technical Challenges

We identified several policy and technical challenges affecting NNSA's disassembly and disposition of nuclear and nonnuclear components from dismantled nuclear weapons. First, NNSA has not established a capability for the disassembly and disposition of pits from dismantled nuclear weapons, creating uncertainty about when they will be removed from Pantex. Second, NNSA is retaining much of its inventory of CSAs, which is not expected to have a near-term effect on NNSA's ability to meet its external HEU supply commitments to the U.S. Naval Reactors Program and others, but poses challenges to Y-12's ability to plan its workload. Third, NNSA is storing millions of nonnuclear components from dismantled weapons at Pantex in a contingency inventory that may exceed future weapons needs, and the agency's ability to effectively manage this inventory is complicated by decisions to retain many components for potential reuse in weapons and by limitations in Pantex's previous component inventory management system. Finally, there is a large backlog of legacy components and unknown legacy material that, at

[41] In 2005, the Secretary of Energy Advisory Board Nuclear Weapons Complex Infrastructure Task Force recommended that NNSA utilize the Device Assembly Facility for assembly of nuclear weapons utilizing insensitive high explosives, thereby freeing up capacity at Pantex for expedited weapons dismantlement. Secretary of Energy Advisory Board Nuclear Weapons Complex Infrastructure Task Force, *Recommendations for the Nuclear Weapons Complex of the Future* (Washington, D.C.: July 13, 2005).

current funding levels, could take up to a decade or longer to dispose of because of technical and classification security challenges associated with the characterization of components. However, efforts to address the need to retain older parts and upgrade Pantex's component inventory management system are already under way.

NNSA Has Not Established a Capability for Disassembly and Disposition of Pits Stored at Pantex

NNSA has not established a capability for the disassembly and disposition of pits from dismantled nuclear weapons, creating uncertainty about when they will be removed from Pantex and potentially posing challenges to site operations. In 1994, the United States declared 38.2 metric tons of weapons-grade plutonium as surplus to national security needs, and in 1997 NNSA announced a plan to dispose of this plutonium through conversion into mixed oxide fuel by building a dedicated pit disassembly and conversion capability and a mixed oxide fuel fabrication facility, among other means.[42] Much of the plutonium slated for disposition is contained in nuclear weapon pits, which must be disassembled and converted to plutonium oxide before it can be fabricated into mixed oxide fuel.

However, after 15 years of consideration, NNSA has decided not to establish a dedicated plutonium disposition capability and is studying other options for disassembly of surplus pits. As a result, the future of the overall plutonium disposition program remains unclear.[43] Since 1997, NNSA has proposed a number of planned alternatives for establishing a plutonium disposition capability; however, in 2007 and 2010, we identified persistent problems with cost overruns and schedule delays in many of these plans.[44] In its fiscal year 2014 budget, NNSA stated that it remains committed to plutonium disposition but that, in consideration of preliminary cost increases and the current budget environment, it is

[42]The United States declared an additional 9 tons of plutonium as excess in 2007.

[43]The plutonium disposition program is managed by NNSA's Fissile Materials Disposition Program.

[44]GAO, *Nuclear Nonproliferation: DOE Needs to Address Uncertainties with and Strengthen Independent Safety Oversight of Its Plutonium Disposition Program*, GAO-10-378 (Washington, D.C.: Mar. 26, 2010); and *Department of Energy: Major Construction Projects Need a Consistent Approach for Assessing Technology Readiness to Help Avoid Cost Increases and Delays*, GAO-07-336 (Washington, D.C.: Mar. 27, 2007).

assessing alternative strategies for a plutonium disposition capability, which may further delay the timelines for pit removal from Pantex.[45]

Because NNSA has not established a capability for pit disassembly and conversion, Pantex has accrued a large inventory of pits that are surplus to defense needs. These pits are being stored on-site until a pit disassembly capability is operational. Many of the surplus pits are available for disassembly. The remaining pits on site comprise the U.S. strategic reserve of plutonium, or serve as candidates for potential reuse in refurbished stockpile weapons.

Pantex is authorized by federal authorities to store up to 20,000 pits on-site. Pantex site contractors told us that the pits from all weapons to be dismantled by fiscal year 2022 could be accommodated at the site without surpassing the 20,000 pit limit. According to our analysis of NNSA's future dismantlement schedule, additional weapons, each with one pit, are to be dismantled from fiscal year 2013 through fiscal year 2022, but the site will remain within the overall storage limit.

However, as future weapons are retired and dismantled and, in the absence of a plutonium disposition capability, storing an increasing number of pits will require a reconfiguration of some of the nonnuclear bays at Pantex. Pantex site contractors told us that while Zone 4 magazine storage is reaching capacity under its current configuration, if a dedicated pit disassembly and conversion capability is not built, additional nonnuclear bays within Zone 12 would need to be converted to permit the storage of the remaining pits up to the 20,000 pit limit. An NNSA official told us that these bays have recently been authorized for nuclear explosive operations and could be used for pit storage without any adverse impact on the site's ability to perform its anticipated workload. See figure 5 for photos of the weapon and pit storage magazines in Pantex Zone 4.

[45]NNSA is disposing of a small amount of plutonium using a pit disassembly development and demonstration project located at LANL.

Figure 5: Pantex Zone 4 Magazines for Pit and Weapon Storage

Source: National Nuclear Security Administration.

NNSA's Decision to Retain Many CSAs Poses Challenges to Y-12's Workload Planning

NNSA has made a policy decision to retain many CSAs for potential reuse in refurbished weapons and as part of the U.S. strategic reserve. Retention of these CSAs is not currently expected to have a near-term impact on NNSA's external HEU supply commitments to the U.S. Naval Reactors Program and other programs, but retention poses challenges to Y-12's ability to plan its future workload.

NNSA Is Retaining Many CSAs

At the end of fiscal year 2012, NNSA identified a large number of CSAs from dismantled weapons or in retired weapons awaiting dismantlement.[46] Some of these CSAs were identified as excess by NNSA and were available for disassembly at Y-12. The HEU from the excess CSAs may be used to meet NNSA's external HEU supply commitments to the U.S. Naval Reactors Program and other programs. However, there were many remaining CSAs being retained by NNSA that were not available for disassembly. According to NNSA documents and officials, as well as Y-12 site contractors, NNSA is retaining many CSAs for several reasons, including the following:

[46]CSAs within active stockpile weapons, managed retirement weapons, and a small quantity held as test objects and for enhanced surveillance activities were not included in this inventory.

- *To provide NNSA with multiple options in selecting which CSAs to reuse in refurbished weapons*. According to data provided by NNSA officials and Y-12 site contractors in March 2013, NNSA is retaining two types of CSAs as options for reuse in a potential future W78 warhead refurbishment.[47] An NNSA official told us that NNSA anticipated a decision on the CSAs for W78 reuse by 2016, which would lead to the release for disassembly of the retained CSAs not selected shortly thereafter. In addition, NNSA is also retaining four types of CSAs as options for reuse in a warhead on the Air Force's planned long-range standoff missile. An NNSA official told us that the work to select CSAs for a long-range standoff missile warhead was in a very preliminary stage and that it was not possible to estimate a date for the release of the CSAs currently being held as reuse candidates.
- *To provide a technical hedge for aging CSAs.* Additional CSAs are being retained because of uncertainty about the effects of aging on the retained CSAs. Some of the retained CSA types have not been disassembled and inspected in many years, and the national laboratories have expressed the concern that the age and degradation of components may affect the number of useable CSAs and CSA parts. The laboratories recommend that the condition of many of the systems be reassessed and that those systems found unacceptable be removed from the list, but NNSA officials told us they had no plans to do so. NNSA officials told us they could not estimate the number of CSAs that the laboratories have requested as a hedge due to concerns about their age.
- *For potential use in planetary defense against earthbound asteroids.* NNSA officials told us that CSAs associated with a certain warhead indicated as excess in the 2012 *Production and Planning Directive* are being retained in an indeterminate state pending a senior-level government evaluation of their use in planetary defense against earthbound asteroids. While NNSA has declared these CSAs to be excess and, until March 2013, had scheduled them for disassembly beginning in fiscal year 2015, the national labs' retention letter has also characterized the CSA associated with this warhead as an "irreplaceable national asset." The WDD program is coordinating NNSA's evaluation of their use in planetary defense with the support of LLNL, LANL, and Y-12.

[47]Refurbishment of the W78 is intended to modify the weapon such that it may be used on multiple platforms.

- *To provide a strategic reserve of HEU.* Because the United States no longer produces HEU, since 1994, the United States has retained a strategic reserve of HEU—in the form of CSAs and HEU metal—to ensure an adequate HEU supply is available for the weapons program in the future. Some of the HEU from retained CSAs is expected to remain in the strategic reserve even after disassembly. For example, once a decision is reached regarding which of the two retained CSA types will be used in the refurbished W78, the remaining CSA types not selected will be released for disassembly, but their HEU metal will continue to make up part of the U.S. strategic reserve.

CSA Retention Is Not Expected to Have an Impact on NNSA's External Supply Commitments but Poses Challenges to Y-12's Ability to Plan Its Disassembly Workload

NNSA's decision to retain many CSAs is not expected to have a near-term impact on NNSA's external HEU supply commitments to the U.S. Naval Reactors Program, space and research reactors, and nuclear nonproliferation programs. Based on our review of a March 2013 Y-12 analysis of the site's ability to supply HEU over the next 20 years and interviews with an NNSA official and an NNSA contractor, CSA disassembly through the end of fiscal year 2020 is projected to provide Y-12 with enough HEU to meet its external supply commitments through 2032. However, the Y-12 analysis noted that, unless additional CSAs are made available for disassembly, after fiscal year 2020 Y-12 will need to draw HEU from its on-hand inventory to meet its commitments. Furthermore, an NNSA official confirmed that a significant delay in the release of managed retirement weapons would impact NNSA's ability to meet external HEU supply commitments to the U.S. Naval Reactors Program after 2032. According to the Y-12 analysis, additional supplies of HEU to support the U.S. Naval Reactors Program after 2032 are required, and NNSA is currently reviewing weapon life extension program requirements that will ensure additional supply.

However, NNSA's decision to retain many CSAs has reduced the number of CSAs available for disassembly at Y-12, which poses significant challenges to Y-12's ability to plan its disassembly workload. We analyzed Y-12 CSA disassembly data from the 2009 *Production and Planning Directive*—published before the number of CSAs retained was increased—and from the March 2013 draft CSA disassembly schedule and found that, from fiscal year 2013 through fiscal year 2032, Y-12 is projected to disassemble far fewer CSAs than in NNSA's 2009 *Production and Planning Directive*.

NNSA's decision to retain many CSAs, and uncertain policy decisions regarding when some will be released for disassembly, pose challenges to Y-12's ability to plan future work. Under NNSA's September 2012 retention plan, the March 2013 draft disassembly schedule shows a significant drop-off in workload in fiscal year 2018 through fiscal year 2020, and after fiscal year 2022. Y-12 site contractors told us that they need approximately 2 to 3 years to plan for the disassembly of CSAs, including training personnel and ensuring that adequate equipment is in place. Y-12 site contractors raised serious concerns about how this potential drop-off in workload could affect both their near-term planning and their long-term workload, resulting in the need to lay off workers, and that the effects could be felt at the site earlier than the first year of the drop-off.

An NNSA official also told us that upcoming decisions regarding which CSAs would be used for certain refurbished weapons would result in the release of additional CSAs for disassembly by late 2016. However, based on our discussions with Y-12 site contractors, a decision in late 2016 could already affect Y-12's ability to prepare for upcoming disassembly work. When we raised these concerns with an NNSA official, the official told us that CSA retention decisions are driven by national security considerations and not by Y-12 workload considerations.

NNSA Is Retaining a Contingency Inventory of Nonnuclear Components That May Exceed Future Weapon Needs

NNSA is storing millions of nonnuclear components from dismantled weapons at Pantex—including millions of parts for potential reuse in repairing, maintaining, or refurbishing weapons in the current and future stockpiles—as a contingency inventory that may exceed future weapon needs. However, NNSA's ability to effectively manage and evaluate the retention of some parts in this inventory is complicated by decisions to retain many components for potential reuse in weapons, including old parts from weapons no longer in the stockpile, and by limitations in Pantex's previous component inventory management system.

The inventory of nonnuclear components at Pantex includes several categories of components that are managed in different ways. Nonnuclear components from weapons still active in the stockpile are categorized within Pantex's "active" component inventory, and nonnuclear components from weapons no longer in the stockpile are considered "legacy" components. "Mark quality" components are those that have been retained for reuse—Pantex retains those in the active category but is authorized to dispose of those in the legacy category. The "non-netable" category comprises components that will not be retained at Pantex and that will be disposed of. Table 3 illustrates Pantex's nonnuclear component inventory as of May 2013.

Table 3: Pantex Nonnuclear Component Inventory as of May 2013

	Mark quality[a]	Non-netable[b]	Total
Legacy[c]	7,250	75,425	**82,675**
Active[d]	3,029,300	239,902	**3,269,202**
Total	**3,036,550**	**315,327**	**3,351,877**

Source: Pantex.

[a]Mark quality refers to nonnuclear components retained for possible reuse.

[b]Non-netable refers to nonnuclear components that will not be retained.

[c]Legacy refers to nonnuclear components from weapons no longer in the stockpile.

[d]Active refers to nonnuclear components from weapons still in the stockpile.

In arranging for the disposition of nonnuclear components from dismantled weapons, Pantex's first priority is disposing of components from ongoing weapon dismantlement to avoid adding unnecessarily to Pantex's preexisting inventory. However, because remanufacturing certain nonnuclear components and parts could be time-consuming and expensive—or, in some cases, is impossible—NNSA officials and the national laboratories ask Pantex to store components for potential reuse in current weapons, future modernized weapons, or for other weapons-related contingencies. These component retention instructions are outlined in a weapon type's *Program Control Document*, which targets the numbers of components to retain, and detailed in each weapon type's *Retirement Disposition Instruction*, developed by the national laboratories and weapon program managers, which specifies the method of disposition for each component—saved for reuse, disposed of, or sent to KCP or NNSS. According to a 2011 Pantex chart, Pantex will add an estimated 53,000 components to the mark quality inventory per year from fiscal year 2011 through fiscal year 2015. Figure 6 shows nonnuclear component storage within Pantex's warehouses and nonnuclear components packaged and ready for shipment from Pantex.

Figure 6: Pantex Nonnuclear Component Warehouse Storage

Source: National Nuclear Security Administration.

Our review of nonnuclear component inventory data and Pantex documents, as well as our interviews with NNSA officials and Pantex site contractors, suggest that Pantex may be retaining more nonnuclear components as “mark quality” for potential reuse than necessary and that the age and condition of some mark quality components raises questions about their suitability for reuse. As of May 2013, Pantex was storing 3 million mark quality nonnuclear components as a contingency inventory for potential reuse in maintaining active stockpile or refurbished weapons. In January 2013, Pantex site contractors estimated that 1.4 million of these components were commercially available hardware, such as screws, nuts, and bolts. According to Pantex documentation, “a large number” of the components retained in the mark quality inventory are believed to be excess based on the current stockpile. Pantex site contractors also told us that some retention requests from the laboratories for nonnuclear components may be overly conservative. For instance, Pantex site contractors told us that, in 2012, NNSA—at the request of the national laboratories—directed Pantex to retain approximately 650 spin rocket motors, but that after questioning from Pantex, they revised the request to 50 motors. In addition, some mark quality components in storage are very old. For example, our review found that 1.7 million components—or more than half of the mark quality inventory at Pantex, as of August 2012—were placed in storage in 1989 or before.[48] During our site visit to Pantex, we observed several components covered in dust

[48]We were limited to using August 2012 data because Pantex officials told us this information was not easily extracted directly from their records.

that appeared not to have been touched or moved in years, if not decades.

NNSA officials and Pantex site contractors, however, told us that they believed that it made sense to retain more components in mark quality inventory than may be necessary because of uncertain future stockpile maintenance, repair, or refurbishment needs, and because it could be costly to remanufacture or replace components that had been disposed of. An NNSA official told us that, in the past, NNSA had disposed of components that the agency later needed. For instance, an NNSA official told us that NNSA had disposed of the center cases—a section of the case that contains the CSA—from dismantled B61 bombs through burial at NNSS but later found the agency would need them for the B61 life extension program. NNSA officials told us that the components' importance was such that NNSA had decided to dig up the cases because doing so cost less than remanufacturing them. In addition, NNSA officials and Pantex site contractors told us that, since some parts will always need to be retained to sustain the current stockpile, and since the cost to sustain the warehouses varies little by the number of parts stored, they believed that any marginal costs associated with storing excess components were justified by the potential cost of any future scenario requiring their remanufacture or reacquisition.

However, we found that some active mark quality nonnuclear components in the Pantex inventory are associated with weapon systems no longer in the stockpile, raising questions about whether these components will ever be reused. For example, as of August 2012, we found that Pantex was storing in its mark quality inventory for reuse 493,305 components from weapons that were no longer in the active stockpile, including approximately 6,135 components from the B43—a weapon produced in the early 1960s and retired from the stockpile in 1991—and 5,092 components from the Mk-11—a weapon produced in the 1950s and retired in 1960. Both of these weapons were dismantled before 1992, but some of their components remain in Pantex's contingency inventory. In addition, Pantex continues to store 58,854 components from dismantled B57s, a weapon that was last dismantled in 1995. Pantex site contractors told us that NNSA retains some components from weapons no longer in the stockpile because they can be reused in active stockpile weapons, but Pantex site contractors said it was unlikely that many of the components from some of these very old weapons would be reused. An NNSA official told us that NNSA is working with the national laboratories to reassess the need to retain these components, but that efforts were hampered under current funding levels.

In recognition of these inventory issues, in September 2012, NNSA created a capability to track “slow moving” inventory and reevaluate the continuing need to retain it. However, in January 2013, NNSA officials told us that the capability was too new to judge its usefulness to weapons program managers and the national laboratories. NNSA officials told us that they would use this capability to evaluate the ongoing necessity to retain some of these slow moving components during their next annual review of retained weapons components to be held in the fall of 2013.

Management of the large nonnuclear component inventory at Pantex has been further complicated by limitations in the site’s previous inventory management system. For example, the inventory system, which dated to 1989, did not have the fields to collect financial and other information to establish storage component costs, the value of the components in storage, or forecast future storage capacity needs. In January 2013, we requested data on the cost of storage for nonnuclear components at Pantex. NNSA officials and Pantex site contractors said they did not have an estimate of those costs. NNSA officials also did not have an estimate of the value of the components in storage that could enable NNSA to make economic decisions about retaining or disposing of certain components, particularly those weapons no longer in the stockpile.

In addition, according to an NNSA official and Pantex site contractors, the system could not be used to forecast future component inflows or outflows based on anticipated capacity and workload at Pantex. Pantex site contractors estimated that Pantex’s inventory was at 86 percent of the site’s storage capacity, which was a decrease from the 1990s, when inventory was at nearly 95 percent capacity. In January 2013, the DOE Inspector General found that the warehouses that Pantex uses to store weapons components are nearing capacity levels.[49] Pantex site contractors were able to show us pictures demonstrating reductions in stored components that had freed up space, but the inventory system could not project if current storage capacity will be sufficient to contain the estimated 53,000 components that will be added to the mark quality inventory on average through fiscal year 2015. Pantex site contractors told us that, if they ran out of storage space, they could store components in special containers outside in Zone 12, or create additional storage by

[49]DOE, *Audit Report: The National Nuclear Security Administration’s Weapons Dismantlement and Disposition Program,* OAS-L-13-06 (Washington, D.C.: Jan. 29, 2013).

opening up an unused warehouse on-site, but that doing so may add to operating costs. Furthermore, when we requested basic information such as how long components had been in storage and their associated weapon system, Pantex site contractors told us they would have to write special queries to extract this information from the system.

In May 2013, Pantex site contractors informed us that they would be addressing some of these limitations through a $38 million upgrade to the site's computer systems in July 2013 that would include improvements to the component inventory management system. However, this system was still being implemented in August 2013, and we were not able to assess the extent to which the upgrades may address the issues we identified. According to NNSA officials and Pantex site contractors, the upgraded system will include fields to collect cost information and the physical size of a component. However, it will not contain fields to track the age of a part, though a Pantex site contractor said that the upgraded system will make it easier to research that data.

Disposing of a Large Nonnuclear Legacy Component Inventory Could Take a Decade or Longer

In addition, there is a large backlog of legacy components and unknown legacy material that could take up to a decade or longer to dispose of because of technical and classification security challenges associated with the characterization of components. Nonnuclear components must be characterized before Pantex can safely and securely dispose of them. Characterization is the process of understanding, documenting, classifying according to security level, and establishing a waste disposal pathway. To characterize a component, Pantex relies heavily on engineers at SNL, as well as weapons component information contained in a database maintained by SNL called the Stockpile Dismantlement Database.

- Legacy components: As previously mentioned, these are components from dismantled weapons that are no longer in the active stockpile and that Pantex is authorized to dispose of. These components may be partially characterized—in that they have been identified and recorded in the inventory system—but do not yet have an appropriate disposal pathway established by Pantex.
- Legacy material: There is an unknown quantity of components in boxes left over from previous decades' dismantlement. These components have not been characterized, and, once identified and recorded, may or may not have an established disposal pathway.

In 2011, after several years of review, NNSA authorized Pantex to dispose of all of the site's legacy components, but approximately 1,300 components need characterization before they can be disposed of. According to an NNSA official, in November 2012, characterization and disposal of legacy components and material in legacy boxes is the lowest priority for the WDD program and would be the first activity to be reduced under program budget cuts. In September 2013, an NNSA official told us that the net impact of sequestration had been a delay to legacy component disposition work in fiscal year 2013. According to Pantex data, by May 2013, Pantex had successfully disposed of more than 75 percent of the legacy component inventory it had in September 2011—from 350,249 to 82,675 components. However, 1,300 of these legacy components had not been fully characterized, as of April 2013, and could not be disposed of. Pantex site contractors told us that they could characterize 730 of these components on-site but that information on the remaining 570 had been sent to SNL for additional research. In April 2013, Pantex site contractors told us this additional research could take over a year to complete.

Additionally, Pantex currently has an unknown quantity of legacy material in boxes left over from previous decades' dismantlement operations that it is attempting to eliminate over time. Pantex site contractors and an NNSA official told us that, in previous decades, less emphasis was placed on properly disposing of nonnuclear weapons components. During our site visit, we observed a number of cardboard and wooden boxes containing unknown weapons parts from previous decades' dismantlements. Pantex site contractors told us that some of these boxes may contain parts that are up to 60 years old and that may be radiologically contaminated, which makes them difficult to handle and identify.

An NNSA official told us that they have an informal goal of disposing of the entire backlog of legacy components and legacy material by fiscal year 2022. However, Pantex site contractors told us that their efforts are hampered when weapons component information in the Stockpile Dismantlement Database does not exist or is incomplete. Pantex site contractors told us they rely heavily on information in the database to identify these legacy components, but some very old weapons information—which may contain highly classified additional details about the design of early nuclear weapons—is incomplete or has not been added to the database out of "need to know" security concerns. NNSA officials told us that because the database can be accessed by a variety of individuals across the weapons complex, LLNL and LANL site contractors are often reluctant to share drawings with SNL for inclusion in the database, hampering SNL and Pantex's efforts to identify and dispose of legacy components. Pantex site contractors told us that they could request the drawings directly from the weapons design laboratories, but a Pantex document states that the time required to characterize a component is significantly lengthened when it is not in the database. NNSA officials told us that they are working to identify a solution, in concert with site contractors at Pantex, SNL, LLNL, and LANL.

Conclusions

NNSA's WDD program is instrumental in enabling the United States to eliminate nuclear weapons excess to defense needs and to meet international treaty commitments. To these ends, DOE and NNSA have dismantled more than 12,000 weapons since the dissolution of the Soviet Union, and the WDD program will play a critical role in dismantling weapons through fiscal year 2022 and beyond as the nuclear weapons stockpile continues to shrink, and more weapons are retired. While we recognize the progress NNSA has made, we identified concerns related to its dismantlement performance goal.

NNSA is unlikely to achieve its goal of dismantling all weapons retired prior to fiscal year 2009 by the end of fiscal year 2022 because of uncertainties surrounding when large numbers of retired weapons that are currently in managed retirement might be released for dismantlement. In addition, because of the possible delay in the retirement of additional weapons resulting from New START treaty implementation, there could be a significant gap in dismantlement workload during the mid- to late-2020s that could affect NNSA's ability to sustain sufficient numbers of certified dismantlement personnel. By relaxing and extending the fiscal year 2022 dismantlement performance goal deadline, NNSA could give itself flexibility to account for the uncertainties associated with weapons in managed retirement and could allow the dismantlement workload to be leveled and extended through the mid-2020s to sustain the dismantlement workforce.

In addition, NNSA's level of progress toward its dismantlement performance goal is unclear because it does not track the actual date of retirement of individual weapons as they are dismantled. As a result, some weapons retired after 2009 may be dismantled and counted toward meeting this performance goal. In addition, some weapons retired prior to fiscal year 2009 will be reinstated to the stockpile, but counted as dismantled, because they are replacing weapons disassembled and not rebuilt under the stockpile surveillance program. As a result, NNSA counts equivalent numbers of weapons as dismantled toward its performance goal. Because the dismantlement performance goal as written does not make these practices clear, NNSA risks providing misleading or confusing information about the age or types of weapons being dismantled.

Recommendations for Executive Action

We recommend that the NNSA Administrator take the following two actions:

- Reevaluate and consider extending the fiscal year 2022 dismantlement performance goal, to account for the uncertainties about when weapons currently in managed retirement will be released for dismantlement, and to avoid a potential dismantlement workload gap due to the deferred retirement of large numbers of additional weapons following entry into force of the New START treaty.
- Revise the dismantlement performance goal to clarify that NNSA intends to dismantle all weapons retired prior to fiscal year 2009, or an *equivalent number of weapons*, by the end of fiscal year 2022 or an updated deadline, to reflect that NNSA may be counting some dismantled weapons retired after fiscal year 2009 as equivalent to weapons retired prior to fiscal year 2009, and is counting some reinstated weapons as being equivalent dismantlements.

Agency Comments and Our Evaluation

We provided a draft of this report to NNSA and DOD for comment. NNSA provided written comments, which are reproduced in appendix II. DOD did not provide written comments.

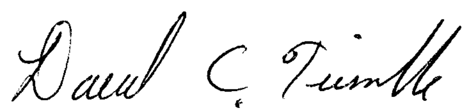
In its comments, NNSA generally agreed with our two recommendations that it (1) reevaluate and consider extending the fiscal year 2022 dismantlement performance goal, to account for the uncertainties when weapons currently in managed retirement will be released for dismantlement, and to avoid a potential dismantlement workload gap due to the deferred retirement of large numbers of additional weapons following entry into force of the New START treaty and (2) revise the dismantlement performance goal to clarify that NNSA intends to dismantle all weapons retired prior to fiscal year 2009, or an equivalent number of weapons, by the end of fiscal year 2022 or an updated deadline.

Regarding the first recommendation, in its written comments, NNSA stated that it is committed to the development of a comprehensive, long-term strategy to address not only weapons retired before fiscal year 2009, but also weapons retired in fiscal year 2009 and thereafter. NNSA stated that such a strategy would allow the agency to manage dismantlement and production activities at Pantex and Y-12 in order to balance the workload at those facilities and to allow NNSA to manage critical skills and technologies to maintain its dismantlement commitments. NNSA also stated that it is fully committed to dismantling all weapons retired prior to fiscal year 2009 by fiscal year 2022. NNSA's proposed action to develop a long-term dismantlement strategy to balance workload is responsive to our recommendation and our concerns about the impacts of a potential gap in dismantlement workload from fiscal year 2022 to the late 2020s or early 2030s. However, as discussed in this report, NNSA is likely to face challenges in achieving its goal of dismantling all weapons retired prior to fiscal year 2009 by fiscal year 2022 due to the uncertainties surrounding when weapons in managed retirement—including some weapons retired before fiscal year 2009—may be released for dismantlement.

Regarding the second recommendation, in its written comments, NNSA responded that the dismantlement performance goal of dismantling by fiscal year 2022 all weapons retired before fiscal year 2009 should focus on the equivalent numbers of weapons that are being dismantled. NNSA agreed with the recommendation and noted that changing how the agency calculates a performance goal requires approval from the Office of Management and Budget. NNSA agreed to work with the Office of Management and Budget during fiscal year 2014 to identify appropriate changes to the dismantlement performance goal in response to our recommendation. In addition, NNSA commented that it was incorrect of us to characterize the way in which NNSA tracks progress toward its dismantlement performance goal as being misleading. Our characterization is accurate. As stated in the report, in tracking progress under its dismantlement performance goal, NNSA counts weapons retired prior to fiscal year 2009 that are reinstated to the stockpile rather than being dismantled. We also found that NNSA does not track the actual retirement date of individual weapons that are dismantled and may be counting weapons toward its dismantlement performance goal that were retired from service after fiscal year 2009. NNSA's performance goal, as written, does not make these practices clear. As we have previously reported, having clear performance goals and measures is a key element of effective program management, and performance goals and measures that are not clearly stated may be confusing or misleading.

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

If you or your staff members have any questions about this report, please contact me at (202) 512-3841 or trimbled@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix III.



David C. Trimble
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

Our objectives were to assess (1) the extent to which the annual inventories of weapons awaiting dismantlement and the National Nuclear Security Administration's (NNSA) annual dismantlement rates have changed over time, and, if so, the reasons why; (2) how NNSA measures progress toward achieving its performance goal of dismantling all weapons retired prior to fiscal year 2009 by the end of fiscal year 2022, and any challenges it might face in meeting the goal; (3) NNSA's schedule for dismantlement of weapons retired as a result of the New Strategic Arms Reduction Treaty (New START) and the challenges, if any, NNSA faces in dismantling those weapons; (4) the physical capacity available at Pantex to meet NNSA's planned future dismantlement workload and to potentially accelerate dismantlement; and (5) the challenges, if any, affecting disassembly and disposition of components from dismantled weapons.

In general, we addressed these objectives by reviewing relevant nuclear weapons stockpile guidance and planning documents and interviewing NNSA officials. These documents include *Nuclear Weapons Stockpile Plans*, the nuclear weapons stockpile *Requirements and Planning Documents*, and NNSA's *Nuclear Weapons Production and Planning Directives*. We interviewed NNSA officials responsible for overseeing the Weapons Dismantlement and Disposition (WDD) program and obtained technical information and data from them on the stockpile, past and future dismantlement workload, component management, and on other issues pertaining to the program. To understand stockpile planning, weapons retirement, and how the Department of Defense (DOD) and the military services interact with NNSA on dismantlement issues, we obtained information and interviewed officials from the Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, U.S. Air Force, U.S. Navy, and U.S. Strategic Command. We also visited the Pantex and Y-12 sites where we observed weapon dismantlement and canned subassembly (CSA) disassembly operations for several weapon systems, viewed component storage facilities, and interviewed representatives of the site operating contractors at each location on issues relating to dismantlement operations and component management processes.[1] We

[1]The terms dismantlement and disassembly are sometimes used interchangeably. However, in our report, we use the term nuclear weapons *dismantlement* to refer to the process at Pantex of reducing a weapon to its component parts and removing the high explosives surrounding the pit. We use the term *disassembly* to refer to weapons disassembled and inspected for surveillance purposes at Pantex, and to refer to further disassembly of weapon components, such as CSAs disassembled at Y-12.

identified a nonprobability sample of seven weapons systems—B53, B61, W62, W70, W71, W76, and B83—based on several factors, including the branch of the military associated with the weapons, the weapon delivery platform (i.e. bomber or missile), and whether the weapon is strategic or nonstrategic. We used a list of standardized questions to conduct interviews with nuclear weapon engineers at Pantex on the time, requirements, challenges, and other issues associated with the dismantlement of those systems.[2] We also received presentations from Y-12 weapon engineers on issues related to the disassembly of the CSAs of these seven weapon systems.

To assess the extent to which and the reasons why the annual inventories of weapons awaiting dismantlement and NNSA's annual dismantlement rates have changed over time, we obtained and analyzed data from NNSA's Weapons Information System on the annual inventories of retired weapons awaiting dismantlement and on annual numbers of weapons dismantled for fiscal years 1992 through 2012. We selected this time frame for several reasons, including that it allowed us to assess weapon retirements and dismantlements since the dissolution of the Soviet Union in December 1991 and resulting from stockpile reductions through strategic arms control treaties and presidential initiatives. The Weapons Information System does not include a specific field or category of nuclear weapons that are awaiting dismantlement. According to NNSA officials, the annual inventory of retired nuclear weapons—which is tracked—approximates, but is not a precise figure for, the number of weapons awaiting dismantlement. According to NNSA officials, during the time frame of our review, each year some number of retired weapons were reinstated, or held for future reinstatement, to the stockpile and were not available for dismantlement.[3] In addition, some retired weapons were not immediately available for dismantlement because they were in managed retirement status and had not been released by the Nuclear Weapons Council. Because NNSA officials told

[2]Because this was a nonprobability sample, information derived about these weapon systems cannot be generalized to all weapon systems, but it can provide illustrative examples of the time, requirements, challenges, and other issues associated with the dismantlement of the systems and the disassembly of the associated CSAs.

[3]According to NNSA officials, in general, the number of weapons in the annual retired inventory to be reinstated to the stockpile was relatively small, perhaps 1 or 2 percent of the total, while weapons in managed retirement status generally represented a larger percentage of the annual retired inventory.

us that it would be difficult and time-consuming to locate older stockpile records and reconcile the data to develop accurate figures on the actual inventory of weapons that were awaiting dismantlement by year over the past 20 years, we agreed with NNSA officials to use the annual retired inventory of weapons as an approximate measure of the number of weapons awaiting dismantlement from year to year, for fiscal year 1992 through fiscal year 2012. We also interviewed NNSA and DOD officials on reasons why the inventories of retired weapons have changed over time, and interviewed NNSA officials and Pantex site contractors on issues that have affected dismantlement processes and rates. We obtained and analyzed data that Pantex has developed to measure the difficulty, or time requirements, in dismantling different weapon types, referred to as dismantlement “difficulty quotients” (DQ). NNSA has used the DQ data to establish “dismantlement equivalent units” (DEQ) for each weapon type to measure the relative dismantlement time requirements of different weapon types. Pantex had DQ data available only for weapons dismantled since fiscal year 1998. As a result, we were unable to analyze dismantlement DQ and DEQ data for all weapon types dismantled since fiscal year 1992 and determine whether weapon systems have become more time-consuming to dismantle over the past 20 years based on this data. However, we did interview weapon engineers at Pantex regarding the challenges in dismantling weapons, including two recently dismantled weapon systems that both had relatively large DEQs.

To assess how NNSA measures progress toward achieving its performance goal of dismantling all weapons retired prior to fiscal year 2009 by the end of fiscal year 2022, and any challenges it might face in meeting the goal, we obtained and analyzed NNSA data on the inventory of retired weapons potentially available for dismantlement over fiscal year 2013 through fiscal year 2022. Specifically, we analyzed a March 2013 draft schedule for the dismantlement or other disposition of all retired weapons over this time, which included the schedule for dismantling the subset of remaining weapons retired prior to fiscal year 2009. We interviewed NNSA and DOD officials on issues related to or that could affect the dismantlement schedule, including reinstatement of retired weapons and release of retired weapons in managed retirement status for dismantlement.

To assess NNSA’s schedule and the challenges, if any, in the dismantlement of weapons to be retired as a result of the New START treaty, we interviewed NNSA officials to determine whether those weapons had been scheduled for dismantlement. We interviewed DOD officials to understand how many and when those weapons are expected to be retired and other conditions affecting the timing and release of those weapons to NNSA for dismantlement. We interviewed NNSA officials and Pantex site contractors on issues related to how this additional future dismantlement workload will be managed.

To assess the physical capacity available at Pantex to meet NNSA's dismantlement goal and to potentially accelerate achievement of this goal, we obtained and analyzed data from Pantex's Long Range Production Planning Model and interviewed Pantex site contractors on the physical capacity at Pantex available to meet the future dismantlement schedule and all other future stockpile production commitments such as weapon life extension and surveillance efforts. We also analyzed data and interviewed NNSA officials and Pantex site contractors on Pantex's ability to accelerate dismantlement work, including data on the extent to which Pantex has exceeded annual dismantlement goals in response to contract performance incentives and information from NNSA on previously developed scenarios for accelerating dismantlement workload to meet the fiscal year 2022 dismantlement goal by fiscal year 2018 or fiscal year 2020.

To assess the challenges affecting disassembly and disposition of components from dismantled weapons, we reviewed NNSA program and planning documents and interviewed NNSA officials and Pantex and Y-12 site contractors on the full scope of the weapons dismantlement and disposition process. We reviewed NNSA data and interviewed NNSA officials and Pantex site contractors on the number and location of pits from dismantled weapons and future plans for reuse or disposition, as well as effects of storage on Pantex operations. We reviewed NNSA documents, analyzed data, and interviewed NNSA officials and Y-12 site contractors on current and future CSA inventories, draft CSA disassembly schedules, and related policy issues affecting CSA management to assess the effects of CSA disassembly and retention on Y-12's workload and ability to supply highly enriched uranium to the U.S. Naval Reactors Program and other programs. We reviewed data from Pantex's nonnuclear weapons component inventory management system and interviewed NNSA officials and Pantex site contractors on the size of the overall inventory, age and weapon system associated with these components, impact of requests from the national labs to retain some components, and limitations of the inventory management system.

We conducted reliability assessments of the data on: (1) the inventories of retired weapons available for dismantlement and on annual numbers of weapons dismantled for fiscal year 1992 through fiscal year 2012

(NNSA's Weapons Information System); (2) future capacity requirements at Pantex (Pantex's Long Range Production Planning Model); and (3) nonnuclear component inventories (Pantex's nonnuclear weapons component inventory management system). We analyzed the data from each system for accuracy by, among other things, manually testing the data for errors and missing data, and interviewed knowledgeable officials on the reliability of the data. We found discrepancies in the data provided to us on the retired and dismantled weapon inventories and on the Pantex capacity projections, but we were able to correct or reconcile the differences through interviews with NNSA officials and Pantex site contractors. We did not identify any material weaknesses in the three data sources that would significantly alter our findings. We determined that, overall, the data provided to us were sufficiently reliable for the purposes of this review.

We conducted this performance audit from January 2012 to April 2014 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Comments from the National Nuclear Security Administration

Department of Energy
National Nuclear Security Administration
Washington DC 20585

OFFICE OF THE ADMINISTRATOR

April 23, 2014

Mr. David Trimble
Director
Natural Resources and Environment
Government Accountability Office
Washington, DC 20458

Dear Mr. Trimble:

The National Nuclear Security Administration (NNSA) appreciates the opportunity to review the Government Accountability Office's (GAO) draft unclassified report titled, "NUCLEAR WEAPONS: Actions Needed by NNSA to Clarify Dismantlement Performance Goal, GAO-14-449." GAO conducted this audit in response to a request made by the Subcommittee on Energy and Water Development of the Senate Committee on Appropriations. GAO was asked to assess NNSA's weapons dismantlement and component disposition efforts. The GAO provided two recommendations for the NNSA to: 1) clarify the dismantlement performance goal to account for NNSA's practice of counting equivalent numbers of weapons dismantled toward the goal; and 2) consider extending the fiscal year (FY) 2022 dismantlement performance goal to avoid a potential dismantlement workload gap due to deferred weapon retirements resulting from New START.

NNSA's response to GAO's recommendations is enclosed. If you have any questions concerning this response, please contact Dean Childs, Director, Office of Audit Coordination and Internal Affairs, at (301) 903-1341.

Sincerely,

Frank G. Klotz
Administrator

Enclosure

Printed with soy ink on recycled paper

Response to Report Recommendations
U. S. Government Accountability Office (GAO) Report
Nuclear Weapons Actions Needed by NNSA to clarify Dismantlement Performance Goal
Unclassified Version

The Government Accountability Office (GAO) recommends that the NNSA Administrator:

Recommendation 1: *Revise the dismantlement performance goal to clarify the weapons NNSA intends to dismantle.*

The National Nuclear Security Administration (NNSA) agrees with the GAO recommendation that the performance goal of dismantling by FY 2022 all weapons retired before FY 2009 should focus on the equivalent number of weapons dismantled. A change in how we calculate a performance goal requires Office of Management and Budget (OMB) approval. NNSA will therefore work with OMB in FY 2014 to identify appropriate changes to the goal in response to GAO's recommendation.

To characterize in the summary that NNSA is misleading on progress in dismantlements is incorrect. Under current management, some weapons retired prior to FY 2009 are reinstated back into the stockpile in exchange for weapons that are dismantled and evaluated through the stockpile surveillance program.

Recommendation 2: *Reevaluate and consider extending the Agency's fiscal year 2022 dismantlement performance goal.*

NNSA is fully committed to dismantling all weapons retired before FY 2009 by FY 2022. NNSA is also committed to the development of a comprehensive, long-term strategy to address not only those weapons retired before FY2009, but also weapons retired in FY 2009 and thereafter. Such a strategy would allow NNSA to manage dismantlement and production activities at Pantex and Y-12 to balance the workload at these facilities.

By considering a comprehensive, long-term strategy for the dismantlement of weapon systems entering the queue after FY 2009, NNSA is able to implement a balanced approach that will allow NNSA to manage critical skills and technologies to maintain its dismantlement commitments.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

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

Staff Acknowledgments

In addition to the contact named above, Jonathan Gill (Assistant Director), Julia Coulter, and William Hoehn made key contributions to this report. Other technical assistance was provided by Antoinette Capaccio, Penney Harwell Caramia, Karen Keegan, Cynthia Norris, Kevin L. O'Neill, Dr. Timothy M. Persons, Dan Royer, Justin Schnare, Rebecca Shea, Amie Steele, and Kiki Theodoropoulos.

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