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Report to the Subcommittee on Strategic Forces, Committee on Armed Services, House of Representatives

March 2009

NUCLEAR WEAPONS

NNSA and DOD Need to More Effectively Manage the Stockpile Life Extension Program

GAO-09-385

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Highlights

Highlights of GAO-09-385, a report to the Subcommittee on Strategic Forces, Committee on Armed Services, House of Representatives

Why GAO Did This Study

As a separately organized agency within the Department of Energy, the National Nuclear Security Administration (NNSA) administers the Stockpile Life Extension Program, whose purpose is to extend, through refurbishment, the operational lives of the weapons in the nuclear stockpile. NNSA encountered significant management problems with its first refurbishment for the W87 warhead. GAO was asked to assess the extent to which NNSA and the Department of Defense (DOD) have effectively managed the refurbishment of two other weapons—the B61 bomb and the W76 warhead.

This report summarizes the findings of GAO's classified report on the refurbishment of the B61 bomb and W76 warhead (GAO-09-152C).

What GAO Recommends

GAO recommends that NNSA and DOD take several actions to improve the management of the life extension program, including, among other things, (1) developing and using consistent budget assumptions and criteria for the baseline to track costs over time, (2) comprehensively reviewing military requirements for a weapons system before beginning a life extension program, and (3) assessing the cost and schedule implications for meeting each military requirement. NNSA and DOD generally agreed with GAO's recommendations.

To view the full product, including the scope and methodology, click on GAO-09-385. For more information, contact Gene Aloise at (202) 512-6870 or aloisee@gao.gov.

What GAO Found

NNSA and DOD have not effectively managed cost, schedule, and technical risks for either the B61 or W76 life extension program. Regarding the B61 program, although NNSA completed the refurbishment of the strategic variants of the B61 bomb—the Mods 7 and 11—on schedule in November 2008, the refurbished weapons do not meet all refurbishment objectives. According to NNSA and DOD officials, NNSA established an unrealistic schedule and failed to fully implement its refurbishment guidance, known as the Phase 6.X process. NNSA was able to meet its refurbishment schedule and avoid significant cost overruns for the B61 program only because (1) some of the refurbishment objectives were changed, (2) NNSA was able to reuse, rather than manufacture, a critical component when B61 bombs were decommissioned, and (3) the Nuclear Weapons Council significantly reduced the number of B61 bombs in the stockpile. Despite DOD concerns about the adequacy of NNSA testing of the B61 bombs under certain conditions, NNSA continued refurbishing the weapons. Some of the B61 refurbishment problems could have been avoided if DOD had fulfilled its roles and responsibilities in overseeing NNSA's life extension program activities. For example, the Air Force did not adequately review NNSA's design, engineering, and testing activities—a review that would have alerted DOD that NNSA was missing some of its refurbishment objectives.

Regarding the W76 program, NNSA did not effectively manage a high risk associated with manufacturing an essential material, known as Fogbank, needed to refurbish the W76 warhead. NNSA had developed a risk mitigation strategy to avoid potential cost overruns and schedule delays related to the manufacture of this key material but failed to effectively implement this strategy. As a result, NNSA's original plans to produce the first refurbished W76 weapon in September 2007 slipped to September 2008; NNSA spent $69 million to address Fogbank production problems; and the Navy faced logistical challenges owing to the delay. Furthermore, NNSA did not have a consistent approach to developing a cost baseline for the W76 program, which makes it difficult to track refurbishment costs over time and to know the actual cost of the program.

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Abbreviations

DOD	Department of Defense
DOE	Department of Energy
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
NNSA	National Nuclear Security Administration
NWC	Nuclear Weapons Council
NWCSSC	Nuclear Weapons Council Standing and Safety Committee
STRATCOM	U.S. Strategic Command

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United States Government Accountability Office
Washington, DC 20548

March 2, 2009

The Honorable Ellen Tauscher
Chairman
The Honorable Michael Turner
Ranking Member
Subcommittee on Strategic Forces
Committee on Armed Services
House of Representatives

Nuclear weapons are an essential part of the nation's defense strategy. However, the end of the Cold War caused a dramatic shift in how the nation maintains these weapons. Instead of designing, testing, and producing new nuclear weapons, the strategy has shifted to maintaining the existing nuclear weapons stockpile indefinitely. To implement this strategy, in January 1996, the Department of Energy (DOE) initiated the Stockpile Life Extension Program (life extension program). Now administered by the National Nuclear Security Administration (NNSA), which is a separately organized agency within DOE, this program is designed to extend the weapons' operational life for an additional 20 to 30 years and to certify the weapons' military performance requirements without underground nuclear testing. As the weapons age, however, certain nuclear weapons components must be replaced or they will begin to undermine the reliability and performance of the weapon. While NNSA does not have complete cost data on the life extension program, it estimates that it spent approximately $2.1 billion on program activities from fiscal years 2003 to 2008.

Within NNSA, the Office of Defense Programs is responsible for administering the life extension program. For those nuclear weapons that are refurbished, this office oversees the activities of the design laboratories and production facilities that (1) determine which components, such as the nuclear explosives package, will need refurbishment to extend each weapon's life; (2) design and produce the necessary components; (3) install the components in the weapons; and (4) certify that the changes do not adversely affect the yield, safety, and reliability of the weapons. Because research and development is needed to refurbish the nuclear weapons, the life extension program requires a coordinated effort among NNSA's three design laboratories and four production facilities—collectively known as the nation's nuclear weapons complex. NNSA also coordinates its life extension activities with the

Department of Defense (DOD) to ensure that refurbished weapons meet all military performance requirements.

NNSA manages the refurbishment of nuclear warheads and bombs according to a process called Phase 6.X, which was jointly developed with DOD in 2000. NNSA's process consists of seven steps, which involve, among other things, establishing a cost and schedule baseline; conducting experiments, tests, and analyses to validate design options and assess production capabilities; preparing production facilities for manufacturing parts and components; and entering full-scale production of refurbished weapons. In addition, under the Phase 6.X process, DOD, including the U.S. Strategic Command (STRATCOM), is responsible for developing, reviewing, and updating the military requirements that specify the performance characteristics for each warhead type and the environments in which the warhead must perform or remain safe. As NNSA designs the warhead or bomb and conducts tests to ensure that they meet these requirements, DOD reviews NNSA's actions in each phase of the refurbishment. NNSA plans to use this same management process for the design of a new warhead, known as the reliable replacement warhead, which NNSA states is a way to replace the nation's aging stockpile with warheads that are safer, provide longer-term reliability, and are less expensive to maintain than those currently in the stockpile.

In December 2000, we reported that the W87 warhead, which was designed to be carried on the land-based Peacekeeper missile,[1] had experienced significant design and production problems that increased its refurbishment costs by over $300 million and caused schedule delays of about 2 years.[2] As we reported, at the heart of many of the problems that contributed to this outcome were an inadequate Office of Defense Programs management process and unclear leadership, which prevented the Office from adequately anticipating and mitigating the problems that arose. In 2005, NNSA completed the refurbishment of the W87. This was the first weapon to be refurbished under the life extension program.

[1]With the decommissioning of the Peacekeeper missiles, a large fraction of the W87 warheads are now mounted on Minuteman III missiles.

[2]GAO, *Nuclear Weapons: Improved Management Needed to Implement Stockpile Stewardship Program Effectively*, GAO-01-48 (Washington, D.C.: Dec. 14, 2000).

In a follow-up study in July 2003,[3] we reported that NNSA had not adequately addressed the budgetary, cost accounting, and other management issues that contributed to problems with the W87 as it began research and development activities for refurbishing the B61 bomb and W76 warhead. As of December 15, 2008, two nuclear weapons were being refurbished—the B61 bomb and the W76 warhead. The B61 bomb is designed to be carried on the B-52 or B-2 bomber by the Air Force. There are two different types of strategic B61 bombs—the Mod 7 and the Mod 11. The Mod 11 is used exclusively as an earth penetrator in free-fall mode to destroy deeply buried targets. NNSA began refurbishment production in June 2006 for the Mod 7 and January 2007 for the Mod 11 and completed production for both weapons in November 2008. In addition to the strategic variants of the B61, the Air Force maintains tactical B61 bombs—the Mods 3, 4, and 10. Unless otherwise specified, all subsequent references to the B61 bomb in this report refer to the strategic variants—the Mods 7 and 11. The W76 is a submarine-launched warhead and the refurbished W76 will be carried on the Trident II missile by the Navy. The first refurbished W76 warhead was completed in September 2008. The W76 warhead is a significant part of the U.S. nuclear weapons stockpile.

NNSA has continued to face management challenges during the refurbishment of the B61 bomb and W76 warhead. Specifically, while the refurbished B61 entered full-scale production in 2006, NNSA still had not met all its refurbishment objectives. In addition, the W76 warhead faced a schedule delay and cost overruns related to manufacturing problems with a critical material used in the W76.

In this context, you asked us to determine the extent to which NNSA and DOD have effectively managed the B61 and W76 life extension programs. While NNSA has faced numerous technical challenges in refurbishing the B61 bomb and W76 warhead, this report focuses on two of the most significant technical challenges that have had an impact on cost, schedule, and meeting refurbishment objectives—the decision to reuse or manufacture a new material for a critical component in the B61 bomb and the manufacture of Fogbank for the W76. In January 2009, we reported to you on the results of our work in a classified report.[4] Subsequently, we

[3]GAO, *Nuclear Weapons: Opportunities Exist to Improve the Budgeting, Cost Accounting, and Management Associated with the Stockpile Life Extension Program*, GAO-03-583 (Washington, D.C.: July 28, 2003).

[4]GAO, *Nuclear Weapons: NNSA and DOD Need to More Effectively Manage the Stockpile Life Extension Program*, GAO-09-152C (Washington, D.C.: Jan. 12, 2009).

worked with NNSA and DOD to produce an unclassified version of our report. This report summarizes the results of our classified report.

To assess the extent to which NNSA and DOD have effectively managed the B61 and W76 life extension programs, we first analyzed NNSA's congressional budget requests, project plans, and acquisition reports to determine whether the life extension activities for the B61 bomb and W76 warhead were within budget or facing cost overruns. We then reviewed NNSA's project plans for the B61 bomb and W76 warhead, life extension guidance documents, risk management practices, briefing slides, and strategic weapons directives to determine whether NNSA reached critical milestones on time. To assess the technical challenges NNSA was facing in refurbishing the B61 bomb and W76 warhead and the steps it was taking to minimize technical risk, we interviewed officials from the Office of Defense Programs at DOE in Washington, D.C.; the nuclear weapons design laboratories, including Lawrence Livermore (LLNL) in California and Los Alamos (LANL) and Sandia in New Mexico; and the weapons production plants, including Y-12 in Tennessee, Pantex in Texas, and Kansas City in Missouri. We also interviewed officials from the Departments of the Air Force and the Navy, STRATCOM, and the Nuclear Weapons Council to determine NNSA's ability to meet military performance requirements for the B61 bomb and W76 warhead and the impact of any schedule delays on DOD's mission requirements. Finally, we toured the Y-12, Pantex, and Kansas City plants to observe the manufacturing processes for nuclear and non-nuclear components for the B61 bomb and W76 warhead. To assess the extent to which DOD fulfilled its roles and responsibilities in overseeing NNSA's life extension activities, we reviewed guidance documents and project plans to determine DOD's roles and responsibilities. We also interviewed officials from NNSA, the Departments of the Air Force and the Navy, STRATCOM, and the Nuclear Weapons Council to determine how effective communication has been between DOD and NNSA and who has authority to make decisions, such as proceeding with full-scale production.

We conducted the work for the classified report between December 2007 and January 2009 in accordance with generally accepted government auditing standards, and we conducted our work for the unclassified report between January 2009 and February 2009. 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.

Results in Brief

NNSA and DOD have not effectively managed cost, schedule, and technical risks for either the B61 or W76 life extension program. Regarding the B61 program, although NNSA completed the refurbishment of the B61 bombs on schedule in November 2008, the refurbished weapons do not meet all refurbishment objectives. According to DOD and NNSA laboratory and production plant officials, NNSA established an unrealistic schedule and failed to fully implement its Phase 6.X process. To meet an aggressive production schedule, NNSA adopted a modified Phase 6.X process that compressed and overlapped the development and production engineering phases, leaving little time to develop and manufacture critical materials and evaluate test results before full-scale production. In addition, NNSA did not include any cost or schedule contingencies in its baseline to address unforeseen technical challenges. NNSA assumed that it would not need time for development and production engineering because it would reuse, rather than manufacture, critical materials. Before fully determining whether a critical material could be reused for the B61 bomb, NNSA developed a production schedule with fixed delivery dates. However, after additional tests showed that NNSA could not reuse this material, NNSA decided to develop an alternative material, which led to an $11 million cost overrun. When NNSA was unable to produce this substitute, it faced significant schedule delays and additional cost overruns.

NNSA was able to meet its refurbishment schedule and avoid significant cost overruns for the B61 bomb only because (1) some of the refurbishment objectives changed, thereby allowing NNSA to use the original material in the weapon design, (2) tactical B61 bombs that were decommissioned had material that NNSA could use, and (3) the Nuclear Weapons Council significantly reduced the number of B61 bombs in the stockpile and thus the number that NNSA had to refurbish. Even though these events allowed NNSA to meet its schedule, it refurbished less than one-third of the weapons in the original baseline for almost twice the unit cost. The cost of manufacturing each B61 bomb almost doubled. Furthermore, the refurbished B61 bombs still do not meet all of the refurbishment objectives.

Many of the B61 refurbishment problems might have been avoided if DOD had fulfilled its roles and responsibilities in overseeing NNSA's life extension program activities. First, STRATCOM did not comprehensively review military requirements for the B61 bomb before NNSA started refurbishment activities, which might have avoided unnecessary testing and manufacturing of the alternative material. Second, the Air Force did not adequately review NNSA's design, engineering, and testing activities—

a review that would have alerted DOD that NNSA was not meeting all refurbishment objectives. According to Air Force officials, the Lead Project Officer failed to provide the necessary oversight and alert the Air Force to changes in testing that NNSA conducted of refurbished B61 bombs.

Regarding the W76 warhead, NNSA did not effectively manage one of the highest risks of the program—the manufacture of a key material known as Fogbank—resulting in $69 million in cost overruns and a schedule delay of at least 1 year that presented significant logistical challenges for the Navy. Recognizing that the manufacture of Fogbank was one of the highest risks to the program and that it lacked the knowledge, expertise, and facilities to manufacture Fogbank, NNSA developed a risk mitigation strategy. This strategy included three primary components: (1) build a new Fogbank production facility early enough to allow time to resolve any manufacturing problems before starting full production; (2) use the existing pilot plant to test the Fogbank manufacturing process while the new facility was under construction; and (3) consider the development of an alternate material for Fogbank. However, NNSA started operations of the new facility about 1 year late because the schedule for constructing the new facility was unrealistic, disagreements on the implementation of safety guidelines emerged, and the W76 program manager lacked authority to manage the construction schedule. In addition, NNSA did not use the pilot plant as planned, missing opportunities to improve the manufacturing process before full-scale production began. Finally, NNSA did not develop an alternate material that was less costly and easier to produce than Fogbank until a late stage. If NNSA had effectively implemented its risk management strategy, schedule delays and cost increases might have been avoided. Compounding these problems, NNSA did not have a consistent approach for developing a cost baseline for the W76 life extension program. The lack of a consistent baseline approach with similar cost assumptions and criteria makes it difficult to know the actual cost of refurbishing nuclear bombs and warheads and to track the costs of the program over time.

To improve the management of the stockpile life extension program, in our classified January 2009 report, we recommended, among other things, that the Administrator of NNSA direct the Deputy Administrator for Defense Programs to develop a realistic schedule for the W76 and future life extension programs. This schedule should allow NNSA to (1) address technical challenges while meeting all military requirements; (2) build in time for unexpected technical challenges that may delay the program; (3) assess the cost and include funding in the baseline for risk mitigation

activities that address the highest risks to the W76 and future life extension programs; and (4) before beginning a life extension program, assess the risks, costs, and scheduling needs for each military requirement established by DOD.

To improve DOD's oversight over NNSA's life extension activities and ensure that refurbished weapons meet all military requirements, we recommended that the Secretary of Defense direct (1) STRATCOM and the Secretary of the responsible service to comprehensively review military requirements for a weapons system before beginning a life extension program and work with NNSA to assess the cost and schedule implications for meeting each military requirement, and (2) the Secretaries of the Air Force and the Navy to ensure that the respective Lead Project Officers have the technical and managerial expertise and resources to review NNSA's progress and technical challenges throughout the life extension program.

We provided a draft of our classified report to NNSA and DOD for their review and comment. As discussed in our classified report, NNSA agreed with our recommendations and plans to take a number of steps to implement them. DOD partially agreed with our recommendations. DOD agreed with our two recommendations directed at the department, but asked us to make modifications to the language of the recommendations to better target the responsible service or agency that has authority to implement them. We made the requested changes. NNSA and DOD also provided technical comments, which we incorporated as appropriate.

Background

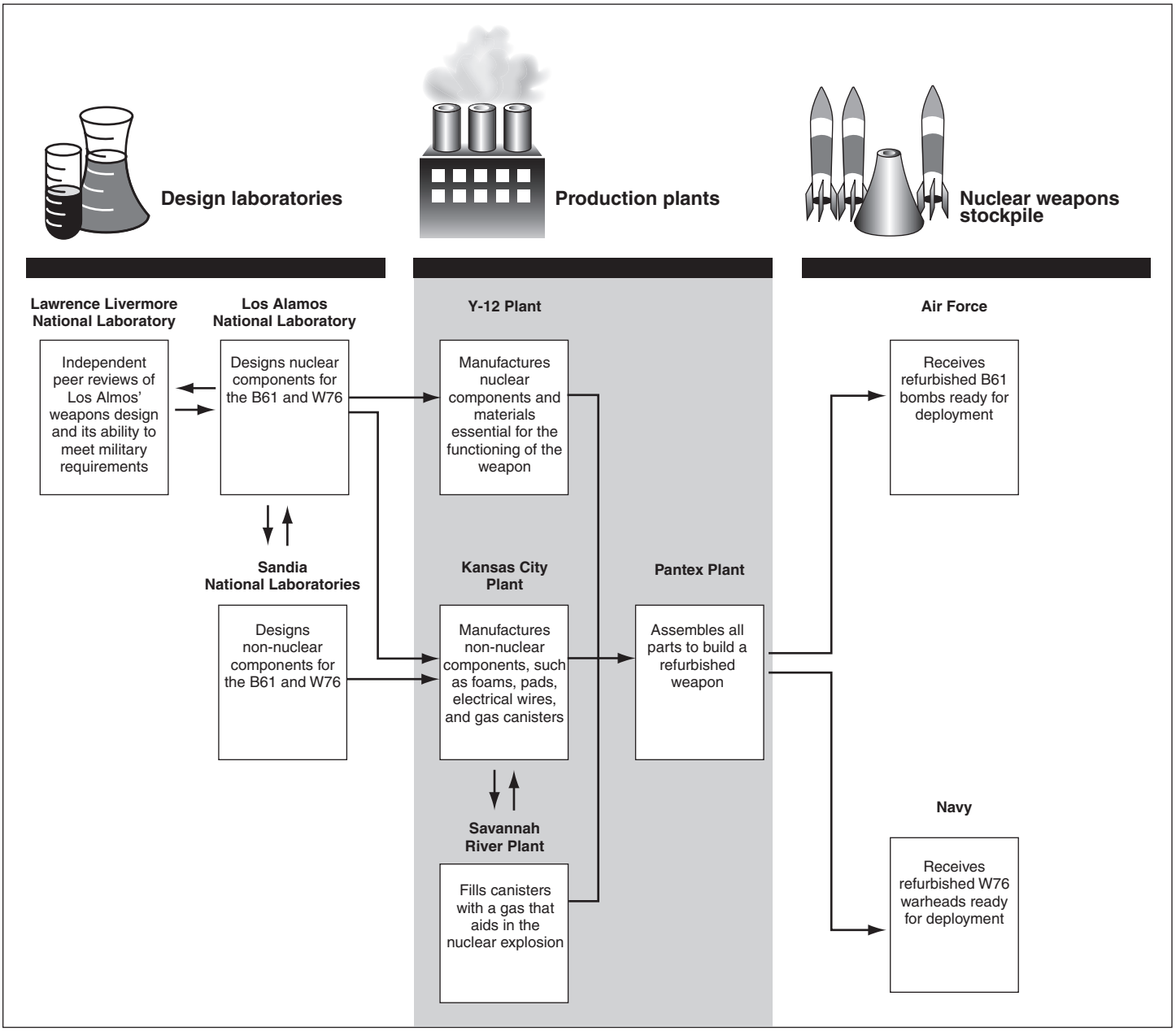
The nation's nuclear weapons stockpile remains a cornerstone of U.S. national security policy. As a result of changes in arms control, arms reduction, and nonproliferation policies, the National Defense Authorization Act for fiscal year 1994 required that DOE develop a science-based Stockpile Stewardship Program to maintain the stockpile without nuclear testing.[5] After this program was established, DOE, in January 1996, initiated the Stockpile Life Extension Program. The purpose of this program is to develop a standard approach for planning nuclear weapons refurbishment activities so that the nuclear weapons complex can extend the operational lives of the weapons in the stockpile by another 20 to 30 years.

[5]Pub. L. No. 103-160, section 3138, 107 Stat. 1547, 1946.

Within NNSA, the Office of Defense Programs is responsible for the warheads and bombs in the stockpile. This responsibility encompasses many different tasks, including the manufacture, maintenance, refurbishment, surveillance, and dismantlement of weapons in the stockpile; activities associated with the research, design, development, simulation, modeling, and nonnuclear testing of nuclear weapons; and the planning, assessment, and certification of the weapons' safety and reliability. A national complex of nuclear weapons design laboratories and production facilities carries out the Office of Defense Programs' mission. Three national laboratories in this complex design nuclear weapons: Lawrence Livermore National Laboratory in California, Los Alamos National Laboratory in New Mexico, and Sandia National Laboratories in New Mexico and California.

For the B61 and W76 life extension programs, Los Alamos National Laboratory is responsible for designing and developing these weapons' nuclear explosives package. Sandia National Laboratories design non-nuclear components, such as arming, fuzing, and firing systems, foams, and electrical cables, and test the weapons' non-nuclear components to certify safety and reliability. Lawrence Livermore National Laboratory peer reviews design and production activities. Los Alamos and Sandia National Laboratories work closely with the production plants to ensure that components meet design specifications. The complex's four production sites include the Y-12 National Security Complex plant in Tennessee, the Kansas City Plant in Missouri, the Savannah River Site plant in South Carolina, and the Pantex Plant in Texas. The Y-12 plant manufactures critical nuclear components, such as parts made from enriched uranium, for the nuclear explosives package. The Kansas City plant produces and procures nonnuclear parts and electronic components and manufactures the new arming, fuzing, and firing system for the W76 warhead. The Savannah River Site plant fills gas bottles it receives from Kansas City with tritium and deuterium, which are used to facilitate the nuclear explosion. Last, the Pantex plant assembles all components supplied by other production plants to produce a weapon for the stockpile. See figure 1 for a summary of this process.

Figure 1: Life Extension Program Refurbishment Process for B61 Bombs and W76 Warheads



Sources: GAO and Clip Art.

An end to underground nuclear testing in 1992 in the United States suspended the development of weapons with new, untested designs. This

suspension created a shift away from the strategy of replacing older warheads with newer designs to a new strategy of retaining and refurbishing previously produced warheads indefinitely, without nuclear testing, and with no plans to replace the weapons. To manage this new strategy of refurbishing nuclear weapons, NNSA uses a process called Phase 6.X, which it jointly developed with DOD. This process consists of the following elements:

- Phase 6.1, concept assessment—conducting studies to provide planning guidance and to develop information so that a decision can be made on whether or not to proceed to phase 6.2.
- Phase 6.2, feasibility study—developing design options and studying their feasibility.
- Phase 6.2A, design definition and cost study—completing definition of selected design option(s) from phase 6.2 and determining the cost of pursuing the design option(s).
- Phase 6.3, development engineering—conducting experiments, tests, and analyses to validate the design option and assess its potential for production.
- Phase 6.4, production engineering—making a strong commitment of resources to the production facilities to prepare for stockpile production.
- Phase 6.5, first production—producing a limited number of refurbished weapons and then disassembling and examining some of them for final qualification of the production process.
- Phase 6.6, full-scale production—ramping up to full production rates at required levels.

DOD oversees NNSA's refurbishment activities through the military services' Lead Project Officer and the Nuclear Weapons Council's Standing and Safety Committee. The Air Force or the Navy appoint a Lead Project Officer to provide day-to-day oversight over NNSA's activities. The Lead Project Officer meets regularly with officials from NNSA, the national laboratories, and production facilities to monitor progress and understand the technical challenges. The Nuclear Weapons Council Standing and Safety Committee (NWCSSC) advises and assists the Nuclear Weapons Council, which provides policy guidance and oversight of nuclear weapons stockpile activities and is required to report regularly to the President on the safety and reliability of the U.S. stockpile. Representatives from the

following organizations make up the NWCSSC: NNSA; the Office of the Under Secretary of Defense for Policy; the Office of the Assistant Secretary of Defense for Networks and Information Integration; the Assistant to the Secretary of Defense for Nuclear, Chemical and Biological Programs; the Joint Staff; STRATCOM; the Army; the Navy; the Air Force; and the Defense Threat Reduction Agency. According to DOD officials, the Lead Project Officer regularly updates the NWCSSC on the status of refurbishment activities and proposes recommendations to the NWCSSC on whether NNSA should proceed to the next phase. NNSA needs approval from the NWC to proceed to Phases 6.2, 6.3, and 6.6.

As of December 15, 2008, two nuclear weapons were undergoing phase 6.X refurbishment activities. The W76 warhead was in phase 6.5, first production unit, and the B61 bomb was in phase 6.6, full-scale production.[6] NNSA originally planned to refurbish the W80 warhead and began phase 6.3, development engineering, but in 2007, NNSA cancelled refurbishment activities for the W80 warhead because DOD planned to reduce the number of W80 warheads in the nuclear stockpile. While complete cost data on the W80 warhead do not exist, NNSA spent about $480 million from fiscal years 2003 to 2007 on refurbishment activities for it.

NNSA Met the B61 Program Schedule, but Did Not Meet All Refurbishment Objectives

NNSA completed the refurbishment of the B61 bomb on schedule in November 2008. However, according to NNSA and DOD officials, NNSA was not able to meet all the refurbishment objectives because it established an unrealistic schedule and failed to fully implement its Phase 6.X process. NNSA was able to meet its refurbishment schedule and avoid significant cost overruns for the B61 only because (1) DOD changed some of the refurbishment objectives, (2) NNSA was able to reuse, rather than manufacture, a critical component for the B61, and (3) the Nuclear Weapons Council significantly reduced the number of B61 bombs in the stockpile. However, the refurbished B61 bombs still do not meet all refurbishment objectives. Some of the B61 refurbishment problems could have been avoided if DOD had fulfilled its roles and responsibilities in overseeing NNSA's life extension program activities.

[6]Currently, the U.S. nuclear weapons stockpile consists of eight types of bombs and missile warheads, numbering in the thousands, which are either stored at strategic military locations or deployed on military aircraft, missiles, or submarines.

NNSA's Aggressive Schedule Did Not Leave Time to Address Significant Technical Challenges and Increased Costs

Since parts of the B61 bomb were beginning to age, NNSA proposed, in 1999, to refurbish the first B61 by September 2004, with full-scale production ending in 2008. However, an NNSA study completed in 2001 by the national laboratories and production facilities found that they could not meet the September 2004 date given the requirements, production capabilities, risk assessments, and Phase 6.X guidelines. Instead, the national laboratories and production facilities concluded that they would need until September 2008—4 years later than the September 2004 date proposed by NNSA—to refurbish the first weapon. This proposed schedule was considered low risk because it allowed NNSA to follow the steps in the Phase 6.X process and included contingencies to address technical challenges. NNSA did not approve this schedule, however. It was concerned that the proposed production schedule for the B61 bomb would conflict with the refurbishment of the W76 warhead, which was originally scheduled for September 2007 and considered a DOD priority. NNSA wanted to complete production of the refurbished B61 bomb before beginning full-scale production of the W76 warhead because the production facilities, such as the Y-12 plant, had limited capacity. To allow the national laboratories and production facilities more time for design, engineering, and production activities while avoiding conflicts with the W76 life extension program, NNSA set a June 2006 date for the first refurbished B61 bomb.

To meet this more aggressive and, as stated in NNSA's program plan, "success-oriented" schedule, NNSA adopted a modified Phase 6.X process that compressed and overlapped the development engineering and production engineering phases, leaving little time to conduct the experiments, tests, and analyses needed to validate design options and to certify that production facilities that manufacture and assemble parts could meet design requirements. NNSA assumed that it would not need time for development and production engineering because it would reuse rather than manufacture critical materials—one of the most critical of which was a plastic. Before fully determining whether the plastic could be reused, NNSA developed a production schedule with fixed delivery dates. However, additional tests showed that NNSA could not reuse this material because it did not function properly under certain conditions. NNSA therefore decided to develop an alternative material with superior properties that would work under all conditions. Since NNSA did not include any cost or schedule contingencies in its baseline to address unforeseen technical challenges, development work on an alternative material posed a significant risk to meeting the program's milestones and added $11 million to the program's cost. NNSA was unable to produce a substitute that could retain the shape needed for the B61 bomb and would

perform under all delivery conditions. NNSA's effort to manufacture this alternative material resulted in significant schedule delays and cost overruns.

In addition to a lack of sufficient time for development and production engineering work, NNSA's B61 life extension program schedule did not include contingencies for testing failures. NNSA assumed that modeling and computational analysis would be sufficient to properly design a component and a physical test of the design would be successful, avoiding the need for follow-up tests. If a test revealed a problem with the design, NNSA would have had to conduct additional tests or change the design, which would have potentially increased cost and delayed the program.

As it turned out, NNSA's tests were not all successful, and the Air Force and Lawrence Livermore National Laboratory peer reviewers recommended delaying production and conducting additional tests to test the refurbished weapon. Nevertheless, NNSA proceeded with full-scale production to meet its schedule milestones. The Air Force's most significant concern was that the testing of refurbished B61 bombs deviated substantially from the original testing plan that NNSA designed and DOD approved. NNSA subsequently conducted follow-on tests to address Air Force concerns.

A Reduction in the Stockpile Allowed NNSA to Meet Its B61 Refurbishment Schedule, but It Did Not Achieve All Refurbishment Objectives

NNSA was able to meet its refurbishment schedule for the B61 only because the following occurred:

- *NNSA sought and received a change in refurbishment objectives.* In response to NNSA's request, STRATCOM, which is responsible for developing and reviewing military mission requirements, reviewed the military needs for the B61. After STRATCOM reviewed its needs, NNSA was then able to abandon its attempt to develop an alternative material, which it could not successfully manufacture to meet requirements, and was able to reuse the original material in the B61 bomb.

- *Dismantlement of decommissioned B61 bombs allowed NNSA to obtain the necessary material for the refurbished B61 bombs.* Even though NNSA abandoned its attempt to develop an alternative material after refurbishment objectives changed, it still did not have the material it needed because NNSA no longer manufactured it. However, NNSA found material it could use in refurbished B61 bombs when it began dismantling

tactical B61 bombs.[7] As a result, NNSA was able to extract the material, which is used in both strategic and tactical B61 bombs.

- *The Nuclear Weapons Council significantly reduced the number of B61s in the stockpile.* Between 2003 and 2007, the Nuclear Weapons Council, which reviews the size of the nation's stockpile, directed NNSA to reduce the total stockpile of nuclear weapons. Following the council's stockpile plan, NNSA reduced the number of B61s that needed refurbishment by about two-thirds. According to officials from production facilities, NNSA would not have been able to meet its November 2008 completion date if it still had to refurbish the originally planned number of weapons. Moreover, NNSA would not have been able to meet its cost baseline because the cost of manufacturing each B61 had almost doubled.

  Even though these events allowed NNSA to meet its schedule, the refurbished B61 bombs do not meet all refurbishment objectives. To address DOD concerns, in December 2007, NNSA agreed to conduct additional tests. According to DOD officials, the additional tests NNSA planned should resolve these concerns if successful in meeting the test objectives.

DOD Failed to Adequately Oversee Critical NNSA Life Extension Activities for the B61

Some of the B61 refurbishment problems could have been avoided if DOD had fulfilled its roles and responsibilities in overseeing NNSA's life extension program activities. First, DOD did not comprehensively review military requirements for the B61 bomb before starting refurbishment activities, which would have avoided unnecessary testing and manufacturing of the alternative material. Specifically, NNSA tested the B61 in conditions that it later learned were no longer used by DOD. In conducting its tests, NNSA was following DOD's specifications to meet all of the weapon's original requirements established in the 1960s. According to the Phase 6.X process, a critical military requirement, which NNSA relied on for its tests, should have been reviewed during the Phase 6.2/2A study during 2001 and 2002. Instead, 2 years elapsed before STRATCOM notified NNSA that the requirement was no longer necessary, and it took another 2 years—until March 2006—to finally change the requirement. As a result, NNSA dedicated time and resources to develop an alternative material and conducted tests following the requirement, which STRATCOM later criticized as being operationally unrealistic testing.

[7]In addition to the strategic variants of the B61, the Air Force also maintains tactical B61 bombs—the Mods 3, 4, and 10.

Second, the Air Force did not adequately review NNSA's design, engineering, and testing activities—a review that would have alerted it to the fact that NNSA was unable to meet all refurbishment objectives. According to Air Force officials, the Lead Project Officer failed to provide the necessary oversight because he lacked the technical and managerial expertise to do so. He did not alert the Air Force to significant concerns with the testing of the refurbished B61. In particular, the Air Force did not raise concerns about NNSA's failure to complete all agreed-upon tests until NNSA had completed a majority of its tests and was preparing for full-scale production. After NNSA entered production, the Air Force required NNSA to conduct additional tests to provide a greater level of assurance that the refurbished B61 would perform as intended and last in the stockpile for at least another 20 years. As we noted, NNSA agreed to conduct additional tests and plans to complete them by the end of 2009. Importantly, these tests will be completed after all the B61 bombs now being refurbished are back in the stockpile.

NNSA Did Not Adequately Address One of the Highest Risks to the W76 Program, Which Led to Cost Increases, Schedule Delays, and an Unrealistic Production Schedule

NNSA developed a risk mitigation strategy to avoid potential cost overruns and schedule delays related to the manufacture of Fogbank but failed to effectively implement it. As a result, NNSA's original plans to produce the first refurbished W76 weapon in September 2007 slipped to September 2008. In addition, NNSA spent $69 million to address Fogbank production problems, and the Navy faced logistical challenges in replacing old W76 warheads with refurbished ones on submarines owing to the delay. Furthermore, NNSA did not use the same criteria and accounting practices each fiscal year to develop a cost baseline for the W76 program, which makes it difficult to track refurbishment costs over time.

NNSA Failed to Address One of Its Highest Risks to the Program

At the beginning of the W76 life extension program in 2000, NNSA identified key technical challenges that would potentially cause schedule delays or cost overruns. One of the highest risks was manufacturing Fogbank because it is difficult to manufacture. In addition, NNSA had lost knowledge of how to manufacture the material because it had kept few records of the process when the material was made in the 1980s and almost all staff with expertise on production had retired or left the agency. Finally, NNSA had to build a new facility at the Y-12 plant because the facilities that produced Fogbank ceased operation in the 1990s and had

since been dismantled, except for a pilot plant used to produce small quantities of Fogbank for test purposes.

To address these concerns, NNSA developed a risk management strategy for Fogbank with three key components: (1) building a new Fogbank production facility early enough to allow time to re-learn the manufacturing process and resolve any problems before starting full production; (2) using the existing pilot plant to test the Fogbank manufacturing process while the new facility was under construction; and (3) developing an alternate material that was easier to produce than Fogbank. However, NNSA failed to effectively implement these three key components. As a result, it had little time to address unexpected technical challenges and no guaranteed source of funding to support risk mitigation activities.

NNSA Started the New Facility Late

After determining that 2 years was sufficient time to test and perfect the Fogbank manufacturing process, NNSA set March 2005 as the target date to begin operations of the new facility at the Y-12 plant and worked backward from that date to establish a design, build, and test schedule for the new facility, according to the official in charge of the project. Working from lessons learned from the W87 life extension program, NNSA strove to achieve an early operations start date to allow sufficient time to address any potential problems in manufacturing Fogbank. In 2000, we reported that production problems resulting from such factors as restarting an atrophied production complex and addressing safety and technician training issues led directly to slippage in the W87 life extension program schedule and contributed to increased costs.[8] In addition, NNSA's own lessons learned report on the W87 program identified the need to demonstrate processes early and often and stated that, with limited resources, assumptions such as "we did it before so we can do it again" are often wrong.

NNSA started the new facility's operations about 1 year late because the schedule for building the facility was unrealistic, disagreements on the implementation of safety guidelines emerged, and the W76 program manager lacked authority to control the schedule. Focused on meeting an operations start date of March 2005, NNSA developed an aggressive construction and operation start schedule with no contingency for cost

[8]GAO, *Nuclear Weapons: Improved Management Needed to Implement Stockpile Stewardship Program Effectively*, GAO-01-48 (Washington, D.C.: Dec. 14, 2000).

overruns or schedule delays. This schedule increased risk to meeting the program schedule because any delay would leave less than 2 years to conduct test production runs, which NNSA determined were necessary for perfecting the process. In addition, the Fogank facility was the first new manufacturing facility to be built at Y-12 in 30 years; therefore, a lack of recent experience with construction project management and implementing safety guidelines heightened the potential for problems. In fact, the contractor building the facility underestimated the time needed to complete preparations for start-up, including training and certifying staff to use the equipment and calibrating instruments.

In addition, NNSA and the contractor disagreed on the interpretation and implementation of safety guidelines. A lack of clarity about which guidelines would apply and the proper interpretation of the guidelines caused confusion over the course of the project. At a late stage, NNSA directed the contractor to apply more conservative nuclear facility safety requirements. As a result, the contractor needed additional time to address safety concerns by, for example, installing weather- and earthquake-proof equipment.

When these issues emerged, the W76 NNSA program manager did not have the authority to manage the construction of the project or resolve the dispute over safety guidelines even though a key risk mitigation strategy was the timely start of facility operations. Construction and start-up of the facility was managed by Y-12, which reported to the Y-12 Site Office, a separate organization not under the authority of the program manager. As soon as the March 2005 new facility start date was missed, the program manager raised concerns and elevated them to the Deputy Administrator for Defense Programs, the cognizant management organization at NNSA headquarters, but the issues remained unresolved. Ultimately, start-up of the new facility was postponed by approximately 1 year, leaving NNSA with half the time originally planned to re-learn the Fogbank production process.

NNSA Did Not Make Full Use of the Pilot Plant

NNSA planned to use the Y-12 pilot plant to gain a better understanding of Fogbank properties and to test the production process on a small scale while the new facility was under construction. The pilot facility could only produce a small amount of Fogbank for the W76 program because it had only a few machines. Although NNSA used the pilot plant from 2000 to 2003, it did not have funds to continue the effort because it shifted money from the W76 program to support higher priority programs at the time, such as the W87 and B61 life extension programs.

However, in 2004, anticipating delays in starting operations at the new facility and recognizing the importance of continuing work at the pilot plant, NNSA provided funding to pay for additional work at the pilot plant. By completing this work, NNSA learned that certain techniques significantly affected the quality of the end product and made adjustments to meet requirements. However, NNSA did not conduct as much work as originally planned and missed opportunities to learn more about the manufacturing process before starting operations.

NNSA Delayed the Development of an Alternate Material until Fogbank Manufacturing Problems Arose

In 2000, NNSA considered replacing Fogbank with an alternate material that was less costly and easier to produce but abandoned the idea because NNSA was confident that it could produce Fogbank since it had done so before. In addition, LANL's computer models and simulations were not sophisticated enough to provide conclusive evidence that the alternate material would function exactly the same as Fogbank. Still further, the Navy, the ultimate customer, had expressed a strong preference for Fogbank because of its proven nuclear test record. In response to the Navy's preference and the lack of sufficient test data on the alternate material, NNSA did not pursue the development of an alternate material until 2007.

In March 2007, however, NNSA again considered producing an alternative material when it was unable to produce usable Fogbank and was facing the prospect of significant schedule delays. Computer models and simulations had improved since 2001, enabling greater confidence in the analysis of alternate materials. Thus, NNSA began a $23 million initiative to develop an alternate material. LANL officials told us that NNSA plans to certify the use of the alternative material by the end of 2009 for the W76 warhead and if NNSA faced additional Fogbank manufacturing problems during full-scale production, the alternate material could then be used instead of Fogbank. Had NNSA continued research and development of an alternate material during the program, it would have had more information on the viability of using the alternate material in the weapon before March 2007. This additional information also might have provided the Navy greater assurance that an alternate material performed as well as Fogbank.

Ineffective Risk Management Led to Schedule Delays and Cost Increases

A failure to implement the three components of NNSA's risk management strategy for Fogbank led to a 1-year schedule delay and a $69 million cost overrun. This cost overrun included $22 million to resolve Fogbank production problems, $23 million to develop the alternate material, and $24 million to maintain Pantex's production capabilities. Regarding Fogbank production problems, in March 2007, NNSA discovered that final

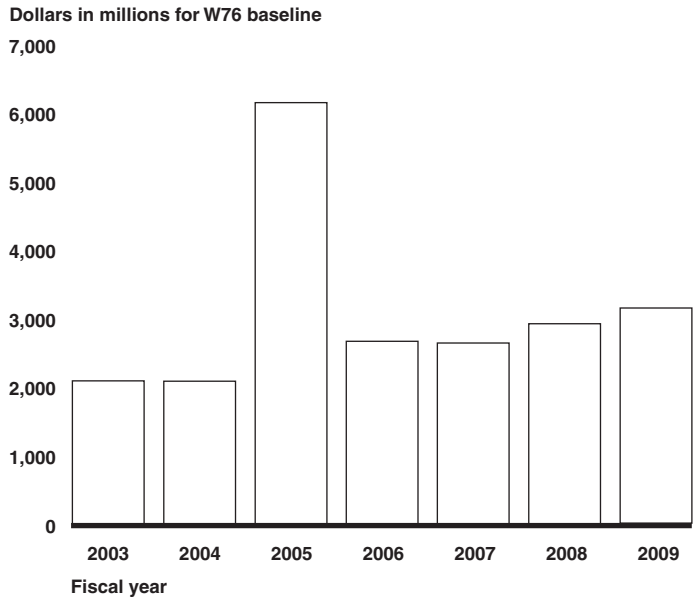
batches of the material had problems. To address the problems and try to meet its September 2007 date for producing the first refurbished weapon, NNSA launched a major effort—"Code Blue"—that made the manufacture of Fogbank a priority for the design laboratories and production facilities. However, this effort failed, and, as a result, NNSA delayed producing the first refurbished weapon from September 2007 to September 2008, and it began its efforts to develop an alternate material to Fogbank. Finally, while Pantex was unable to begin assembling refurbished units in September 2007 as planned, it still spent $24 million in fiscal year 2008 to remain in "stand-by" mode, which includes maintaining the skills of the technicians who will assemble refurbished W76 weapons.

The 1-year delay led to logistical challenges for the Navy and an aggressive production schedule of refurbished W76 warheads to make up time. The Navy originally planned to start replacing old W76 warheads with refurbished ones on submarines in April 2008. However, owing to W76 production delays, the Navy had to replace aging parts of W76 warheads in its current arsenal and has had to delay replacing old warheads with newly refurbished weapons until April 2009. Furthermore, to make up for initial schedule setbacks caused by Fogbank production problems, NNSA has increased the rate at which it plans to produce refurbished W76 weapons. NNSA will produce more weapons per year than originally planned, an annual increment that over time will enable it to still finish production at the originally planned end date. However, a higher rate of production requires more resources and leaves less room for error because any slowdown will have a greater impact on the larger number needed to be produced. NNSA production officials have indicated that they may not be able to meet this more compressed schedule if they do not receive extra resources or if they encounter any production problems, both considered realistic possibilities.

NNSA Lacks a Consistent Approach to Developing the W76 Cost Baseline

NNSA does not have a consistent approach for developing a cost baseline for the W76 program. NNSA has changed its baseline almost every year since 2001 to reflect changes in the number of warheads needed in the stockpile and changes in NNSA reporting guidelines. For example, in fiscal year 2004, the cost estimate for the W76 program was $2.1 billion;[9] in fiscal year 2005, it was $6.2 billion; and in fiscal year 2006, it was $2.7 billion (see fig. 2).

Figure 2: W76 Cost Baseline



Source: GAO analysis of NNSA data.

Changes in the baseline were the result of changes in the percent of the stockpile to be refurbished, which ranged from 25 percent to 86 percent. As the number of weapons to be refurbished changed, the baseline moved correspondingly because it costs more to refurbish more weapons. For example, NNSA planned to refurbish significantly more weapons in 2005 than 2004, based on official guidance, accounting for part of the $4.1 billion differential between those years.

Significant changes in the baseline were also driven by inconsistent NNSA accounting practices. For example, in fiscal year 2005, NNSA required program managers to include all indirect costs, such as the overhead costs

[9]This estimate excludes construction costs.

of operating facilities, as well as direct costs in the baseline. The next year it dropped this requirement. Prior to fiscal year 2005, NNSA did not tie overhead costs to specific weapon systems. However, in an attempt to provide a more accurate estimate of total costs by weapon, NNSA created accounts for the W76 warhead that captured a pro-rated portion of general costs, such as research and production support at the laboratories and production facilities. For example, NNSA included the pro-rated cost of forklift operators, who load and unload trucks for all weapon systems. Thus, a portion of these overhead costs was added to the 2005 baseline to better account for the full the costs of the program. However, NNSA discovered that this approach constrained flexibility. If priorities shifted and changes needed to be made to overhead activities, resources could not be easily redirected to different weapon systems. Any change would require congressional approval because such overhead costs were tied to a specific weapon system as a budget line item. Consequently, in fiscal year 2006, NNSA reported the production and research support accounts separately. While this change restored some flexibility for overall NNSA complex management, the transition reduced clarity about the total cost of a weapon system. Accounting changes have persisted, with, for example, some baseline years including large expense items, such as employee benefits, and other baseline years excluding such costs. A lack of a consistent baseline approach with similar cost assumptions and criteria makes it difficult to track the costs of the program over time and determine how well NNSA develops cost estimates.

Conclusions

Refurbishing the nuclear weapons stockpile is a difficult task. NNSA must draw on the scientific expertise of the nuclear weapons laboratories and the manufacturing and engineering expertise of the nuclear weapons production facilities. Recognizing this challenge, NNSA and DOD have developed multiple tools for managing the refurbishment effort: Phase 6.X, risk management strategies, test and evaluation plans, and a lessons learned document from the W87 life extension program.

By selectively using these guidance documents, however, NNSA has incurred significant cost increases and schedule delays that it could have avoided. In addition, NNSA did not include any cost or schedule contingencies in its baseline to address the unforeseen technical challenges that arose. If NNSA had more carefully followed the Phase 6.X process, it might have had sufficient time in its schedule to develop and test key materials that it had not manufactured in decades and address unforeseen technical issues.

Moreover, NNSA did not fully implement its risk management strategy to address one of the highest risks to the W76 life extension program—the manufacturing of Fogbank. If NNSA had effectively implemented its risk management strategies, schedule delays and cost increases might have been avoided or mitigated. Most importantly, if NNSA had started operations of the new facility on schedule, it would have had more time to address manufacturing challenges. In fact, the 1-year delay in the startup of the new Fogbank facility corresponded almost exactly to the 1-year program delay. In addition, without the authority to control the construction and start of operations of the new facility, the W76 program manager could not help resolve the disagreement over the safety regulations needed at the facility. Potentially compounding these problems, NNSA committed to an ambitious production schedule to make up for delays related to Fogbank—a schedule that does not leave time to address any future production problems. Furthermore, NNSA cannot be held accountable to meeting its cost targets without a consistent approach in developing a cost baseline for the W76 program. The ability to track cost over time and assess how well an agency holds to a cost baseline is fundamental for proper management and oversight.

Finally, because DOD failed to adequately oversee the B61 refurbishment program, as Phase 6.X requires, NNSA spent unnecessary time and money trying to find an alternative material. In addition, because the Lead Project Officer for the B61 bomb did not adequately monitor NNSA's activities during critical phases or have the technical expertise to do so, the Air Force did not have sufficient time to ask NNSA to conduct additional tests before NNSA entered full-scale production.

All of these management issues raise significant questions about NNSA's ability not only to complete life extension programs on time and on budget that meet all refurbishment objectives, but also its ability to manage the design and production of new weapons, such as the proposed reliable replacement warhead. NNSA and DOD state that the reliable replacement warhead is a way to replace the nation's aging stockpile with a safer, more reliable, and more secure warhead than those currently in our stockpile, and plan to use the Phase 6.X process to design and manufacture this warhead. Because NNSA did not properly follow the Phase 6.X process, meet all refurbishment objectives for the B61 bomb, and conduct all planned tests, it raises questions about NNSA's ability to design a new weapon that meets DOD's needs and also provides sufficient confidence to DOD that a new weapon will perform as expected without conducting underground nuclear tests. In addition, NNSA's failure to implement its risk mitigation strategy for the highest risk to the program and implement lessons learned from prior life

extensions, like the W87 warhead, does not inspire confidence in its ability to achieve the program's goals on time and on budget.

Recommendations

To improve the management of the stockpile life extension program, we recommend that the Administrator of NNSA direct the Deputy Administrator for Defense Programs to take the following six actions:

- Develop a realistic schedule for the W76 warhead and future life extension programs that allows NNSA to (1) address technical challenges while meeting all military requirements and (2) build in time for unexpected technical challenges that may delay the program.
- Assess the cost and include funding in the baseline for risk mitigation activities that address the highest risks to the W76 and future life extension programs.
- Before beginning a life extension program, assess the risks, costs, and scheduling needs for each military requirement established by DOD.
- Ensure that the program managers responsible for overseeing the construction of new facilities directly related to future life extension programs coordinate with the program managers of such future programs to avoid the types of delays and problems faced with the construction and operation of the Fogbank manufacturing facility for the W76 program.
- Ensure that program managers for the construction of new facilities for future life extensions base their schedule for the construction and start-up of a facility on the life extension program managers' needs identified in their risk mitigation strategies.
- Develop and use consistent budget assumptions and criteria for the baseline to track costs over time.

To improve DOD's oversight over NNSA's life extension activities and ensure that refurbished weapons meet all military requirements, we recommend that the Secretary of Defense take the following three actions:

- Direct STRATCOM and the Secretary of the responsible Service to comprehensively review military requirements for a weapons system prior to entering Phase 6.2A of a life extension program.
- Direct STRATCOM and the Secretary of the responsible Service to work with NNSA to assess the cost and schedule implications for meeting each military requirement prior to entering Phase 6.3.

- Direct the Secretaries of the Air Force and the Navy to ensure that their respective Lead Project Officers have the technical and managerial expertise and resources to review NNSA's progress and technical challenges throughout the life extension program.

Agency Comments and Our Evaluation

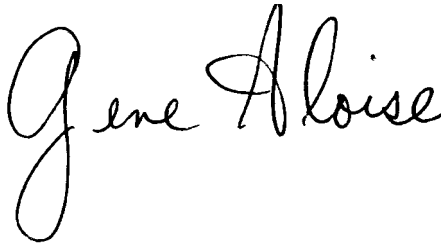
We provided NNSA and DOD with draft copies of our classified report for their review and comment. In addition to their official comments, which are reprinted in appendixes I and II, NNSA and DOD provided technical comments, which we incorporated as appropriate. As discussed in our classified report, NNSA agreed with our recommendations and plans to take a number of steps to implement them. First, NNSA plans to assess the risks, costs, and scheduling needs for each military requirement DOD establishes during the early phases of a life extension program. NNSA will consult officials from the production facilities to better understand the potential impact on cost and schedule of manufacturing critical nuclear and non-nuclear materials. In addition, NNSA plans to adopt an Integrated Phase Gate process that establishes well-defined milestones, or gates, throughout the Phase 6.X process. Before proceeding to the next gate, NNSA and DOD officials must identify any risks to cost and schedule and can opt to delay the life extension program if the risks are too high and additional actions, such as testing, should be taken. Second, NNSA will include funding needs for risk mitigation activities that address the highest risks to future life extension programs in budget reports to Congress. Third, NNSA plans to better coordinate construction activities at the production facilities with the needs of life extension program activities. Last, according to NNSA, it developed a methodology to establish a baseline with consistent budget assumptions and criteria to track costs over time. We believe that these actions could significantly improve the management of the life extension program.

DOD partially agreed with our recommendations. DOD agreed with our two recommendations directed at the department, but asked us to make modifications to the language of the recommendations to better target the responsible service or agency that has authority to implement them. We modified our recommendations by (1) including the Department of the Navy because it is responsible for reviewing NNSA's refurbishment activities for certain nuclear weapons, such as the W76, and (2) specifying during which phase of the phase 6.X process DOD should comprehensively review its military requirements and assess the cost and schedule implications for meeting each military requirement. DOD also expressed concern that the report placed an undue burden of responsibility for program delays for the B61 life extension program on DOD and that there were other technical issues NNSA faced that were not discussed in this report that led to program delays. We

believe that our report fairly attributes management problems with the B61 life extension program to both NNSA and DOD. As we state in the report, NNSA did not include any cost or schedule contingencies in its baseline to address unforeseen technical challenges in refurbishing the B61 bomb, and its aggressive schedule posed a significant risk to meeting the program's milestones. This report did not address all of the technical challenges that NNSA faced in refurbishing the B61 bomb because some did not have an impact on cost and schedule and others were additional examples of problems NNSA faced by compressing the development and engineering schedule. As we noted on page 3 of this report, the scope of our discussion of the B61 was limited to the most significant technical challenge that had an impact on cost, schedule, and weapon performance and reliability—the decision to reuse or manufacture a new material for a critical component. NNSA had the burden of completing the refurbishment on time and on schedule, but DOD failed to provide the necessary oversight. Last, we recognize that the Air Force has taken steps to strengthen the management and oversight of nuclear activities, such as consolidating nuclear activities under a newly established Air Force Nuclear Weapons Center. However, it is too early to assess the impact these actions have had on the Air Force's oversight of the life extension program.

We are sending copies of this report to the Secretary of Energy, the Administrator of NNSA, the Secretary of Defense, and interested congressional committees. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staffs have any questions about this report, please contact me at (202) 512-3841 or aloisee@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.



Gene Aloise
Director, Natural Resources
and Environment

Appendix I: Comments from the National Nuclear Security Administration

Department of Energy
National Nuclear Security Administration
Washington, DC 20585

December 9, 2008

OFFICE OF THE ADMINISTRATOR

Mr. Gene Aloise
Director, Natural Resources
and Environment
Government Accountability Office
Washington, DC 20548-0001

Dear Mr. Aloise:

The National Nuclear Security Administration (NNSA) appreciates the opportunity to review the Government Accountability Office's (GAO) report, GAO-09-152C, "NUCLEAR WEAPONS: NNSA and DOD Need To More Effectively Manage the Stockpile Life Extension Program." We understand that this report is the result of audit work conducted at the request of the House's Subcommittee on Strategic Forces, Committee on Armed Services.

NNSA generally agrees with the report and corresponding recommendations and is offering this unclassified response to the report. We will provide, under separate cover, additional classified comments for your consideration.

While GAO is offering recommendations to improve the management of the Life Extension Programs, NNSA wants to assure you that, in the area of improving our approach to requirements, risk, cost and schedule, NNSA performs a comprehensive review of military requirements during the study phase of the "6.X" process. The military requirements process is managed by the Project Officers Group with which NNSA interacts in our vetting of requirements. NNSA has taken steps to overlay additional rigor, accountability, and integration through a formal "Integrated Phase Gate" process. This stated process is an adaptation of an industry process developed to improve the requirements, risk, and cost management program elements. It also brings to bear the early involvement of production agencies in order to better identify potential production impacts beginning early in a Life Extension Program. With the Integrated Phase Gate approach, senior managers and leaders are accountable for risks identified early in the product realization process, and must either accept/mitigate risk or delay at well-defined milestones (gates) throughout the acquisition activity. This methodology has been embraced and is being applied to the next Life Extension Program.

As with many processes that implement increased rigor, there is a need for identification of increased funding in order to increase the fidelity in project risk assessment, cost estimation, and schedule development. However, NNSA believes that this increased rigor will correct deficiencies noted in the report to include the:

- development of more realistic schedules which address necessary contingencies for technical challenges/risk management;
- assessment of risks, costs, and schedules that are associated with Department of Defense requirements; and
- assessment of, and inclusion of, contingency funds associated with technical risks.

For those recommendations related to improvements in risk mitigation, NNSA agrees that risk identification and risk mitigation need to occur as early as possible. In the case of one of the weapon systems, a risk mitigation plan was identified but the funding prioritization had an adverse effect on the complete execution of the risk mitigation plan. In a similar vein, NNSA has identified its risk mitigation strategies and associated funding requirements leading into the next Life Extension Program. NNSA is aware that prioritization of funding execution remains an issue. NNSA currently reports to Congressional Committees on the cost to acquire a weapon or to conduct a Life Extension Program. This information is captured in Selected Acquisition Reports. For future weapons acquisition work, NNSA will ensure that Life Extension Program funding requirements that are portrayed in the Selected Acquisition Reports include risk mitigation activities and management reserve. Heretofore, the Selected Acquisition Reports have only reflected that portion of Life Extension Programs that have been funded. To include properly implemented risk mitigation activities will provide a more accurate display of funding requirements.

Regarding the integration of related construction and other activities related to Life Extension Programs, NNSA will improve the integration of construction requirements as they impact a Life Extension Program. With the next Life Extension Program, we are identifying not only the production requirements but also the needs of the Nuclear Weapons Complex. NNSA's next Life Extension Program is also the vehicle being used to better integrate our technical maturation activities to focus on our requirements-driven activities.

In response to the recommendation related to budget assumptions and cost tracking, NNSA developed a process for the establishment of an 'Acquisition Program Baseline' approach which is linked to the Integrated Phase Gate process—as previously discussed—and runs through the end of a Life Extension Program production.

As I mentioned earlier, NNSA will provide more detailed, classified technical comments under separate cover. Should you have any questions, please contact Richard Speidel, Director, Policy and Internal Controls Management.

Sincerely,

William C. Ostendorff
Principal Deputy Administrator

cc: Robert Smolen, Deputy Administrator for Defense Programs

Appendix II: Comments from the Department of Defense

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ASSISTANT TO THE SECRETARY OF DEFENSE
3050 DEFENSE PENTAGON
WASHINGTON, DC 20301-3050

NUCLEAR AND CHEMICAL
AND BIOLOGICAL DEFENSE
PROGRAMS

NOV 21 2008

Mr. Gene Aloise
Director, Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Aloise:

This is the Department of Defense (DoD) response to the Government Accountability Office (GAO) Draft Report, GAO-09-152C, "NUCLEAR WEAPONS: NNSA and DoD Need To More Effectively Manage the Stockpile Life Extension Program, dated October 30, 2008 (GAO Code 360913)."

The DoD partially-concurs with the draft report's recommendation to review military requirements. We strongly support the planned review of military requirements through Phase 6.2 of the Life Extension Program prior to the cost study of Phase 6.2a as currently required. Recommended language is provided. We believe that this process was followed in the B61 Life Extension Program (LEP) process, but recognize the need to emphasize requirements early in the program.

The DoD also partially-concurs with the recommendation to assign a Lead Project Officer (LPO) with adequate technical expertise. We recommend that the recommendation be extended to include each responsible service and request that U.S. Strategic Command (USSTRATCOM) be removed from the recommendation, as USSTRATCOM does not control the selection of the LPO. Air Force is currently engaged in significant activities designed to revitalize its nuclear enterprise that will address this recommendation. Revised recommendations are enclosed.

In general, we support the findings of the GAO on the current life extension programs. We fear however, that by excluding National Nuclear Security Administration (NNSA) programmatic and technical issues associated with the development of the B61 LEP, an undue burden of responsibility for program delays was targeted to the DoD and specifically to the Air Force. Expansion of the report to include these other factors would validate the recommendations to the NNSA.

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A number of technical corrections were suggested to further enhance the report and were forwarded under separate cover. The Department appreciates this opportunity to comment on the draft report. If you have any questions, my point of contact for this action is Dr Bert Jorgensen, 703-693-4009; Bert.Jorgensen@osd.mil or Bert.Jorgensen@osd.smil.mil.

Sincerely,

Steve Henry
Deputy Assistant to the Secretary of Defense (Nuclear Matters)

Enclosure:
As stated

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Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Gene Aloise (202) 512-3841 or aloisee@gao.gov

Staff Acknowledgments

In addition to the contact named above, Marc Castellano, Leland Cogliani, Jonathan Gill, Marie Mak, James Noel, Omari Norman, Tim Persons, Carol Herrnstadt Shulman, and John Smale made significant contributions to this report.

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