



U.S. Department of Energy
Office of Inspector General
Office of Audits and Inspections

Audit Report

Follow-up Audit of the National Nuclear Security Administration's W76 Nuclear Warhead Refurbishment Program



Department of Energy

Washington, DC 20585

September 26, 2012

MEMORANDUM FOR THE SECRETARY

A handwritten signature in cursive script, reading "Greg Friedman", is positioned above the printed name.

FROM: Gregory H. Friedman
Inspector General

SUBJECT: INFORMATION: "Follow-up Audit of the National Nuclear Security Administration's W76 Nuclear Warhead Refurbishment Program"

BACKGROUND

The Department of Energy's National Nuclear Security Administration is responsible for ensuring that the Nation's nuclear weapons stockpile continues to meet National defense requirements. As part of that effort, NNSA is refurbishing the aging W76 nuclear warhead with the goal of extending the warhead life by 30 years. However, the W76 Life Extension Program (LEP) has experienced significant delays in startup and in achieving production goals. By the end of Fiscal Year 2011, NNSA had completed less than half of the anticipated units due to technical production issues. NNSA intended to address this problem by increasing production rates in future years.

Delays encountered thus far have significantly increased the risk that the W76 LEP and follow-on weapon refurbishments cannot be accomplished in time to meet commitments to the Department of Defense. These commitments require that NNSA conclude the W76 LEP by FY 2018, effectively allowing only 7 years to complete the 85 percent of refurbishments remaining; therefore, any delays have downstream implications. Until the W76 LEP is completed, NNSA cannot meet the scheduled FY 2018 start date for refurbishment of the B61 bomb that is needed to meet United States' commitments to the North Atlantic Treaty Organization. As noted by an NNSA official, facility limitations preclude beginning work on the B61 LEP until the W76 LEP is complete. NNSA has stated that finding ways to reduce the cost of the W76 LEP is a priority. Accordingly, one of NNSA's High Priority Performance Goals since 2007 has been to reduce the W76 production cost on a per unit basis.

In our 2006 report, *W76 Life Extension Project* (DOE/IG-0729, May 2006), the Office of Inspector General reported that NNSA was at risk of not achieving the first production unit for the W76 refurbishment by the end of FY 2007 within the established scope, schedule and cost parameters. Given the additional delays and the importance of the LEP, we initiated this follow-up audit to take a fresh look at the status of NNSA's W76 LEP, focusing on NNSA's ability to reduce unit costs.

CONCLUSIONS AND OBSERVATIONS

NNSA may be unable to complete the W76 LEP within established scope, cost and schedule parameters, unless it adopts a more effective approach to reducing unit costs. This concern is exacerbated by the fact that the Program is faced with a relatively flat budget over the next few

years, even though its annual scope of work is projected to increase significantly. The Program's budget increases for Fiscal Years 2013 and 2014, for example, are projected to be only 2.9 percent in each year more than FY 2011 levels. The Program's production schedule, however, shows production increasing 59 percent during the same period. The increase in production appears to be unsustainable given the projected funding. The goal of reducing the unit cost of W76 LEP production appeared to be one of the only paths to keeping the Program on track without adversely affecting other NNSA programs. Although a senior NNSA official expressed confidence that NNSA would achieve the increased production rates within the out-year budget estimates, Program officials could not provide plans detailing actions necessary to achieve the needed cost reductions.

Cost Reduction Challenge

Based on the FY 2012 approved budget, NNSA may not realize the per unit cost savings necessary to complete the W76 LEP within established scope, cost and schedule parameters. To meet its scope and schedule commitments within a relatively flat budget, NNSA must reduce the annual cost per unit by 35 percent by FY 2014. However, as shown in the following table, NNSA's own weapons design and production facilities responsible for completing the LEP estimated that they can realize only a 25 percent cost per unit savings by FY 2014.

Budgeted Cost per Unit (all dollars in millions)				
Fiscal Year Budget	Annual/ Proposed Budget	Increase in Budget from FY 11	Cost per Unit Savings Needed	Cost per Unit Savings Projected
2011*	\$248			
2012	\$257	3.7%	15%	5%
2013	\$255	2.9%	28%	13%
2014	\$255	2.9%	35%	25%
2015	\$255	2.9%	35%	21%
2016	\$260	4.9%	34%	24%

*Actual costs

We could not satisfactorily reconcile the need to reduce unit costs by 35 percent to meet cost considerations with the assertions of the weapons facilities that estimated a 25 percent reduction was the best they could anticipate.

Reducing costs below the projected levels may be difficult because many elements in the cost composition estimate are outside of NNSA's control. For example:

- NNSA's Kansas City Plant will be moving its W76 LEP production to a new facility, requiring relocation activities that may add \$19 million to the Program's total cost;
- NNSA sites estimated that efforts to resolve technical production issues would cost an additional \$10 million; and,

- Contractor pension cost increases included in the estimates added approximately \$10 million to the W76 LEP costs in FY 2012, according to an NNSA official. NNSA was unsure of pension cost impacts to the Program beyond FY 2012. Yet, pension projections for NNSA show that total pension costs throughout the entire enterprise are expected to remain at FY 2012 levels or higher through FY 2016.

If NNSA is not able to lower unit costs below current projections, the W76 LEP will face large cost overruns. In fact, the weapons design and production sites estimated that, collectively, FY 2012 and FY 2013 costs would be \$86 million greater than the estimates for those years as found in NNSA's FY 2012 budget. This is illustrated in the following chart.

Projected Cost vs. FY2012 Budget (all dollars in millions)			
Fiscal Year Budget	Site Projected Cost	Budgeted Funds	Cost Savings Needed
2011*	\$248	\$248	
2012	\$288	\$257	\$31
2013	\$310	\$255	\$55
2014	\$295	\$255	\$40
2015	\$311	\$255	\$56
2016	\$299	\$260	\$39
Total	\$1,751	\$1,530	\$221

*actual costs and budget

Further, as noted, there was a total gap of \$221 million from FY 2012 costs through FY 2016 costs submitted by the sites to meet Program requirements and the out-year budget projection contained in the FY 2012 Congressional Budget Request.

NNSA Program officials pointed out that unit cost estimates have been and will continue to be affected by changes in production requirements and volatility in available funding. For example, the FY 2013 Congressional Budget showed funding levels reduced by one third from the prior year to approximately \$175 million. NNSA also noted that the planned production rate for the W76 LEP had decreased by one third from that planned in FY 2011. While recognizing the impact of changes in production rates and funding, Program officials agreed that our analysis was generally consistent with NNSA's own internal concerns about meeting W76 goals within budget constraints.

Quantified Cost Savings Measures

NNSA Stockpile Management officials expressed confidence that the Program can achieve the increased production rates within the FY 2012 Congressional Budget Request estimates. Yet, Program officials could not provide plans detailing the specific actions needed to achieve necessary cost reductions. Beginning in its FY 2007 performance measure report, NNSA committed to reducing its projected production unit cost, specifically to reducing the project by a cumulative 2 percent in unit cost by FY 2010. But, it actually achieved less than a 1 percent reduction. During this time period, the Program experienced cost increases due to unanticipated

technical production issues and increased contractor healthcare and compensation expenses. As a result, NNSA was unable to meet its self-imposed cost reduction targets. NNSA performance measure reports reflect that future cost efficiencies in the remaining years of production would be needed to offset cost increases. However, NNSA did not specifically identify the steps necessary to achieve the essential cost reductions.

NNSA established a Cost Control Board for the W76 LEP. A Program official stated that the Cost Control Board, which is jointly chaired by NNSA and the Department of the Navy and includes both Federal and contractor personnel, set cost targets and solicited cost reduction measures from the sites. For instance, NNSA's Kansas City Plant identified over \$18 million in approved cost savings measures between FY 2007 and FY 2011. Beyond those identified through 2011, Program officials were unable to provide us with a list of the cost reduction initiatives necessary to address the \$221 million gap between the weapons design and production site estimates and the budget. While individual NNSA facilities had identified some site specific cost savings, NNSA had not created a forward-looking plan to reduce costs Program-wide, enabling the Program to absorb or mitigate increased costs resulting from increased production levels, the relocation of the Kansas City Plant, technical production issues, and pension payment increases .

Senior NNSA officials asserted that they would reallocate funds from other weapons programs if they were unable to achieve W76 cost reductions. However, NNSA had not determined the sources and extent of reallocated funds or the impact on programs providing such funds.

W76 LEP Program officials expressed their disagreement with our methodology for calculating unit cost. In particular, they stated that we overestimated annual unit costs by including costs that were not directly related to production in each year, such as pension costs. However, we concluded that inclusion of these costs better illustrated the overall cost challenges facing the Program and was consistent with how the Program reports cost performance to Congress. In general, officials agreed that our analysis, including the risks going forward, were consistent with NNSA's concerns about Program execution in future years.

Best Practice

Had NNSA made full use of available performance management tools, it might be in a better position to measure the overall effectiveness of the W76 LEP. Program officials told us that they consider Earned Value Management Systems (EVMS) to be a best practice. NNSA used EVMS to measure each site's performance against current year budget authority and workload requirements. However, NNSA did not use EVMS to measure the overall performance of the W76 LEP Program. NNSA officials explained that they did not use the EVMS as a forward-looking tool for Program-wide planning purposes because of production issues and uncertainties about the Program's ultimate scope and budget. As a result, NNSA could not measure actual Program cost performance against planned cost performance in order to identify needed changes to cost reduction strategies. Although a Program-wide EVMS has not yet been implemented, a W76 LEP official told us that NNSA plans to use EVMS at the Program level in future years.

W76 LEP Impacts

Delays in completing the W76 LEP within planned scope, cost and schedule could have national security implications. If NNSA is unable to achieve the cost per unit reductions necessary to meet the W76 LEP's planned production requirements, it will require additional funding, a reduction in scope, or a delay in production. Delays in completing the W76 LEP within schedule, for instance, could prevent NNSA from beginning full production of the B61 bomb refurbishment to meet existing United States' commitments.

RECOMMENDATIONS

Given current widespread calls for dramatic reductions in Federal spending, NNSA may be faced with future budget reductions. We noted that possible decreases in budget would require NNSA to reduce unit production costs even beyond those discussed in our report.

To assist NNSA in meeting its goals within available budgets, we recommend that the Administrator, NNSA, ensure that the W76 LEP:

1. Develops a forward-looking plan to reduce costs Program-wide to meet planned production rates within budget; and,
2. Implements and utilizes a Program-wide EVMS that quantifies required scope, schedule and cost performance through the end of the Program.

MANAGEMENT COMMENTS

Management agreed that additional adjustments to W76 plans will be required to maintain the Program within budget constraints. While it believed that it had the focus and necessary tools to ensure success of the W76 LEP, management agreed to develop a forward-looking plan to help meet W76 goals. Management stated that NNSA will tailor the EVMS methodology and implementation, which are primarily focused on construction activities, for application to weapons production activities.

Management did take exception to the methodology we used to calculate unit cost but stated it will consider the audit's analysis and develop a plan based on the methodologies determined to be most appropriate. Management also noted that some data used in the "Budgeted Cost per Unit" chart was outdated. Specifically, management noted that the W76 rate of production had decreased by one third from FY 2011 requirements. Management acknowledged that the numbers used in the "Budgeted Cost per Unit" chart were volatile and that any data used may be outdated prior to issuance of our report. Management also took exception with how the costs associated with the Kansas City Plant's move to a new facility were reported.

Management's response and technical comments, which provide clarifications regarding NNSA's planned methodologies for implementing the recommendations, are included in Attachment 3 of this report.

AUDITOR COMMENTS

Management's proposed corrective actions are responsive to our recommendations. Although NNSA officials disagreed with our methodology for calculating unit cost, they agreed that our analysis was consistent with NNSA's concerns about meeting W76 goals within budget constraints. As previously noted, management believed that we overestimated annual unit costs by including costs that were not directly related to production in each year, such as pension costs. However, we concluded that inclusion of these costs better illustrated the overall cost challenges facing the Program and was consistent with how the Program reports cost performance to Congress.

We acknowledge that Program requirements are changing and remain volatile. Our analyses were based on Program requirements that were in place as of the FY 2012 approved budget. We noted that proposed reductions in production and funding are likely to make it more difficult for the Program to meet its cost per unit requirements because fixed costs that are unlikely to decrease will have to be allocated over fewer produced units. Nonetheless, our report reflects management's concerns regarding Program requirement and funding volatility. Regarding management's concerns with the costs associated with moving the Kansas City Plant to a new facility, we met with NNSA Program officials and provided documentation for how we arrived at the costs reported. They agreed with our analysis; however, consistent with NNSA's concerns, the audit report clarifies our position regarding these costs.

We appreciate management's recognition that forward-looking plans should be developed and EVMS principles should be implemented to help ensure W76 LEP goals are met.

Attachments

cc: Deputy Secretary
Associate Deputy Secretary
Administrator, National Nuclear Security Administration
Chief of Staff

OBJECTIVE, SCOPE AND METHODOLOGY

OBJECTIVE

The objective of the audit was to determine whether the National Nuclear Security Administration (NNSA) is completing the W76 refurbishment within the established cost, scope and schedule parameters.

SCOPE

We conducted the audit from September 2010 to August 2012 at the NNSA Headquarters in Washington, DC; NNSA Albuquerque Complex in Albuquerque, New Mexico; the Pantex Plant and the Pantex Site Office in Amarillo, Texas; the Y-12 National Security Complex and the Y-12 Site Office in Oak Ridge, Tennessee; Los Alamos National Laboratory in Los Alamos, New Mexico; the Kansas City Plant and Kansas City Site Office in Kansas City, Missouri; and Sandia National Laboratories in Albuquerque, New Mexico. The scope of the audit was limited to W76 refurbishment activities from September 2008 (first production unit) through the end of the Program.

METHODOLOGY

To accomplish the audit objective, we:

- Identified the W76 refurbishment technical scope, scheduled milestones, budget and cost;
- Reviewed applicable Department of Energy (Department) Orders, Federal laws and regulations, internal policies and related prior reports;
- Assessed compliance with the *GPRA Modernization Act of 2010*;
- Analyzed the status of the project and contractors' performance;
- Interviewed key Department and contractor personnel;
- Reviewed current Program management reports; and,
- Reviewed results of prior audits and reviews.

This audit was conducted in accordance with generally accepted Government auditing standards for performance audits and included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. The Department established performance measures regarding the W76 Life Extension Program as required by the *GPRA Modernization Act of 2010*. Because our review was limited, it would not necessarily have

disclosed all internal control deficiencies that may have existed at the time of our audit. We did not conduct a reliability assessment of computer-processed data because we did not rely on computer-processed information to achieve our audit objective.

Management waived an exit conference.

RELATED REPORTS

Office of Inspector General Reports

- [W76 Life Extension Project](#) (DOE/IG-0729, May 2006). This report found that the National Nuclear Security Administration (NNSA) is at risk of not achieving first production unit for the W76 refurbishment within the established scope, schedule and cost parameters. Specifically, there were delays in completing tests and other milestones, reductions in design scope, unexplained cost variances, and incomplete documentation of program baseline changes. These delays and scope deviations were caused by project management shortcomings, including delayed project planning and a failure to link site schedules with the overall project schedule.
- [NNSA's Refurbishment of the B61](#) (DOE/IG-0697, August 2005). The audit report disclosed that NNSA was at risk of not achieving the first production unit for the B61 refurbishment within the original schedule and scope specifications and it did not have a valid estimate of total refurbishment costs. NNSA's project planning and management processes were not adequate to ensure refurbishment completion in accordance with the original parameters.
- [Refurbishment of the W80 – Weapon Type](#) (DOE/IG-0590, March 2003). The audit found that project milestones were frequently changed or delayed, and delays in one activity caused delays or cancellations of subsequent activities. The Project Plan was poorly maintained because there was not one manager overseeing the entire refurbishment process.

Government Accountability Office Reports

- *NNSA and DOD Need to More Effectively Manage the Stockpile Life Extension Program* (GAO-09-385, March 2009). This report identified challenges that could potentially cause schedule delays or cost overruns in the W76 Life Extension Program. Specifically, the Program experienced technical issues producing required materials, the Program experienced delays in the construction of production facilities, and fluctuations in Program baselines made it difficult to track or project total Program costs.
- *Improved Management Needed to Implement Stockpile Stewardship Program Effectively* (GAO-01-48, December 2000). This audit found that poor project management caused NNSA to be unable to predict and plan for problems that ultimately led to cost overruns and schedule delays. Specifically, the Kansas City Plant had difficulties restarting operations, the Y-12 National Security Complex and the Pantex Plant experienced safety problems, and the aggressive schedule caused inexperienced technicians at the Pantex to damage detonators when installing them.

MANAGEMENT COMMENTS



Department of Energy
National Nuclear Security Administration
Washington, DC 20585



August 10, 2012

MEMORANDUM FOR DAVID SEDILLO
DIRECTOR, NNSA AUDIT DIVISION
OFFICE OF THE INSPECTOR GENERAL

FROM: CYNTHIA A. LERSTEN *Plty map for*
ASSOCIATE ADMINISTRATOR
FOR MANAGEMENT AND BUDGET

SUBJECT: Comments to Draft Report on NNSA's W76 Refurbishment Project;
A10AL002/2010-02051

The National Nuclear Security Administration (NNSA) appreciates the opportunity to have reviewed the Inspector General's (IG) draft report, "NNSA's W76 Refurbishment Project." We understand that the purpose of this follow-up audit was to take a fresh look at the status of NNSA's W76 refurbishment program, focusing on NNSA's ability to reduce unit costs.

The IG concluded that without a more effective effort to reduce unit costs, NNSA may be unable to complete the W76 Life Extension Program (LEP) within the established scope, cost and schedule parameters. While NNSA acknowledges that additional adjustments to plans will be required to maintain the program within budget constraints, we believe that the appropriate management tools and management focus are in place to ensure successful execution of the W76 refurbishment.

Our initial response to the report recommendations is attached, which reflects a general agreement with the high level approach and intended outcomes of the IG's recommendations. However, the management response provides important clarifications regarding NNSA's planned methodologies for implementing the recommendations. In addition, we have provided technical comments to further enhance the factual accuracy of the report.

If you have any questions, please contact Dean Childs, Director, Internal Controls at 301-903-1341.

Attachment



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NNSA RESPONSE TO IG DRAFT REPORT
Follow-up Audit of the National Nuclear Security Administration's W76 Nuclear Warhead
Refurbishment Program

Response to Report Recommendations

Recommendation 1: Develop a forward-looking plan to reduce costs program-wide to meet planned production rates within budget.

Management Response: Agree in Principle

NNSA agrees with the recommendation to develop a forward looking plan of action to help ensure W76 LEP goals are met. However, as noted during the audit, NNSA takes exception to the IG's methodology for calculating unit cost to be integrated into such a plan. NNSA will consider the IG's analysis and develop a plan based on the methodologies determined to be most appropriate.

Recommendation 2: Implement and utilize a program-wide EVMS that quantifies required scope, schedule and cost performance through the end of the program.

Management Response: Agree in Principle

NNSA agrees that EVMS principles should be implemented program-wide in accordance with the IG's recommendation. However, it was indicated during the audit, and assumed to be the IG's intent in the stated recommendation, that the application of EVMS be in accordance with methods established in the 413 series of Department of Energy Directives, which focus primarily on construction activities. However, while applying the general EVMS principles, NNSA will tailor the methodology and implementation for application to weapons production activities.

Technical Comments

1. Page 2, Table "Budgeted Cost Per Unit." – Some data in this table is outdated as the Program of Record has changed since this review was conducted by the IG. While we have provided revised numbers to the IG, we recognize that these numbers may change frequently and any data included in the document may be again outdated prior to issuance of the report. Therefore, we recommend adding a footnote to Table 2 which explains and acknowledges that the numbers are volatile and may not reflect the current cost per unit. It should also acknowledge that on February 21, 2012, the NNSA Director of the Office of Nuclear Weapons (NA-122) provided updated guidance and direction to plan for and execute a new Program of Record for the W76-1 LEP. This resulted in a new Production and Planning Directive 2011-1. The new program of record reduces the W76-1 rate of production to two thirds of that shown in the FY 2011 Requirements and Planning Document.

2. Page 2, paragraph #4, first bullet states: "NNSA's Kansas City Plant will be moving its W76 LEP production to a new facility, requiring relocation activities that may add \$19 million to the program's total cost. Also, NNSA sites estimated that efforts to resolve technical production issues would cost an additional \$10 million..." This gives the impression that the total incremental cost is \$29 million. However, the \$19 million represents a combination of the relocation, technical and vendor support costs. NNSA therefore requests the sentence be revised to read as follows: "NNSA's Kansas City Plant will be moving its W76 LEP production activities to a new facility. The impact of relocation, resolution of technical issues and vendor support prior to the move may add \$19 million to the program total cost to maintain schedule requirements."

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