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Audit Report

Follow-up Audit on Stockpile Surveillance Testing

DOE/IG-0744

October 2006



Department of Energy

Washington, DC 20585

October 30, 2006

MEMORANDUM FOR THE SECRETARY

FROM: *Greg Friedman*
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Inspector General

SUBJECT: INFORMATION: Audit Report on the "Follow-up Audit of Stockpile Surveillance Testing"

BACKGROUND

Annually, the President of the United States issues the Nuclear Weapons Stockpile Plan. As part of the development of the Plan, the Secretary of Energy is required to confirm that the U.S. nuclear weapons stockpile is safe, secure and reliable. In support of this effort, the Department's National Nuclear Security Administration (NNSA), as part of its Stockpile Stewardship Program, uses statistical sampling techniques, various tests, along with computer simulations, to assess weapon reliability. "Surveillance Testing," during which the performance and reliability of randomly selected weapons and components is evaluated, is one of the key components of this effort. These tests follow an established schedule. Any delay in the testing regime deprives decision-makers of data on the current status of the stockpile.

In 2001, the Office of Inspector General reported that the Department was behind schedule in conducting several of the stockpile surveillance tests. The Department was unable to conduct timely tests, in part, because it did not have up-to-date safety studies in place. These studies are a pre-requisite for surveillance activities on each weapons system; they establish the basis for assuring worker and environment safety during the disassembly, inspection, reassembly and other test protocols. In response to our 2001 report, the Department committed to taking steps to return stockpile surveillance testing to its planned schedule. This included: (1) developing a management plan with goals and milestones to address the test backlog; and, (2) expediting the renewal of safety studies to assure testing would be completed as scheduled.

The objective of this follow-up audit was to determine whether the NNSA had resolved the weapons testing backlog.

RESULTS OF AUDIT

Although it made some progress, the Department had not eliminated the weapons surveillance testing backlog. The audit disclosed that significant backlogs existed in each of the three types of tests conducted in the surveillance program--laboratory tests, flight tests and component tests. As of September 30, 2005:

- Laboratory tests for seven of the nine weapons' systems in the surveillance program were behind schedule; and,



- Flight tests for six systems were behind schedule.

Furthermore, testing backlogs existed for all five primary weapons' components, such as gas transfer valves and detonators.

Consistent with prior commitments, the Department had taken steps to improve its surveillance test planning and to renew safety studies to eliminate the backlog. However, these efforts were not fully successful. Departmental efforts were constrained by:

- The need to address unanticipated safety-related concerns identified by weapons design laboratories;
- Contractor performance problems in preparing Documented Safety Analyses, essential safety-related documents; and,
- A one-time, Department-wide stand-down of classified operations associated with concerns over the security of classified removable electronic media.

To cite one example of an unanticipated safety concern, in FY 2004, a weapons design laboratory provided new information about an unanticipated hazard that led to a suspension of disassembly, inspection and reassembly of weapons. Additionally, in FY 2005, poor quality contractor submittals of hazard analyses to support the Documented Safety Analysis required considerable rework and multiple reviews and approvals leading to further schedule slippages.

The surveillance program's role in assessing and ensuring confidence in the reliability of the weapons stockpile is increasingly important as the nuclear weapons stockpile ages. However, as a result of the continuing backlog of surveillance tests, the Department lacks vital information about the reliability of the stockpile. Further, as a result of testing delays, important operating anomalies or other defects could go undetected.

Recognizing the importance of the surveillance program, the Department has committed by the end of FY 2007 to eliminate the majority of the existing testing backlog at the Pantex Plant, where weapons are disassembled, inspected and reassembled. Further, the Department has taken action to improve contractor performance by detailing its expectations for the development of Documented Safety Analyses. It also plans to increase Pantex Plant capabilities critical to the surveillance program. Finally, the Department has indicated that it plans to analyze its business practices to streamline safety authorization processes, while continuing to ensure safe operations.

From our perspective, elimination of the existing surveillance testing backlog depends in large part on the successful implementation and execution of the Departmental initiatives. Further, the ultimate success of the surveillance testing program is dependent upon addressing and resolving the following issues:

- Risk management and the balance between mission demands and risk avoidance;

- The efficacy of the current structure of the surveillance testing program in addressing the uncertainties associated with the aging stockpile; and,
- Future infrastructure and human resources needed to meet the objectives of the surveillance testing program given the reality of an aging stockpile.

Management provided a number of technical comments which have been incorporated into the body of the report.

Attachment

cc: Deputy Secretary
Administrator, National Nuclear Security Administration
Chief of Staff
Director, Policy and Internal Controls Management, NA-66

REPORT ON THE FOLLOW-UP AUDIT OF STOCKPILE SURVEILLANCE TESTING

TABLE OF CONTENTS

Shortfalls in Surveillance Testing

Details of Finding	1
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Appendices

1. Objective, Scope, and Methodology	7
2. Related Audit Reports.....	8

Shortfalls in Surveillance Testing

Shortfalls in Surveillance Testing

Significant backlogs existed in each of the three types of tests conducted in the Surveillance Testing Program---laboratory tests, flight tests, and component tests---as of September 30, 2005. Laboratory tests are conducted on weapons' non-nuclear systems to detect defects due to handling, aging, manufacturing, or design. Flight tests involve dropping or launching a weapon, with its nuclear components removed, to assess performance and reliability. Component tests involve the destructive analysis of the five primary weapon components: pits, secondaries, detonators, cable assemblies, and the gas transfer valves systems to identify defects or failures. Although it made progress in reducing the backlog for a number of systems, the surveillance testing backlog actually increased for the majority of systems and components during the five-year period from Fiscal Year (FY) 2000 to 2005.

Laboratory Tests

Laboratory tests for seven of the nine weapons systems in the surveillance program were behind schedule as of September 30, 2005. Table 1 shows that the backlog of laboratory testing for 3 systems was at least 30 percent.

Table 1- Backlog of Laboratory Testing
(At Fiscal Year Ended 2005)

Weapon System	FY 2005 Planned	FY2005 Achieved	FY 2005 Shortfall	FY 2005 Percentage Backlog
W62	36	13	23	64%
W78	36	25	11	31%
W80	20	14	6	30%
W88	29	23	6	20%
B61-7/11	30	24	6	20%
B61-3/4/10	32	28	4	12%
B83	30	29	1	3%

The Department met or exceeded the planned number of tests for the W76 and the W87.

However, while the Department of Energy (Department) reduced the FY 2000 testing backlog for four of the systems, the backlog of laboratory tests for five systems (W62, W78, W80, W88, and the B61-3/4/10 weapons) actually increased over the five-year period. (See Appendix 3 for the backlogs of laboratory testing during Fiscal Years 2005 and 2000).

Flight Tests

Similarly, flight tests for six of the nine weapons systems in the program were behind schedule as of September 30, 2005. Table 2 shows that the backlog of flight tests for 2 systems exceeded 30 percent.

Table 2 - Backlog of Flight Testing
(At Fiscal Year Ended 2005)

Weapon System	FY 2005 Planned	FY 2005 Achieved	FY 2005 Shortfall	FY 2005 Percentage Backlog
W87	8	5	3	37%
W80	22	14	8	36%
B61-3/4/10	12	10	2	17%
W78	8	7	1	13%
B61-7/11	16	14	2	13%
W62	8	7	1	13%

The Department met or exceeded the planned number of tests for the W76, W88, and the B83.

However, while the Department reduced the FY 2000 testing backlog for three of the systems, the backlog of flight tests for five systems (W87, W80, B61-3/4/10, W-78, and the B61-7/11 weapons) also increased over the five-year period. (See Appendix 3 for the backlogs of flight tests during Fiscal Years 2005 and 2000).

In responding to the report, officials advised that the National Nuclear Security Administration (NNSA) and the Department of Defense (DoD) determine plans to address flight test shortfalls. In some cases, based on the results of other successful flight tests, NNSA and DoD may choose to eliminate some requirements to make up the shortfall. These decisions are not reflected in the table above since our intent is to measure NNSA's progress in completing planned tests, thereby, eliminating the testing backlog.

Component Tests

In addition, the Department did not conduct tests as scheduled for all five components included in the weapons Surveillance Testing Program. As shown in Table 3, the backlog of tests increased for four of the components during FY 2000 through FY 2005.

Table 3 - Backlog of Component Testing
(At Fiscal Years Ended 2005 and 2000)

Component Type	FY 2005 Prior Years Cumulative Backlog	FY 2000 Backlog
Pits	19	4
Secondaries	12	0
Detonators	175	0
Gas Transfer Valves	35	61
Gas Transfer Systems	27	26

Backlog Factors and the Path Forward

Although it took steps to improve planning and, in some cases, increased the number of tests, the Department had not fully updated safety studies, a primary cause of the surveillance testing backlog that existed in FY 2000. Additional safety-related concerns and contractor performance problems had arisen during the five-year period to FY 2005 and limited the Department's progress in updating safety basis documentation and reducing the testing backlog. A Departmental stand-down of all classified activities related to the use of Classified Removable Electronic Media also contributed to the delay of surveillance tests. The Department has committed to eliminate the majority of the backlog at the Pantex Plant by the end of FY 2007.

Updates of Safety Studies

The Office of Inspector General reported in *Stockpile Surveillance Testing* (IG-0528, October 2001), that a lack of planning for the expiration of required safety studies was a primary cause for the testing backlog that existed in FY 2000. Before surveillance tests can be conducted, weapons must first be disassembled, inspected, reassembled, and in the case of flight tests, have the nuclear package replaced with telemetry. However, a valid safety study is required for each weapon

system, certifying that conducting the operation is safe to the worker, facility, and environment, before work can begin on the weapon. We found that a number of weapons could not be disassembled, inspected, and tested in FY 2000 because the related safety studies had been allowed to expire, and that the studies for other weapon systems would expire in FY 2002.

In response to the October 2001 report, the Department committed to update safety basis documentation for active systems in the stockpile. However, as of the time of this review, the Department had completed updates for only three of the nine weapons systems in the stockpile, and partially completed work on one other system.

The Department made limited progress in updating the safety basis documentation required to conduct surveillance tests, in part, because of unanticipated safety concerns that require technical study. These concerns were identified as part of the updating process. Additional security concerns and contractor performance problems also delayed completing the safety studies necessary to support authorizing work to disassemble, inspect, and reassemble the weapons.

For example, a weapons design laboratory provided new information about an unanticipated hazard that led to a suspension of operations during FY 2004 at the Pantex Plant, which disassembles, inspects and reassembles weapons. Concerns about this hazard continued to delay completion of safety basis documentation for specific weapons systems into FY 2005. In several cases, the contractor made change control requests delaying the submittal of Hazard Analyses Reports, a safety-related document, for several weapons systems because of changes in weapons response information provided by the design laboratories.

Additionally, NNSA cited the contractor for submitting poor quality Documented Safety Analyses, another safety-related document, during FY 2005, which led to schedule slippages in completing the authorizations needed to meet mission needs. According to the Pantex Site Office, the contractor submitted Hazard Analysis Reports in FY 2005 for several weapons systems that required considerable rework. The Site Office concluded that there appeared to be significant planning, performance and integration issues associated with developing Hazard Analyses Reports, and other safety-related documents and activities that increased mission accomplishment risks.

Specifically, in March 2006, the Manager, Pantex Site Office, communicated to the contractor's general manager that:

- Documented Safety Analyses had generally been deficient in areas such as hazard identification and accident analysis; and,
- No integrated comprehensive schedule existed to show what Documented Safety Analyses were required to support weapons program, facility, or new activity start-ups.

The Manager also noted that the re-submittal of the Documented Safety Analyses documents to correct previously identified comments and conditions led to schedule slippages.

Security Factors

The FY 2004 stand-down of NNSA operations, because of concerns over the security of Classified Removable Electronic Media, also delayed surveillance tests. During this time, weapons could not be shipped or received at Departmental sites for surveillance work. Officials at one site stated that full surveillance operations did not resume for six to seven months.

Path Forward

In April 2006, the Department committed to eliminate the majority of the surveillance testing backlog at the Pantex Plant by the end of FY 2007. The Department has taken a number of steps and launched several initiatives crucial to successfully carrying out this commitment. For example, in March 2006, the Manager, Pantex Site Office established specific expectations to improve the adequacy of contractor Documented Safety Analyses documents, standardize the Site Office review times, and to improve the overall schedule performance for Documented Safety Analyses.

Additionally, several planned Departmental initiatives to transform the weapons complex to make it fully responsive to national security needs are important to eliminating the backlog. Specifically, the Department recognized the need to manage risk more effectively to increase productivity, including surveillance testing productivity, while ensuring safe nuclear operations. As part of this effort, the Department plans to analyze the costs and benefits of its policies and procedures for ensuring safe and secure operations, and to streamline its safety authorization

process. It also plans to increase weapons disassembly, inspection and reassembly capability at the Pantex Plant critical to the surveillance program.

Effects of Testing Backlogs

The Stockpile Surveillance Program is vital to the nation's security. The surveillance program's role in assessing and ensuring confidence in the reliability of the current weapons stockpile has increased in importance since existing weapons remain in the stockpile longer than originally intended. However, when tests are delayed or not completed, the Department lacks vital information about the nuclear weapons stockpile and anomalies or defects within the weapon systems could be missed.

Elimination of the surveillance testing backlog depends on successful implementation of ongoing Departmental initiatives to improve contractor performance, streamline the safety authorization process, and to increase weapons activities capabilities at the Pantex Plant.

In addition to the above initiatives, we believe that the long-term success of the surveillance testing program depends on how the Department addresses:

- Risk management and the balance between mission demands and risk avoidance;
- The efficacy of the surveillance test program, as currently structured; and,
- The future infrastructure and human resources needed to meet the objectives of the surveillance test program in an aging stockpile environment.

MANAGEMENT COMMENTS

Management provided a number of technical comments which have been incorporated into the body of the report.

Appendix 1

OBJECTIVE

The audit objective was to determine whether the National Nuclear Security Administration (NNSA) has eliminated the weapons surveillance testing backlog.

SCOPE

The field work was performed between May 2005 and April 2006 at the NNSA Headquarters in Washington, DC; Sandia National Laboratories in Albuquerque, NM; Los Alamos National Laboratory in Los Alamos, NM; and, the Pantex Plant in Amarillo, TX.

METHODOLOGY

To accomplish the audit objective, we:

- Reviewed policies and procedures governing stockpile surveillance testing;
- Interviewed Departmental Headquarters officials concerning the stockpile surveillance backlog;
- Interviewed Department and contractor officials at Sandia National Laboratories, Los Alamos National Laboratory, and the Pantex Plant;
- Verified testing data to assess whether backlogs existed in flight, laboratory, and component testing;
- Requested stockpile surveillance testing information from the three sites that conduct surveillance testing;
- Analyzed stockpile surveillance information received; and,
- Reviewed performance measures established in accordance with Government Performance and Results Act.

The 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. We did not rely extensively on computer processed data.

Management waived an exit conference.

RELATED AUDIT REPORTS

- *Stockpile Surveillance Testing* (DOE/IG-0528, October 2001). The audit found that at least since 1996, the Department of Energy (Department) had not met many of its internally-generated milestones for flight, laboratory, and component tests. Flight and laboratory tests scheduled for five different weapon systems were significantly backlogged. In addition, there were a large number of untested components. When tests are delayed or are not completed, the Department lacks critical information on the reliability of the specific weapons involved. Additionally, anomalies or defects within the weapon systems can go undetected since the likelihood of detecting anomalies decreases when fewer tests are conducted. Without needed test data, the Department's ability to assign valid reliability levels to some weapon systems is a risk.
- *Management of the Stockpile Surveillance Program's Significant Finding Investigations* (DOE/IG-0535, December 2001). The audit found that the Department had not been meeting internally established time frames for initiating and conducting investigations of defects and malfunctions in nuclear weapons. In some instances, confirming the need for an investigation took over 300 working days, despite the Department's 45-day criteria. Once initiated, the majority of investigations examined were open more than one year even though a one-year benchmark had been established for such investigations. As a result of investigation delays, test data and findings relating to weapon reliability were not readily available to the Departments of Energy and Defense.

**Backlog of Laboratory Testing
(At Fiscal Year 2005 and Fiscal Year 2000)**

Weapon System	FY 2005 Percentage Backlog	FY 2000 Percentage Backlog
W62	64%	17%
W78	31%	8%
W80	30%	15%
W87	¹	6%
W88	20%	²
B61-7/11	20%	27%
B61-3/4/10	12%	3%
B83	3%	17%
W76	0%	26%

**Backlog of Flight Testing
(At Fiscal Year 2005 and Fiscal Year 2000)**

Weapon System	FY 2005 Percentage Backlog	FY 2000 Percentage Backlog
W87	37%	13%
W80	36%	31%
B61-3/4/10	17%	0%
W78	13%	³
B61-7/11	13%	0%
W62	13%	38%
B83	⁴	⁵
W76	0%	8%
W88	0%	25%

¹ Exceeded planned tests by 28 percent.

² Exceeded planned tests by 17 percent.

³ Exceeded planned tests by 13 percent.

⁴ Exceeded planned tests by 8 percent.

⁵ Exceeded planned tests by 17 percent.

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