



OFFICE OF INSPECTOR GENERAL

U.S. Department of Energy

AUDIT REPORT

OAI-M-17-04

January 2017

**THE NATIONAL NUCLEAR SECURITY
ADMINISTRATION'S WEAPONS
EVALUATION TEST LABORATORY**



Department of Energy
Washington, DC 20585

January 3, 2017

MEMORANDUM FOR THE DEPUTY ADMINISTRATOR FOR DEFENSE PROGRAMS,
NATIONAL NUCLEAR SECURITY ADMINISTRATION

Michelle Anderson

FROM: Michelle Anderson
Deputy Inspector General
for Audits and Inspections
Office of Inspector General

SUBJECT: INFORMATION: Audit Report on "The National Nuclear Security
Administration's Weapons Evaluation Test Laboratory"

BACKGROUND

The primary mission of the Department of Energy's National Nuclear Security Administration (NNSA) is to ensure the safety, reliability, and performance of the Nation's nuclear weapons stockpile. NNSA's stockpile surveillance program continuously assesses and evaluates each nuclear weapon system to detect or anticipate any potential problems. Sandia National Laboratories' (Sandia) Weapons Evaluation Test Laboratory (WETL), located at the Pantex Plant in Amarillo, Texas, supports the execution of the stockpile surveillance program by testing weapon functionality and providing quality data to support NNSA's annual stockpile assessments. Specifically, WETL performs laboratory testing using centrifuges and other test equipment. The non-nuclear components are mounted on a centrifuge and exposed to environments that simulate the launch and reentry conditions. Funding for Sandia's laboratory testing program totaled about \$62 million for fiscal years (FY) 2012 through 2015, including \$15.8 million for WETL operations.

In December 2013, the Office of Inspector General received an anonymous complaint regarding the management of Sandia's Integrated Stockpile Evaluation Group. The complaint alleged that Sandia diverted equipment to other programs and failed to fund preventive maintenance for WETL. Because WETL tests are important to ensuring that the Nation's stockpile is safe and reliable, our audit objective was to determine whether Sandia effectively managed WETL.

RESULTS OF AUDIT

We did not substantiate the allegation that Sandia diverted equipment to other programs. Because the allegation contained no specifics, we focused our review on equipment in the year that the complaint was received. Specifically, we verified that all FY 2013 equipment purchases over \$25,000 and most purchases of sensitive items (cell phones and computing assets) were reflected in the WETL property list. In addition, an FY 2015 wall-to-wall property inventory

performed by Sandia every 4 years found no missing items purchased for WETL in FY 2013. Furthermore, we interviewed all WETL technologists on staff for August and October 2015, and the technologists indicated no concerns regarding equipment diversion.

Although some officials expressed concern to us about the adverse impact of constrained budgets on maintenance, we did not identify specific instances where Sandia failed to fund maintenance at WETL. We were unable to determine the sufficiency of preventive maintenance funding because maintenance work at WETL is charged to labor, and the centrifuges did not have defined preventive maintenance requirements for the structural condition of the centrifuges until March 2016. Although the custom-made centrifuges are the most used equipment at WETL, Sandia does not have a defined maintenance budget for WETL. Instead, the WETL operations budget is segregated into labor and other direct charges, such as purchases and travel. We noted that the WETL operations budget had decreased by about \$.5 million from \$4.3 million in FY 2012 to \$3.8 million in FY 2015. A Sandia official informed us that, due to competing priorities and limited funding, Sandia weighed the execution of mission-related testing in the short run against the long term risks of not maintaining equipment. Therefore, we were unable to substantiate the allegation because Sandia lacked a preventive maintenance budget and defined preventive maintenance requirements for WETL.

However, we found that Sandia had not met NNSA's expectations for laboratory testing at WETL. Our review disclosed that Sandia experienced delays in executing baselined¹ laboratory tests. Although Sandia completed 98 tests overall, it completed only 88 of 107 (82 percent) baselined laboratory tests during FYs 2013 through 2015. In particular, we determined that Sandia had not completed all baselined tests for four of the eight weapons systems. For example, Sandia completed only 8 of 14 (57 percent) laboratory tests for the W80. The testing delays were due primarily to significant unplanned downtime of WETL testing equipment in FYs 2014 and 2015. Specifically, one of WETL's large centrifuges was inoperable due to noise and vibration issues, followed by an unrelated fire in the drive system. This large centrifuge was not used for testing for nearly 2 years.

We did not identify a connection between the centrifuge vibration issues and preventive maintenance. Although Sandia did not have defined preventive maintenance requirements for the structural condition of the centrifuges, the centrifuge operating and maintenance instructions included calibration and visual inspections of the arm and concrete structure. Vibration studies to determine the structural condition of the centrifuges were established in March 2016. A Sandia official informed us that, while Sandia determined that the root cause of the centrifuge vibration issues was due to the metal deterioration of the arm, its investigation of the long-term/aging failure mechanisms for the centrifuge is still ongoing.

While the centrifuge outage was the primary factor for the delays in executing tests, we noted that laboratory testing was also affected by Sandia implementing a new safety initiative. We also identified opportunities for NNSA to improve its communication of baseline change control requirements for the laboratory testing program.

¹The testing baseline is the quantity of laboratory tests performed on weapon systems (such as W80) as agreed upon by NNSA and Sandia to be executed with a given level of program funding.

Laboratory Tests

Sandia experienced delays in executing baselined laboratory tests at WETL. We noted that in FY 2013, WETL changed from a 12-month testing cycle to an 18-month testing cycle to save on set up costs in response to budget constraints. Although the required number of laboratory tests for a particular weapon system would not be conducted in 1 out of every 3 years, the total number of tests performed would be the same over a 3-year period under the 18-month testing cycle. Under the 18-month testing cycle, WETL completed 98 laboratory tests, including 88 of 107 (82 percent) baselined tests during FYs 2013 through 2015. However, while laboratory test completions met (W76-0 and B83) or exceeded (W76-1 and W87) baselined quantities for some weapon systems, we determined that all baselined laboratory tests for four of the eight weapon systems had not been completed.

WEAPON SYSTEM	BASELINED	COMPLETED	BASELINED NOT COMPLETED
B61	15	12	3 (20 percent)
W76-0	20	20	
W76-1	23	25	
W78	13	9	4 (31 percent)
W80	14	8	6 (43 percent)
B83	4	4	
W87	5	13	
W88	13	7	6 (46 percent)
Total	107	98	19

The testing delays created a backlog in WETL's test schedules. Sandia maintains a list of specific units from various weapon system cycles that have been selected for laboratory testing in a given year but have not been completed. As of January 2016, Sandia had identified a backlog of 17 tests that had been delayed due to the centrifuge outage and budget constraints. We noted that the number of tests in the backlog did not correspond with the number of baselined tests that had not been completed (see previous table). A Sandia official explained that this was due to factors such as timing differences associated with the 18-month testing cycle and selected backlog tests that were not incorporated into Sandia's official baseline for a particular fiscal year. As of September 2016, Sandia had identified that there was still a backlog of 10 tests.

Equipment Downtime

Unplanned downtime for the testing equipment at WETL created major disruptions to testing operations and contributed, in large part, to the failure to meet baseline testing goals. WETL equipment experienced a significant amount of unplanned downtime during FYs 2014 and 2015, far exceeding Sandia's unplanned downtime goal of less than 10 percent.

FISCAL YEARS	HOURS OF UNPLANNED EQUIPMENT DOWNTIME	HOURS OF OPERATION	PERCENTAGE OF UNPLANNED DOWNTIME	UNPLANNED DOWNTIME GOAL
FY 2014	2,104	6,670	32 percent	< 10 percent
FY 2015	1,965	6,605	30 percent	< 10 percent

The primary factor contributing to the unplanned equipment downtime was a nearly 2-year outage of the large centrifuge dedicated to testing Navy weapon systems. The outage was due to noise and vibration issues, followed by an unrelated fire in the drive system. The Navy centrifuge and a centrifuge dedicated to Air Force systems are the most used test equipment at WETL because every system component or assembly is exposed to environments that simulate the launch and reentry conditions during the testing process. According to Sandia officials, the two large centrifuges are custom made and were designed in the 1990s specifically for Sandia. Due to the uniqueness of the centrifuges, Sandia officials told us that the potential failure mechanisms to support long-term planning have yet to be determined.

The WETL equipment downtime delayed testing operations. In October 2013, the Navy centrifuge developed unacceptable noise and vibration issues that led to Sandia shutting it down for investigation. Then in May 2014, a fire occurred in the drive unit of the centrifuge, further contributing to equipment downtime. Sandia repaired the centrifuge by stiffening the arm to control the vibration and replaced the drive unit. Sandia tested the Navy weapon systems using the operable Air Force centrifuge. A Sandia official informed us that, after being shut down for nearly 2 years, testing on the centrifuge resumed in September 2015. As of September 2016, Sandia's investigation of the long-term/aging failure mechanisms for the centrifuge was still ongoing.

In addition, Sandia's actions to consolidate explosives operations have affected testing at WETL. In an effort to improve safety, in October 2014, Sandia implemented the Explosive Consolidation Initiative (ECI), which delayed testing at WETL by limiting the staff authorized to handle explosives and requiring prior approval before conducting explosives operations. To mitigate testing schedule effects, Sandia performed W87 tests instead of W78 tests and, in October 2015, designated certain WETL staff to perform explosive handling operations.

Communication of Baseline Change Control Requirements

While the centrifuge outage and implementing ECI contributed to testing delays, we noted that NNSA could improve communicating baseline change control requirements for laboratory testing. In particular, we noted that NNSA had not clearly communicated its expectations for baseline change control to Sandia. Sandia officials stated that they relied on verbal agreements and discussions with various NNSA officials to communicate Sandia's decision to test W87 instead of W78 in July 2015. A Sandia official explained that this change to the baseline test schedule was because of ECI and the complexity of tests associated with W78's large amount of explosives. However, the NNSA officials responsible for the W78 program stated that they were not informed of this baseline change until late in the fiscal year, when Sandia decided in July 2015 to test W87 instead of W78. In our view, obtaining timely approval through the change control process is critical to mitigating laboratory test schedule effects, as it describes the impact to milestones and changes to deliverables.

When we discussed the baseline change control requirements with NNSA and Sandia officials, there were inconsistencies regarding their understanding of the baseline change control requirements. While NNSA has an example of a change request form in the Requirements Modernization and Integration (RMI) “Tool” document (T081, *Programmatic Change Control*), a Sandia official believed that NNSA did not require use of the RMI Tool documents. Sandia Field Office officials stated that T081 was required, but acknowledged that there needed to be more clarity and better communication of NNSA’s expectations regarding change control. According to NNSA, use of the T081 Tool became effective on July 1, 2016, during our audit fieldwork. Specifically, R008 – *Portfolio-Program-Project Management* now mandates that the program-project team must document changes “per T081,” with T081 specifying the minimal elements that are required to be included in a change request. Office of Nuclear Weapons Stockpile (NA-122) officials stated that Sandia must have a defensible rationale for whatever mechanism it chooses to use to initiate review and approval by NNSA stakeholders for its change control needs.

Implications

The efficient execution of WETL laboratory tests is critical to identifying stockpile defects in a timely manner to maintain a safe, secure, and reliable nuclear weapons stockpile. Although Sandia anticipates that it will eliminate the WETL test backlog by April 2017, because of the age and uniqueness of the centrifuges, we believe there is an increased risk of further operational delays and unplanned equipment outages.

RECOMMENDATION

To help improve the WETL Laboratory Testing Program, we recommend that the Deputy Director, Office of Nuclear Weapons Stockpile, NNSA, ensure that:

1. NNSA clearly communicates and fully implements its formal baseline change control process requirements to ensure consistency and transparency of surveillance testing.

MANAGEMENT RESPONSE

Management concurred with the report recommendation and stated that NNSA has already taken several actions to address the intent of the recommendation, including clarifying key definitions and developing a single change control approval form that clearly communicates the disposition of each change request. NNSA also provided interim guidance to sites on implementing New Material and Stockpile Evaluation Program requirements, which became effective July 1, 2016. Final guidance is estimated to be complete by January 31, 2017.

AUDITOR COMMENTS

We consider management’s comments and planned corrective action to be responsive to our findings and recommendation. Management’s formal comments are included in Attachment 3.

Attachments

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

OBJECTIVE, SCOPE, AND METHODOLOGY

OBJECTIVE

We conducted this audit to determine whether Sandia National Laboratories effectively managed the Weapons Evaluation Test Laboratory.

SCOPE

This audit was performed from July 2015 through January 2017 at the National Nuclear Security Administration (NNSA) Albuquerque Complex and Sandia National Laboratories (Sandia) located in Albuquerque, New Mexico, and the Weapons Evaluation Test Laboratory (WETL) in Amarillo, Texas. The scope of the audit included the management and operations of the WETL laboratory test program during fiscal years 2012 through 2015. The audit was conducted under Office of Audits General project number A15AL047.

METHODOLOGY

To accomplish the audit objective, we:

- Reviewed applicable laws and regulations, and Department of Energy policies related to surveillance and laboratory testing at the WETL facility;
- Reviewed and analyzed Sandia's laboratory testing schedules and completions for WETL;
- Evaluated equipment use and downtime;
- Analyzed equipment maintenance and upgrade plans;
- Reviewed contingency and recovery plans to mitigate test delays due to equipment issues and the test backlog;
- Toured the WETL test facility; and
- Interviewed key NNSA and Sandia personnel.

We conducted this performance audit in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective. The audit included tests of controls and compliance with laws and regulations to the extent necessary to satisfy the objective. We assessed the implementation of the *GPRA Modernization Act of 2010* as necessary to accomplish the objective, and determined that performance measures related to surveillance testing were established. 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. Finally, we relied on computer-processed data on a limited basis to achieve our audit objective. NNSA and Sandia officials provided documents that were generated from reporting systems and we found the data to be sufficiently reliable for the purposes of this audit.

Management waived an exit conference on December 14, 2016.

PRIOR REPORT

Audit Report for the [*Follow-up Audit of the Stockpile Surveillance Program*](#) (OAS-L-12-10, September 2012). The Office of Inspector General reported that although the National Nuclear Security Administration (NNSA) mitigated transition challenges related to the Surveillance Transformation Project (STP), it had not established an effective system of performance measurement over the Enhanced Surveillance subprogram. NNSA initiated the STP to accelerate the surveillance program to look for changes in an aging stockpile. The audit found that NNSA measured performance according to the percentage of budget spent, rather than on actual program accomplishments. After discussing the performance measurement concerns with NNSA officials, NNSA replaced the measure with one that more accurately reflected performance. Because the audit disclosed that NNSA had taken actions in mitigating the STP transition challenges, there were no formal recommendations.

MANAGEMENT COMMENTS



Department of Energy
Under Secretary for Nuclear Security
Administrator, National Nuclear Security Administration
Washington, DC 20585



December 8, 2016

MEMORANDUM FOR RICKEY R. HASS
ACTING INSPECTOR GENERAL

FROM: FRANK G. KLOTZ *FKey*

SUBJECT: Comments on the Office of Inspector General Draft Report *The National Nuclear Security Administration's Weapons Evaluation Test Laboratory* (2015-01464/A15AL047)

Thank you for the opportunity to review and comment on the subject draft report. We appreciate the Office of Inspector General's independent review of allegations, which were found to be unsubstantiated, that Sandia's Integrated Stockpile Evaluation Group diverted equipment to other programs and failed to adequately fund preventive maintenance at the Weapons Evaluation Test Laboratory (WETL). The report also highlights the importance of the WETL missions and some of the complex challenges that impacted the baseline testing schedules.

The National Nuclear Security Administration (NNSA) concurs with the auditors' recommendation to more fully implement and communicate our formal baseline change control requirements to facilitate greater consistency and transparency of our testing activities. We have already taken several actions to address the intent of the recommendation, including clarifying key definitions and developing a single change control approval form that clearly communicates the disposition of each change request. NNSA has also provided interim guidance to sites on implementing *New Material and Stockpile Evaluation Program* requirements, which became effective July 1, 2016. Final guidance is estimated to be complete by January 31, 2017.

Technical and general comments to enhance the clarity and factual accuracy of the report have been provided for your consideration under separate cover. If you have any questions regarding this response, please contact Mr. Dean Childs, Director, Audits and Internal Affairs, at (301) 903-1341.



FEEDBACK

The Office of Inspector General has a continuing interest in improving the usefulness of its products. We aim to make our reports as responsive as possible and ask you to consider sharing your thoughts with us.

Please send your comments, suggestions, and feedback to OIG.Reports@hq.doe.gov and include your name, contact information, and the report number. Comments may also be mailed to:

Office of Inspector General (IG-12)
Department of Energy
Washington, DC 20585

If you want to discuss this report or your comments with a member of the Office of Inspector General staff, please contact our office at (202) 253-2162.