



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

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# AUDIT REPORT

National Nuclear Security Administration's  
Space-Based Nuclear Detonation Detection  
Program

OAS-L-14-09

July 2014

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**Department of Energy**  
Washington, DC 20585

July 28, 2014

MEMORANDUM FOR THE DEPUTY ADMINISTRATOR FOR DEFENSE NUCLEAR  
NONPROLIFERATION

*George W. Collard*

FROM: George W. Collard  
Assistant Inspector General  
for Audits  
Office of Inspector General

SUBJECT: INFORMATION: Audit Report on "National Nuclear Security  
Administration's Space-Based Nuclear Detonation Detection Program"

BACKGROUND

The National Nuclear Security Administration's (NNSA) Office of Defense Nuclear Nonproliferation Research and Development manages the Nuclear Detonation Detection (NDD) Program. The mission of the NDD program is to develop, demonstrate and deliver technologies to detect worldwide nuclear detonations. NDD efforts are aligned along three functional areas: space-based; ground-based; and nuclear forensics. NNSA dedicated nearly \$300 million in Fiscal Years 2011 through 2013, to the Space-Based NDD (SNDD) Program to supply detection sensor payloads and provide on-orbit operational support to meet interagency commitments for the United States NDD System which serves two broad classes of missions: treaty monitoring and war fighting.

NNSA agreed to produce eight Global Burst Detector (GBD) payloads for Global Positioning System (GPS) III satellites and provide them as Government-furnished equipment to the Air Force Space and Missile Systems Center (Air Force), which is the organization responsible for the acquisition of GPS III satellites. Sandia National Laboratories (SNL) and Los Alamos National Laboratory (LANL) are primarily responsible for the development and production of the sensor payloads. SNL is the main integrator for the GBD payloads and produces three of the major components. LANL produces two additional components and provides them to SNL for integration. The payloads are to be delivered by specified dates to the Air Force for inclusion onto the GPS satellites. As of June 2014, NNSA had delivered two of the eight GBD payloads to the Air Force and SNL and LANL were working on the third.

Because of the importance of the SNDD mission, we initiated an audit to determine whether NNSA has effectively managed the Program to meet customer needs.

RESULTS OF AUDIT

NNSA could not ensure, and we could not independently validate, whether it will fully meet customer needs within the SNDD Program budget. In particular, despite SNL and LANL officials' assertions that the remaining GBD payloads could be delivered on time, we could not

validate whether the delivery dates could be met within the budget due to a lack of cost and schedule data for the project. While not specifically required because of the nature of the effort, we noted SNL and LANL had not utilized key project management tools such as those contained in Department of Energy (Department) Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, to manage the SNDD program. Broadening requirements to use these project management principles has the potential to improve NNSA's monitoring of the efficiency and effectiveness of the program to ensure that decisions are based on the best available data.

To its credit, in response to our concerns, NNSA management officials agreed with the need to utilize additional project management techniques and stated that they planned to implement an integrated systems engineering function for the SNDD program. For instance, management will require a more detailed work breakdown structure, synchronize resource-loaded schedules and improve the rigor of data presented at quarterly program management reviews.

### **Nuclear Detonation Detection Sensor Payloads**

We could not validate whether SNL and LANL could meet the payload delivery dates within the budget due to a lack of cost and schedule data. SNL and LANL officials asserted that a significant reduction in the Fiscal Year 2013 budget had forced them to make difficult decisions concerning prioritization that led to the planned delay of GBD production-related activities. Specifically, in July 2013, SNL and LANL anticipated delivering the third GBD payload late and might not be able to deliver the fourth, sixth, and eighth payloads for the GPS III satellites at all because they could not procure long-lead parts and recruit expertise in time to complete the payloads by the Air Force need dates. In February 2014, officials at SNL and LANL told us that all of the remaining GBD payloads will now be delivered on time because they expected the Air Force to extend the delivery dates for the remaining payloads and Fiscal Year 2014 budgets to increase.

However, we found that NNSA could not provide information to support its contention that the schedule for planned payload deliveries would be extended nor could it show how planned resources and budgets were adequate to meet the scheduled deliverables. When queried, Air Force officials told us that they also could not confirm NNSA's assumption that the need dates for the fourth, sixth and eighth payloads would change. Further, neither NNSA nor SNL and LANL had developed cost and schedule data to support the projected on-time deliveries of the payloads. In fact, when we asked for such cost and schedule data, a SNL official stated that such data had not been developed. Finally, NNSA and the laboratories were unable to provide information on the cost to produce each of the two delivered payloads because they do not track costs by payload.

### **Project Management Principles**

Cost and schedule data to support on-time deliveries was unavailable because SNL and LANL had not, in our view, adopted sufficient project management controls for the SNDD program. Rather, NNSA and contractor program officials stated that the SNDD program was managed to ensure the payloads would perform to established technical specifications. While we recognize the importance of meeting technical specifications, it is also important that management employ sound project management practices to measure cost and schedule performance. These tools,

while they may initially add to SNDD program costs, would enhance management's ability to recognize issues and permit them to take corrective actions to ultimately reduce costs and improve schedule performance when necessary. In fact, while an NNSA Office of Acquisition and Project Management official believed that the intent of Department Order 413.3B application was limited to capital construction projects, the official agreed that the SNDD program should implement project management principles such as those outlined in Department Order 413.3B due to the importance and cost of the payloads.

The following project management tools, tailored for the size and complexity of the project, could improve overall management of the effort:

- An approved performance baseline with the project cost and key milestones and completion dates when the payload design is mature, as well as an appropriate change control process to manage changes to the performance baselines. We noted that SNL and LANL did not establish performance baselines that included the project cost, key milestones and completion dates for measurement of project performance.
- A work breakdown structure that organizes and defines a project into manageable objectives and steps leading to the completion of a project and is used to derive the cost baseline. We noted that LANL did not have a work breakdown structure and SNL's work breakdown structure was not in sufficient detail to be able to track and measure cost performance for an individual payload.
- A critical path analysis showing the schedule for the key work elements necessary to complete a project on time. SNL and LANL had not established critical paths for the project. SNL and LANL had reported to NNSA in July 2013 that they anticipated delivering the third GBD payload late and might not be able to deliver the fourth, sixth, and eighth payloads for the GPS III satellites at all, in part, because they could not procure long-lead parts. The laboratories lacked a critical path analysis to show the impact of anticipated delays in long-lead procurements on the overall delivery schedule.
- A resource-loaded schedule showing the resources needed to complete a project as scheduled. At a minimum, the resource-loaded schedule must contain labor, material and equipment costs. We noted that LANL had not developed a resource-loaded schedule and SNL's resource-loaded schedule did not always contain all labor and equipment costs. A SNL official stated that the component managers have the option to populate the resource-loaded schedule with labor and equipment costs or not. We noted that several managers did not populate the resource-loaded schedule with this information. Such information is needed to ensure that planned resources are commensurate with delivering the payloads as scheduled.
- An Earned Value Management System (EVMS) for cost variance analysis and to support project risk management and decision making. The EVMS uses the project baseline as the benchmark to monitor project and contract performance. Although both SNL and LANL have a site-wide EVMS, the NDD programs at these sites chose not to utilize the existing EVMS systems as a tool to monitor and measure project performance.

## **Mission and Program Management Impacts**

Without timely delivery of the GBD payloads, the nation's capability to detect nuclear detonations from orbiting satellites may be jeopardized. The Department's failure to meet critical milestones may require the Air Force to fabricate mass simulators that provide the necessary weight and power balance to allow the satellite to function without the GBD payloads. Furthermore, the failure to apply project management principles prevents NNSA from monitoring the efficiency and effectiveness of its contractors' performance in delivering individual sensor payloads and may hinder its ability to make informed decisions regarding the direction of the SNDD program in the future. This is significant because the current economic climate and associated Federal budgetary concerns dictate finding ways to improve efficiency and reduce the cost of agency operations.

To their credit, SNL and LANL are committed to producing reliable, high quality GBD payloads that meet United States NDD System operational requirements. For instance, SNL had adopted an aerospace industry standardized quality management system for its SNDD program. SNL officials informed us that they were certified under the international AS9100c, quality management standards. Additionally, LANL is introducing each project lead to its quality assurance plan, which is based on Department Order 414.1D, *Quality Assurance*, criteria, and is ensuring that training for critical skills is properly tracked. Furthermore, we noted no material exceptions in our review of SNL and LANL technical requirement validation tests.

### SUGGESTED ACTION

NNSA is aware of the lack of project management principles utilization in managing the SNDD Program and plans to take action to address the situation such as requiring a more detailed work breakdown structure and synchronizing the resource-loaded schedules. Therefore, we are not making any formal recommendations. However, we suggest that the Deputy Administrator for Defense Nuclear Nonproliferation, National Nuclear Security Administration, ensure that the Space-Based Nuclear Detonation Detection Program Manager, in coordination with the National Nuclear Security Administration's Office of Acquisition and Project Management, incorporate project management principles such as those outlined in Department Order 413.3B into the SNDD Program, as appropriate.

We appreciated the cooperation of your staff that provided information and assistance during the audit.

Attachment

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

## OBJECTIVE, SCOPE AND METHODOLOGY

### OBJECTIVE

The objective of this audit was to determine whether the National Nuclear Security Administration (NNSA) has effectively managed the Space-Based Nuclear Detonation Detection (SNDD) program to meet customer needs.

### SCOPE

We performed this audit from June 2013 to July 2014, at NNSA Headquarters in Washington, DC; Sandia National Laboratories in Albuquerque, New Mexico; Los Alamos National Laboratory in Los Alamos, New Mexico; Lawrence Livermore National Laboratory in Livermore, California; and the Air Force Space and Missile Systems Center in Los Angeles, California. The audit was conducted under Office of Inspector General Project Number A13LL041.

### METHODOLOGY

To accomplish the objective, we:

- Reviewed Department of Energy guidance for program and project management controls;
- Reviewed SNDD life cycle plans, program management reviews, internal reviews and risk assessments, as well as resource-loaded schedule and work breakdown structure;
- Interviewed key Federal and contractor personnel associated with the SNDD Program;
- Interviewed key Air Force personnel associated with integrating Global Burst Detector payloads onto satellite platforms;
- Toured SNDD program facilities at Sandia National Laboratories and Los Alamos National Laboratory to include design, production and assembly areas as well as component storage facilities; and
- Tested a sample of technical requirement verification processes.

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 that 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 necessary to satisfy the audit objective. We also assessed compliance with the *GPRA Modernization Act of 2010*. In particular, we determined that performance measures related to the SNDD program were established as required. Because our review was limited, it would not have necessarily disclosed all internal control deficiencies that may have existed at the time of our audit. We did not rely on computer-generated data to satisfy our objective. Management waived an exit conference.

## **FEEDBACK**

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