U.S. Department of Energy
Office of Inspector General
Office of Audit Services

Audit Report

The National Nuclear Security Administration's Enhanced Surveillance Campaign

DOE/IG-0646

April 2004

Department of Energy
Washington, DC 20585

April 14, 2004

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman
Inspector General

SUBJECT: INFORMATION: Audit Report on "The National Nuclear Security Administration's Enhanced Surveillance Campaign"

BACKGROUND

The goal of the National Nuclear Security Administration's (NNSA) Enhanced Surveillance Campaign is to provide advance warning of manufacturing and aging defects that could affect the nuclear weapons stockpile. Operating as intended, enhanced surveillance allows NNSA to refurbish weapons before safety, reliability, or performance is impaired. The program involves investigating changes in the atomic properties of weapons materials and anticipating the impact such changes will have on weapon performance. The tools, methods, and technologies are designed to assist in making stockpile life-extension decisions, determining when or if a new pit facility should be built, and annually certifying the stockpile to the President. If this campaign does not succeed, NNSA may not be prepared to repair a weapon system that has experienced an age-related defect.

Work conducted in the Enhanced Surveillance Campaign is divided into six major technical elements: pits, canned sub-assemblies/cases, high explosives, systems, non-nuclear components, and non-nuclear materials. These materials and components have the highest risk of impacting weapon safety, reliability, or performance due to aging. To achieve the program goal, NNSA establishes milestones and deliverables annually for each of the six elements. About $91 million has been budgeted for these efforts in Fiscal Year 2004. The objective of the audit was to determine whether the milestones designed to achieve the program goal were being met.

RESULTS OF AUDIT

Using NNSA's own schedule as our baseline, the review disclosed that NNSA experienced delays in completing certain Enhanced Surveillance Campaign milestones and is at risk of missing some future milestones. At the time of our review, Los Alamos and Lawrence Livermore National Laboratories and the Pantex Plant had not completed critical work as scheduled in four of the six major technical elements: pits, canned sub-assemblies, high explosives, and non-nuclear materials. The delays, some for as long as 23 months, were due primarily to weaknesses in project planning. For example, Los Alamos, Livermore, and Pantex had not adequately planned for unexpected events that arose such as: safety basis documents which required updating and other improvements; essential facilities which were

found to be unavailable when needed; critical equipment failure; and a lack of necessary weapons parts. In our judgment, the operational delays at Los Alamos, Livermore, and Pantex may deprive NNSA of the information it needs to make informed decisions on such topics as weapon refurbishment schedules and building a new pit facility.

Management expressed the view that key milestones were not in jeopardy, but acknowledged that there were many challenges facing the campaign including funding, competing priorities, and retention of personnel. As noted in our report and as recognized by senior NNSA officials, some of the milestones that are in doubt are among the most critical to the overall success of the Enhanced Surveillance Campaign. NNSA has studied ways to improve its management of projects to ensure work is accomplished on schedule and within budget. In March 2003, NNSA issued a report on *Recommendations for a Defense Program Core Planning Document Structure*. Although the issuance of the document is a positive step forward, further improvements in project planning are needed. This audit report includes recommendations intended to enhance the effectiveness of the Enhanced Surveillance Campaign.

The Office of Inspector General has previously reported on challenges facing the Department regarding the reliability of the stockpile. Similar to problems observed during the current audit, our report on *Stockpile Surveillance Testing* (DOE/IG-0528, October 2001) found that the Department lacked essential information on the operating characteristics and reliability of the weapons due to delays in flight, laboratory, and component surveillance testing.

MANAGEMENT REACTION

NNSA generally concurred with the findings and recommendations regarding the delays in completing Enhanced Surveillance Campaign milestones but did not agree that they are at risk of missing future milestones critical to the success of the campaign. NNSA believes that the highest level milestones are being achieved on schedule. Nevertheless, NNSA has begun to implement corrective actions and is developing an action plan that will address the recommendations. Management comments are summarized beginning on page 5 and are included in their entirety as Appendix 3.

Attachment

cc: Deputy Secretary
Administrator, National Nuclear Security Administration

THE NATIONAL NUCLEAR SECURITY ADMINISTRATION'S ENHANCED SURVEILLANCE CAMPAIGN

TABLE OF CONTENTS

MEETING ENHANCED SURVEILLANCE CAMPAIGN MILESTONES

Background

Annually, the National Nuclear Security Administration (NNSA) publishes an Enhanced Surveillance Campaign Implementation Plan that provides a description of the work that the national laboratories, production plants, and sites are to accomplish during the fiscal year. Additionally, the implementation plan includes a series of long and short-term milestones to be completed for each of the six major technical elements (MTE). At the site level, task plans have been developed delineating the work required to meet these milestones. These cascading plans become the benchmark against which progress on the program is measured.

Meeting Implementation Plan Milestones

NNSA has experienced delays in completing several Enhanced Surveillance Campaign milestones. Specifically, critical work was not completed as scheduled in four of the six MTEs: pits, canned sub-assemblies, high explosives, and non-nuclear materials. These delays have put some future milestones in jeopardy.

Pits

Both Los Alamos National Laboratory (Los Alamos) and Livermore National Laboratory (Livermore), and the Pantex Plant experienced delays in completing two of four pit MTE milestones. For instance, Los Alamos and Livermore experienced 19 and 23-month delays, respectively, in completing a milestone to prepare plutonium-spiked alloys. These alloys are to be used in accelerated aging tests, which will allow for a more precise estimate of the lifetime of existing pits. The delays, in turn, could impact the timely completion of the Fiscal Year (FY) 2004 milestone to compare the accelerated aging alloys to naturally aged stockpile material. Achieving this milestone is particularly important because an FY 2006 milestone regarding construction of the modern pit facility may be impacted by the results of these tests.

Management did not agree with our conclusion that delays in preparing the plutonium-spiked alloy could negatively impact the timely completion of the related FY 2004 milestone. Management advised that the previous delay to prepare plutonium-spiked alloys had been addressed in Los Alamos and Livermore planning and they did not expect any impact on meeting the current FY 2004 higher level milestones.

Although NNSA expects to meet the FY 2004 milestone, we noted that Los Alamos and Livermore had previously experienced significant delays in completing the milestone to cast the alloy.

The initial alloy was rejected because it did not meet all the required specifications. The alloy eventually cast also did not meet the exact specifications of that used to manufacture the naturally aged pit. If, during the validation period, the pit materials do not favorably compare, no contingency remains to resolve discrepancies. This could impact successful completion of future milestones.

Similarly, a Livermore and Pantex milestone to begin high-resolution x-ray tomography of pits at Pantex has been delayed by approximately 13 months, from November 2003 to January 2005. The x-ray tomography is intended to take a closer look at the internal structure of the pit and provide the capability to magnify defects or anomalies that may not be detected by current technology. NNSA is moving forward with efforts to incorporate the high-resolution pit x-ray into the stockpile surveillance program at Pantex to facilitate non-destructive analysis of pits. Although the existing pit surveillance program continues, missing this milestone delays the program's ability to enhance detection of defects or anomalies.

Canned Sub-Assemblies

During FY 2002, NNSA missed one of five milestones related to canned sub-assemblies. The purpose of the canned sub-assembly MTE is to determine when key components need to be replaced. Both Los Alamos and Livermore were tasked to validate 3-dimensional models for canned sub-assembly aging. While Los Alamos completed the milestone as scheduled for its weapon systems, Livermore reduced the scope of its model from 3-dimension to a simpler model. A Livermore official acknowledged that since the down scoped model did not provide the level of complexity originally planned, the 3-dimensional model may have to be constructed at a later date for other weapon systems.

High Explosives

During FY 2002, NNSA missed one of two FY 2002 high explosive milestones. The high explosive MTE is critical to the life-extension program because it provides additional diagnostics to the stockpile surveillance program. Both Los Alamos and Pantex missed completing milestones related to function test designs covering two weapon systems. This could delay the development and implementation of more comprehensive diagnostic tools for stockpile surveillance testing, originally scheduled for FY 2005.

Both Los Alamos and Pantex advised that steps have been taken to continue the project without further delay. They acknowledged the technical risk associated with the development of this diagnostic and that, so far, the risk has not precluded successful implementation on schedule. Given the lack of specific project management schedules or analyses of delays, we were unable to evaluate whether management's actions were sufficient to recover previous slippages.

Non-Nuclear Materials

NNSA missed one of ten milestones in the non-nuclear materials MTE. Specifically, Livermore missed a FY 2003 milestone to deliver a Solid Phase Micro Extraction (SPME) diagnostic to the stockpile surveillance program. This diagnostic would aid in determining the effects of aging on non-nuclear materials. Because the milestone was missed, Pantex will experience a delay of approximately 12 months in implementing the SPME into the stockpile surveillance program. As a result, aging defects may go undetected for at least one cycle — typically 12 months — of stockpile surveillance testing.

Project Planning

Critical work was not completed as scheduled because, at the site level, NNSA had not effectively applied project management planning principles or incorporated sufficient contingencies into implementation plans. For example, project plans had not included sufficient time or resources to deal with unexpected events that arose such as: inadequate safety basis documents; unavailable facilities; equipment failure; or lack of necessary weapons parts.

To illustrate, Los Alamos encountered delays in the pit MTE because laboratory officials did not anticipate the need to update existing safety basis documents. For example, under the existing safety basis documents, the material involved in preparing the spiked alloy was not authorized in the facility they had planned to use. Similarly, Livermore did not foresee the need for updated safety basis documents to complete the same milestone. Livermore also did not allow for the possibility that a needed facility would be unavailable or that equipment at Pantex would fail. In this instance, the facility required to carry out activities associated with this milestone was not available when needed. Had Livermore adequately prepared for this and other contingencies, it may have been able to mitigate delays encountered in the non-nuclear materials MTE (i.e., delivery of a Solid Phase Micro Extraction diagnostic to the stockpile surveillance program). Further, Los Alamos and Pantex experienced delays in the high explosive MTE because neither site had an alternative source in place to obtain the necessary classified parts that had become unavailable.

Management commented that while safety basis issues did delay work on pit milestones, they were not ignored by the sites in the project planning phase. The schedules at the sites were aggressive and success-oriented and, admittedly, allowed little variance in timelines to meet difficult and evolving challenges that are often beyond the control of the Enhanced Surveillance Campaign project manager at the site. While seeking to shorten schedules and to attain aggressive goals is commendable, reasonable contingency planning is still a basic requirement for all well-managed projects.

We learned that, starting in FY 2004, NNSA contractors will no longer be required to report milestone progress at the detailed task level, which may also impact project management. Under the new reporting process, contractors will report progress on the higher level implementation plan milestones. Without cost, status, and control information at the detailed task level management may be unable to effectively monitor status or progress to completion.

NNSA commented that project and program managers have access to all levels of detail but that control is maintained at the highest level milestones in Headquarters. However, we noted during the audit that, due to budgetary constraints, the number of managers dedicated to the Enhanced Surveillance Campaign at Headquarters was limited.

To its credit, one of the sites we reviewed had implemented a formal project management system for its Enhanced Surveillance Campaign projects. Pantex uses the Primavera Project Management tool to manage tasks received from the laboratories. This tool allows managers to establish relationships among activities in separate projects, compare actual performance to original plans, improve processes, and increase accuracy of future estimates. It also aids in project planning by, among other things, analyzing "what-if" alternatives and target plans.

Key Decisions and the Annual Certification

While we recognize the priority that NNSA management has placed on the overall stockpile stewardship program, failure to complete critical enhanced surveillance milestones as scheduled could delay warnings of manufacturing and aging defects, impact the annual certification of the nuclear weapons stockpile, and hinder facility planning decisions. The viability of the nuclear weapons stockpile depends upon timely notification of problems so that weapon components can be replaced or systems refurbished before safety, reliability, or performance are adversely affected.

RECOMMENDATIONS

We recommend that the Deputy Administrator for Defense Programs:

1. Implement an effective project management system for planning, organizing, and tracking Enhanced Surveillance Campaign activities and costs;

2. Assess the impact that known delays will have on future Enhanced Surveillance Campaign milestones and develop a recovery plan and strategy to mitigate their impact; and,

3. Ensure that approved safety basis documents, facilities, equipment, parts, and other infrastructure and resource requirements are considered when planning future Enhanced Surveillance Campaign tasks.

MANAGEMENT REACTION

In management's response, which is included as Appendix 3, the Associate Administrator for Management and Administration generally concurred with the findings and recommendations regarding delays in completing Enhanced Surveillance Campaign milestones and stated that a tentative corrective action plan had been developed. However, NNSA did not agree that it is at risk of missing future milestones critical to the success of the Enhanced Surveillance campaign and indicated that the most significant milestones are being achieved on schedule.

The Associate Administrator for Management and Administration also provided a number of technical comments intended to clarify various issues raised in the report. These comments have been incorporated into the body of report, where appropriate.

AUDITOR COMMENTS

The actions taken are responsive to the audit report recommendations and should resolve the majority of issues raised in the report. However, despite the assertion that the most significant milestones are being achieved on schedule, NNSA, as the audit report notes, does not currently have in place a fully effective project management system.

This system should include, among other elements, a critical path analysis which clearly identifies crucial elements of the Campaign and the consequences of not meeting specific scheduled milestones. It should be further noted that most of the milestones, referred to in management comments, have not come due. As a consequence, neither NNSA nor the Office of Inspector General, at this time, can make a definitive determination as to the status of the Campaign.

Appendix 1

OBJECTIVE

The object of the audit was to determine whether milestones designed to achieve the program goal were being met.

SCOPE

The audit was performed between June 2003 and December 2003 at Headquarters NNSA, Los Alamos National Laboratory; Lawrence Livermore National Laboratory; Sandia National Laboratory-California; and the Pantex Plant. The audit examined NNSA's progress in meeting the goal of the Enhanced Surveillance Campaign.

METHODOLOGY

To accomplish the audit objective we:

- Reviewed Federal and Departmental requirements related to the conduct of enhanced surveillance activities;
- Evaluated prior external and internal reports regarding the program;
- Analyzed the Enhanced Surveillance Campaign budget;
- Evaluated the Enhanced Surveillance Campaign implementation and site task plans;
- Reviewed laboratory and plant quarterly updates to management;
- Evaluated whether the laboratories and plants were meeting scheduled milestones;
- Discussed the Enhanced Surveillance Campaign with officials from NNSA Headquarters, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratory, and the Pantex Plant; and,
- Reviewed performance measures established in accordance with the Government Performance and Results Act.

The audit was performed 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. Accordingly, we assessed the significant internal controls related to the Enhanced Surveillance Campaign. Because our review was limited, it would not necessarily have identified all internal control deficiencies that may have existed. Additionally, we did not rely on computer-processed

data. We also reviewed the implementation of the Government Performance and Results Act of 1993, as it related to the Enhanced Surveillance Campaign. Performance objectives had been established for enhanced surveillance activities.

We discussed the findings with the NNSA Enhanced Surveillance Campaign Manager on November 18, 2003.

Appendix 2

RELATED AUDIT REPORTS AND INTERNAL REVIEWS

Office of Inspector General

- *National Nuclear Security Administration's Planning, Programming, Budgeting, and Evaluation Process* (DOE/IG-0614, August 2003). The audit disclosed that the National Nuclear Security Administration's planning, programming, budgeting, and evaluation process was consistent with the Department of Defense process even though budget execution and evaluation differ. Although the process provided a mechanism for making centralized resource allocation decisions, it did not result in changes for existing financial and budgeting systems at NNSA management and operating contractors.

- *Plutonium-238 Production* (DOE/IG-0607, June 2003). The audit disclosed that unless the Department accelerates its program to reestablish a plutonium-238 production capability, it risks being unable to meet future national security and NASA requirements.

- *Planning for National Nuclear Security Administration Infrastructure* (DOE/IG OAS-B-03-02, May 2003). The audit disclosed that the NNSA site plans did not contain accurate assessments of the structural and mechanical condition of the site's facilities nor did they identify and prioritize the mission-critical facilities in need of repair or refurbishment.

- *National Nuclear Security Administration's Nuclear Explosive Safety Study Program* (DOE/IG-0581, January 2003). The audit disclosed that comprehensive Nuclear Explosive Safety studies had been delayed for six of the nine nuclear weapon types currently active in the nation's nuclear weapons stockpile.

- *National Nuclear Security Administration's Test Readiness Program* (DOE/IG-0566, September 2002). The audit disclosed that Nevada's ability to conduct an underground nuclear test is at risk. Nevada and its support organization did not have adequate experienced staff, equipment, or facilities to carry out this requirement within the established timeframe. The ability to test was made even more difficult because the Department did not have a comprehensive plan or methodology to fill key and critical positions, validate aging assets, incorporate technology advances, and update Nuclear Explosive Safety studies.

- *Management Challenges at the Department of Energy* (DOE/IG-0538, December 2001). The audit found that the resolution of safety problems is an urgent need that ranks among the most serious challenges facing the Department.

- *Stockpile Surveillance Testing* (DOE/IG-0528, October 2001). The audit found that surveillance testing backlogs existed in flight, laboratory, and component testing and when tests are delayed or not completed, the Department lacks essential information on the operating characteristics and reliability of the weapon

- *Management of the Nuclear Weapons Production Infrastructure* (DOE/IG-0484, September 2000). The audit found that the nuclear weapons production infrastructure had not been adequately maintained and current and future goals of the Stockpile Stewardship Plan are at risk.

National Nuclear Security Administration Defense Programs

- *Strategic Review of the Surveillance Program 150-Day Report* (January 1, 2001). Initiated by NNSA, this strategic review focused on defining the surveillance approach that would be most appropriate to assure the continued safety and reliability of the nation's nuclear stockpile. The team identified possible changes and improvements in the program to meet the needs of an aging stockpile with limitations on testing and an increasing need to preserve stockpile assets.

Other Reports

- *FY 2001 Report to Congress of the Panel to Assess the Reliability, Safety, and Security of the United States Nuclear Stockpile* (March 15, 2002). This Congressionally-established panel concluded that redirection of the Stockpile Stewardship Program is needed to maintain confidence in our nuclear stockpile.

- *FY 2000 Report to Congress of the Panel to Assess the Reliability, Safety, and Security of the United States Nuclear Stockpile* (February 1, 2001). This Congressionally-established panel found a disturbing gap between the nation's declaratory policy that maintenance of a safe and reliable nuclear stockpile is a supreme national interest and the actions taken to support this policy.

- *FY 1999 Report to Congress of the Panel to Assess the Reliability, Safety, and Security of the United States Nuclear Stockpile* (November 8, 1999). The Congressionally-appointed panel reported that effective execution of both the Stockpile Stewardship Program and Annual Certification Process offered the best hope for sustaining confidence in the nuclear stockpile, and its deterrent capabilities, into the future. The panel recommended strengthening and broadening the Annual Certification Process to provide assurance that potential problems are being sought out and reported.

Appendix 3

Department of Energy
National Nuclear Security Administration
Washington, DC 20585

MAR 1 2004

MEMORANDUM FOR Ricky R. Hass
Acting Assistant Inspector General
for Audit Services

FROM: Michael C. Kane
Associate Administrator
for Management and Administration

SUBJECT: Comments to Enhanced Surveillance Campaign Draft Report

NNSA appreciates the opportunity to have reviewed the Inspector General's (IG) draft report, "The National Nuclear Security Administration's Enhanced Surveillance Campaign." We understand that the IG worked on the premise that the Enhanced Surveillance Campaign is divided into six major technical elements: pits, canned sub-assemblies/cases, high explosives, systems, non-nuclear components, and non-nuclear materials. These materials and components pose the highest risk of aging impacts on weapon safety, reliability, or performance. To achieve the program goal, the NNSA sets top level milestones and deliverables annually for each of the six elements. Therefore, the objective of the audit was to determine whether the milestones designed to achieve the program goal were being met.

Although NNSA generally agrees with the report, we do not agree with the observation that we are at risk of missing future milestones that are critical to the success of the Enhances Surveillance Campaign. Over the past two years, NNSA has strengthened project management by identifying and closely monitoring priority milestones. The most significant milestones, Level 1 and 2, are being achieved on schedule. We appreciate the IG's comment that NNSA has made progress in each of the campaign's major technical elements and that we are on schedule to meet the vast majority of our individual milestones within the Enhanced Surveillance Campaign. Our challenge is to ensure consistent planning throughout the complex. NNSA has developed a tentative corrective action plan similar to the attached action plan related to the recommendations and will provide that plan to the IG when the plan is completed.

I have attached several technical comments that have been provided by our sites. These comments provide clarity and correct any factual errors that were noted. Should you have any questions about this response, please contact Richard M. Speidel, Director, Policy and Internal Controls Management. He may be contacted at 202-586-5009.

Attachments

cc: Deputy Administrator for Defense Programs, NA-10

IG Report No: DOE/IG-0646

CUSTOMER RESPONSE FORM

The Office of Inspector General has a continuing interest in improving the usefulness of its products. We wish to make our reports as responsive as possible to our customers' requirements and, therefore, ask that you consider sharing your thoughts with us. On the back of this form, you may suggest improvements to enhance the effectiveness of future reports. Please include answers to the following questions if they are applicable to you:

1. What additional background information about the selection, scheduling, scope, or procedures of the audit would have been helpful to the reader in understanding this report?

2. What additional information related to findings and recommendations could have been included in this report to assist management in implementing corrective actions?

3. What format, stylistic, or organizational changes might have made this report's overall message more clear to the reader?

4. What additional actions could the Office of Inspector General have taken on the issues discussed in this report which would have been helpful?

Please include your name and telephone number so that we may contact you should we have any questions about your comments.

Name_____Date_____

Telephone_____Organization_____

When you have completed this form, you may fax it to the Office of Inspector General at (202) 586-0948 or you may mail it to:

Office of Inspector General (IG-1)
U.S. Department of Energy
Washington, D.C. 20585
ATTN: Customer Relations

If you wish to discuss this report or your comments with a staff member of the Office of Inspector General, please contact Wilma Slaughter at (202) 586-1924.

The Office of Inspector General wants to make the distribution of its reports as customer friendly and cost effective as possible. Therefore, this report will be available electronically through the Internet at the following address:

U.S. Department of Energy Office of Inspector General, Home Page
http://www.ig.doe.gov

Your comments would be appreciated and can be provided on the Customer Response Form attached to the report.