



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

Audit Report

The National Nuclear Security Administration's B61 Spin Rocket Motor Project

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Department of Energy

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MEMORANDUM FOR THE SECRETARY

FROM:

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SUBJECT

INFORMATION: Audit Report on "The National Nuclear Security Administration's B61 Spin Rocket Motor Project"

BACKGROUND

The Department of Energy's Sandia National Laboratories are refurbishing the Spin Rocket Motor, a prime component of the B61 nuclear weapon system. Both the original motor produced in 1966 and the version last produced in 1991 are the subjects of the refurbishment. Both motors, which are essentially identical, produce thrust to arm the weapon. In December 2001, the National Nuclear Security Administration (NNSA) received Nuclear Weapons Council Standing and Safety Committee (NWCSSC) approval to study the feasibility and cost of replacement options. In April 2003, the NWCSSC approved the development of a new Spin Rocket Motor based on Sandia's assertions that test data collected between 1997 and 2002 showed the motors, due in large part to "detrimental aging," were not performing according to specifications. Detrimental aging occurs when a component's age prevents it from performing to meet military requirements. The first production unit for this refurbishment effort is scheduled to be completed in December 2006, at an estimated overall project cost of about \$60 million.

NNSA's 6.X process for managing refurbishments requires the examination of various design options and their cost impacts before proceeding to the development-engineering phase. Pursuant to the 6.X process, a rationale for replacing components is to be supported by test evidence indicating weapon defects and aging trends. In order to be used as part of a justification, test results must be obtained under "War Reserve" conditions, that is, conditions similar to those experienced in wartime (e.g., climate factors such as temperature). Furthermore, refurbishments are to be supported by evidence indicating the cause and impact of any reported anomalies.

The Office of Inspector General received allegations raising serious questions concerning the Department of Energy's decision to proceed with the B61 Spin Rocket Motor project. As a consequence, we initiated this audit to evaluate the Department conclusion about the performance of the motor.

RESULTS OF AUDIT

Based on reported test anomalies, coupled with the fact that some versions of the Spin Rocket Motor had been in use for over 30 years, we concluded that there was a reasonable basis to be concerned about the aging and future performance of the motor. However, the Department did not have conclusive information on the cause and impact of observed test anomalies nor of the cost of alternative options, both of which were needed

to prioritize the development of a new motor in the context of competing weapons development requirements. The lack of this information placed the decision to proceed with development of a new Spin Rocket Motor at odds with the operating principles promulgated in NNSA's 6.X procedures.

Moreover, independent reviews conducted in 2002 suggested a range of expert opinion and different courses of action regarding motor aging and test anomalies. For example:

- One review observed that it would be "uncomfortable" with delaying replacement due to observed component aging and test anomalies; while,
- Another review concluded that observed anomalies were not part of structured tests under War Reserve conditions and recommended that NNSA perform a Significant Finding Investigation to investigate the motor's performance and identify any aging concerns that would warrant replacing the motor.

While the suggested investigation was initiated, it did not begin until after the development of a new motor was approved and work commenced. The Significant Finding Investigation had not been completed as of the time of our audit. However, preliminary data from ongoing investigations did not evidence detrimental aging or performance decrements in the existing Spin Rocket Motor. Further, Sandia's cost estimates and assumptions used to support the decision to develop a new motor rather than to examine other options, such as refurbishing the existing motor, were not fully supported.

We found that NNSA had not adequately validated key Spin Rocket Motor data provided by Sandia prior to approval of the new project. One senior NNSA weapons program official acknowledged that, due to staff reductions in the NNSA program, the information presented by Sandia was accepted without question and had not been validated.

During the course of the audit, Sandia and NNSA officials advised us that there were other concerns, such as spin rate issues and the time it would take to develop a new motor, that prompted the need for the project when it was approved. While we recognized that the age of the Spin Rocket Motor in and of itself may have provided a reasonable basis to be concerned about the performance of the existing motor, the project was approved before problems were fully investigated for cause and effect and before the cost impact of various options was fully evaluated. As a result, it was unclear: (i) whether the Spin Rocket Motor replacement project represented the highest and best use of the Department's finite weapons refurbishment budget; and, (ii) how the motor replacement project compared in terms of priority to other weapons refurbishment projects. In contrast to the Spin Rocket Motor, a Sandia official told us that at least one other project had been fully investigated, had defined causes for the anomalies, had been subjected to a full resource evaluation, and was not receiving the support needed for refurbishment.

Consequently, we made several recommendations to ensure that future refurbishment projects are managed in accordance with NNSA's 6.X policy, specifically to ensure that such projects are justified and supported based on analyses of refurbishment options and validated cost data.

MANAGEMENT REACTION

Management did not agree with the finding but generally concurred with the recommendations. Management emphasized that the B61 Spin Rocket Motor replacement project was approved through the joint NNSA/Department of Defense NNSA Phase 6.X process and was a follow-on, long-term solution to a stockpile problem. While it acknowledged there was no evidence to indicate an immediate performance impact, management stated there was sufficient concern with aging, in combination with motor margins, to justify the prudent course to replace the motor. Management's verbatim comments are included in Appendix 5.

While the refurbishment decision was based on collaborative efforts between NNSA and the Department of Defense, we found that the 6.X process was not completely followed. Specifically, test evidence provided in support of the refurbishment had not been obtained under approved test protocols, i.e., War Reserve conditions; investigations of the cause and impact of test anomalies had not completed before initiating development of a new motor; and, documentation was not available to support Sandia's determination that building a new motor was the less costly option. With regard to concerns about aging and margins, as indicated in the audit report, a number of tests observed no performance degradation due to aging and found that the motors met expectations and continued to perform within margins. This included tests specifically designed to predict the effects of aging on weapons components. Consequently, information provided to NNSA and Department of Defense officials, which was the basis for the decision to refurbish the motor, was not complete. While there is no assurance of the final outcome, we continue to believe that, prior to making the decision to initiate the project, responsible officials should have had the benefit of the full range of information called for in the 6.X process. Had that been the case, any decision regarding the future of the Spin Rocket Motor would have been fully documented, eliminating any controversy.

Attachment

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