Department of Energy
Washington, DC 20585

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July 15, 2008

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman
Inspector General

SUBJECT: INFORMATION: Audit Report on "Nuclear Weapons Programs Heavy Water Inventory"

INTRODUCTION AND OBJECTIVE

The Department of Energy's National Nuclear Security Administration (NNSA) maintains an inventory of heavy water, a vital national security asset. The heavy water is used to make lithium deuteride weapons parts which contribute to the explosive yield of nuclear weapons. It is also used to support the NNSA's Stockpile Stewardship Program, which is designed to ensure, without underground nuclear testing, the safety, security, and reliability of the Nation's nuclear stockpile. To cite one of the primary examples of its use, the heavy water is needed for the Inertial Confinement Fusion (ICF) program in experiments which will enable a better understanding of the dynamics of radiation transport, secondary implosion and ignition, and the dynamics of aging in nuclear weapons.

The inventory of heavy water available and suitable for national security purposes is primarily managed and stored at NNSA's Y-12 National Security Complex (Y-12) in Oak Ridge, Tennessee. At present, there is no capability to produce heavy water in the United States. The Department last produced heavy water at its Savannah River Site in 1982, but this production facility was dismantled in 1996. Due to the significance of heavy water inventories to the nuclear weapons program, we initiated an audit to determine whether the Department's inventory will be sufficient to meet national security requirements.

RESULTS OF AUDIT

Based on our analysis of currently available NNSA data, the Department's heavy water inventory is adequate to meet near-term requirements. However, NNSA is likely to fully deplete the inventory by 2019, absent new sources of the material. Further, NNSA had not established a path forward to secure new sources of heavy water.

NNSA has identified several alternatives to meet future requirements. It contended, for example, that new heavy water production capabilities could be established or contaminated heavy water could be purified so that it would be suitable for national security purposes. Each alternative, however, requires a significant lead-time to establish new supplies of heavy water, and, in fact, the viability of a number of the alternatives has not been proven. An NNSA contractor-prepared heavy water inventory assessment included a "rough order magnitude" estimate that it would require ten years to construct

new production capabilities. This means that, if construction were to start immediately and proceed without major interruption, the new sources would not be available until existing inventories are nearly depleted. We further determined that NNSA had not:

- Performed a comprehensive feasibility and cost-benefit analysis of all the alternatives to determine the most effective approach to obtaining additional supplies of heavy water; and,

- Established a reserve stock quantity needed to meet program requirements until a new source of heavy water is secured. Such a reserve would also meet future contingencies.

In the past, the availability of heavy water has not been a priority for NNSA. According to NNSA officials, competing higher priorities, such as management of uranium and plutonium, have prevented the Department from addressing heavy water inventories. We also noted that estimates for the future demand for heavy water have frequently changed, which may have contributed to the lack of priority given to establishing new sources of the material.

If the Department does not take timely action to firmly establish future heavy water requirements and act accordingly to secure new sources of the material, it is at risk of not being able to fulfill its future national security missions. Specifically, current and future weapons life extension programs, ICF's weapons certification activities, as well as potential new programmatic needs depend on a reliable new source of heavy water. As such, we made recommendations to address the forward looking potential shortage of heavy water.

MANAGEMENT COMMENTS

Management concurred with our finding and recommendations. Management stated in responding to our audit recommendations that it is developing a strategic plan to identify heavy water requirements, consider various alternatives for the production or upgrade of heavy water to support mission requirements, and to identify plans for disposal of excess inventories. Management also stated that it is considering establishing a heavy water reserve.

Management's comments were responsive to our findings and recommendations. Management's detailed comments are contained in Appendix 3 of the full report which is classified for national security reasons.

Attachment

cc: Acting Deputy Secretary
Administrator, National Nuclear Security Administration
Chief of Staff
Manager, Y-12 Site Office
Director, Policy and Internal Controls Management, NA-66