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

Audit Report

Management of Spent Nuclear Fuel at the Savannah River Site

DOE/IG-0727 May 2006

Department of Energy
Washington, DC 20585

May 12, 2006

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman
Inspector General

SUBJECT: INFORMATION: Audit Report on "Management of Spent Nuclear Fuel at the Savannah River Site"

BACKGROUND

The Department of Energy (Department) is responsible for managing the agency's spent nuclear fuel inventory and preparing it for final disposition in a geologic repository. Currently, there are approximately 12,000 spent fuel assemblies stored at the Savannah River Site. These assemblies are the result of the production of nuclear weapons materials and shipments of foreign and domestic research reactor fuel to the Site. The Savannah River Site spent nuclear fuel is part of a broader Department-wide inventory that includes spent nuclear fuel stored at the Hanford Site and the Idaho National Laboratory. Department plans call for preparation of this material for permanent disposition in Yucca Mountain or a similar geologic repository.

In a July 2000 Record of Decision, as part of an effort to identify the best method to prepare the Savannah River's spent nuclear fuel for disposition, the Department selected a process known as "melt and dilute" as the preferred alternative. Savannah River had established a goal of having the technology in place by 2008. The Record of Decision also committed the Department to explore direct disposal as an alternative strategy, and to maintain the current conventional processing facility (H-Canyon) to address any degrading of spent fuel stored at the Savannah River Site until a new disposal program was implemented. Once known operational requirements were met and a new technology for preparing spent nuclear fuel for disposal was in place, the H-Canyon would be available for shutdown.

We initiated this audit to determine the current status of the spent nuclear fuel program at the Savannah River Site and to determine whether the Department will have to maintain H-Canyon capabilities beyond the time required to carry out defined work requirements.

RESULTS OF AUDIT

We found that there have been delays in developing and implementing a spent nuclear fuel program at Savannah River; and as a result, H-Canyon will have to be maintained in an idle, but operational mode, for at least two years. According to a Savannah River Site plan, a new spent nuclear fuel disposal technology will not be ready until at least Fiscal Year (FY) 2012. However, H-Canyon will have completed all of its scheduled and proposed operations by FY 2010. Given the commitment the Department made in the

Record of Decision and the absence of a fully developed disposition strategy, the two year gap is projected to cost the taxpayers about $300 million.
This situation resulted from the fact that the Department: (1) abandoned work on the preferred technology (melt and dilute) selected in the 2000 Record of Decision; and, (2) delayed approving an alternative method for preparing the Site's spent nuclear fuel for disposition until it adopted a complex-wide strategy to include the Hanford Site and the Idaho National Laboratory. Although the Department started work on the complex-wide strategy in October 2002, as of January 2006, it had not decided on an overall approach and had not established a deadline for completing its work.

EM officials provided us with several explanations for the delay, including: (1) refocusing the emphasis of the program from accelerating closure to reducing cost and risk; and, (2) the fact that delays in opening the Yucca Mountain High-Level Waste Repository made spent fuel disposition less time sensitive. While we acknowledge these programmatic impacts, it does not appear that the Department, during the delay in implementing a disposition strategy, placed adequate emphasis on the significant cost of keeping H-Canyon open.

To address this situation, we made several recommendations designed to ensure that the Department establishes a complex-wide strategy and expedites the implementation of a technology to prepare spent nuclear fuel at the Savannah River Site for disposition.

MANAGEMENT REACTION

The Office of Environmental Management concurred with the report's finding and recommendations, but noted that the Department is currently examining additional missions for H-Canyon. Management further stated that if such missions can be quantified and approved, the Department would not incur added costs to keep H-Canyon available while an alternative capability for preparing spent nuclear fuel for disposal is developed.

Management's comments also highlighted the organizational and technical complexities confronting the development of a complex-wide strategy to dispose of the fuel, such as the inter-dependence of decisions affecting the geologic repository and the identification and approval of additional missions possible for H-Canyon.

While we recognize that there are extremely complex issues confronting the spent nuclear fuel program, our purpose in focusing on H-Canyon was to identify the significant monetary impact that will result if focus is not maintained on resolving these issues in a timely manner.

Management's comments to the recommendations and our responses are included in the report. Verbatim comments can be found in Appendix 3.

Attachment

cc: Deputy Secretary
Under Secretary for Energy, Science and Environment
Administrator, National Nuclear Security Administration
Chief of Staff
Manager, Savannah River Operations Office

REPORT ON MANAGEMENT OF SPENT NUCLEAR FUEL AT THE SAVANNAH RIVER SITE

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SPENT NUCLEAR FUEL MANGEMENT

H-Canyon Operations Extended

The Department of Energy's (Department) spent nuclear fuel program at the Savannah River Site (Site) will likely require H-Canyon to be maintained at least two years beyond defined operational needs. The Department committed to maintain H-Canyon operational readiness to provide a disposal path for degraded spent nuclear fuel, which may pose an immediate safety and health risk, until a treatment or packaging capability is available. However, as of January 2006, the Department had not approved a specific technology to prepare the Site's spent nuclear fuel for disposal.

Although officials at the Site proposed starting conceptual design work for a spent nuclear fuel treatment and packaging capability in Fiscal Year (FY) 2007, the Department did not approve the technology or funding for conceptual design work in FY 2007. According to Site officials, FY 2007 funding for the project was prerequisite to having operational capability to treat and package the spent nuclear fuel by FY 2012. H-Canyon will have completed all of its defined operations by the end of FY 2010, and could stand idle until at least 2012, or later, until a new treatment or packaging capability is available. No other materials have been identified for processing beyond FY 2010.

Disposition Strategy

The Department will have to maintain H-Canyon capabilities longer than needed because, in 2003, it abandoned work on the preferred alternative technology selected in the 2000 Record of Decision and delayed approving an alternative technology for the Site's spent nuclear fuel until it adopted a complex-wide strategy for also disposing of spent nuclear fuel stored at the Hanford Site and Idaho National Laboratory. Although the Department started work on a strategy in October 2002, as of January 2006, it had not decided on a complex-wide approach and had not established a deadline for completing work on the strategy.

In October 2002, the Assistant Secretary for Environmental Management (EM) chartered a spent fuel Corporate Project Team (Spent Fuel Project Team) to reevaluate storage, packaging, transportation and disposal activities across the complex and to recommend a corporate strategy by September 2003. EM tasked the Spent Fuel Project Team to improve spent fuel management by:

- Clearly identifying EM's spent fuel mission;
- Defining the current and projected spent fuel inventory within EM's responsibilities;

- Integrating EM's spent fuel activities with the Office of Civilian Radioactive Waste Management (OCRWM); and,

- Identifying opportunities for the acceleration of spent fuel disposition.

In May 2005, the reevaluation had not been completed and EM revised the methodology for developing the spent fuel corporate strategy. The Spent Fuel Project Team was effectively disbanded and the responsibility for recommending direction for the complex-wide spent fuel program was assigned to line management under EM's Office of Logistics and Waste Disposition Enhancements. EM plans to meet with field personnel from the various sites managing spent fuel to identify issues needing resolution before developing a corporate strategy.

EM officials provided several explanations for the delay in completing the spent nuclear fuel complex-wide strategy. First, according to EM personnel, there were changes in direction from EM management. Specifically, personnel changes in EM top management led to a refocusing of the program's emphasis from accelerating closure to reducing cost and risk. Furthermore, EM officials believed that there was sufficient time to develop a corporate strategy to dispose of spent fuel since there were delays in opening the Yucca Mountain High Level Waste Repository. However, this approach does not give adequate consideration of the cost impacts of keeping H-Canyon open. Although management indicated that EM intends to look for other missions for H-Canyon, to date, no other missions have been identified.

Costs

The Department is likely to incur at least $300 million to keep H-Canyon available, but idle, until a technology is approved and made operational at the Savannah River Site. Specifically, the cost to keep H-Canyon operational without processing materials will be about $150 million per year for at least two years.

RECOMMENDATIONS

We recommend that the Assistant Secretary for Environmental Management:

1. Accelerate work to complete a complex-wide strategy for the disposition of spent fuel;

2. Formally select a preferred technology for preparing spent fuel at the Site for disposition consistent with the complex-wide strategy; and,

3. Expedite the implementation of this technology to minimize the impact of extending H-Canyon operations.

MANAGEMENT REACTION

The Principal Deputy Assistant Secretary for Environmental Management concurred with the report's finding and recommendations. Specifically, management stated that the Department is currently examining alternative missions for H-Canyon that may keep it operating well beyond FY 2010. Management concluded that if such missions are quantified and approved, then the Department would not incur the additional costs to keep H-Canyon available. Management also stated that it is working closely with OCRWM to complete a complex-wide strategy for the disposition of EM's spent nuclear fuel at Yucca Mountain. Further, a Record of Decision will be prepared to select the preferred approach once the plans for any H-Canyon missions are further developed. Finally, the implementation of the decision will be consistent with the plans for the H-Canyon operations, the OCRWM schedule for Yucca Mountain, and the priorities of the Department.

Management's verbatim comments can be found in Appendix 3.

AUDITOR COMMENTS

While management agreed with the recommendations and provided corrective actions, it did not delineate when these corrective actions would be achieved. Management's response to our recommendations emphasize the importance of coordination between EM and OCRWM and the complexities that must be evaluated and reduced to ultimately dispose of spent nuclear fuel. While we agree that the identification of additional H-Canyon missions beyond 2010 could potentially avoid the increased costs identified in the report, it remains unclear how management plans to address such complex issues as coordinating spent nuclear fuel disposition activities with the opening of Yucca Mountain or when management's planned actions will be completed. The report points out the significant monetary impact that will result if these unknowns are not addressed in a timely manner.

Appendix 1

OBJECTIVE

The objective of this audit was to determine whether the Department's spent nuclear fuel program at the Savannah River Site will extend the time required to maintain H-Canyon operational readiness beyond defined needs.

SCOPE

The audit was performed between October 2004 and January 2006, at the Savannah River Site in Aiken, South Carolina, and the Office of Environmental Management, in Germantown, Maryland. The scope of the audit included a review of the treatment, packaging and disposal plans for spent fuel stored at the Site. In addition, we reviewed long-term spent fuel management issues such as storage capacity and shipping schedules.

METHODOLOGY

To accomplish the audit objective, we:

- Researched applicable Federal and Departmental regulations and guidance;
- Reviewed prior Office of Inspector General and Government Accountability Office reports related to the audit objective;
- Reviewed Records of Decision to determine the Department's documented strategy for the disposal of spent fuel; and,
- Interviewed Savannah River and EM Headquarters management personnel and reviewed implementation plans to determine anticipated changes to the formal strategy for disposing of spent fuel at the Site.

The audit was conducted 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. We assessed the Department's compliance with the Government Performance and Results Act of 1993. The Department has established performance measures related to the storage of spent fuel at the Site, but not for final disposition. 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. In performing this audit, we did not rely on computer-based data to accomplish the audit objective. Therefore, it was not necessary to assess its reliability.

Management waived the exit conference.

PRIOR AUDIT REPORTS

Office of Inspector General

- *Recovery of Highly Enriched Uranium Provided to Foreign Countries* (DOE/IG-0638, February 2004). The Office of Inspector General (OIG) found that the Department's Foreign Research Reactor Spent Nuclear Fuel Acceptance Program (Acceptance Program) was likely to recover only about half of the spent fuel containing highly-enriched uranium (HEU) covered by the program and there was no effort to recover additional spent fuel with HEU dispersed to foreign countries not included in the program. The report noted that the program was the responsibility of the Office of Environmental Management, even though that office's primary mission was environmental cleanup rather than non-proliferation. To ensure that, to the maximum extent practical, spent fuel containing HEU would be recovered and dispositioned, the OIG recommended that the Department determine: whether aspects of spent fuel recovery could be more effectively managed by the National Nuclear Security Administration; whether the Acceptance Program should be expanded to include all outstanding spent fuel with HEU produced in the U.S. and dispersed to foreign countries; whether improvements to the program could be made to encourage greater foreign participation; and, the responsibility for the ultimate disposal of spent fuel containing HEU.

Government Accountability Office

- *Nuclear Waste: DOE's Hanford Spent Nuclear Fuel Storage Project--Cost, Schedule, and Management Issues* (RCED-99-267, September 1999). The Government Accountability Office found that uncertainty remained over when the Department's project to improve the storage of spent nuclear fuel at the Hanford Site would be finished and how much it would cost. Contractors had addressed the three main problems that existed earlier (an unrealistic schedule, poor control over the project's baseline, and unresolved technical issues) but still had several matters to resolve before being able to provide assurance that cost and schedule estimates could be met. The report recommended that the Secretary of Energy strengthen leadership and oversight to better ensure that the project was completed as efficiently and effectively as possible.

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United States Government **Department of Energy**

Memorandum

DATE: March 30, 2006

REPLY TO ATTN OF: EM-13 (John Scorah, 301-903-3201)

SUBJECT: Draft Audit Report on Management of Spent Nuclear Fuel at the Savannah River Site

TO: George W. Collard, Assistant Inspector General for Performance Audits
Office of Inspector General

The Office of Environmental Management (EM) has reviewed the draft Office of Inspector General audit report entitled "Management of Spent Nuclear Fuel at the Savannah River Site" and concurs with the report's recommendations. EM agrees that H-Canyon must be kept available to process spent nuclear fuel (SNF) until the Savannah River Site (SRS) has an alternative capability for preparing the SNF for disposal. EM also agrees that current schedules for H-Canyon do not show operating the facility beyond Fiscal Year (FY) 2010 and that SRS will not have an alternative capability for preparing the SNF for disposal until at least FY 2012. Therefore EM understands how the draft report could conclude that H-Canyon would have to be kept available but idle for at least two years. At the same time, EM believes it would be helpful for the report to recognize that the Department of Energy (DOE) is currently examining additional missions for H-Canyon that may keep it operating for well beyond FY 2010. If such missions are quantified and approved, then DOE will not be incurring added costs to keep H-Canyon available while an alternative capability for preparing SNF for disposal is developed.

EM's planned actions with regard to the recommendations are as follows:

1. Accelerate work to complete a complex-wide strategy for the disposition of spent fuel.

   EM is working closely with each of the sites and the Office of Civilian Radioactive Waste Management (OCRWM) to complete a complex-wide strategy for the disposition of EM's SNF at Yucca Mountain. To a significant extent, this strategy is dependent on decisions that are made regarding H-Canyon operations and the schedule for the geologic repository. EM will complete the strategy as soon as practicable consistent with a resolution of these existing uncertainties.

2. Formally select a preferred technology for preparing spent fuel at the site for disposition consistent with the complex-wide strategy.

   EM expects that the SNF at SRS will be prepared for disposal either by packaging for direct disposal at Yucca Mountain, conventional processing in H-Canyon, or a combination of the two approaches. An amended Record of Decision for the SRS SNF Management Final Environmental Impact Statement will be prepared to select the

preferred approach once the plans for any additional H-Canyon missions are further developed.

3. Expedite the implementation of this technology to minimize the impact of extending H-Canyon operations.

   EM will execute the implementation of the selected approach for preparing the SRS SNF for disposal consistent with the plans for H-Canyon operations, the OCRWM schedule for Yucca Mountain, and the priorities of the Department.

If you have any further questions, please contact Mr. Frank Marcinowski, Deputy Assistant Secretary for Logistics and Waste Disposition Enhancements, at (202) 586-0370.

Charles E. Anderson
Principal Deputy Assistant Secretary for
Environmental Management

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