DOE/IG-0554

AUDIT REPORT

THE PLUTONIUM STABILIZATION AND PACKAGING SYSTEM AT THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

MAY 2002

U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL
OFFICE OF AUDIT SERVICES

U. S. DEPARTMENT OF ENERGY
Washington, DC 20585

May 13, 2002

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman (Signed)
Inspector General

SUBJECT: INFORMATION: Audit Report on "The Plutonium Stabilization and Packaging System at the Rocky Flats Environmental Technology Site"

BACKGROUND

From 1952 to 1989, the Rocky Flats Environmental Technology Site (Rocky Flats) produced nuclear weapons components for the Department of Energy. In January 1992, the primary mission of the site changed from nuclear weapons production to site cleanup and closure. A prerequisite to closure is the removal of 9,800 kilograms of plutonium metals and oxides stored at the site. Rocky Flats estimates that these metals and oxides will be packaged into 1,900 containers which, as currently planned, will be shipped to the Department's Savannah River Site.

In 1998, the Department established a target of May 31, 2002, to stabilize and package the plutonium at Rocky Flats. In order to prepare the material for shipment, the Department procured and installed the Plutonium Stabilization and Packaging System (PuSPS). The objective of the audit was to determine whether Rocky Flats would be able to stabilize and package its plutonium by the May 2002 target.

RESULTS OF AUDIT

Given current PuSPS operations levels, packaging of less than half of the approximately 1,900 containers needed would be completed by the target date, and the last container of the remaining plutonium metals and oxides would not be packaged until March 2003. The Rocky Flats Field Office (RFFO) acknowledged that the target would be missed, citing startup delays and equipment failures as the primary cause. The audit disclosed that Kaiser-Hill Company, LLC (Kaiser-Hill), the Rocky Flats remediation contractor, had not developed a long-term production schedule designed to ensure that the last container would be completed by May 2002, and that RFFO did not ensure that a contingency plan was prepared for use in the event that there was a delay or termination in PuSPS production.

Completing the stabilization, packaging, and shipment of the plutonium metals and oxides on a timely basis is an important component of the closure effort at Rocky Flats. Until such time as this process is successfully completed, the resources devoted to running the PuSPS and the $3.6 million monthly cost associated with maintaining the protected area cannot be redirected to other aspects of cleanup. Further, missed milestones increase the risk of delays to the planned 2006 Rocky Flats closure date, which has significant cost implications for the Department's environmental remediation effort.

In making our recommendations, we recognize the impact of a recent agreement between the Department and the State of South Carolina to postpone shipments to the Savannah River Site until there is satisfactory agreement regarding final disposition of the container materials. This has prevented Rocky Flats from beginning shipments of plutonium materials already packaged by the PuSPS. Resolution of these issues will permit shipments to begin.

To address the specific issues noted in the attached report, we recommended that the Manager, RFFO direct Kaiser-Hill to: (1) develop a long-term, comprehensive, and detailed schedule to show when production can realistically be completed, and, (2) prepare a contingency plan for plutonium stabilization and packaging.

Our finding is consistent with a recent Defense Nuclear Facilities Safety Board report that identified concerns with Rocky Flats' revised schedule for completion. The Defense Board determined that a significantly high production rate, "will be needed consistently to meet the current projected completion of plutonium metals and oxide repackaging in PuSPS…"

MANAGEMENT REACTION

Management agreed with the finding and recommendations and stated that it had developed a long-term production schedule for the PuSPS based on six months of operational experience. The target is to produce 140 containers per month, with an estimated date of January 2003 for completion of PuSPS operations. Management also stated that it has implemented extraordinary levels of management oversight to deal with PuSPS contingencies. It believes that its efforts have been, and will continue to be, successful in managing contingencies. Management's verbatim comments are included in the report in Appendix 2.

While we respect management's commitment to increase PuSPS production and to respond to obstacles in both production and shipping of plutonium metals and oxides, we remain concerned that the current target of 140 containers per month may not be realistic. Thus, we continue to support realistic monthly production assumptions and a more aggressive contingency planning process addressing actions to be taken if the planned schedule cannot be met.

THE PLUTONIUM STABILIZATION AND PACKAGING SYSTEM AT THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

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INTRODUCTION AND OBJECTIVE

The Department of Energy (Department) and its site contractor, Kaiser-Hill Company, LLC (Kaiser-Hill), contracted in February 2000 to close the Rocky Flats Environmental Technology Site (Rocky Flats) by December 15, 2006. A prerequisite to this closure is the removal of 9,800 kilograms of plutonium metals and oxides in storage at Rocky Flats. The plutonium, currently stored inside a high-security protected area, must be stabilized and packaged prior to being shipped offsite.

In 1998, the Department established a target of stabilizing and packaging the plutonium by May 31, 2002. The current contract milestone for the final shipment to the Savannah River Site is October 14, 2002. In order to prepare and package the material for shipment, the Department procured and installed a Plutonium Stabilization and Packaging System (PuSPS) at Rocky Flats.

The objective of the audit was to determine whether Rocky Flats would be able to stabilize and package its plutonium by the May 31, 2002, target.

CONCLUSIONS AND OBSERVATIONS

Given current PuSPS operations, Rocky Flats will not be able to stabilize and package all of its plutonium by the May 2002 target. We estimated that only 869 of the approximately 1,900 containers will be packaged by May 31, 2002. At this rate, the final container will not be produced until March 2003.

Rocky Flats Field Office (RFFO) stated that production delays occurred due to delayed startup of the PuSPS, lower than anticipated production rates, and higher than expected equipment failures. In addition, we identified several control deficiencies. Specifically, Kaiser-Hill did not develop a detailed, long-term production schedule to ensure on-time completion and the RFFO did not ensure that a contingency plan was developed in the event that production stopped.

Until production is completed, the resources devoted to running the PuSPS cannot be redirected to other aspects of cleanup. Likewise, until shipments are completed, the $3.6 million monthly cost associated with maintaining the protected area will continue. Missed milestones also increase the risk of delaying the planned 2006 closure date, which could increase final site closure costs.

Similar issues were discussed in reports issued by the General Accounting Office (GAO) in 1998, and again in 1999 and 2001. GAO questioned whether the Department would meet the May 2002 target date to have plutonium stabilized and packaged. GAO also concluded that the Department would have to overcome major challenges, including getting the PuSPS to perform and sustain a rate of production needed for timely completion, if Rocky Flats was to close on time and within budget.

A recent agreement between the Department and the State of South Carolina, to postpone shipments until there is satisfactory agreement regarding final disposition of the container materials, may cause an additional hindrance. Thus far, this has prevented Rocky Flats from beginning shipments of plutonium materials already packaged by the PuSPS. The Department and the State of South Carolina are still working to reach a satisfactory agreement regarding final disposition that will permit shipments to begin.

The audit identified issues that management should consider when preparing its year-end assurance memorandum on internal controls.

(Signed)
Office of Inspector General

Plutonium Stabilization And Packaging At Rocky Flats

Rocky Flats Unable To Meet Target

In a January 2002 draft report to the RFFO, we indicated that Rocky Flats would not be able to meet its May 2002 target date for completing the stabilization and packaging of the plutonium metals and oxides. We estimated that, given the then-current PuSPS operations, only 1,136 of the needed 1,900 containers would be produced by May 31, 2002, and the final container would not be produced until November 2002. Since the issuance of the draft, the PuSPS has produced even fewer containers than originally projected. As a result, we revised our projection and now estimate that, as of May 31, 2002, only 869 containers would be produced. At this rate, the final container will not be produced until March 2003.

Kaiser-Hill had planned to meet the May 2002 target by gradually reaching and then maintaining a production level of eight containers per day. This level was to be achieved by running two eight-hour shifts a day and completing four containers per shift. However, recent reports issued by Kaiser-Hill and GAO identified problems with attaining this level. In a February 2001 *Risk Mitigation Strategy* prepared by Kaiser-Hill project managers, and again in a March 2001 risk management plan, Kaiser-Hill indicated that the PuSPS equipment may not achieve the production rate needed to meet the goal. In addition, GAO stated in its February 2001 report, *Progress Made at Rocky Flats, but Closure by 2006 Is Unlikely, and Costs May Increase,* that Rocky Flats had significant technical problems to overcome in order to successfully operate the stabilizing and packaging system. GAO also expressed concern that Kaiser Hill had no empirical evidence to show that the eight container-per-day production level is within the system's capability.

During our audit, Kaiser-Hill had been able to add a second eight-hour shift as planned, but it had not been able to produce the specified eight containers per day. We concluded that, even if the PuSPS produced eight containers per day, seven days per week, there was not sufficient time remaining for Kaiser-Hill to meet the May 2002 target. In January 2002, Kaiser-Hill started operating the PuSPS in two 10-hour shifts in order to increase its daily output. While there were some immediate increases in daily output, the PuSPS has been unable to produce the targeted 140 containers per month. The average monthly number of containers produced during the 3-month period of January through March 2002 was only 112. In addition, production declined steadily between January and March 2002.

Standards And Expectations

The Secretary of Energy's February 1995 *Implementation Plan for the Remediation of Nuclear Materials in the Defense Nuclear Facilities Complex* (*Implementation Plan*) committed the Department to stabilize and package the plutonium metals and oxides in compliance with the Department's Standard 3013*, Stabilization, Packaging, and Storage of Plutonium-Bearing Materials,* at Rocky Flats by May 2002. The commitment, which was developed as a result of a 1994 Defense Nuclear Facilities Safety Board (Defense Board) report on poor storage practices for special nuclear materials, remained unchanged in the January 2001 update to the *Implementation Plan*.

Expectations for sound management are laid out in the operating contract and regulations. The contract requires a PuSPS production schedule and contingency plan. Also, Department Order 430.1, *Life Cycle Asset Management*, requires assets to be managed according to industry standards. Industry standards for high-risk prototype projects such as the PuSPS include contingency planning. In addition, Kaiser-Hill's *Programmatic Risk Management Plan* and *Project Management Plan* require a contingency plan to mitigate risks for six major closure projects, one of which included the PuSPS.

Need For Production And Contingency Planning

RFFO stated that production delays occurred due to delayed startup of the PuSPS, lower than anticipated production rates, and higher than expected equipment failures. In addition, we also identified several control deficiencies. Specifically, Kaiser-Hill did not develop a detailed, long-term production schedule designed to ensure that the last container would be produced by May 2002. Also, RFFO did not ensure that a contingency plan was prepared to use in the event that production stopped. These actions were essential since the planned PuSPS startup was delayed nearly 3 years.

Prior to January 2002, Kaiser-Hill had only planned operations in the short-term — one or two-week increments — with no long-term outlook toward achieving the May 2002 target. Despite the fact that the stabilization and packaging target date was fast approaching, Kaiser-Hill operated the PuSPS only nine days per two-week period and still had not reached a production level of eight containers per day. While it appeared clear to us by July 2001 that the target would not be met, no decisions were made by management to change the operating schedule until December 2001 and no changes were actually made until January 2002. Our conclusion was based on analysis of the PuSPS production and the existing PuSPS operating schedule.

Further, RFFO did not ensure that Kaiser-Hill prepared a contingency plan for plutonium stabilization and packaging in the event that the PuSPS experiences a catastrophic failure. Kaiser-Hill's February 2001 *Risk Mitigation Strategy* was a first step toward a contingency plan. The document identified various production scenarios and contained recommendations related to each. However, RFFO did not take the opportunity to use Kaiser-Hill's document as a catalyst for developing a contingency plan for the PuSPS. According to the RFFO Project Manager, a contingency plan was not needed, as RFFO already knew what to do if alternative actions are required. However, any significant change from the current plan to package the metals and oxides in containers that meet the Department's Standard 3013 at Rocky Flats would be time-consuming and require coordination with other Department offices.

Closure Costs

Without the completion of the stabilization and packaging process, resources devoted to running the PuSPS cannot be redirected to other aspects of cleanup. A delay would hinder Kaiser-Hill's plan to move significant numbers of trained personnel to other key closure activities, such as building remediation. In addition, until the estimated 1,900 containers are shipped to the Savannah River Site, the protected area cannot be closed and the $3.6 million monthly cost associated with maintaining it will continue. Each missed milestone at Rocky Flats increases the risk of delays to the planned site closure date of December 2006, which could in turn increase final site closure costs.

RECOMMENDATIONS

We recommend that the Manager, Rocky Flats Field Office direct Kaiser-Hill to:

1. Develop a long-term, comprehensive, and detailed schedule to show when production can realistically be completed.

2. Prepare a contingency plan for plutonium stabilization and packaging in the event that the PuSPS experiences a catastrophic failure.

MANAGEMENT REACTION

RFFO management agreed with the finding and recommendations. Management stated that it developed a long-term production schedule for the PuSPS based on 6 months of operational experience. The schedule is to produce 140 containers per month that meet the 3013 Standard, with an estimated date of January 2003 for completion of PuSPS operations. Management also stated that it has implemented extraordinary levels of management oversight to deal with PuSPS contingencies. RFFO believes that its efforts have been, and will continue to be, successful in managing PuSPS operations. Management's verbatim comments are included in the report in Appendix 2.

AUDITOR COMMENTS

Management's comments and actions to date are partially responsive to our recommendations. Clearly, management is striving to increase PuSPS production and to respond to obstacles to both production and shipping of plutonium metals and oxides. These are necessary to package and remove the materials from Rocky Flats. However, management's current monthly production target may not be realistic, and responding to obstacles as they arise constitutes reaction, not advance planning for contingencies.

While Kaiser-Hill has made significant progress in improving the PuSPS production rate, the current production target of 140 containers per month is overly optimistic. Management stated in its comments that the PuSPS has produced 140 containers in one month. Nevertheless, this is not supported by the past three months of production statistics. Specifically, the PuSPS produced 127 containers in January 2002, 113 in February 2002, and 97 in March 2002. Taking the total produced through the end of March 2002, and adding the most recent 3-month average of 112 containers per month, we estimate that the 1,900 containers would not be complete until March 2003. These results, in our view, are sufficient to question whether the PuSPS can produce 140 containers monthly, and whether the January 2003 completion date now cited by RFFO is realistic. In addition, the PuSPS is now operating 20 hours per workday. More realistic monthly production assumptions are needed to accurately forecast completion of production.

Further, while the contingency planning action cited by RFFO in its comments — implementation of an extraordinary level of management oversight — is commendable, intense management oversight cannot take the place of a workable contingency plan in preparing Rocky Flats for the possibility of PuSPS failure.

Appendix 1

SCOPE

The audit was performed at Rocky Flats and the Oakland Operations Office between May 2001 and March 2002. The audit covered the period from the inception of the contract for the PuSPS through March 2002.

METHODOLOGY

To accomplish the audit objective we:

- Reviewed the contract for the PuSPS;
- Determined the production levels of the PuSPS and compared them to the performance specifications required by the contract;
- Interviewed RFFO, Kaiser-Hill, and Department Headquarters personnel;
- Interviewed personnel from the Savannah River Site, the Hanford Site, Argonne National Laboratory-West, and Los Alamos National Laboratory;
- Interviewed the Chairman of the Defense Board;
- Reviewed the Rocky Flats Closure Project Baseline;
- Reviewed Department Orders regarding project management and approval; and,
- Reviewed prior GAO reports.

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. In addition, we reviewed RFFO's performance measure for site closure by December 2006 in accordance with the *Government Performance and Results Act of 1993*. 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. We did not conduct a reliability assessment of computer-processed data because we did not rely upon such data during the audit. The exit conference was held with RFFO management on April 11, 2002.

RFO F 1325.8

United States Government **Department of Energy**
Rocky Flats Field Office

memorandum

DATE: MAR 0 8 2002

REPLY TO ATTN OF: AMP:FC/WM:DAH:02-00277

SUBJECT: Office of Inspector General Draft Audit Report on "The Plutonium Stabilization and Packaging System at the Rocky Flats Environmental Technology Site"

TO: William S. Maharay, Assistant Inspector General for Audit Services, Office of Inspector General

This memorandum is to provide comments to the report titled "Draft Report on 'The Stabilization and Packaging System at the Rocky Flats Environmental Technology Site" (Site). The Rocky Flats Field Office (RFFO) and the Department of Energy Headquarters (DOE-HQ) have reviewed the draft report and concurs with the report's conclusion. This report concluded the Site will not be able to stabilize and package all plutonium metals and oxides before the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-1 Milestone of May 31, 2002. The RFFO reached the same conclusion in an assessment report, issued on October 31, 2001, and on December 27, 2001, provided notification to DOE-HQ that the milestone would be missed. Discussion regarding the draft report's two recommendations is provided below.

- Recommendation No. 1: Develop a long term, comprehensive, and detailed schedule to show when production can be completed.

  Discussion: The RFFO concurs with the need for a production schedule and has already established a viable plan based on approximately six months of operational experience with the Plutonium Stabilization and Packaging System (PuSPS). This production schedule was presented to the Assistant Secretary for Environmental Management on December 3, 2001. According to the plan, K-H is committed to producing a total of 140 3013 containers each month through the PuSPS. Recent performance of the PuSPS indicates that this production rate is reasonable with a total of 127 3013 containers produced during the month of January 2002. There were 42 containers produced during the week of February 25, 2002, exceeding planned production levels. The production plan projects completion of PuSPS operations by January 2003.

- Recommendation No. 2: Prepare a contingency plan to supplement PuSPS production or otherwise replace the PuSPS process in the event that the PuSPS does not achieve the assumed production rate.

  Discussion: The RFFO concurs with the need for contingency planning and as a result, the Site has implemented extraordinary levels of management oversight to aggressively ensure that production levels are met and actions identified in risk mitigation plans are closed. These contingency efforts have been effective and the PuSPS operation has currently achieved planned production levels of 140 containers per month. There is a continuing challenge of maintaining the production levels that have been reached, and the same methods that have been effective to date to achieve production levels at the Site

are being employed to retain those levels. The Department has determined that completion of PuSPS operations for all the Rocky Flats metal and oxides provides the best path forward to support Site Closure by December 2006.

I appreciate your concern regarding our ability to meet our DNFSB commitments. Specific comments on your report are included in the attachment. If you have any questions please contact me at 303-966-2025 or Dave Hicks of my staff at 303-966-3122.

Barbara A. Mazurowski

Barbara A. Mazurowski,
Manager

cc:
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Appendix 3

RELATED GENERAL ACCOUNTING OFFICE REPORTS

- *NUCLEAR CLEANUP: Progress made at Rocky Flats, but Closure by 2006 Is Unlikely, and Costs May Increase*, (GAO-01-284, February 2001). To close Rocky Flats on time and within budget, Kaiser-Hill and the Department must overcome major challenges, including getting the automated plutonium-packaging system to reliably perform at the rate needed for timely completion. Once the system begins operations, it is unclear whether it can sustain the needed production rate to allow the site's closure by the target date. Kaiser-Hill officials believed the PuSPS could produce one container every 2 hours of operation or eight containers per day during two 8-hour shifts, but had no empirical evidence to support this view.

- *DEPARTMENT OF ENERGY: Accelerated Closure of Rocky Flats: Status and Obstacles*, (GAO/RCED-99-100, April 1999). The site is now planning to accelerate the stabilization, packaging, and shipment of its plutonium metals and oxides by 2 years. The site expects to complete these tasks by May 2002. However, as the GAO reported in April 1998, the site has encountered problems--including difficulties in procuring an automated plutonium stabilization and packaging system--that have delayed its progress and increased costs.

- *DEPARTMENT OF ENERGY: Problems and Progress in Managing Plutonium*, (GAO/RCED-98-68, April 1998). Although the Department has made some progress in stabilizing its plutonium, the Department is unlikely to meet its May 2002 target date to have its plutonium that is not in pits stabilized, packaged, and stored. The Department's sites with most of this plutonium have experienced many delays and expect more in meeting their implementation plan milestones.

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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.

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