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

Audit Report

Transuranic Waste Management at Los Alamos National Laboratory

DOE/IG-0673

February 2005

31641





Department of Energy

Washington, DC 20585

February 10, 2005

MEMORANDUM FOR THE SECRETARY

FROM:


Gregory H. Friedman
Inspector General

SUBJECT:

INFORMATION: Audit Report on "Transuranic Waste Management at Los Alamos National Laboratory"

BACKGROUND

Los Alamos National Laboratory (Los Alamos), one of the Department of Energy's nuclear weapons laboratories, is operated by the University of California for the Department's National Nuclear Security Administration. Activities at Los Alamos, such as nuclear weapons component fabrication and plutonium processing, generate significant quantities of transuranic waste. Federal environmental regulations require the Department to characterize, certify, and dispose of wastes generated by on-going processes, as well as waste in storage generated from legacy weapons-related activities. In 2002, to reduce the health and safety risks associated with on-site storage of the waste, the Department, the State of New Mexico, and the U.S. Environmental Protection Agency signed a Letter of Intent to expedite existing environmental cleanup efforts at Los Alamos, in part, by accelerating the disposal of over 40,000 drums of legacy transuranic waste. Specifically, the Department committed to removing all legacy *high-risk* transuranic waste by December 2004, and the remaining legacy transuranic waste by 2010. Since 1997, the Department has spent about \$350 million on Los Alamos transuranic waste disposal activities. Additional expenditures of about \$370 million will be needed to finish removing such waste from the site.

The objective of this audit was to determine whether the Department was on schedule to meet its transuranic waste disposal commitments.

RESULTS OF AUDIT

The Department will not meet its commitments for removing transuranic waste from Los Alamos. Based on current projections, the Department will complete removal of all *high-risk* waste in October 2005, at the earliest, and we estimate is unlikely to complete removal of the legacy transuranic waste before 2014 – four years beyond the commitment date. The Department will not meet the accelerated waste disposal goals because Los Alamos had not consistently followed approved waste processing procedures. We noted that the July 2004 Laboratory site-wide stand down contributed to its inability to meet the accelerated schedule. Further, Los Alamos had planned to meet the accelerated schedule by using mobile waste processing equipment provided by the Department; however, the



Department did not supply the equipment because of its' concern regarding the Laboratory's ability to use the equipment in a timely manner. The lack of progress in disposition efforts prevented Los Alamos from expeditiously reducing the health and safety risk posed by the continued aboveground storage of transuranic waste. While employee and community health and safety are primary considerations in this effort, project cost increases associated with the delayed completion schedule are also of concern because of their impact on other important clean-up efforts in the Department. In this regard, we concluded that unless the Department accelerates processing rates, the total cost of completing the waste disposition project could increase by over \$70 million.

As discussed in our recent audit, *The Stabilization of Nuclear Materials at Los Alamos National Laboratory* (DOE/IG-0659, August 2004), problems associated with meeting project milestones are not unique to transuranic waste disposal. While the Department has committed to reducing risks and accelerating the pace of cleanup at Los Alamos, continued vigilance is necessary to ensure that the Department's workforce, members of the public, and the environment are protected from harm. Consequently, we recommended that the Assistant Secretary for Environmental Management take specific action to increase transuranic waste processing rates; update the waste disposition baseline to reflect operating conditions and resource allocations; and notify stakeholders of any changes in the schedule for achieving transuranic waste disposal commitments.

MANAGEMENT REACTION

The Assistant Secretary for Environmental Management generally concurred with our recommendations. Management stated that Los Alamos is working to re-baseline the waste disposal program in FY 2005, and that once accomplished, stakeholders will be notified of the Department's schedule. Management also contended it was too soon to conclude that the Department would not meet the 2010 waste disposal commitment.

Our position on not meeting the 2010 commitment date is supported by the fact that, by its own admission, in October 2004, Los Alamos reported that the transuranic waste disposition project was, at that time, about two years behind schedule. Further, the two-year schedule delay did not take into account the fact that Los Alamos would have to characterize 19,000 drums of waste that it had assumed would be characterized using the Department's mobile characterization equipment, which was not provided as planned. In response to another issue raised by Environmental Management, we revised our report to show that the Department did not provide characterization equipment to Los Alamos because of the Department's conclusion that Los Alamos was unable to use the equipment in a timely manner.

Management's comments are provided in their entirety in Appendix 4.

Attachment

cc: Under Secretary for Energy, Science and Environment
Administrator, National Nuclear Security Administration
Assistant Secretary for Environmental Management

REPORT ON TRANSURANIC WASTE MANAGEMENT AT LOS ALAMOS NATIONAL
LABORATORY

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Legacy Transuranic Waste Disposal

Background

Los Alamos National Laboratory (Los Alamos) has been involved in the development, production, and maintenance of the Nation's nuclear weapons stockpile for over six decades. Research, development, and fabrication of weapons components produced a massive quantity of waste material, including over 40,000 drums of transuranic waste. This waste is composed primarily of protective clothing, tools, equipment, and sludges contaminated with manmade radioactive elements such as plutonium. Materials contaminated with transuranic elements pose health and safety risks that require storage and disposal in highly regulated facilities, such as the Waste Isolation Pilot Project (WIPP).

The process to dispose of Los Alamos' transuranic waste inventory at WIPP involves three stages. First, waste is characterized to ensure it meets the waste acceptance criteria for WIPP. Second, data generated by the characterization process is reviewed and the waste is certified for disposal. Finally, certified waste is shipped to WIPP for burial. Appendix 2 provides several photographs depicting transuranic waste drums during storage, characterization, and shipment.

Schedule Delays

Based on current projections, the Department of Energy (Department) will not meet its transuranic waste disposal commitments at Los Alamos. Specifically, the Department was unable to satisfy its agreement to remove all high-risk transuranic waste by December 2004. In addition, we estimated that the Department is unlikely to complete removal of the remaining legacy transuranic waste stored at the site until at least 2014 – four years beyond its original 2010 commitment.

High-Risk Transuranic Waste

In its May 2002 agreement with the State of New Mexico and the Environmental Protection Agency, the Department committed to removing all high-risk transuranic waste from Los Alamos by December 2004. However, as of November 2004, only 168 of 2,300 high-risk waste drums had been shipped to WIPP for disposal. Los Alamos stopped characterizing, certifying, and shipping transuranic waste in October 2003, and does not plan to resume shipping high-risk waste until April 2005. Los Alamos does not anticipate completing the high-risk waste disposal project until October 2005 – about 10-months behind schedule.

Legacy Transuranic Waste

The Department is also not on schedule to complete removing the remaining legacy transuranic waste from the site by 2010. To meet Los Alamos' accelerated disposition baseline goals, about 6,500 drums of legacy transuranic waste should have been characterized and shipped to WIPP in Fiscal Years (FYs) 2003 and 2004. However, we observed that only 1,360 drums of transuranic waste were actually removed from Los Alamos during that period. In May 2004, Los Alamos estimated that the project's completion date had slipped by about 13 months. The schedule slippage continued to grow and by September 2004, it had increased to about two years, to 2012. Based on our analysis of Los Alamos' past performance problems, waste processing and shipping rates, and current operating conditions, we concluded that the legacy transuranic waste disposition project would slip beyond the 2012 estimate, to at least 2014.

Operating Issues And Supplemental Capacity

The Department will not meet its transuranic waste disposal commitments because Los Alamos did not adhere to waste certification requirements. In addition, the Department did not supply anticipated mobile waste processing equipment necessary to achieve the accelerated waste disposal commitments.

Operating Issues

Los Alamos personnel did not consistently follow approved waste certification procedures when processing transuranic waste. We noted that Los Alamos suspended transuranic waste characterization in October 2003 – effectively halting all waste disposal activities – because of adverse findings from a quality assurance review conducted by the Carlsbad Field Office (Carlsbad). The review concluded that personnel did not properly calibrate equipment used to characterize waste. Consequently, Los Alamos could not demonstrate that all waste drums met the disposal requirements of WIPP. Carlsbad found that 98 drums of transuranic waste had been sent to the WIPP even though they were not properly certified for shipment and disposal. In addition to that quality assurance review, statistics maintained by Carlsbad indicated that about one half of the transuranic waste shipments made by Los Alamos since 1999 had issues related to work quality or procedural compliance.

We concluded that Los Alamos' rapid scale-up of waste operations may have resulted in operational breakdowns. For example, in the five years prior to the October 2003 work suspension, Los Alamos

only characterized, certified, and shipped a total of 1,589 drums of transuranic waste. When Los Alamos attempted to increase shipping rates to 2,000 drums in a single year, operating procedures failed. While Los Alamos revised its procedures and retrained its personnel during the period from October 2003 through January 2004, the benefits of these actions were not fully realized because the Department required that uniform waste standards be employed for transuranic waste processing. Specifically, in February 2004, the Department directed Los Alamos to implement waste characterization and certification procedures developed by Carlsbad. Los Alamos finished implementing the new procedures and resumed full characterization of waste in July 2004.

Although not related to waste processing activities, Los Alamos' ability to meet the accelerated waste disposal goals were further impacted by a site-wide operational stand down. In particular, transuranic waste operations were suspended again on July 16, 2004. This shutdown was caused by security and safety issues, and was not controllable by officials charged with completing the transuranic waste disposal project. In September 2004, Los Alamos estimated that it would not resume characterizing waste until October 2004, certifying waste for disposal until January 2005, and shipping waste to WIPP for disposal until March 2005. However, in November 2004, Los Alamos estimated it would not resume waste shipments until late April 2005.

Supplemental Capacity

Overall schedule slippages grew when the Department did not supplement Los Alamos' waste characterization capacity as expected. A key component of Los Alamos' acceleration strategy was the Department providing two mobile waste characterization lines. These lines were expected to allow Los Alamos to nearly double its waste characterization capacity. Using assumptions from the Department's cleanup performance management plans, Los Alamos developed a baseline for meeting the accelerated transuranic waste disposal commitments in October 2003.

The baseline assumed the Department would augment Los Alamos' transuranic waste processing capabilities in 2003 by deploying two mobile waste characterization lines. Los Alamos assumed that the Department's mobile characterization equipment would process nearly half, about 19,000 drums, of the transuranic waste

inventory. However, the Department elected to deploy these resources to other sites. Officials from the Office of Environmental Management stated that a mobile real-time radiography unit was provided to Los Alamos to aid in the waste characterization process. However, Los Alamos' inability to utilize the equipment in a timely manner resulted in the decision to re-deploy the mobile processing equipment to sites that could more effectively utilize these resources.

Risks, Costs, and Delays

Unless the Department acts to increase waste throughput at Los Alamos, it will not be able to satisfy its goal of reducing the risk posed by the continued aboveground storage of transuranic waste. The May 2000 Cerro Grande fire and the September 11, 2001, terrorist attacks heightened the Department's awareness that aboveground waste storage facilities are vulnerable to releases and dispersal of radioactive material. Due to its close proximity to Los Alamos' transuranic waste storage area, the town of White Rock, New Mexico, will continue to be at an increased risk until the Department finishes disposing of its high-risk transuranic waste.

Without additional action, the Department may be unable to prevent the recurrence of unnecessary costs and a significant overall cost growth for the project. For example, the Department incurred over \$23 million in costs during FY 2004 to correct problems caused by Los Alamos' failure to follow waste certification procedures and the site-wide operational stand down. Additional efforts to increase the throughput of transuranic waste processing lines at Los Alamos may also help the Department reduce or eliminate the estimated \$72 million cost increase associated with completing the project four years beyond the original commitment.

RECOMMENDATIONS

We recommend that the Assistant Secretary for Environmental Management, in conjunction with the Administrator, National Nuclear Security Administration:

1. Reevaluate transuranic waste characterization capabilities at Los Alamos, mobile characterization equipment deployment priorities, and based on resulting information, take action to recover schedule slippages;
2. Update Los Alamos' waste disposition baseline to reflect actual operating capabilities and resource allocations; and,

-
3. Notify stakeholders of any changes in the schedule for meeting the Department's Letter of Intent commitments following the completion of recommendations 1 and 2.

**MANAGEMENT
REACTION**

The Assistant Secretary for Environmental Management concurred with recommendations 1 and 2. Management initially non-concurred with recommendation 3, stating that Los Alamos is working to re-baseline the waste disposal program in FY 2005. Once that is accomplished, all stakeholders will be notified of the Department's schedule. Management also believed it was too soon to conclude the Department would not meet the 2010 waste disposal commitment, and did not agree that the lack of waste characterization equipment contributed to schedule delays. The corrective actions planned by management include a review of the waste disposition baseline and the development of a recovery plan to improve the transuranic waste management program at Los Alamos. Management's comments are shown in their entirety in Appendix 4.

**AUDITOR
RESPONSE**

Management's comments were responsive to recommendations 1 and 2. We modified recommendation 3 to be consistent with management's comments. However, we continue to believe that our conclusions regarding the Department's ability to meet the 2010 commitment date and the schedule impacts of the capacity constraints discussed in this report are valid. For example, Los Alamos' October 15, 2004, project management report indicated that the transuranic waste disposition project was already about two years behind schedule. Further, that two-year schedule delay did not take into account the fact that Los Alamos would have to characterize the 19,000 drums it assumed the Department's mobile characterization equipment would process. Finally, we noted that the schedule for the high-risk transuranic waste disposal project slipped again following the issuance of this report in draft for management comment in December 2004. According to information obtained from the Defense Nuclear Facilities Safety Board, Los Alamos does not plan to resume shipping high-risk waste until May 2005, a delay of another month, and believes that only about 40 percent of the waste shipments planned for FY 2005 can be realistically achieved.

Appendix 1

OBJECTIVE	The objective of the audit was to determine whether the Department was on schedule to meet its transuranic waste disposal commitments at Los Alamos National Laboratory.
SCOPE	We conducted the audit from April 2004 through September 2004, at Los Alamos National Laboratory in Los Alamos, New Mexico; the Carlsbad Field Office in Carlsbad, New Mexico; and, the Office of Environmental Management in Washington, DC. The scope of the audit covered activities related to the characterization, certification, and shipment of transuranic waste from Los Alamos National Laboratory from 1997 through 2010.
METHODOLOGY	<p>To accomplish the audit objective, we:</p> <ul style="list-style-type: none">• Analyzed the Department's Transuranic Waste Performance Management Plan, the Performance Management Plan for Accelerating Cleanup at Los Alamos National Laboratory, and Los Alamos' accelerated waste disposition baseline;• Analyzed the Department's Letter of Intent for reducing risk and accelerating the pace of environmental cleanup in the State of New Mexico;• Discussed transuranic waste disposition activities with officials from the Department and Los Alamos;• Analyzed the current operating environment to determine the impact of actual and projected slippages; and,• Calculated schedule delays and cost impacts associated with the Department's accelerated waste disposition project at Los Alamos.

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 significant internal controls related to Los Alamos' transuranic waste disposition project. 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 also did not assess the reliability of computer-processed data because only a limited amount of computer-processed data was used during the audit.

Appendix 1 (continued)

Finally, we assessed the Department's compliance with the Government Performance and Results Act of 1993. We found that the Department established performance measures to evaluate its transuranic waste disposal efforts. However, the Department's FY 2004 Performance and Accountability Report stated that Los Alamos was able to resume waste shipments in the third quarter of FY 2004 and that the Office of Environmental Management's legacy transuranic waste disposition project was still on track for completion by FY 2010. As of November 2004, Los Alamos had not resumed transuranic waste shipments, and as discussed in this report, the project is not on schedule.

An exit conference was held with the Office of Environmental Management on February 4, 2005.

Appendix 2

TRANSURANIC WASTE STORAGE, CHARACTERIZATION, AND SHIPMENT

The photographs below are provided to aid readers in developing a better understanding of transuranic waste disposition activities at Los Alamos.

The first two photographs show how transuranic waste drums are stored at Los Alamos.



Appendix 2 (continued)



The photograph to the left shows the contents of a waste drum being characterized via real-time radiography. Los Alamos runs its waste drums through this process to ensure that the drums do not contain items prohibited from disposal at WIPP.

The last picture shows how transuranic waste shipments are configured for transportation to WIPP near Carlsbad, New Mexico. Each of the 3 transportation containers shown can hold up to 14 drums of waste.



PRIOR REPORTS

- *The Stabilization of Nuclear Materials at Los Alamos National Laboratory* (DOE/IG-0659, August 2004), found that although the Department had made some progress in stabilizing the most hazardous fissionable materials, stabilization had not been accelerated to the level anticipated. The Department missed interim milestones and project tasks, which may further delay stabilization and increase risk that stabilization will not be completed by 2010. Delays occurred because (1) the Department had not fully funded the stabilization effort at Los Alamos; (2) Los Alamos had not made full use of available project management tools; and (3) performance measures and incentives were not incorporated into the Los Alamos contract.
- *Transuranic Waste Retrieval and Processing at the Hanford Site* (DOE/IG-0624, October 2003), found that the Department faces significant challenges retrieving and processing transuranic waste. The Waste Retrieval and Processing facility operated at significantly less than full capacity. The facility was designed to receive and process up to 3,400 containers of transuranic waste and 3,400 containers of low-level waste annually. However, in its first 4 years of operation, the facility processed an average of less than 1,300 containers of transuranic waste per year, and processing for FY 2003 was expected to increase only slightly. The Department's milestones were in jeopardy because Richland had not placed sufficient emphasis on retrieving and processing projects or developed what we considered to be an achievable transuranic waste retrieval plan. Similarly the Department had not performed a comprehensive study to determine achievable retrieval rates and optimal processing levels needed to meet, at a minimum cost, regulatory milestones and cleanup goals.

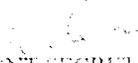


Department of Energy

Washington, DC 20585

January 15, 2009

MEMORANDUM FOR RICKEY R. HASS
ASSISTANT INSPECTOR GENERAL FOR
AUDIT OPERATIONS

FROM: PAUL M. GOLAN 
ACTING ASSISTANT SECRETARY FOR
ENVIRONMENTAL MANAGEMENT

SUBJECT: RESPONSE TO OFFICE OF INSPECTOR GENERAL ON DRAFT
AUDIT REPORT ENTITLED "TRANSURANIC WASTE
MANAGEMENT AT LOS ALAMOS NATIONAL LABORATORY
(LANL)"

The purpose of this memorandum is to respond to your draft report on transuranic (TRU) waste management activities at Los Alamos National Laboratory (LANL). The following are comments regarding the draft report and recommendations presented.

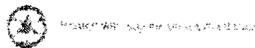
Report Comments:

On page 1 of the report, under "Schedule Delays," the Office of Environmental Management (EM) and the National Nuclear Security Administration (NNSA) believe that it is too early to state that we cannot meet the 2010 commitment, as there are some opportunities that have not been fully explored, which could result in the recovery of schedule and some dollars if they come to fruition. For example, we have some authorization basis issues that may have opportunities to improve operations. TRU retrieval is an area that could benefit from process improvements that could substantially increase throughput. Additionally, there are lessons learned from other sites that may be pertinent to LANL TRU waste management operations. Given these opportunities, it is too early to say *"the Department is unlikely to complete removal of the remaining legacy transuranic waste stored at the site until at least 2014 - four years beyond its original 2010 commitment"*

On page 2, under "Operating Issues and Supplemental Capacity," we disagree with the statement that alleges partial culpability for the failure of LANL to meet the TRU waste shipping goals on:

"...the Department did not supply anticipated mobile waste processing equipment necessary to achieve the accelerated waste disposal commitments."

The failure of LANL to meet the shipping goals is not due to a lack of equipment availability. LANL waste characterization operations lost TRU waste site certification due to quality and regulatory issues that occurred over a year-long period. These issues were significant, as formally documented in audit reports, and were of concern to the Waste Isolation Pilot Plant's



Appendix 4 (continued)

(WIPP) regulators as well as the Department. When the site-wide operational stand-down at LANL occurred, LANL's ability to complete the numerous corrective actions needed to regain certification was impaired. The primary cause of LANL failing to meet their shipping goals was because of loss of certification, not due to equipment availability as suggested by the report.

Comments on Recommendations:

1. *Re-evaluate TRU waste characterization capabilities at LANL, mobile characterization equipment deployment priorities, and based on resulting information, take action to recover schedule slippages.*

EM and NNSA agree with this recommendation. EM and NNSA will work together to develop a recovery plan to address Recommendations 1 and 2 to improve the TRU program and shipping schedules.

2. *Update LANL's waste disposition baseline to reflect actual operating capabilities and resource allocations.*

EM and NNSA agree. A joint EM and NNSA review of the waste disposition baseline is scheduled to begin in January 2005. This effort will reflect a more accurate forecasted completion date and anticipated budget requirement for the program.

3. *Notify stakeholders of the delays associated with meeting the Department's Letter of Intent commitments.*

We do not concur with this recommendation. Although we are currently behind the Quick-To-WIPP high activity operations, we believe we can do significantly more in later years to recover the schedule. The Laboratory is working to re-baseline the TRU program in FY 2005. Once that is accomplished, all stakeholders will be notified of the Department's schedule.

Finally, with the Laboratory contract being re-competed, it is possible that there will be an opportunity to accelerate cleanup schedules; however, it is too early to speculate on this.

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

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