DOE/IG-0490

AUDIT REPORT

CONTAINERS SUITABLE FOR SHIPPING FISSILE MATERIAL

NOVEMBER 2000

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

November 28, 2000

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman (Signed)
Inspector General

SUBJECT: INFORMATION: Audit Report on "Containers Suitable for Shipping Fissile Material"

BACKGROUND

As a result of its weapons program activities, the Department of Energy (Department) has a significant inventory of surplus fissile materials. Within the Department, the National Nuclear Security Administration and the Office of Environmental Management are responsible for managing this inventory, including its protection and disposal. To accomplish these objectives, the Department has established a program to ship the fissile materials, including surplus pits and plutonium metals, oxides, fluorides, and residues, from several Department facilities to a final designated disposition location. The various fissile materials are to be shipped in Type B containers certified by the Department or the Nuclear Regulatory Commission, or under an exemption as duly granted by the appropriate Federal agency. The objective of this audit was to determine whether the Department has containers suitable for shipping its surplus fissile material.

RESULTS OF AUDIT

In January 2000, the Department announced that the Savannah River Site had been selected as the site for plutonium disposition facilities. This decision confirmed the need to ship surplus pits in large quantities from the Pantex Plant to Savannah River. Although the Department had some suitable shipping containers, it did not have a sufficient number to meet its anticipated mission of shipping surplus pits. Further, the Department had not certified containers needed to ship the different types of surplus fissile materials from the Rocky Flats Environmental Technology Site to the Savannah River Site. Based on the results of the audit, it is our view that these conditions exist because container activities at the Department were not appropriately managed and integrated over the past eight years. Specifically, there was no central source of container information for designers, users, and regulators; and, a formal needs assessment, to identify and prioritize emerging shipping container needs, was not completed. As a result, significant amounts of surplus fissile material cannot be shipped even though the Department had spent or committed to spend about $18.5 million related to its container activities.

We recognize the complexity of the policy and technology issues related to packaging and shipping surplus fissile materials. However, given the history of the Department's container activities, including the expenditure of millions of dollars to date and, the likelihood of significant additional expenditures, the Department should improve coordination of its container activities to ensure there is an adequate number of containers to meet the anticipated shipping rates. Therefore, the report includes recommendations for actions designed to better coordinate the Department's container activities.

MANAGEMENT REACTION

Management concurred and proposed actions to address the recommendations.

Attachment

cc: Deputy Secretary
Under Secretary for Energy, Science and Environment
Under Secretary for Nuclear Security/Administrator for Nuclear Security

CONTAINERS SUITABLE FOR SHIPPING FISSILE MATERIAL

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Overview

INTRODUCTION AND OBJECTIVE

Since the end of the Cold War, the United States has not produced any nuclear weapons. Instead, it is dismantling large numbers of weapons as well as closing some production sites. Consequently, the Department of Energy (DOE) has to dispose of surplus weapons-related fissile material, such as pits and plutonium metals, oxides, fluorides, and residues, that is, the byproducts of weapons production (surplus fissile materials). These surplus fissile materials are located at several DOE sites. For example, pits are located primarily at the Pantex Plant (Pantex), and other surplus fissile materials are located throughout the complex. DOE plans to ship much of its surplus fissile materials to various locations for final disposition.

To achieve final disposition, DOE must have certified Type B containers (containers) for shipping surplus fissile material. The offices involved in identifying container needs and certifying containers (container activities) are DOE's Office of Environmental Management (EM) and the National Nuclear Security Administration's[1] (NNSA) Offices of Defense Programs (DP) and Defense Nuclear Nonproliferation (NN). The objective of this audit was to determine if DOE has containers suitable for shipping its surplus fissile material.

CONCLUSIONS AND OBSERVATIONS

DOE did not have sufficient numbers of containers ready to ship all the different types of its surplus fissile material from various sites to the Savannah River Site (Savannah River). This occurred because DOE did not effectively integrate and manage its shipping container activities. Since Fiscal Year (FY) 1998, DOE has spent or committed to spend about $18.5 million related to its container activities, but still does not have sufficient numbers of containers to ship surplus fissile materials to Savannah River.

Other container coordination problems were identified in an October 1995 report issued by the Office of Inspector General entitled *The Department of Energy's Transportation Accident Resistant Container Program,* DOE/IG-0380. The audit concluded that DOE spent $29 million to build containers for the Air Force that were not wanted. This occurred because DOE did not coordinate the need for the containers with the user prior to incurring production costs.

[1] The National Defense Authorization Act for Fiscal Year 2000, Public Law 106-65, established a semi-autonomous agency within DOE, the National Nuclear Security Administration (NNSA). The NNSA began operations March 1, 2000. It is comprised of the former DOE Offices of Defense Programs, Nonproliferation and National Security, Fissile Materials Disposition, and Naval Reactors.

In June 2000, DOE recognized the need for a centralized and coordinated approach in its *Integrated Nuclear Materials Management Plan*. This Plan stated that "transportation planning must be coordinated across programs and sites," and that "increased integration is needed for the design, certification, procurement, and management of shipping containers."

In our opinion, the matters discussed in this report should be considered by management when preparing its yearend assurance memorandum on internal controls.

(Signed)
Office of Inspector General

Shipping Containers

Container Activities

DOE's weapon-related container activities have not produced sufficient numbers of a container suitable for shipping surplus pits from Pantex to Savannah River. In addition, EM activities have not provided a container that is certified to ship all the different types of the other surplus fissile material from the Rocky Flats Environmental Technology Site (Rocky Flats) to Savannah River.

Pit Containers

DOE does not have sufficient numbers of suitable shipping containers to meet the anticipated shipping rates of surplus pits from Pantex to Savannah River. In 1992, DOE identified the need for a shipping and storage container for its pits that would provide a non-corrosive environment for storage while simultaneously serving as a certified shipping container. The container selected to meet this need was the AT-400A. Initially, DOE anticipated that thousands of pits would be packaged in these containers between 1995 and 2000. In 1998, after encountering problems with the design and high costs of the container, DOE terminated the effort. The General Accounting Office (GAO) reported on these problems in *Progress and Problems in Managing Plutonium*, GAO/RCED-98-68, April 1998. The report stated that after 5 years and nearly $50 million in cost, DOE could only package 5 percent of its pits in the containers. In fact, DOE only packaged 18 of its pits in AT-400A containers before terminating the project.

To ensure the timely and cost-effective resolution of the wide range of issues surrounding pit storage, DOE prepared and implemented the *Integrated Pit Storage Program Plan*. This Plan, dated October 1998, evaluated several options, but to also be conservative, it assumed that all of the surplus pits would be shipped to a disassembly and conversion facility at a location other than Pantex. As a result of the life cycle analysis, DOE ascertained that the implementation of a sealed insert option coupled with the acquisition of a new shipping container would be significantly faster and more cost-effective than completion of the AT-400A program. Therefore, DOE stopped production of the AT-400A and decided to use the newly designed and approved AL-R8 Sealed Insert (AL-R8/SI) storage container described in the Plan. This single purpose container would be used to store pits at Pantex but could not be used for shipping.

DOE is currently packaging pits in the single-purpose AL-R8/SI containers, an activity that will not be complete until 2004. DOE originally anticipated having all pits packaged in a dual-purpose container by 2000, yet management stated that it did not have a mission

to ship pits to a disassembly and conversion facility until January 2000. Management, however, had a staff level working group that was formed in May 1999 to assist Headquarters in the evaluation of pit container alternatives and selection of a generic pit-shipping configuration. This working group issued its final report in October 1999 and now, DOE plans to have a shipping container for pits designed, approved, and ready for use by 2005.

Other Fissile Material Containers

Likewise, DOE does not have suitable shipping containers to transport some of its surplus oxides, fluorides, and residues from Rocky Flats to Savannah River. DOE had planned to use two shipping containers, the SAFKEG and the 9975, to ship its surplus fissile material. But neither of these containers had the necessary certification for shipment of these materials.

DOE decided to use the DP sponsored SAFKEG container for the shipment of oxides. Certification of this container was requested in 1994, a process EM stated should take two years. The container, however, was still not certified at the time of our audit. Thus, it could not be used to ship these materials to Savannah River.

Rocky Flats has also experienced certification problems with the EM sponsored 9975 container. This container, developed at Savannah River, was not certified to ship residues. In order to use this container, DOE had to have it certified for this purpose. Rocky Flats assumed that certification would be obtained by August 1998, and based on this assumption, Rocky Flats began to prepare its residues for shipment in the 9975 container. However, the Savannah River Operations Office did not prepare the application for certification until August 1999. Further, the application was never submitted. This precluded the possibility of obtaining certification to ship the residues as planned.

In September 1999, after considering other factors in addition to the shipping container certification issue, DOE decided to send the Rocky Flats residues to the Waste Isolation Pilot Plant (WIPP). This change required that the material be blended in order to meet WIPP waste acceptance criteria, repackaged, and placed into drums that fit into the TRUPACT-II container. Similarly, DOE is considering blending its fluorides so that they also can be shipped to WIPP. This is being considered at least in part because Rocky Flats does not have a certified shipping container for these fluorides. Again, DOE did not successfully achieve its goals because no specific office was responsible for assuring the certification of containers.

In discussion of our audit, management stated that during the past few years Rocky Flats revised its priority to focus on getting 9975 shipping containers certified for the shipment of oxides instead of SAFKEG containers. According to management, the current projected schedule is to have a certificate issued for oxides in April 2001. Management further stated that technical issues, as well as a lack of coordination, contributed to the certification problems.

Guidance

While detailed procedures do not exist within DOE covering container activities, various documents including Office of Management and Budget (OMB) Circulars and DOE Orders exist and provide useful programmatic guidance. For instance, OMB Circular A-123, *Management Accountability and Control*, states that government resources are to be used efficiently and effectively to achieve intended program results. In this case, containers are needed to ship fissile materials for final disposition and storing such materials in a safe manner. Thus, container activities would be effective when they had produced usable, certified containers to support the plutonium disposition mission of DOE.

Additionally, DOE Order 430.1A, *Life Cycle Asset Management*, states effective management practices must include requirements such as identification of project technical and organizational interfaces, as well as integration with other projects and activities. Therefore, container activities should be managed in a way to promote integration and coordination with other DOE projects like site closure and surplus material disposition in order to realize effective management practices.

DOE Order 460.2, *Departmental Materials Transportation and Packaging Management*, establishes DOE policies and requirements for materials transportation and container operations. This Order requires that information on various aspects of containers such as those in inventory, new container needs, and containers under development are included in the DOE *Packaging Management Plan*. Further, the Order requires that formal needs assessments be performed to identify and prioritize emerging transportation and container needs, and that a catalog of available containers be maintained.

Management Of Container Activities

Container activities were not successful because DOE did not sufficiently integrate and manage its container activities. It did not develop the DOE *Packaging Management Plan* required by DOE Order 460.2, for its containers. This Plan could have centralized information and facilitated integration to improve management of DOE's container needs. DOE's field elements did not submit information on all of the containers in inventory, new container needs,

and containers under development. Further, DOE has not completed a formal needs assessment on all containers. This assessment would have identified and prioritized emerging shipping container needs. DOE also has not established a catalog of containers. Thus, there is no central source of container information for designers, users, and regulators.

Most recently, a lack of coordination can be seen in the PC-2 container effort undertaken by Los Alamos National Laboratory (Los Alamos). Its efforts, which had not been coordinated with DOE, cost $171,000 and progressed to the point of having a prototype. Since DOE had not authorized the project, it directed Los Alamos to stop work on the container.

Problems with coordination were a direct result of not having an integrated approach to container activities. The offices involved in these activities fall under different organizations. During the audit, the need for a centralized approach was also recognized in DP's memo dated February 8, 2000, to the Manager of the Albuquerque Operations Office (Albuquerque). This memo pointed out that having a single manager responsible for shipping and storage requirements would result in management efficiencies for DP activities.

The FY 2001 draft of the Stockpile Stewardship Plan echoed the same point about the need for management of container activities. It stated:

> "Currently there are numerous, unconnected container initiatives throughout the Department weapons complex. There is a need for a single container management plan to assure that funding allocation and use are not applied to misdirected, locally driven projects that possibly conflict with mission needs. Centralized management of shipping and storage containers for nuclear weapons and weapons components is necessary to assure an adequate supply for mission needs."

The document went on to emphasize how EM, DP, and Nuclear Energy, Science and Technology (NE) should feed into an integrated container management plan that incorporates the container database currently used by DP.

Further, the June 2000 Integrated Nuclear Materials Management Plan asserted that coordination was needed across programs and sites.

This Plan also identified that increased integration is needed for the design, certification, procurement, and management of shipping containers DOE-wide.

Costs Of Container Activities

As a result of not adequately integrating and managing its shipping container activities, DOE has spent millions without having a shipping container suitable for some of its surplus fissile materials. During FYs 1998 and 1999, subsequent to the GAO report, DOE spent $8.7 million on the terminated AT-400A container. In addition, DOE will incur costs of at least $9.8 million over the next two years to blend and repackage residues for shipment to WIPP that were originally prepared for shipment to Savannah River. Finally, DOE has not been able to meet its objectives to acquire shipping containers to ship surplus fissile material from Pantex and Rocky Flats to Savannah River.

Ultimately, these costs may be small in comparison to the costs DOE could incur if Rocky Flats does not meet its closure deadline due to not having sufficient certified Type B containers. Management asserted there are numerous other programmatic activities that will also influence DOE's ability to close Rocky Flats by 2006.

RECOMMENDATIONS

We recommend that the Under Secretary for the National Nuclear Security Administration and the Under Secretary for Energy, Science and Environment:

1. establish a more formal process within DOE for integrating coordination of Type B container activities;
2. develop and implement the DOE *Packaging Management Plan*;
3. direct all field elements to provide information on containers in inventory, new container needs, and containers under development to the DOE centralized point of contact; and,
4. prioritize and coordinate Type B container certification needs throughout DOE.

MANAGEMENT REACTION

Management concurred with the recommendations, and provided general comments on the report.

Recommendation 1. Management concurred and stated that it does recognize the benefits of better integration among Headquarters program offices and field elements. The proposed plan is that the offices of EM, DP, NN, and NE are discussing these issues and mapping a path forward for DOE integration of container activities. A means of control of program office packaging and shipping activity

interfaces is being developed by NNSA, EM, and NE through a Memorandum of Agreement (MOA) as it relates to both classified and unclassified shipments of nuclear material and radioactive waste, including Type B shipments. Given the interfaces between the multiple programs, the MOA will define the communication and issue-resolution process to address integration concerns. The MOA will be implemented by March 31, 2001.

Recommendation 2. Management concurred and stated that DP-20 has tasked Albuquerque to develop an *Integrated Container Management Program Plan* for packages requiring safe secure trailer transportation. DP and EM will expand this Plan to include Type B shipping containers to support the MOA. This Plan will be implemented by September 30, 2001.

Recommendation 3. Management concurred and stated that it has initiated action to acquire and consolidate the information on all certified Type B containers in the EM, NNSA, NE, the Nuclear Regulatory Commission, and Department of Transportation inventory. This will be completed by September 30, 2001, and made available, as appropriate, on the internet.

Recommendation 4. Management concurred and stated that the process being developed as part of the MOA is the mechanism that would most appropriately provide for issues associated with certification and container management to be raised to senior management for resolution. DOE concurs that prioritization and coordination need to be improved and is taking actions to achieve this by September 30, 2001.

AUDITOR COMMENTS

Based on management comments, we believe management's proposed actions meet the intent of our recommendations.

ADDITIONAL MANAGEMENT COMMENTS

Management stated that the efforts in DP to address overall package needs are getting additional integration across the divide between NNSA and other DOE organizations. Many of the ad hoc activities for assessing package needs and resources available have been formalized by DP. DP-20 has created the DP *Package Management Program*. The Nuclear Materials Stewardship Project Office in Albuquerque has been assigned the lead for DP's *Package Management Program*. A joint DP/EM package inventory data call was issued on August 22, 2000, which was the first official act of package management planning coordinated by this office. This data call will provide inventory and status information on all of DOE's Type B packages. The data will be managed separately for NNSA and the rest of DOE because of

classification issues, but the data structures and requests for inventory numbers are the same. Package needs, the availability of shipping services, shipper/receiver site capabilities, and certification of new packages are all aspects of this effort. Details of DP's *Package Management Plan* are still evolving in the context of overall transportation planning. The goal of this integrated Transportation Safeguards System planning effort is to bring focus to the transportation infrastructure requirements when project plans are developed.

In addition, for shipment of surplus pits, management stated that DOE recognized that the existing pit-shipping container would not be suitable for the plutonium disposition mission because the number of containers was insufficient to meet the anticipated shipping rates. About the time that Savannah River was designated as a preferred site for the Pit Disassembly and Conversion Facility, DOE initiated the effort for a new, surplus pit-shipping container. The goal of this initiative is to have the new surplus pit-shipping container certified in time to support surplus pit shipments from Pantex to Savannah River starting in 2005.

Management further stated that the working group identified in the body of the report issued a systems analysis of potential options in anticipation of formalization of DOE decisions in the Surplus Plutonium Disposition Environmental Impact Statement. The purpose of the analysis was to understand the relative cost and risk of potential alternatives for surplus pit packaging and transportation. This systems analysis does not provide for a DOE decision on mission siting nor commit DOE to any design process.

Management stated that the decision to ship residues to WIPP was based on factors in addition to the container certification issue. The life cycle cost for these residues strongly favors direct disposal at WIPP rather than shipment to Savannah River for processing and subsequent storage at Yucca Mountain in Nevada. Management also stated that the radiation exposure to workers was lower if the residues were shipped to WIPP instead of Savannah River. For similar reasons, management is considering shipment of its fluoride residues to WIPP as well.

Management's comments stated that our assertion that the *Integrated Nuclear Materials Management Plan* identified that increased integration is needed for the design, certification, procurement, and management of shipping containers DOE-wide was not accurate. Instead, management's interpretation was that the Plan directed that packaging efforts be integrated across the complex.

ADDITIONAL AUDITOR COMMENTS

Management's additional comments demonstrate that it has recognized a need for improved management of Type B container activities. For example, the data call of August 22, 2000, appears to be moving towards a more integrated and coordinated approach across the DOE complex.

Further, management stated that until January 2000, it did not need to ship surplus pits from Pantex to Savannah River. However, it did spend considerable time and millions of dollars for a dual-purpose pit storage and shipping container starting in 1992. Thus, accepting this explanation, DOE expended funds for eight years before it had a mission to ship surplus pits.

We did not audit the life cycle costs of the decision to ship residues to WIPP. Therefore, we cannot attest to the validity of management's assertion. The decision to ship to WIPP was made after residues had already been prepared for shipment to Savannah River in anticipation of certification of the 9975 container.

Finally, our assertion regarding the *Integrated Nuclear Materials Management Plan* is based on direct language from the Plan. Furthermore, we could not find where the Plan directed integration across the complex.

Appendix

SCOPE

We performed the audit from September 1999 to August 2000 at DOE Headquarters, Albuquerque, Rocky Flats Field Office (RFFO), and the Amarillo Area Office at Pantex. The scope was limited to containers suitable for shipping surplus fissile material. These containers are identified as Type B containers. We reviewed activities related to Type B pit shipping containers from 1992 through March 2000. We reviewed activities related to other Type B containers from September 1999 through March 2000. Our review did not include shipments of surplus highly enriched uranium to the Oak Ridge Y-12 Plant.

METHODOLOGY

To accomplish the audit objective, we:

- reviewed DOE's Surplus Plutonium Disposition Final Environmental Impact Statement dated November 1999, sections of OMB Circular A-123, and DOE guidance on project management;
- interviewed DOE Headquarters, Albuquerque, RFFO, and Pantex officials to understand their procedures for container management;
- reviewed the certification process of EM;
- reviewed prior audit reports and reviews related to container activities; and,
- reviewed the *Government Performance and Results Act of 1993* and determined if performance plans and measures were established.

We conducted the audit according to 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. Accordingly, we assessed the significant internal controls and performance measures established under the *Government Performance and Results Act of 1993* related to DOE's Type B container activities. There were no specific performance goals for the development and certification of containers for surplus fissile material. 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. Computer processed data was not used, and therefore, we did not perform any tests on such data.

We held an exit conference on November 6, 2000.

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