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INSPECTION REPORT

Alleged Nuclear Material Control and Accountability Weaknesses at the Department of Energy's Portsmouth Project

INS-O-15-04

May 2015

Department of Energy
Washington, DC 20585

May 21, 2015

MEMORANDUM FOR THE MANAGER, PORTSMOUTH/PADUCAH PROJECT OFFICE

FROM: Marilyn E. Richardson
Acting Assistant Inspector General
for Inspections
Office of Inspector General

SUBJECT: INFORMATION: Inspection Report on "Alleged Nuclear Material Control and Accountability Weaknesses at the Department of Energy's Portsmouth Project"

BACKGROUND

The Portsmouth Gaseous Diffusion Plant (Portsmouth) was constructed by the United States Atomic Energy Commission to provide enriched uranium for the nation's nuclear defense system, and it was later used to provide for commercial nuclear power reactors. The gaseous diffusion process is no longer operational, and the Department of Energy (Department) is conducting an extensive cleanup of the site. Department Order 474.2, *Nuclear Material Control and Accountability*, requires that accurate records of nuclear materials are maintained and physical inventories are conducted to provide assurance that nuclear material is not missing. Portsmouth currently maintains uranium rated as Category III and IV according to the Graded Safeguards Table in Department Order 474.2. A significant majority of the site uranium inventory is Category IV Attractiveness Level E, which is the lowest grade of accountable material in the Department Complex. Nevertheless, because of this material, the contractor site operator must develop, implement, and maintain a Nuclear Material Control and Accountability (NMC&A) program on a graded safeguards basis that includes provisions for accurate nuclear material inventory information, along with controls to deter, detect, and respond to the loss or misuse of nuclear material.

The Office of Inspector General (OIG) received a complaint that nuclear material accountability and access controls at Portsmouth were not adequate. In response, we initiated a review to determine the facts and circumstances regarding this allegation.

RESULTS OF INSPECTION

In general, nothing came to our attention to indicate that the required nuclear material access controls were not in place. However, we found that improvements at Portsmouth could be made to increase confidence that nuclear material was accounted for and that any compromised tamper indicating devices (TIDs) protecting nuclear material are replaced in a timely manner.

Portsmouth uses the Portsmouth Materials Accountability System (PORTSMAS) to track the location, purity, assay, and weight of nuclear material. During the interim, or "in-process" phase, nuclear material is not fully accounted for until the material has been sent to the laboratory for analysis. The NMC&A group adds this information to PORTSMAS once the analysis is complete. We were told that during the past year, approximately 100 containers were listed as in-process and recorded as empty in PORTSMAS. However, our review determined that the nuclear material was present in these containers and not accurately reported in PORTSMAS. Personnel informed us that the containers were considered empty for accounting purposes because the material had not completed the NMC&A process. Portsmouth officials recognized this assurance weakness and took action to record the volume of the contaminated lube oil located in the containers.

Portsmouth officials told of one instance in which a TID bag was never replaced because an email sent to a new supervisor with instructions to replace the bag was overlooked. The TID bag was not replaced until we asked to view the container. As a result of our review of this instance, immediate corrective action was taken.

These weaknesses could have resulted in the potential undetected loss of nuclear material, losses which could affect the health and safety of employees and the general public. However, according to Portsmouth officials, the risk of potential loss of low attractiveness level nuclear material is reduced due to effective access controls. Nevertheless, we believe improvements are warranted in these areas and have made recommendations designed to assist management in ensuring all nuclear material is accounted for.

MANAGEMENT REACTION

Management concurred with the report's recommendations and indicated that corrective actions had been taken to address the issues identified. Management commented that even though the report identified a potential to lose nuclear material, they were confident that there has been no loss of material due to the strength of the Portsmouth NMC&A program. Additionally, Management stated that the Portsmouth NMC&A program has an extensive record of internal self-assessments as well as independent assessments from past to present that demonstrated exceptional programmatic management and accurate accounting of nuclear materials.

Management's comments are included in Appendix 3.

cc: Deputy Secretary
Associate Under Secretary for Environment, Health, Safety, and Security
Chief of Staff
Manager, Oak Ridge Office

INSPECTION REPORT ON ALLEGED NUCLEAR MATERIAL CONTROL AND ACCOUNTABILITY WEAKNESSES AT THE DEPARTMENT OF ENERGY'S PORTSMOUTH PROJECT

TABLE OF CONTENTS

Inspection Report

Appendices

ALLEGED NUCLEAR MATERIAL CONTROL AND ACCOUNTABILITY WEAKNESSES AT THE DEPARTMENT OF ENERGY'S PORTSMOUTH PROJECT

NUCLEAR MATERIAL CONTROL AND ACCOUNTABILITY PROCESSES

The Portsmouth Gaseous Diffusion Plant (Portsmouth) nuclear materials inventory is maintained in 12 of 13 material balance areas (MBAs). An MBA is a storage area where nuclear materials are accounted for and controlled. The location, purity, assay, and weight of the nuclear material are tracked in the Portsmouth Materials Accountability System (PORTSMAS) as part of the Nuclear Material Control and Accountability (NMC&A) process.

Nuclear material must go through the entire NMC&A process before it is listed in a specific container in PORTSMAS. As processing and laboratory analysis is completed, nuclear material produced through breakdown and cleanup of contaminated equipment is stored in a container and eventually accounted for in PORTSMAS. However, during the interim, or "in-process" phase, nuclear material is not fully accounted for until the material has been sent to the laboratory for analysis. The laboratory determines the uranium purity, assay, and weight of the nuclear material located inside of the containers. The NMC&A group adds this information to PORTSMAS once the analysis is complete. Therefore, it is probable that nuclear material could exist in a container while PORTSMAS conversely reports the container as empty.

In general, nothing came to our attention to indicate that the required nuclear material access controls were not in place. However, we found that improvements at Portsmouth could be made to increase confidence that nuclear material was accounted for and that compromised tamper indicating devices (TIDs) protecting nuclear material are replaced in a timely manner.

Nuclear Material Control Issues

Contrary to Department of Energy (Department) requirements, Portsmouth officials could not provide assurance that nuclear material was fully accounted for throughout the various phases of the NMC&A process. Department Order 474.2, *Nuclear Material Control and Accountability*, requires that the physical inventory provide assurance that nuclear materials are not missing. We were told that during the past year, approximately 100 containers were listed as in-process and recorded as empty in PORTSMAS. Upon reviewing PORTSMAS, we identified at least 103 containers that were considered empty. However, our physical review of these containers revealed they were not empty and actually contained nuclear contaminated lube oil. We confirmed with Portsmouth officials that they may not have been able to detect missing nuclear material if any of the 103 containers had been missing while listed as in-process. In response to the weakness we identified, Portsmouth officials subsequently updated the data in the NMC&A database with the correct item description code, volume of material in containers, and appropriate assay for facility as interim values. Further, in response to our inspection, management indicated they held a meeting with appropriate personnel to discuss NMC&A expectations with respect to unused containers.

In addition, two containers with up to 20 liters of the lowest attractiveness level of nuclear material may not have been accounted for and could be missing. A Portsmouth problem report

noted that two containers could not be located during a 2012 physical inventory, and a recommendation was made to leave the containers listed in PORTSMAS. During the following 2013 physical inventory, these same two containers still could not be located, and an email to staff provided guidance to remove the containers from PORTSMAS and categorize the containers as empty. We were told that the containers were considered empty because PORTSMAS did not have any records indicating that nuclear material had been placed inside the containers. Later, we were told that the two missing containers were listed as in-process. We determined during our inspection that a container listed as in-process could potentially contain nuclear material not accounted for in PORTSMAS.

Tamper Indicating Device Bag Tear

Our inspection revealed that an item containing uranium oxide, a nuclear material required to be protected by a TID and stored within a plastic bag, may have been compromised for at least 294 days. Site-specific procedure requires that plastic bags with holes must be replaced, sealed with a new TID, and weighed to rule out the possibility of nuclear material diversion. The plastic bag, the item was stored in was identified in the 2013 annual inventory as having a tear.[1] On November 21, 2013, the NMC&A Administrator sent an email instructing an employee to remove the existing TID, rebag and seal the container, and then send a confirmatory weight ticket with a description of the final package. This task was never completed, which allowed an integrity issue to exist for at least 294 days. Upon our request to view the container, NMC&A personnel informed us they had replaced the TID bag prior to our observation. As a result of our inspection, the NMC&A group decided to review the use of TIDs.

Contributing Factors and Impact

Staff levels, a low priority, and the way the PORTSMAS in-process account was used resulted in Portsmouth not being able to account for and detect missing nuclear material from certain containers. Specifically, contractor officials informed us that the process to analyze the material in the containers was delayed due to a shortage of personnel to operate a "blending machine," which is integral to the process. Also, we were told that due to the material being at the lowest attractiveness level, the task to complete the analysis was determined not a high priority. In addition, we were told that the TID bag was never replaced because an email sent to a new supervisor with instructions to replace the bag was overlooked. As previously noted, the TID bag was not actually replaced until we requested to view the container.

These weaknesses could result in the potential undetected loss of nuclear material, which could affect the health and safety of employees and the general public. However, according to Portsmouth officials, the risk of potential loss of low attractiveness level nuclear material (uranium) is reduced due to effective access controls. We believe improvements are warranted in these areas and have made recommendations designed to assist management in ensuring that all nuclear material is actually accounted for in PORTSMAS.

[1] A tear in the bag causes the TID to be ineffective.

RECOMMENDATIONS

To address the issues identified in this report, we recommend that the Manager of Portsmouth/Paducah Project Office:

1. Ensure that nuclear material volume levels in containers are recorded in PORTSMAS when pending processing;

2. Reemphasize the TID process requirements and require that follow-up is conducted to ensure that TIDs are replaced in a timely manner; and

3. Evaluate the effectiveness of the TID program and adjust the program as necessary.

MANAGEMENT RESPONSE

Management concurred with the report's recommendations and took immediate corrective actions. Management commented that even though the report identified a potential to lose nuclear material, they were confident that there has been no loss of material due to the strength of the Portsmouth Nuclear Materials Control and Accountability program.

INSPECTOR COMMENTS

The Department's corrective actions were responsive to our recommendations. We modified our report, as necessary, in response to management's comments.

Management's comments are included in Appendix 3.

OBJECTIVE, SCOPE, AND METHODOLOGY

Objective

The Office of Inspector General (OIG) received a complaint regarding nuclear material accountability and access controls. In response, we initiated a review to determine the facts and circumstances regarding the allegation on whether Portsmouth Gaseous Diffusion Plant (Portsmouth) had adequate controls for accountability and accessibility of nuclear materials.

Scope

We conducted fieldwork for this allegation-based inspection between September 2014 and May 2015 which focused on nuclear material inventory, access controls, and database procedures at Portsmouth. The inspection was conducted under OIG Project Number S14IS012.

Methodology

To accomplish our objective, we:

- Reviewed Federal, Department, and Portsmouth policies, procedures, and manuals related to nuclear material storage and security;
- Interviewed officials from the Oak Ridge Office and Portsmouth;
- Conducted on-site inventories of missing nuclear material storage containers; and
- Obtained and analyzed inventory databases, reports, and internal investigations on inventory discrepancies and missing items.

We conducted this allegation-based inspection in accordance with the Council of the Inspectors General on Integrity and Efficiency's *Quality Standards for Inspection and Evaluation*. Those standards require that we plan and perform the inspection to obtain sufficient, appropriate evidence to provide a reasonable basis for our conclusions and observations based on our inspection objective. We believe the evidence obtained provided a reasonable basis for our conclusions and observations based on our inspection objective. Accordingly, the inspection included tests of controls and compliance with laws and regulations to the extent necessary to satisfy the inspection objective. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our inspection. Finally, we relied on computer-processed data, to some extent, to satisfy our objective. We confirmed the validity of such data, when appropriate, by reviewing source documents. Management waived the exit conference.

PRIOR REPORTS

- Inspection Report on *Follow-up Inspection on Material Control and Accountability at Los Alamos National Laboratory* (INS-O-13-04, July 2013). The inspection was initiated to determine whether Los Alamos National Laboratory (LANL) implemented the planned corrective actions intended to improve the policies and procedures for inventory, transfers, characteristics, and locations of nuclear materials related to the Material Control and Accountability (MC&A) program. The report determined that LANL continued to experience problems with the accountability of certain nuclear materials controlled under its MC&A program. Specifically, our testing of 15 material balance areas (MBAs) revealed instances in which nuclear materials were not maintained in the correct location, properly labeled or correctly identified in the LANL MC&A database. For one Category IV MBA selected for inventory as part of our follow-up inspection, the LANL Inventory Team identified several weaknesses with the accountability of certain nuclear materials.

- Inspection Report on *Material Control and Accountability at Los Alamos National Laboratory* (DOE/IG-0774, September 2007). The inspection was initiated to determine if LANL's MC&A program was providing timely and accurate information regarding the inventory, transfers, characteristics, and location of accountable nuclear materials at the Laboratory. Several inventories conducted by LANL were not completed in a timely manner due to problems with performing verification measurements within specified time frames. LANL used weighted sampling to conduct its inventories, which was consistent with its approved MC&A plan. The formulation, assignment and labeling of lot identification numbers could be improved to enhance controls over and accuracy in accounting for nuclear material. Contrary to LANL's MC&A plan, in several instances lots containing multiple items of accountable nuclear material (anywhere from 3 to 157 items) were annotated in the Laboratory's MC&A accounting system as single items.

- Inspection Report on *Material Control and Accountability at Lawrence Livermore National Laboratory* (DOE/IG-0745, November 2006). The inspection was initiated to determine if the Lawrence Livermore National Laboratory MC&A program was providing timely and accurate information regarding the inventory, transfers, characteristics, and location of accountable nuclear materials. The report identified a few opportunities for improvement in the MC&A program. Specifically, we found that when designated personnel at Livermore conducted a required 100 percent semiannual inventory of accountable nuclear material in the material access area (MAA), they did not always follow applicable inventory procedures. For example, inventory personnel did not validate serial numbers, verify the integrity of tamper indicating devices (TIDs), or confirm the net weight of accountable nuclear material accumulated in three containers stored in a sealed glove box within the MAA. Further, Livermore's Controlled Materials Accountability and Tracking System (COMATS) was not always accurate or updated to reflect the actual status or location of TIDs or items of Category IV material outside the MAA.

MANAGEMENT COMMENTS

Department of Energy
Washington, DC 20585
APR 15 2015

MEMORANDUM FOR MARILYN RICHARDSON
ACTING ASSISTANT INSPECTOR GENERAL
FOR INSPECTIONS
OFFICE OF INSPECTOR GENERAL

FROM: MARK WHITNEY
ACTING ASSISTANT SECRETARY
FOR ENVIRONMENTAL MANAGEMENT

SUBECT: Response to Inspector General's Draft Report "*Alleged Nuclear Material Control and Accountability Weaknesses at the Department's Portsmouth Project*"

Thank you for the opportunity to review and comment on the subject draft report. While we do not generally have any issues with the facts/issues in this report, there remains one concern that we wish to ensure the Office of Inspector General (OIG) understands--we are confident that there has not been a loss of material. The report identified a potential to lose material at the Portsmouth site. However, assurance that there has been no loss of material is provided by the strength of the Portsmouth Nuclear Materials Control and Accountability (NMC&A) program that includes physical access controls; regular, thorough inventories; and a multi-faceted NMC&A Assessment Program, all of which are in accordance with the Department of Energy's (DOE) directives. Access to any man-portable accountable nuclear material is physically controlled within the "Limited Area" of the site, which requires an active DOE clearance for unescorted access. The "Limited Area" physical protections include but are not limited to armed guards, physical barriers, and electronic monitoring. Accountable material is inventoried through regular and thorough inventory inspections conducted more frequently than DOE Order requirements. Additionally, the Portsmouth NMC&A program has an extensive record of internal self-assessments as well as Independent Assessments from past to present that demonstrated exceptional programmatic management and accurate accounting of nuclear materials.

The recommendations for improvements offered by OIG were welcomed and were implemented as follows:

Recommendation 1: Ensure that nuclear material volume levels in containers are recorded in Portsmouth Materials Accountability System when pending processing.

Management Reaction: Concur.

Action: Based on the preliminary findings during the inspection, the Portsmouth NMC&A department updated the data in the NMC&A database with the correct Item Description Code, volume of material in containers, and assigned the appropriate assay for facility as interim

values. The final assay values of the containers shall be determined after batching and lab analysis.

Additionally, on January 13, a meeting was held with Material Balance Area Custodians, Material Handler Supervision, and Cascade Supervision to discuss NMC&A expectations with respect to unused small containers. The following was established: Unused empty small diameter cans are to be locked in a cage outside Area 5. This will strengthen access control of the containers until needed for NMC&A purposes.

Completion Date: Implemented after draft preliminary finding was provided; recommendation considered closed.

Recommendation 2: Reemphasize the Tamper Indicating Devices (TID) process requirements and require that follow-up is conducted to ensure that TIDs are replaced in a timely manner.

Management Reaction: Concur.

Action: On January 13, a meeting was held with Material Handler Supervision and Cascade Supervision to discuss NMC&A expectations. The following was established:

1. The need for prompt action to confirm and replace defective TIDs was emphasized.

2. TID Administrator will copy NMC&A manager on e-mail requests for TID replacement so that managerial tracking can be maintained.

Completion Date: Implemented January 13; recommendation considered closed.

Recommendation 3: Evaluate the effectiveness of the TID Program and adjust the program as necessary.

Management Reaction: Concur.

Action: The TID program is evaluated on a regular basis during NMC&A Self-assessments, Independent Assessments, and DOE Safeguards and Security Surveys. A review of previous Assessments and DOE Surveys revealed no findings questioning the effectiveness of the current TID program. It was determined that the current TID program is sufficiently rigorous for a Category III/IV site. Should site conditions change, e.g. disposition of all Category III material, shipment of all containerized oxides, etc., NMC&A will re-evaluate the need for a TID program.

Completion Date: Evaluated TID program after the draft preliminary finding was identified and made a determination; recommendation considered closed.

Monetary Impact: None identified in the draft report.

If you have any questions on these comments, please contact me or Mr. Bert Gawthorp, Portsmouth/ Paducah Project Office Lead Counsel, at (859) 219-4005.

FEEDBACK

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