OFFICE OF INSPECTOR GENERAL

U.S. Department of Energy

AUDIT REPORT

DOE-OIG-20-50

July 2020

THE DEPARTMENT OF ENERGY'S STORAGE AND DISPOSITION OF EXPLOSIVES MATERIAL AT SELECTED SITES

Department of Energy
Washington, DC 20585

July 20, 2020

MEMORANDUM FOR THE ADMINISTRATOR, NATIONAL NUCLEAR SECURITY ADMINISTRATION

SUBJECT: AUDIT REPORT: "The Department of Energy's Storage and Disposition of Explosives Material at Selected Sites"

The attached report discusses our review of the Department of Energy's storage and disposition of explosives at selected National Nuclear Security Administration sites. This report contains five recommendations that, if fully implemented, should help ensure explosives are being adequately managed. Management concurred or concurred in principle with our recommendations.

We conducted this audit from October 2018 through April 2020 in accordance with generally accepted government audit standards. We appreciate the cooperation and assistance received during this evaluation.

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for Audits
Office of Inspector General

cc: Chief of Staff

Department of Energy
Office of Inspector General

The Department of Energy's Storage and Disposition of Explosives Material at Selected Sites
(DOE-OIG-20-50)

WHY OIG PERFORMED THIS REVIEW

Over the last 15 years, the Office of Inspector General has issued several reports on the topic of explosives material. These reports found weaknesses with control and accountability of explosives material, as well as, handling and storing explosives material. Given the risks associated with the management of explosives material and our previous findings in the area, we initiated this audit at three National Nuclear Security Administration sites to determine whether the selected sites were storing and disposing of explosives material in accordance with Department and Federal requirements.

What OIG Found

We found that the three sites reviewed were generally storing and disposing of explosives material in accordance with Federal and Department of Energy requirements. However, we noted weaknesses at all three sites that potentially limit the effectiveness of explosives material control, accountability, and safety. Specifically, we identified weaknesses with control and accountability related to site database inventory systems, physical inventories, and errors in identification labels. While we identified weaknesses at all three sites, we made the determination that the weaknesses at one site may have been more significant due to the limitations identified in its record-keeping process.

We attributed these weaknesses at the three sites to issues in overall explosives inventory controls, including tracking and accountability from acquisition to disposition. Additionally, sites' policies and procedures did not always include steps that met the requirements of a physical inventory or have an effective process to regularly update or replace physical identification labels. Further, sites did not have adequate controls in place to ensure that incompatible explosives material was not moved to or stored in prohibited areas, and storage reviews were not always completed.

Given the inherent risks associated with the management of explosives material, the Department should take steps to ensure that materials are properly stored and disposed of, as well as accounted for. Failure to do so puts the Department at an increased risk that worker safety may be compromised.

Recommendations and Suggested Actions

To address the issues identified in this report, we have made five recommendations that, if fully implemented, should help ensure that explosives are properly stored, accounted for, and disposed of in accordance with Federal regulations and Department standards.

BACKGROUND

The Department of Energy manages a significant portfolio of explosives material across its complex of National Laboratories and other facilities to carry out elements of its diversified mission. The Department's research and development operations involve a wide variety of explosive devices and materials such as rocket motors, propellants, bulk explosives, shaped charges, artillery shells, ammunition, and detonators. These explosives are utilized for many different types of research and testing operations, including environmental testing, component testing and modeling, and performance testing.

Site contractors are required by DOE-STD-1212-2012, *Explosives Safety* (the Standard), to maintain explosive safety programs to protect the public and provide a safe and healthy workplace for employees. Additionally, Title 41 of the Code of Federal Regulations (CFR), Subpart 109, *Department of Energy Property Management Regulations* (the Regulations), establishes the Department's uniform personal property management policies, standards, and practices to ensure that personal property is managed in a safe and secure manner and is available to support efficient mission execution. However, our past work has found that this has not always occurred. For example, our Inspection Report on *Management of Explosives at Selected Department Sites* (INS-O-12-02, July 2012) revealed problems with handling and storing explosives at the sites reviewed that potentially increased the risk of harm to personnel and infrastructure. Due to the inherently dangerous nature of explosives, DOE-STD-1212-2012 and 41 CFR, Subpart 109 require strict control and accountability be maintained over all elements. Similarly, officials are charged with periodically inspecting stored explosives to ensure that they remain stable and safe for continued storage and future use. Due to its mission, the National Nuclear Security Administration (NNSA) and its sites are the most significant user of the Department's explosives inventories. As such, we focused our review of non-nuclear, non-classified, and non-Protective Force explosives material at three NNSA sites.

Given the dangers related to handling and storing explosives and our previous findings in this area, we initiated this audit to determine whether selected sites are storing and disposing of explosives material in accordance with requirements of DOE-STD-1212-2012, Explosives Safety, and 41 CFR, Subpart 109, Department of Energy Property Management Regulations.

DEPARTMENT STANDARDS AND FEDERAL REGULATIONS REQUIRE SITES TO SAFELY STORE, ACCOUNT FOR, AND DISPOSE OF EXPLOSIVES MATERIAL

DOE-STD-1212-2012 contains safety requirements and provides the basic technical requirements for an explosives safety program at Department facilities. Also, the Standard includes a requirement for facilities to establish a program to review the explosives material stored at facilities. However, the Standard does not dictate the specifics of a storage review program; instead, it provides an example of what an effective storage review program should include. Specifically, the detailed example includes suggested actions, such as assigning storage review dates and/or intervals to each explosive placed in storage, and designating or creating a storage review committee to establish and approve storage review intervals for all stored explosives. Additionally, the Standard dictates appropriate storage compatibility of explosives in accordance with the principles of Department of Defense criteria to decrease the risk of initiation

or decomposition. Further, the Standard requires each storage area to be inventoried at least annually to ensure that total weights conform to allowable quantity-distance constraints. The requirements of the Standard are presented as either mandatory or advisory. Mandatory requirements, designated by the words "shall," "must," or "will," have to be followed unless the Department Head of Field Element or NNSA Site Manager grants an exemption. Advisory requirements, denoted by "should" or "may," can be deviated from with a written waiver granted by facility management.

41 CFR, Subpart 109 sets forth the Department's Property Management Regulations, which establish uniform property management policies, regulations, and procedures that implement and supplement the Federal Property Management Regulations. The Regulations include explosives as sensitive personal property, which, regardless of value, requires special control and accountability. As such, the Regulations provide property management standards and practices that include property records and physical inventory requirements.

In addition to the Department's standards and regulations, we identified explosives-related requirements at other Federal agencies that are not applicable to the Department but are notable for benchmarking purposes. For example, the Department of Defense's DoDI 5000.64, *Accountability and Management of DoD Equipment and Other Accountable Property*, requires property records for sensitive property, such as explosives, to be kept current and reflect current status, location, financial information, and condition until authorized disposition occurs. Additionally, property records must provide a comprehensive log of transactions suitable for audit and be the source for use in validating the existence and completeness of property. Further, the Bureau of Alcohol, Tobacco, Firearms and Explosives - 27 CFR Part 555, *Commerce in Explosives*, requires explosives to be accounted for at all times. Additionally, entities licensed by the Bureau of Alcohol, Tobacco, Firearms and Explosives to possess explosives are required to maintain inventory and use records to ensure explosives can be traced in the event they are lost or stolen.

EXPLOSIVES MATERIAL CONTROL AND ACCOUNTABILITY WEAKNESSES

While we found that the three sites reviewed were generally storing and disposing of explosives material in accordance with Federal and Department requirements, we noted weaknesses across the sites that potentially limit the effectiveness of explosives material control, accountability, and safety. Specifically, we identified weaknesses with control and accountability related to site database inventory systems, physical inventories, and errors in identification labels. Further, during our review, we found other weaknesses related to explosives material safety. Specifically, we identified weaknesses with explosive storage compatibility and storage review programs. While we identified weaknesses at all three sites, we made the determination that the weaknesses at one site may have been more significant due to the limitations identified in its record-keeping process.

Site Database Inventory Systems Not Tracking All Explosives Material

Unlike two of the sites, our review found that one site had not adequately tracked the acquisition, use, or disposal of explosives material in its established database tracking systems that had been

in place for at least the last 8 years. In particular, 41 CFR, Subpart 109 requires property to be managed in an efficient manner throughout its life cycle and requires contractors to maintain inventory records for each item of accountable property that include specific data elements such as asset type, description of item, property control number, location, and use status (active, storage, excess, etc.). As an additional benchmark, requirements and standards driven by the Department of Defense and Bureau of Alcohol, Tobacco, Firearms and Explosives require explosives records to be maintained and/or kept current and to reflect the current status, location, and condition until authorized disposition. While we understand these requirements are not applicable to the Department's sites, the value of identifying and maintaining accurate inventory records suitable for audit and traceability cannot be refuted. A review of the records maintained in the database inventory system being utilized at the site did not allow us to make a determination whether or not the inventory of explosives material was complete and accurate. Specifically, the inventory system maintained at the site was created as a stand-alone database system that was manually updated. Additionally, officials indicated that the database system was maintained solely by one individual and was not capable of tracking a history of changes or additions. Even though the system included data fields that met the intent of 41 CFR, Subpart 109 and DOE-STD-1212-2012, such as net explosive weights, compatibility groups, and storage review dates, our review found that the fields were not automated. Instead, calculations of weight conversions were performed outside of the system and recorded manually, and thus, more susceptible to errors in calculation and subsequent data entry.

Our analysis of the information entered into the system found errors and inconsistencies related to weight conversions from grams to pounds. Specifically, our analysis of information for a sample of 45 explosives items in the site's explosives database tracking system found inaccuracies or inconsistencies in 13, or over 28 percent, of the sampled items. Eight inconsistencies included differences in rounding procedures and missing information, while five inaccuracies appeared to be related to either mislabeling units of measurement or not accurately using the data fields in the tracking system. For example, in one instance, the individual Net Explosive Weight (NEW) for 30 items was listed as 37.5 without any unit of measurement; however, the total NEW in pounds for the 30 items was recorded as 37.5 pounds. The total NEW should have been the individual NEW multiplied by the number of items (37.5 x 30), which would be a significant difference between a NEW of 37.5 pounds and 1,125 pounds. Subsequent to our review, officials indicated that there was an error in the individual NEW. Instead of 37.5, it should have been recorded as 1.25 pounds, with a total NEW of 37.5 pounds. Although this error did not have an effect on total weight limits, it illustrates the importance of all data fields being correct and complete because errors related to the weight of explosives material can negatively impact established load or weight limits and quantity-distance constraints.

Additionally, we noted that historical data that included movements of explosives material in and out of storage areas had not been captured in the explosives database tracking system. Since historical data was not captured in the database tracking system, we were unable to successfully track explosives material from receipt to disposition. Even though the site maintains running inventory sheets within each of its storage areas, it was unclear how often the explosives database inventory system was updated to reflect changes in the quantity of explosives material documented in the running inventory sheets. We also attempted to match the results of the 2013

to 2018 annual inventories to our 45 sampled items and were not able to confirm their validity. Specifically, 15 of the 45 sampled items were in the inventory prior to 2013 and did not have any documented changes or movements, so they would not have shown up on the running inventory sheets. However, of the remaining 30 sampled inventory items that were moved in to or out of the site's storage locations between 2013 and 2018, we found 25 of the 30 items had not been captured on running inventory sheets. Even though we understand that the standard of maintaining current records as dictated by the Bureau of Alcohol, Tobacco, Firearms and Explosives is not applicable to the Department's sites, we believe that it is essential to ensure accurate and timely accounting for explosives.

Site officials indicated that company directives, procedures, and forms were used to track the acquisition, use, and/or disposal of explosives. However, during our site visit, explosives officials indicated that they were not sure how to access all the records and suggested we contact the shipping department. Subsequent to our site visit, we requested available documentation detailing the history (acquisition, usage, movement, etc.) of a selected item in storage since 2010. Approximately 6 weeks later, we received printouts from the database tracking system and a copy of the Explosives Issue and Return form, dated January 29, 2018, that could not be definitely linked to the selected item through the site's explosive tracking number. Since it had taken over 6 weeks to receive available documentation, we did not pursue any additional information. Because of these limitations in the site's record-keeping process, we were unable to effectively test or reconcile the information within the database inventory system to the explosives material stored.

This occurred because the site's contractor officials indicated inventory controls for explosives material focused mainly on safety, not on tracking and accountability from acquisition to disposition. Specifically, contractor officials at the site had not prioritized resources to develop and maintain an accurate and real-time database inventory system to track and account for explosives material. While we agree that safety is the most critical element related to the Department's storage and usage of explosives due to inherent dangers, property management is also an important factor in ensuring that explosives are properly accounted for until authorized disposition. The site's contractor did not have detailed policies or desk procedures related to the operation or use of its current database tracking system for its personnel to ensure that inventory records were maintained and accounted for from acquisition to disposition. Our discussions with contractor officials confirmed that the individual responsible for keeping the inventory records up to date did not have a full understanding of how the system operated, other than how information was entered into the system. While not specifically required, a comprehensive automated database inventory system would reduce the likelihood of input errors and also ensure that explosives are adequately accounted for through disposition. To their credit, in comments to an earlier draft of this report, site officials indicated that they were pursuing an established automated inventory system that would be supported by the Information Services Department.

Limited Explosives Material Inventories

Our review found that the three sites had not always conducted annual physical inventories in a manner consistent with the DOE-STD-1212-2012 and Federal regulations. The DOE-STD-1212-2012 requires storage areas to be physically inventoried at least annually to determine the

total weight of explosives present. Additionally, 41 CFR, Subpart 109 requires sensitive items such as explosives to be inventoried on an annual basis with a 100 percent inventory accuracy. Further, this regulation notes that procedures limited to checking off a listing of recorded property without actual verification of the existence of the property does not meet the requirements of a physical inventory. At the sites reviewed, we found variations on how physical inventories were being performed. Specifically, we found:

- One site's procedures for conducting its annual physical inventory was limited to comparing and/or matching the information from an inventory listing to the information listed on the attached labels. While the site maintained a separation of duties between the individual who maintained the database system and the individual(s) who conducted the inventory, annual physical inventories were conducted differently depending on location at the site. Specifically, if explosives were stored in the site's corporate storage[1] location, a 10 percent random sample was reviewed. If it was located outside of its corporate storage location, then 100 percent was inventoried. However, the procedures did not include an actual count of the number of explosives included in storage containers/packaging. Officials indicated that unless there was evidence that seals had been broken, an actual count was unnecessary. Additionally, officials indicated that they only inventoried 10 percent annually in the corporate storage area since, prior to being moved to the corporate storage area, explosives were inspected as part of their procedures. However, there is no corroborating evidence to support the officials' assertion that materials moved to the corporate storage area had been previously inspected using a physical count nor an indication of which materials were selected for review in their 10 percent inventory.

- As part of our review, we conducted a limited inventory of 40 selected trackable units of explosives material located in one of the site's corporate storage areas, which contained a total of 382 trackable units or items. Of the 40 selected trackable units listed on a current inventory listing, we were unable to locate 1 of the 40 items. During our site visit, officials conducted an extensive search for the trackable unit but were unable to locate the item. Subsequently, officials concluded that based on a review of documentation and several assumptions, the missing item had been dispositioned and sent to an offsite facility to be processed as waste. Their conclusion assumed that the trackable unit was included in a batch of other items that had been sent offsite for disposal in 2017. Management concluded that in putting together the shipping/processing documentation, the missing item was not included in the documents and, therefore, not updated in the database inventory system. However, the missing trackable unit was identified as present in a 2018 annual inventory, months after the batch of other items, identified above, was reportedly sent offsite. Since the site does not perform a 100 percent inventory in its corporate storage area, it cannot ensure that all trackable units of explosives material have been accounted for.

- Another site's procedures for conducting its annual physical inventory was limited to comparing and/or matching the information from an inventory listing to the information listed on the attached labels. Contractor officials indicated that they had not performed

[1] Corporate storage is specific to one site and refers to its long-term storage location.

an actual physical count of the explosives items in containers (i.e., boxes, cases, etc.) during annual inventories, as they adhere strictly to the cardinal principle addressed in DOE-STD-1212-2012 of limiting exposure to explosive hazards in a manner consistent with a safe and efficient operation. Based on the site's database inventory system and the process for conducting annual physical inventories, we were unable to confirm whether all of the site's explosives material had been accounted for by the contractor during the annual physical inventory.

- A third site's procedures for conducting its annual physical inventory included comparing/matching information from an inventory listing to the information listed on the attached labels. In addition, officials indicated that they open storage containers/packaging and perform physical counts of explosives material when possible. However, as part of our review, we conducted a full inventory of 390 explosives material or barcodes located in one of the site's storage facilities and were unable to locate one of the barcodes. The site uses barcodes as unique tracking numbers for batches of explosives material. After an extensive search and further investigation, site officials indicated that the missing explosives material had been sent to another site for use in 2016 and that the database inventory system had not been updated as required by site policy. While the site was able to provide documentation to confirm their conclusion, it was concerning because officials had indicated that physical inventories were conducted on an annual basis. Officials stated that the annual inventory conducted in December 2018 had caught the error. However, it was not clear why the error had not been detected in previous annual inventories. Additionally, we found no documented evidence to confirm that an annual inventory had been conducted for that area in 2017. If an annual inventory had been conducted, the error would have been detected earlier.

These variations occurred because the sites' policies and procedures had not always included steps that met the requirements of a physical inventory as defined in 41 CFR, Subpart 109, which would include actual verification of the location and existence of the explosives material. Instead, two of the sites relied on procedures that were limited to checking off an inventory listing based on information recorded on the identification labels attached to storage containers/packaging. Additionally, policies had not always included procedures for conducting an adequate review of explosives material during the annual physical inventory as required by 41 CFR, Subpart 109 for sensitive items. Federal officials indicated that oversight related to the annual inventories had been limited to notification by the contractor that an annual inventory had been conducted. While we understand the need to balance the cardinal principle of limiting exposure with sound property management, packages and containers that have not been properly sealed or explosives that have not been reconciled through historical records should be physically counted. Without performing an actual count of explosives material that includes verification of location and existence, sites may be unable to ensure that all explosives have been accounted for accurately. Subsequent to our review, NNSA Property and Explosives officials stated that when the 41 CFR, Subpart 109 was revised, the Department had not issued any additional guidance to address the Department's path forward with regards to the Regulations. As such, officials indicated that the Department and NNSA have been operating solely on the language as stated in the 41 CFR, Subpart 109 for inventorying sensitive items at 100 percent

inventory accuracy, which has led to multiple interpretations. As a result of our audit, NNSA officials told us that a request had been put forth to the Department for an interpretation to specifically clarify inventory accuracy.

Identification Label Errors and Discrepancies

Our review of a sample of explosives material at two of the three sites found numerous errors or discrepancies in the information included on the labels attached to the explosives material storage container/packaging, the storage container/packaging itself, and/or the recorded information in the database inventory system. Specifically, we found errors in data for ownership, net explosive weights, and location. For example, at one site, we found discrepancies of ownership information on the label attached to the storage container/packaging and the inventory listing. A further review by site officials found that the discrepancies were a result of transferred ownerships being updated in the database inventory system but not updated on the labels attached to the storage containers/packaging. Further, our review of sample items found errors in the specific locations noted in the database inventory system and the actual locations of the explosives material. Additionally, at the other site, we found a number of discrepancies between the net explosive weights designated on the box by the manufacturer, the attached site label, and the recorded information in the database inventory system. We were unable to make an adequate conclusion at the third site because the database tracking system had not included sufficient information related to historical movements, usage, and dispositions of explosives material to identify similar errors.

These errors occurred because two of the sites did not always have an effective process or procedure in place to regularly update or replace the physical identification labels on explosives material when certain conditions occurred, such as changes in custodial ownership, usage of a portion of the materials, movement within a storage area, etc. The DOE-STD-1212-2012 specifies that the containers must be labeled with the applicable hazard classification code and clearly marked to identify the contents. Materials that have not been properly identified or labeled shall be removed and destroyed. Federal officials indicated that they had conducted independent assessments to demonstrate implementation of the Standard. The assessments included evaluations of safe work practices, training and qualifications, roles and responsibilities, corrective actions, and lessons learned. However, the assessments had not included steps specific to detecting errors in physical identification labels. Without accurate identification labels, sites run the risk of having explosives material being improperly accounted for and stored.

EXPLOSIVES SAFETY WEAKNESSES

Incompatible Explosives Material Stored Together

At two of the three sites, we found that explosives material was being stored based on material compatibility, as required by DOE-STD-1212-2012. Specifically, the Standard dictates appropriate storage compatibility groups in accordance with Department of Defense principles and tables to ensure that explosives are not stored with materials that increase the risk of initiation or decomposition. However, at the third site, we found evidence that incompatible explosives material had been stored together in the same area for approximately 4 years. At the

onset of the audit, we were provided a current inventory listing of explosives located at the site. Our review of the listing indicated that 12 explosives material items, which had been designated as "Compatibility Group L" (Group L), were co-mingled in an area with other designated explosives material types. Group L designated explosives material presents a special risk that requires isolation because it has characteristics that do not permit storage with other materials. Examples include damaged explosives, suspect explosives, explosives that have undergone severe testing, and other explosives that have an elevated risk associated with them.

As specified in the Standard, Group L type explosives material is not permitted to be stored with any other designated explosives material type. Sometime after providing the initial inventory listing and prior to our site visit, officials moved 11 of the 12 Group L explosives material items from the listed storage area. Even though most of the Group L explosives material items had been reportedly removed prior to the site visit, it does not change the fact that according to inventory records, they had been previously stored in an area with incompatible explosives material and had been inventoried without any opposition. Subsequent to our site visit, management officials confirmed that the Group L explosives material had been moved to an appropriate storage location and later expended in an explosives shot. Further, officials explained that the identified explosives material had at one point undergone testing and been reclassified as Group L explosives material. In this case, officials indicated that the owner of the material would have been equally justified in maintaining the explosives material pre-test compatibility group, in which case they could have been stored with other material. However, because the owner of the materials chose to reclassify the explosives material as Group L, officials agreed that the storage compatibility requirements for Group L materials should have been met and that the explosives material should not have been stored with material from a different class.

This instance occurred because the site did not have adequate controls in place to ensure that incompatible explosives material was not moved to or stored in prohibited areas. The only control in place for ensuring compatibility was the local procedures for each of the storage areas. Specifically, the owner of a storage area has the responsibility to verify that the material being added is compatible. This type of control was subject to human error. As noted above, Federal officials performed independent assessments as part of their oversight role. However, the assessments had not included steps that would have identified whether explosives were stored properly based on material compatibility. Instead, officials indicated that they relied on the contractors for compliance. Unlike another site's automated system, the explosives inventory tracking system at the site had not included any controls that would have prevented incompatible materials from being moved or stored in a prohibited area. An automatic control built into the inventory tracking system would have enhanced the site's control to ensure compatibility of stored explosives material and reduced the chances of human error.

Storage Reviews Not Scheduled at One Site

Additionally, our review found that two sites had effective storage review programs in place that included storage review committees for explosives material. As required by DOE-STD-1212-2012, sites are to establish a storage review program to review the explosives material at that facility. However, at the third site, we found that even though it had elements of a storage

review program in place, the site was not effective in assigning storage review dates/intervals for explosives material. While the Standard does not dictate the specifics of a storage review program, it provides an example of what an effective storage review program should include. Specifically, the example includes suggested actions such as assigning a storage review date/interval to each explosive placed in storage. Storage reviews are important because explosives may degrade during prolonged storage, increasing the hazards of handling or using explosives. Our review of a sample of explosives at the site found numerous explosives materials in the inventory that had either exceeded the documented storage review date or did not have a storage review date assigned in the system of record. In some cases, the database inventory system only noted that the shelf life or storage review date had been exceeded, while others had dates that ranged back to 2006.

The lack of scheduled storage reviews occurred because the site had not established a storage review committee as suggested by the Standard for an effective storage review program. While storage review committees are not explicitly required by DOE-STD-1212-2012, the Standard does include as part of an example for an effective storage review program that "Facility management should designate or create a storage review committee to establish and approve storage review intervals for all explosives stored at the DOE facility." Contractor officials expressed a belief that establishing storage review dates was not a significant issue since the site does not have explosives material that would present a danger even if the assigned storage review dates were exceeded. Instead, officials indicated that the site had instituted an informal policy of allowing storage review dates to be exceeded with the understanding that the explosives material would not be used until tested for stability. However, since the tracking system at the site had not included historical data, we were unable to confirm the implementation of this practice. Nonetheless, without an effective storage review program in place, the site had increased the risk of stability or predictability issues with its stored explosives. As part of their oversight process, the NNSA Field Office representatives conducted a 2016 walkthrough of explosives material storage areas. During the walkthrough, they identified that 75 percent of randomly selected storage locations contained explosives material that had exceeded the manufacturer's recommended shelf life. According to the site's tracking system for the issues identified during the walkthrough, corrective actions, which included disposing of the materials that have exceeded their shelf lives, were scheduled to be completed by November 2019. Even if a storage review committee is not established, responsibility for reviewing and establishing storage review dates to ensure the safety of the site's explosives material should be delegated or assigned.

Subsequent to our review, site officials agreed that it was important to ensure that explosives do not exceed shelf/service life. As such, officials indicated that a process was underway to develop an aggressive program to properly remediate explosives that are held in excess or have exceeded shelf/service life by the end of fiscal year 2020. Additionally, officials stated that establishing a storage review sub-committee was currently being considered, which would improve how the site implements explosives storage review requirements in the future.

IMPROVEMENTS TO ENSURE WORKER SAFETY

Given the inherent risks associated with the management of explosives material, the Department should take all steps possible to ensure that materials are properly stored and disposed of, as well as accounted for. Failure to do so puts the Department at an increased risk that worker safety may be compromised or that explosives material could be unaccounted for without being detected.

RECOMMENDATIONS

We recommend that the Administrator, National Nuclear Security Administration direct the site offices under NNSA's purview to ensure contractors:

1. Maintain comprehensive database tracking and inventory systems for stored explosives material that include historical data controls to detect incompatible explosives material, established load limits, and quantity-distance constraints;

2. Establish steps to meet the requirements of conducting a physical inventory that include procedures not limited to checking off a listing of recorded property without actual verification of the location and existence of explosives material;

3. Develop processes to regularly update or replace physical identification labels on explosives material when changes occur;

4. Develop procedures to ensure that incompatible explosives material is not moved to or stored in prohibited areas; and

5. Consider designating a storage review committee to establish and approve storage review intervals for all stored explosives or develop other mitigating controls.

MANAGEMENT COMMENTS

Management concurred, or concurred in principle, with our recommendations and indicated that corrective actions were planned to address the issues identified in the report. While management's position is that they generally agreed with the recommendations and would be taking actions to address the intent of the recommendations, the corrective actions may not be exactly as prescribed. Instead, NNSA, in coordination with the Field Offices, plans to evaluate explosives inventory systems and policies to support the ongoing effectiveness of explosives inventory programs across the complex and to implement improvements deemed necessary to ensure compliance with all regulations. Specifically, management stated that the impacted management and operating contractor would transition to a company-supported data system that will include integrated tracking through disposition. Additionally, management plans to evaluate explosives inventory system requirements and inventory policies, including container labeling and visual inspection requirements. Also, management intends to evaluate the policies and procedures for labeling explosive materials and management and operating contractor's

implementation of the DOE-STD-1212-2019 storage compatibility procedures. Finally, NNSA management stated that the identified site will establish an Occupational Safety and Industrial Hygiene Council with responsibility for explosives safety and explosives storage reviews.

Management comments are included in Appendix 3. Additionally, management provided technical comments, which have been addressed in the body of the report, where appropriate.

AUDITOR COMMENTS

Management's comments and planned corrective actions are responsive to our recommendations.

Appendix 1: Objective, Scope, and Methodology

OBJECTIVE

We conducted this audit to determine whether selected sites are storing and disposing of explosives material in accordance with requirements of the DOE-STD-1212-2012, *Explosives Safety*, and 41 Code of Federal Regulations, Subpart 109, *Department of Energy Property Management Regulations*.

SCOPE

The audit was performed between October 2018 and April 2020 at the Department of Energy Headquarters in Washington, DC and selected National Nuclear Security Administration sites. Our review was limited to the storage and disposal of non-nuclear, non-classified, and non-Protective Force explosives material at the selected sites. The audit was conducted under Office of Inspector General project number A18PT041.

METHODOLOGY

To accomplish our audit objective, we:

- Reviewed applicable policies, procedures, laws, and regulations pertaining to the Department of Energy's storage and disposition of explosives material.

- Interviewed Department and contractor officials to obtain an understanding of roles and responsibilities related to the storage and disposition of explosives material.

- Requested explosives material inventory listings from Departmental sites to determine a universe of explosives.

- Obtained overviews of sites' Explosive Safety Programs, reporting structure, periodic inventories of explosives material, tracking systems, site/location explosives material limits, training, safety security incidents, explosives material disposal efforts, and coordination efforts with the Explosive Safety Committee.

- Selected a judgmental sample of explosives material stored at each of the sites visited, based on factors such as large net explosive weights, anomalies in the data provided, age of materials and/or how long they have been onsite, large volume materials, and storage compatibility groups. We conducted visual verification of the selected sample and compared data in the inventory tracking system to the labels attached to the explosives material. We did not select a statistical sample; therefore, we cannot project our audit results to the population.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis

for our findings and conclusions based on our audit objective. Accordingly, the audit included tests of controls and compliance with laws and regulations necessary to satisfy the audit 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 audit. We partially relied on computer-based data to satisfy our objective. We conducted a reliability assessment of computer-processed data relevant to our audit objective and deemed the data sufficiently reliable.

An exit conference was held with Department officials on June 25, 2020.

- Inspection Report on *Accountability and Control of Explosives at Lawrence Livermore National Laboratory's High Explosives Applications Facility* (INS-O-13-06, September 2013). The report concluded that there were weaknesses with controls over access and inventory of explosive materials at the High Explosives Applications Facility (HEAF). Specifically, individuals at Lawrence Livermore National Laboratory with high-level security clearances had the potential to access the HEAF explosive operations area even though they lacked specific authorization and/or had not received required safety training. Further, some cleared personnel had been granted unescorted access to enter the HEAF explosive operations area, despite the fact that they did not have an official need or the additional training required for unescorted access. Additionally, a unified perpetual system of records capable of tracking and accounting for explosives acquired, stored, and expended at HEAF from acquisition to disposition did not exist. The report found that these issues occurred because officials had not adequately considered the risks associated with access to the facility and the increased potential for theft and diversion of explosives. In addition, the inventory controls for explosives with HEAF primarily focused on safety and not tracking and accountability of high-risk personal property such as explosives from acquisition to disposition.

- Inspection Report on *Management of Explosives at Selected Department Sites* (INS-O-12-02, July 2012). The report concluded that problems existed with handling and storing explosives at each of the four contractor-operated sites visited, potentially increasing the risk of harm to personnel and infrastructure. For instance, contrary to established practice designed to minimize the impact of inadvertent detonation, the Savannah River Site and the Idaho National Laboratory performed explosive shipment inspections during peak traffic hours at populated main gates rather than at remote areas and/or during non-peak traffic hours. The inspection determined that excess combustible and non-combustible materials were being stored in explosives bunkers, incorrect bunker placards and fire symbols were posted on bunkers and buildings, and excess explosives waste was not being disposed of in a timely manner. The report concluded that Department of Energy management had not focused the attention needed to ensure that the responsible facilities contractors properly implemented Department policies for handling and storing explosives, as required. Also, contractor officials charged with managing and safeguarding explosives had not ensured compliance with various aspects of the *DOE Explosives Safety Manual*.

Department of Energy
Under Secretary for Nuclear Security
Administrator, National Nuclear Security Administration
Washington, DC 20585

June 16, 2020

MEMORANDUM FOR TERI L. DONALDSON
INSPECTOR GENERAL

FROM: LISA E. GORDON-HAGERTY

SUBJECT: Response to the Office of Inspector General Draft Report *The Department of Energy's Storage and Disposition of Explosives Material at Selected Sites* (A18PT041)

Thank you for the opportunity to review and comment on the subject draft report. NNSA maintains a robust explosives safety culture that is reinforced through our leadership of an Explosives Safety Committee comprised of Federal and contractor personnel across the Department. The report's conclusion that storage and disposition of explosives material at the sites reviewed generally comply with Federal and Departmental requirements reflects our commitment to safe and effective operations.

We appreciate the auditors' observations and recommendations to further enhance our inventory procedures. The attached management decision outlines the actions planned to address each recommendation. Subject matter experts have also provided technical comments for your consideration under separate cover to enhance the accuracy and completeness of information presented in the report. If you have any questions regarding this response, please contact Mr. Dean Childs, Director, Audits and Internal Affairs, at (301) 903-1341.

Attachment

Attachment

NATIONAL NUCLEAR SECURITY ADMINISTRATION
Management Decision

The Department of Energy's Storage and Disposition of Explosives Material at Selected Sites (A18PT041)

The Office of Inspector General (OIG) recommended that the Administrator of the National Nuclear Security Administration (NNSA) direct the site offices under NNSA's purview to ensure contractors:

Recommendation 1: Maintain comprehensive database tracking and inventory systems for stored explosives material that include historical data controls to detect incompatible explosives material, established load limits, and quantity-distance constraints;

Management Response: Concur. The impacted management and operating contractor will transition from a stand-alone inventory system at the facility reviewed by the auditors to a company-supported data system. The new system will include integrated tracking through disposition, showing storage of compatible explosives material and Net Explosives Weight, consistent with the approved Explosives Safety Site Plan. Additionally, NNSA's Office of Worker Safety and Health Services (NA-513) and the Office of Acquisition Management (NA-APM-10), in coordination with NNSA's Field Offices, will evaluate explosives inventory system requirements across the Enterprise. The estimated completion date for these actions is December 31, 2022.

Recommendation 2: Establish steps to meet the requirements of conducting a physical inventory that include procedures not limited to checking off a listing of recorded property without actual verification of the location and existence of explosives material;

Management Response: Concur in principle. We agree that physical inventories of explosives should be conducted in accordance with applicable requirements. Inventory procedures must, however, carefully balance administrative accountability requirements and risks associated with opening containers and exposing explosives material. None of the sites' procedures for conducting physical inventories were limited to checking off a listing of recorded property, as implied in the report and this recommendation. Site inventory personnel did conduct physical counts and verify material containers. However, containers are not always opened during physical inventories to limit exposure, consistent with explosives safety technical standards. NA-513 and NA-APM-10, in coordination with NNSA's Field Offices, will evaluate inventory policies, to include container labeling and visual inspection requirements, to support the on-going effectiveness of explosives inventory programs across the complex. Results of this evaluation will be documented by December 31, 2022.

Attachment

Recommendation 3: Develop processes to regularly update or replace physical identification labels on explosives material when changes occur;

Management Response: Concur in principle. NA-513 in coordination with NNSA's Field Offices, will evaluate policies and procedures for labeling explosive materials to enhance the consistency and effectiveness of explosives inventory programs across the complex. Results of this evaluation will be documented by December 31, 2021.

Recommendation 4: Develop procedures to ensure that incompatible explosives material is not moved to or stored in prohibited areas; and

Management Response: Concur in principle. DOE-STD-1212-2019, section 32.4 Storage Compatibility outlines the procedures for storing mixed compatibility groups. NA-513 in coordination with NNSA's Field Offices, will evaluate M&O's implementation of the DOE-STD-1212-2019 storage compatibility procedures to ensure consistent implementation across the complex. Results of this evaluation will be documented by December 31, 2021.

Recommendation 5: Consider designating a storage review committee to establish and approve storage review intervals for all stored explosives or develop other mitigating controls;

Management Response: Concur. The current version of DOE-STD-2012-2019, DOE's Explosives Safety technical standard, requires that all sites establish an Explosives Safety Program that includes a contractor Explosives Storage Review Committee to establish and approve storage review intervals for all bulk explosives stored at the facility. Currently four of the five NNSA sites that store bulk explosives have a storage review committee or its equivalent. The remaining site will establish an Occupational Safety and Industrial Hygiene Council with responsibility for explosives safety and explosives storage reviews. The council will meet the intent of the storage review committee and include representatives from national laboratory users and the Protective Force Services contractor. The council will be established by December 31, 2020.

FEEDBACK

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Office of Inspector General (IG-12)
Department of Energy
Washington, DC 20585

If you want to discuss this report or your comments with a member of the Office of Inspector General staff, please contact our office at (202) 586-1818. For media-related inquiries, please call (202) 586-7406.