U.S. Department of Energy
Office of Inspector General
Office of Inspections and Special Inquiries

Inspection Report

Material Control and Accountability at Los Alamos National Laboratory

DOE/IG-0774 **September 2007**

Department of Energy
Washington, DC 20585

September 7, 2007

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman
Inspector General

SUBJECT: INFORMATION: Inspection Report on "Material Control and Accountability at Los Alamos National Laboratory"

BACKGROUND

The Department of Energy's Los Alamos National Laboratory (LANL) has a national security mission that includes responsibility for the science, engineering and technology related to certain radioactive materials supporting the Nation's nuclear weapons program. These include materials such as plutonium, enriched uranium and depleted uranium.

LANL maintains inventories of Categories I, II, III, and IV accountable nuclear material. Categories I and II materials are those that would be most attractive to an adversary intent on theft or diversion. Categories III and IV materials are those that would be less attractive, because they contain smaller quantities of plutonium, uranium or other materials.

The capability to prevent, deter or detect the theft or diversion of nuclear material is critical. As such, control and accountability of this material is provided through a Material Control and Accountability (MC&A) Program. The objective of our inspection was 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.

RESULTS OF INSPECTION

We concluded that, in general, the Laboratory's MC&A Program provided timely and accurate information concerning its inventory of accountable nuclear material. However, we identified certain opportunities for improving controls over the nuclear material inventory. For example:

- Several inventories conducted by LANL were not completed in a timely manner due to problems with performing verification measurements within specified time frames. Similar findings were reported during 2003 and 2005 external Safeguards and Security Surveys of LANL.

- A storage vault that contained over 11,000 individual lots of accountable nuclear material had not undergone a 100 percent inventory in over a decade. LANL used weighted sampling to conduct its inventories, which was consistent with its approved MC&A Plan.

While the use of properly structured weighted sampling is a recognized technique, the reality is that some lots may not have been physically verified in many years. We noted that the lack of a 100 percent inventory was identified as a concern during a contractor "due diligence inspection" when the LANL management contract transitioned from the University of California to Los Alamos National Security, LLC, in June 2006.

- The formulation, assignment and labeling of lot identification numbers could be improved to enhance controls over and accuracy in accounting for nuclear material.

- Eight custodians were both the shipping and receiving agent in the same transaction, which violated a Department requirement for separation of duties.

- 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.

We made several recommendations designed to enhance the security of LANL's management of accountable nuclear materials.

MANAGEMENT REACTION

In responding to a draft of this report, management agreed with our recommendations and identified corrective actions taken, initiated, or planned to address them. Management's comments are provided in their entirety in Appendix C of the report. We consider management's comments to be responsive to our recommendations.

Attachment

cc: Deputy Secretary
Administrator, National Nuclear Security Administration
Chief of Staff
Chief Health, Safety and Security Officer
Manager, Los Alamos Site Office
Director, Policy and Internal Controls Management (NA-66)
Director, Office of Internal Review (CF-1.2)
Audit Liaison, Los Alamos Site Office

MATERIAL CONTROL AND ACCOUNTABILITY AT LOS ALAMOS NATIONAL LABORATORY

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INTRODUCTION AND OBJECTIVE

The Department of Energy's (DOE's) Los Alamos National Laboratory (LANL) is a multidisciplinary research institution engaged in strategic science on behalf of national security. This includes the responsibility for the science, engineering, and technology of plutonium and other radioactive materials in support of the Nation's nuclear weapons stockpile program. These materials may constitute accountable nuclear material, which is a collective term that includes all materials so designated by the Secretary of Energy in quantities that require special control. Examples of these materials include plutonium, enriched uranium, and depleted uranium.

LANL's activities require the maintenance of inventories of Categories I, II, III, and IV accountable nuclear material. Categories I and II are the most attractive to an adversary intent on theft or diversion and generally include weapon components such as pits, as well as other pure products and high-grade materials containing significant quantities of plutonium and uranium. At LANL, these categories of material are maintained in Material Balance Areas located within LANL's Material Access Area (MAA).

Categories III and IV materials are considered less attractive to an adversary because they contain smaller quantities of plutonium, uranium, and other materials. While the MAA does contain some Categories III and IV materials, these categories of accountable nuclear material are generally maintained in Material Balance Areas located throughout the Laboratory's Limited Security and Property Protection Areas.

LANL maintains approximately 19,400 lots of accountable nuclear material within the MAA and approximately 7,500 lots at other locations throughout the Laboratory. The capability to deter, detect, and assist in the prevention of theft or diversion of this material is critical. As such, LANL maintains a graded safeguards program under a Material Control and Accountability (MC&A) Program. This Program was established under the requirements of DOE Order 470.4, "Safeguards and Security Program," and DOE Manual 470.4-6, "Nuclear Material Control and Accountability," and is operating under LANL's recently approved MC&A Plan.

The objective of this inspection was 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.

OBSERVATIONS AND CONCLUSIONS

We concluded that in many respects LANL's MC&A Program provided timely and accurate information concerning the inventory, transfers, characteristics, and location of accountable nuclear material at the Laboratory. However, we identified certain opportunities for improving controls over accountable nuclear material maintained both inside and outside the MAA.

Within the MAA, we sampled 66 accountable nuclear material lots, including Categories I and II materials, and 30 associated tamper indicating devices. We found all lots of accountable nuclear material to be consistent with the characteristics and locations identified in the Laboratory's official MC&A accounting system. We also found that the limited number of transfers of accountable nuclear material within the MAA was appropriately documented. We observed Laboratory MC&A personnel conducting semi-annual inventory activities, and the personnel appeared to be conforming with prescribed inventory procedures. However, during our review we identified the following concerns that we believe warrant management attention:

- Six of six inventories conducted by LANL in the MAA since December 2005 were not completed in a timely manner due to problems with performing verification measurements within specified time frames. We noted that similar findings were identified and reported during 2003 and 2005 Los Alamos Site Office Safeguards and Security Surveys;

- The storage vault in the MAA, which contained over 11,000 individual lots of accountable nuclear material, had not undergone a 100 percent inventory for a number of years, perhaps 13 years or more. Consistent with its MC&A Plan, LANL used weighted sampling to conduct its inventories. However, we are concerned that, by relying on weighted sampling and never conducting a 100 percent inventory, LANL created the potential for some lots not to have had their presence physically verified in over a decade. We noted that a 100 percent inventory was not even conducted when the LANL management contract transitioned from the University of California to Los Alamos National Security, LLC, in June 2006; and,

- The formulation, assignment, and labeling of lot identification numbers could be improved to enhance controls over and accuracy in accounting for nuclear material. For example, lot identification numbers were not always formulated in

accordance with applicable instructions, and different lots were assigned the same identification number, which could lead to confusion.

Outside the MAA, we observed operations and inventory procedures in several Categories III and IV Material Balance Areas. We also sampled 814 Categories III and IV lots of accountable nuclear material in 7 separate Material Balance Areas. We found MC&A activities that were not consistent with DOE and/or LANL MC&A requirements. Specifically:

- Eight custodians shipped accountable nuclear material from one Material Balance Area to another where they were the receiving custodian. Thus, they were both the shipping and receiving agent in the same transaction—this violated a DOE requirement for separation of duties;

- In several instances, lots containing multiple items of accountable nuclear material were annotated in the Laboratory's official MC&A accounting system as single items, contrary to the accounting structure identified in LANL's MC&A Plan. We noted that these lots actually contained anywhere from 3 to 157 discrete accountable items; and,

- A Material Balance Area custodian did not appropriately document the creation of a new lot of accountable nuclear material within the time frame required by LANL's MC&A Plan. Under the circumstances, the nuclear material could have been diverted without any record showing that it had ever existed.

In addition, across multiple Categories III and IV Material Balance Areas, we had several concerns based on instances of non-compliance with applicable MC&A procedures for the recording of information in the Laboratory's official MC&A accounting system and the labeling of lots. A detailed discussion of the issues can be found in Appendix B.

Details of Findings

MC&A PROGRAM PERFORMANCE

We concluded that LANL's MC&A Program could be improved with regard to the provision of timely and accurate information concerning the inventory, transfers, characteristics, and location of accountable nuclear materials. We identified opportunities for improvement in controls over accountable nuclear material maintained both inside and outside the MAA.

MC&A Controls Inside the MAA

Within the MAA, we sampled 66 accountable nuclear material lots, including Categories I and II materials, and 30 associated tamper indicating devices. We found all lots of accountable nuclear material to be consistent with the characteristics and locations identified in LANL's Materials Accounting and Safeguards System (MASS), which is the Laboratory's official MC&A accounting system. We also found that the limited number of transfers of accountable nuclear material within the MAA was appropriately documented. In addition, while conducting our inspection, we observed Laboratory MC&A personnel conducting a semi-annual inventory, which used prescribed inventory procedures based on a weighted sample approach. LANL reviewed 430 lots and 370 tamper indicating devices in 17 Material Balance Areas and only identified discrepancies with two tamper indicating devices and one container label.

However, during our review we identified the following concerns that we believe warrant management attention.

Completion of Past Inventories

We found that six of six inventories conducted by LANL in the MAA since December 2005 were not completed in a timely manner due to problems with performing verification measurements within the specified eight working days time frame. This is similar to findings reported during 2003 and 2005 Los Alamos Site Office Safeguards and Security Surveys.

DOE MC&A policies require that nuclear material accounting systems be structured to ensure timely detection of errors or discrepancies in records associated with Category I or II quantities of accountable nuclear material. In this regard, the LANL MC&A Plan provides that during physical inventories a Nuclear Material Physical Inventory Measurement ticket will be used to identify accountable items requiring further measurement. These measurements are then to be completed within eight working days, with the results reported to the LANL Physical Inventory Officer.

Due to a series of issues, such as a contamination incident in the MAA storage vault, the MAA laboratory that conducts the required inventory verification measurements was shut down for lengthy periods of time during the first half of 2006. This resulted in four bi-monthly process area and two semi-annual storage area inventories remaining open for as long as 10 months. This had the potential to impact LANL's ability to ensure the timely detection of errors or discrepancies. The inventories were not closed until October 2006.

Inventory of Storage Vault

We identified that the storage vault in the MAA, which contains over 11,000 individual lots of accountable nuclear material, had not undergone a 100 percent inventory for a number of years, perhaps 13 years or more. Consistent with its MC&A Plan, LANL used weighted sampling to conduct its inventories. However, we are concerned that, by relying on weighted sampling and never conducting a 100 percent inventory, LANL created the potential for some lots not to have had their presence physically verified in over a decade. We noted that a 100 percent inventory was not even conducted when the LANL management contract transitioned from the University of California to Los Alamos National Security, LLC, in June 2006.

LANL's sampling approach identifies 110 lots plus adjacent items for inventory every semi-annual period, with the sample weighted to ensure that the most "attractive" items in storage have the greatest chance of being selected and "less attractive" items the least chance of being selected. LANL's reasoning for reliance on this statistical sampling method was based on the Laboratory's policy of ALARA (As Low As Reasonably Achievable) radiation exposure and the area's relatively high level of radiation. During discussions with assigned technicians and other MC&A-related personnel, we were unable to find anyone with knowledge or documentation of the last time the vault was completely inventoried. In contrast to LANL's practice, we noted that Lawrence Livermore National Laboratory conducted 100 percent semi-annual inventories of the accountable nuclear materials in its MAA.

During contract transition, Los Alamos National Security, LLC, performed "due diligence" inspections of laboratory facilities and operations to identify those conditions it believed could give rise to liability, loss, damage, or non-compliance with the terms of its contract. As part of this effort, Los Alamos National Security, LLC, noted that a 100 percent inventory of Special Nuclear Material had not been conducted. To meet "due diligence"

requirements, Los Alamos National Security, LLC, conducted statistical sampling of Special Nuclear Material and plans actions within the next 2 years to ensure 100 percent accountability of items in the inventory. Given the sensitivity of the nuclear material involved, we believe Los Alamos National Security, LLC, should place particular emphasis on assuring that all materials in the vault are properly accounted for at the earliest possible time. National Nuclear Security Administration Headquarters and Los Alamos Site Office officials suggested to us that DOE policy should be modified to require periodic 100 percent inventories when statistical sampling is used as the primary method of assuring accountability of accountable nuclear material.

Lot Identification Numbers

We found that the formulation, assignment, and labeling of lot identification numbers could be improved to enhance controls over and accuracy in accounting for nuclear material.

The MAA maintains Process Accountability Flow Diagrams that contain instructions on how to develop an identification number for a particular lot of accountable nuclear material. The Diagrams provide a methodology for generating lot identification numbers based on a naming convention for each process, i.e., a production activity. However, we determined that the instructions were not always followed. We noted during our inspection that the formulation of lot identification numbers was often based on the preference of the technicians who worked with the materials. For example, we were told one technician's lot identification numbers were based on the characters in a movie the technician had just seen.

In addition, during our sampling process, we noted that side-by-side Material Balance Areas used numbering systems that resulted in some duplication of lot identification numbers. In two instances, we noted that lots in the different Material Balance Areas had exactly the same lot identification number, potentially making inventory verification activities difficult. Verbal confirmations from facility workers were required to provide assurance that these lots had been accounted for properly. We were told by an MC&A official that MASS allows items in different material accounts (i.e., Material Balance Areas) to have the same lot identification number.

We also noted that the labeling of lot identification numbers varied significantly from item to item. For example, some items had their lot identification numbers marked on the outside of containers or plastic bags with a felt-tipped marker, other items had their lot identification numbers handwritten or typed on tags attached to the

items, and some items had their lot identification numbers physically engraved on the items. Some of these practices resulted in difficulty reading lot identification numbers due to handwriting inconsistencies, wearing away of the identification numbers due to handling of the items, or obliteration of the lot identification numbers due to mechanical processes used while working with the items in the process area.

MC&A Controls Outside the MAA

Outside the MAA, we observed operations and inventory procedures in several Categories III and IV Material Balance Areas. We also randomly sampled 814 Categories III and IV lots of accountable nuclear material in 7 Material Balance Areas. The following MC&A activities were inconsistent with DOE and/or LANL MC&A requirements.

Separation of Duties

We found that eight custodians shipped accountable nuclear material from one Material Balance Area to another where they were the receiving custodian. Thus, they were both the shipping and receiving agent in the same transaction—this violated DOE Manual 470.4-6, which states "a single custodian must not serve as both shipper and receiver for material transfers."

During our inventory of selected items in a Material Balance Area, we determined that a Material Balance Area custodian had both shipped and then received accountable nuclear materials between Material Balance Areas that he administered. A subsequent query of MASS by MC&A officials determined that seven other custodians had transferred material to themselves. LANL issued an Internal Assessment Report that stated "Custodians may not ship materials from one MBA and then receive it in another MBA as defined in DOE M [Manual] 470.4-6 . . . ." The Internal Assessment Report also stated that "Each custodian was immediately contacted and notified of the violation." In addition, each custodian was requested to acknowledge his/her understanding of the requirement to preclude recurrence. As an immediate compensatory measure, LANL management requested a daily report that monitors accountable nuclear material transfer transactions to ensure the same custodian does not ship and receive material between Material Balance Areas he/she controls.

Multiple Item Lots

We also found that, in several instances, lots containing multiple items of accountable nuclear material were annotated in MASS as single items, contrary to the accounting structure identified in LANL's MC&A Plan. We determined that these lots actually contained anywhere from 3 to 157 discrete accountable items.

Under LANL's MC&A Plan, nuclear materials are to be accounted for by discrete item. MASS is used to maintain detailed item inventory records, categorized by material type, composition, location, and process status, and is to provide a complete audit trail on all accountable nuclear material from receipt through disposition. The practice we observed with multiple item lots was not consistent with the concepts of accounting by "discrete item" and having "detailed item inventory records" and "a complete audit trail." Not annotating MASS with the specific number of individual accountable items comprising a lot prevented LANL from knowing exactly how many discrete accountable items the Laboratory was maintaining and could have negatively impacted the control and accountability of nuclear materials. When we raised this issue, LANL management stated that it would require Material Balance Area custodians to use the comment field in MASS to note when a specific lot contains more than one discrete item.

Timely Recording in MASS

We found that a Material Balance Area custodian did not document the creation of a new lot of accountable nuclear material in MASS within the time frame required by LANL's MC&A Plan. The MC&A Plan states "Timeliness goals for closing NM [Nuclear Material] transactions onto MASS are established on a graded safeguards basis as follows: Category IV NM in four hours." In the instance we identified, however, the lot was created on September 5, 2006, but was not entered into MASS until September 13, 2006, eight days past the required time frame.

Although we only identified the one instance of noncompliance, ensuring compliance with this MC&A Plan requirement is essential because of the potential that undocumented accountable material could be diverted without any record or evidence showing that it had ever existed. Due to our identification of this condition, LANL management issued an Internal Assessment Report acknowledging that an accountable item "had been generated . . . , but was not entered into MASS within the 4 hour time requirement of the MC&A Plan." The custodian responded that this was an oversight. The Internal Assessment Report stated that the custodian would be retrained on the requirements of applicable work instructions.

Accuracy of MC&A Information

In addition, across multiple Categories III and IV Material Balance Areas, we had several concerns based on instances of non-compliance with applicable MC&A procedures for the recording of

information in MASS and the labeling of lots. A detailed discussion of the issues can be found in Appendix B.

RECOMMENDATIONS

We recommend that the Chief Health, Safety and Security Officer:

1. Consider modifying DOE Manual 470.4-6 to require periodic 100 percent inventories when statistical sampling is used as the primary method of assuring accountability of accountable nuclear material.

We recommend that the Manager, Los Alamos Site Office, directs LANL MC&A management to:

2. Ensure that bi-monthly and semi-annual inventories in the MAA are completed in a timely manner, to include completion of verification measurements within specified time frames.

3. Review the formulation, assignment, and labeling of lot identification numbers and implement more standardized methodologies that would enhance controls over and accuracy in accounting for nuclear material.

4. Ensure that LANL maintains separation of duties when shipping and receiving accountable nuclear material between Material Balance Areas.

5. Ensure that the recording of multiple item lot information in MASS is consistent with the concepts of accounting by "discrete item" and having "detailed item inventory records" and "a complete audit trail," as provided for under the accounting structure of the LANL MC&A Plan.

6. Ensure that the creation of any new lot of accountable nuclear material is recorded in MASS in the time frames required.

7. Review the issues discussed in Appendix B and take action to ensure that information is appropriately/accurately recorded in MASS in a timely manner, that lot identification tags are accurate and intact, and that container labels list all required information.

MANAGEMENT COMMENTS

In comments on a draft of this report, the National Nuclear Security Administration (NNSA) generally agreed with the report and its recommendations. NNSA identified completed, ongoing, and planned actions to address recommendations 2 through 7.

Regarding recommendation 1, the Office of Health, Safety and Security (HSS) considered modifying DOE Manual 470.4-6 and concluded that MC&A requirements should not be modified to require periodic 100 percent inventories. HSS summarized that "Although periodic 100 percent inventories are a good practice and many DOE facilities perform them, there are circumstances when conducting 100 percent inventories is not practical and providing a high level of assurance by other means is a preferable approach. For these situations, the marginal increase in assurance provided by conducting 100 percent physical inventories does not justify the additional costs, worker radiation exposure, operational impacts, and in some cases increased security risks."

Management's comments are contained in their entirety at Appendix C.

INSPECTOR COMMENTS

We consider management's comments to be responsive to our recommendations.

Appendix A

SCOPE AND METHODOLOGY

We conducted our inspection fieldwork between June and December 2006. Los Alamos Site Office and Laboratory personnel were interviewed regarding LANL MC&A procedures, the MC&A Program, and MASS. We reviewed applicable policies and procedures, as well as inspection and survey reports issued by the Los Alamos Site Office and the Department's Office of Independent Oversight. We observed a number of LANL-conducted inventories at various Material Balance Areas, to include 316, 424, 425, 428, 429, and 469 and the 700 and 800 series. We conducted a number of random samples at various Material Balance Areas, to include 310, 315, 316, 424, 469, 517, and 520 and the 700 and 800 series. We did not conduct sampling in LANL's vault area due to safety considerations.

We did not review LANL's performance measurement processes as they relate to the MC&A Program because DOE had temporarily relieved Los Alamos National Security, LLC, the new management and operating contractor at LANL, of performance measurement requirements. The new contract was awarded on December 21, 2005, and commenced on June 1, 2006. Performance measures and associated incentives were not put into place until October 2006.

This inspection was conducted in accordance with the "Quality Standards for Inspections" issued by the President's Council on Integrity and Efficiency.

Appendix B

Accuracy of MC&A Information

Across multiple Categories III and IV Material Balance Areas, we identified several issues involving instances of non-compliance with applicable MC&A procedures for the recording of information in MASS and the labeling of lots. Specifically, we found that:

- While conducting a series of random samples in the Chemical and Metallurgy Research Facility, we noted that every lot we sampled that consisted of solid material dissolved in a solution was recorded in MASS as if the material were still in a solid state, i.e., grams instead of grams per liter, as presented in DOE guidance. Material categorization as described in the LANL MC&A Plan is based on the attractiveness level and quantity of material, so accurately identifying the nature and amount of material present is important. LANL uses the attractiveness levels prescribed by DOE guidance, where it is recognized that Categories I, II, III, and IV materials can be in the form of solutions, specified as so many grams per liter.

- One lot identification number was listed as active in MASS even though the lot was destroyed nearly 12 months earlier during a December 2, 2005, hydrodynamic test. The Material Balance Area custodian said that the deletion paperwork was properly submitted at the time of destruction, but was lost prior to MASS transaction generation. The lot was finally removed from MASS on November 27, 2006.

- Five required lot identification labels had deficiencies. Three labels had incorrect lot identification numbers hand printed on them; one label was torn in half; and one label had become detached from its assigned lot. In the case of the first three labels, pen and ink corrections were immediately made. We were told that the label discrepancies relating to the torn and detached labels were corrected after our departure.

- Three tamper indicating devices attached to accountable items were not recorded in MASS. Tamper indicating devices are used in conjunction with a material surveillance program to detect violations of container integrity. The necessary MASS transactions and/or other corrections were accomplished.

- The lot identification numbers for one drum and nine lots stored therein had their identification numbers transposed in MASS. During our random sample, two laboratory personnel spent approximately 30 minutes attempting to locate a drum we

had selected to be inventoried. A determination was made that the lot identification number must be wrong, and subsequently the drum was located. It was determined that the drum and all the lots stored therein had their lot identification numbers transposed during the shipping process and incorrectly recorded in MASS.

- The labels for two sealed drums did not list all internally stored lots, as required. An August 14, 2003, notice from the LANL Security and Safeguards Division titled "Accountability Requirements for Multiple-Item Containers" stated that "In all cases, the NM [nuclear material] custodian must ensure the label of the multiple-item container correctly lists all accountable and nonaccountable items within the container." We were told that content listings were later attached to the outside of the drums.

Department of Energy
National Nuclear Security Administration
Washington, DC 20585

August 2, 2007

MEMORANDUM FOR: Christopher R. Sharpley
Deputy Inspector General
for Investigations and Inspections

FROM: Michael C. Kane
Associate Administrator
for Management and Administration

SUBJECT: Comments to Draft LANL MC&A Report; S06IS023; IDRMS No. 2006-14003

The National Nuclear Security Administration (NNSA) appreciates the opportunity to review the Inspector General's (IG) draft report on material control and accountability at Los Alamos National Laboratory. We understand that this inspection was to determine if the Laboratory's Material Control & Accounting (MC&A) program is providing timely and accurate information regarding the inventory, transfers, characteristics, and location of accountable nuclear materials at the Laboratory.

NNSA generally agrees with the report and the recommendations but offers the following comments:

- 100% inventories -- While we understand the intent of the recommendation there is no requirement for such an inventory. It is important to note that the Laboratory currently meets the requirements for conducting physical inventories. A change to policy must take into consideration the length of time required for a desired 100% inventory with confirmation or verification measurements and the impact that the inventory would have operationally. Equally important is the conditions within any vault (high radiation areas, requirement for respirators, annual radiation dose limits).
- Timeliness of inventories Incorporating milestones into the contract adheres to the current methodology where current performance incentives are linked to the completion of inventories.
- Standardized methodologies for enhanced controls -- is addressed in the technical comments.
- Separation of duties A more explicit Standing Order was developed and implemented and there have been no violations of

the separation of duties for Material Balance Area custodians since inception of the Standing Order.

- Consistent accounting – The Laboratory is still addressing this concern. The technical comments provide insight to the progress being made and the Laboratory's resolution of this concern.
- Recording of data within timeframes required and, addressing issues discussed in Appendix B – Both topical areas have been addressed and rectified by the Laboratory.

I have provided technical comments for the IG's consideration in preparing the final report. Should you have any questions about this response, please contact Richard Speidel, Director, Policy and Internal Controls Management.

cc: Donald Winchell, Manager, Los Alamos Site Office
William Desmond, Chief, Defense Nuclear Security
David Boyd, Senior Procurement Executive
Karen Boardman, Director, Service Center

Department of Energy
Washington, DC 20585

August 2, 2007

MEMORANDUM FOR GREGORY H. FRIEDMAN
INSPECTOR GENERAL

FROM: GLENN S. PODONSKY
CHIEF HEALTH, SAFETY AND SECURITY OFFICER
OFFICE OF HEALTH, SAFETY AND SECURITY

SUBJECT: Comments for Draft IG Report: Material Control and Accountability at Los Alamos National Laboratory (SO6IS023)

The Office of Health, Safety and Security (HSS) has reviewed the subject draft inspection report provided by the Inspector General's Office on June 29, 2007, and provides the following comments.

Recommendation 1:

We recommend that the Chief Health, Safety and Security Officer consider modifying Department of Energy (DOE) Manual 470.4-6, *Nuclear Materials Control and Accountability*, to require periodic100 percent inventories when statistical sampling is used as the primary method of assuring accountability of accountable nuclear material.

Concise Response:

HSS does not agree that DOE M 470.4-6 should be modified to require periodic 100 percent inventories. When 100 percent inventories can be conducted quickly, safely, and efficiently, they are a good practice. However, for many nuclear material locations in the DOE complex, this is not the case. Typically barriers to conducting 100 percent physical inventories for such locations are high radiation levels and inaccessibility of the materials. For such materials, DOE relies on other measures to provide a high degree of assurance in the integrity of the inventories. We feel that the additional assurance provided by conducting 100 percent inventories in these cases does not justify the increase in radiation exposure to workers, lost operational time in personnel workload while inventories are being conducted, other financial costs involved in conducting the inventories, increased risk in additional handling of nuclear materials, and, often, the increased security vulnerabilities associated with providing easier access to the materials during inventory periods.

Instead, we believe the current safeguards and security policy approach of allowing site management, with oversight and approval from DOE site offices and program offices, to determine the best methodology for providing a high level of confidence in nuclear material inventories. The resulting methodology takes into account all the specific concerns associated with the products and operations at each site and facility. We do not believe these site-specific methods would be improved by adding an unconditional requirement to conduct a 100 percent physical inventory. While periodic 100 percent inventories can be an important element of the site protection design in many cases, we do not believe that an unconditional policy requirement for 100 percent inventories is warranted.

Rationale:

There are a number of facilities in DOE for which 100 percent physical inventories are the best approach to providing a level of high level of assurance.

There are at least three types of materials and/or locations for which 100 percent inventories may not be appropriate. They are:

1) Materials stored in high security areas for which conduct 100 percent physical inventories would significantly increase radiation exposure for workers. The Los Alamos National Laboratory (LANL) vault cited in the draft IG report is an example of this type of location. There are over 11,000 items on inventory in the vault. These items sit in a variety of shelf types and drawers. Some require lifting the items from the drawers in order to perform the inventories. A large number of items are located on shelves requiring access by ladder to inventory the items. Radiation readings in some parts of the vault are greater than 100 mRem per hour and radiation dose for workers performing inventories in this vault can be up to 25-30 mRem per hour. Inventory teams are comprised of four workers: two people conducting the inventories, one material handler, and one radiation control technician. All personnel are required to wear a respirator while performing inventory in the vault to prevent the inhalation of toxic and radioactive materials. Because of the radiation dose in the vault, personnel are limited to 2 hours of work in the vault per day. A rough estimate of the time to conduct current physical inventories for the LANL vault is between 7 and 9 hours (28 to 32 person-hours, based on four- person teams), and these inventories only select 110-item locations.

2) Materials of little financial or strategic value and for which the security interests are minor. The costs of conducting 100 percent inventories can far exceed the value of the materials or DOE security interests concerning them. Examples of materials for which this can be the case are depleted uranium, enriched lithium, and some attractiveness level E special nuclear materials. See DOE M 470.4-6 for more information on safeguards attractiveness levels.

3) Static storage locations with major barriers to access. There are several storage locations within DOE where there are major physical barriers to accessing materials. Additionally, the materials are rarely moved or handled. In some cases, there are radiation barriers as well. Accessing the materials typically requires removal of the physical barriers by use of heavy equipment such as cranes or other lifting and handling devices; additionally, the materials are often packaged or stored in such a way that accessing individual items is difficult and requires special handling equipment and/or procedures. These materials are usually inventoried by verifying that the barriers have remained intact, and the integrity of the storage locations has not been violated. Opening even a few of these locations is difficult, costly, and raises safety concerns. Conducting a 100 percent physical inventory of these locations would be very expensive and require large amounts of operational resources. Additionally, removing the physical barriers for long periods of time or at predictable times would increase the security risks associated with terrorists attacks aimed at removing the materials.

A high level of assurance can be provided by other means/the costs and impacts of conducting 100 percent inventories can exceed their benefits.

Conducting physical inventories is not the sole means of achieving and maintaining a high level of confidence in the nuclear material inventories and detecting missing or misplaced items. Inventories provide one measure of assurance within the overall safeguards and security program. Performance of inventories is integrated with other elements of the safeguards and security program, namely, physical protection, personnel security, other material control, accountability, and surveillance measures, protective force, and information security to establish the security posture for a particular site and set of material. It is also not a single fail-safe system. Systems are designed to be multiply redundant assuring that loss of one element will not cause catastrophic failure of the entire system. Establishment of these multiple layers of protection measures provides a high level of confidence that special nuclear material continues to reside in its designated location.

Because of the costs and difficulties involved in conducting 100 percent inventories, DOE allows the use of other measures to provide the high degree of assurance required by DOE policy in its nuclear material inventories. Physical barriers, access controls, and personnel security programs limit who has access to the materials and thereby greatly reduce the chance of unauthorized material movement. Administrative controls assure that inadvertent errors are not made when materials are moved into or out of a storage location or other areas. These controls include a two-person rule for handling and transferring materials, transfer checks on materials and containers to assure the right types and amounts of materials were shipped and received, requirements that transfers be appropriately authorized and documented, and separation of duties and responsibilities between materials handling and materials accounting functions. These measures, when combined with random

sampling during physical inventories, provide a high level assurance that the nuclear materials inventories are as stated.

Use of random sampling for physical inventories is consistent with its use in Departmental financial accounting and quality assurance policies.

The use of random sampling for physical inventories is similar to the way auditors use random sampling in reviewing financial records and to the way random sampling is used in quality control. Financial auditors sample company records and review internal controls as part of their process of determining whether a company's financial and inventory reports accurately (fairly) represent the company's financial position. The auditor's statement about the accuracy/fairness of the company's financial statements is based on a sample of the company's record, rather than a review of all of them. Similarly in quality control, sampling of output is typically used to determine if a production system is operating as intended. Detection of defectives items indicates something is wrong with the system. Use of random sampling for physical inventories borrows from both these concepts. Random sampling, when combined with other system elements, allows DOE to say it has a high degree of confidence that its inventories are as stated. It also allows DOE facilities to detect systematic problems in materials control and accountability (MC&A) systems.

Summary:

Physical inventories are only one of many measures that DOE uses to provide a high degree of confidence in its inventories. Although periodic 100 percent inventories are a good practice and many DOE facilities perform them, there are circumstances when conducting 100 percent inventories is not practical and providing a high level of assurance by other means is a preferable approach. For these situations, the marginal increase in assurance provided by conducting 100 percent physical inventories does not justify the additional costs, worker radiation exposure, operational impacts, and in some cases increased security risks. Based on these considerations, our view is that MC&A requirements should not be modified to require periodic 100 percent inventories. Rather, DOE M 470.4-6 should continue to allow DOE program and site offices to approve the inventory methodologies tailored for their mission and facility(ies). The program and site offices are in the best position to know whether the benefits of conducting 100 percent inventories justify the cost and impacts of conducting them and whether a high level of assurance in the inventories can be achieved by other means.

If you have any questions, you may contact me at (301) 903-3777, or your staff may contact Jim Crabtree, of my staff, at (301) 903-6008.

cc: Richard Speidel, NA-66

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