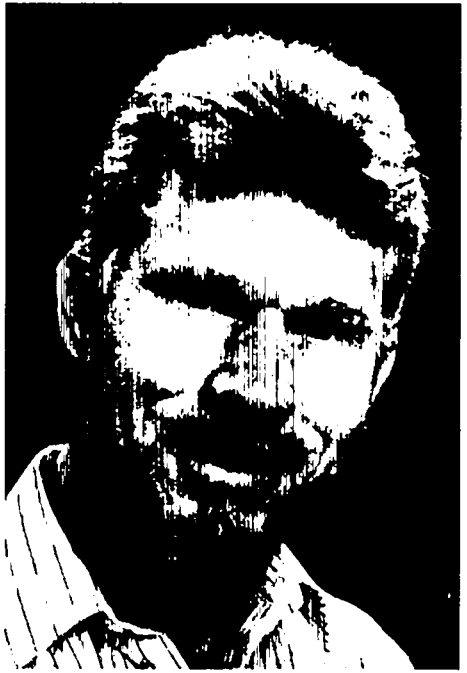
Nuclear Material Handler Awareness Program

Your Responsibilities for Safeguarding Nuclear Materials

Los Alamos
NATIONAL LABORATORY

A Message from the Program Director for Safeguards Assurance (PDSA)



Los Alamos National Laboratory plays a leading role in advancing the science and technology of nuclear materials essential to our national defense and, more broadly, to our nation's well-being (for example, alternative energy, biomedical research, and space exploration). Maintaining this role requires Los Alamos to have a highly diverse nuclear materials inventory. Because of the monetary and strategic value of this inventory and its potential radiation hazards, it is vital that this inventory be properly managed and safeguarded at all times.

As nuclear material handlers, you represent the first line of defense in ensuring effective safeguards. Indeed, you have substantial responsibility for the control, accountability, and safe handling of nuclear materials in accordance with approved policies and procedures. Therefore, it is essential that you be properly trained and qualified. This training workbook is intended to help you gain and maintain the requisite level of safeguards knowledge. Only in this way can the success of our nuclear materials programs and continued strength of our nation be ensured for the present and the future.

In closing, I wish to thank each of you for your total commitment and support of the Laboratory's nuclear safeguards program. Remember, safeguards, like security, is a continuing challenge. Together, we can meet that challenge!

Carl A. Ostenak

INTRODUCTION

The Department of Energy (DOE) has given Los Alamos National Laboratory full responsibility for managing and safeguarding the nuclear material (NM) in its custody. As an NM handler, you share in that responsibility.

Overall Objective

You will learn the basic responsibilities of NM handlers and become familiar with the environment in which they work.

To understand your safeguards responsibilities, you must read this workbook, complete an awareness evaluation form, and mail the form to the address provided. Before completing this workbook, you may want to view a 12-minute Materials Control & Accountability (MC&A) awareness video to help you become familiar with the Laboratory's safeguards program. This video is available through your NM custodian.

Note: As an NM handler, you also have health, safety, and environmental responsibilities. It is not the intent of this workbook to address these important additional responsibilities.

NM Handler Vocabulary

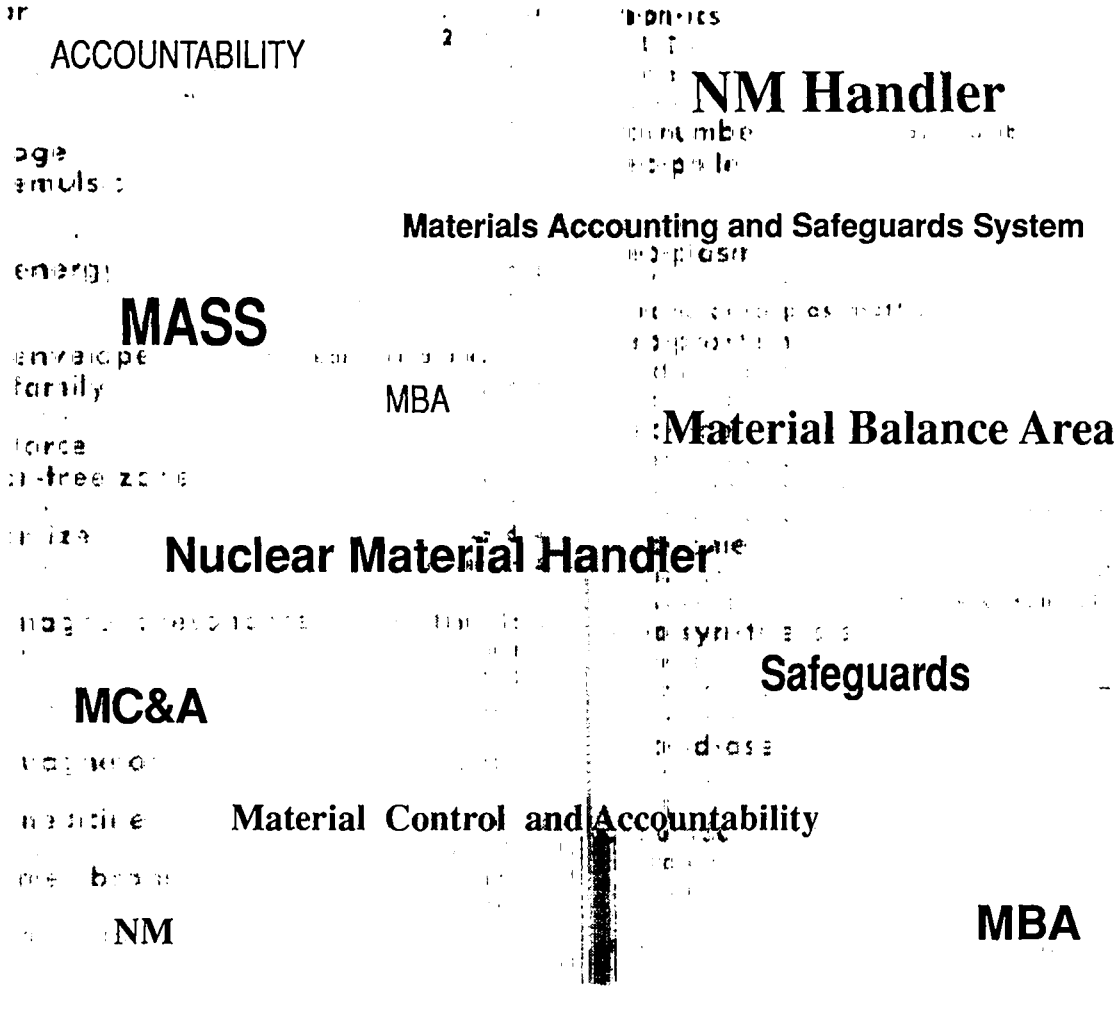
Nuclear Material Handler—Any person who is authorized to handle, move, process, store, and/or transport nuclear material.

Materials Accounting and Safeguards System (MASS)—The Laboratory's official accounting system for all reportable nuclear material in its inventory.

Material Balance Area (MBA)—A unique geographical area designed for using, processing, and/or storing nuclear material. Each MBA maintains control and accountability for the nuclear material in its inventory.

Materials Control and Accountability (MC&A)—A part of safeguards that provides protection from theft, sabotage, or other unauthorized handling of nuclear material. MC&A also provides assurance that all nuclear material is present and accounted for according to Los Alamos procedures.

Safeguards—An integrated system for protecting nuclear material. The components of this system include physical protection, materials accountability, and materials control. Together these components serve to prevent, detect, and respond to theft, sabotage, or other unauthorized handling of nuclear material.



NUCLEAR MATERIAL (NM)

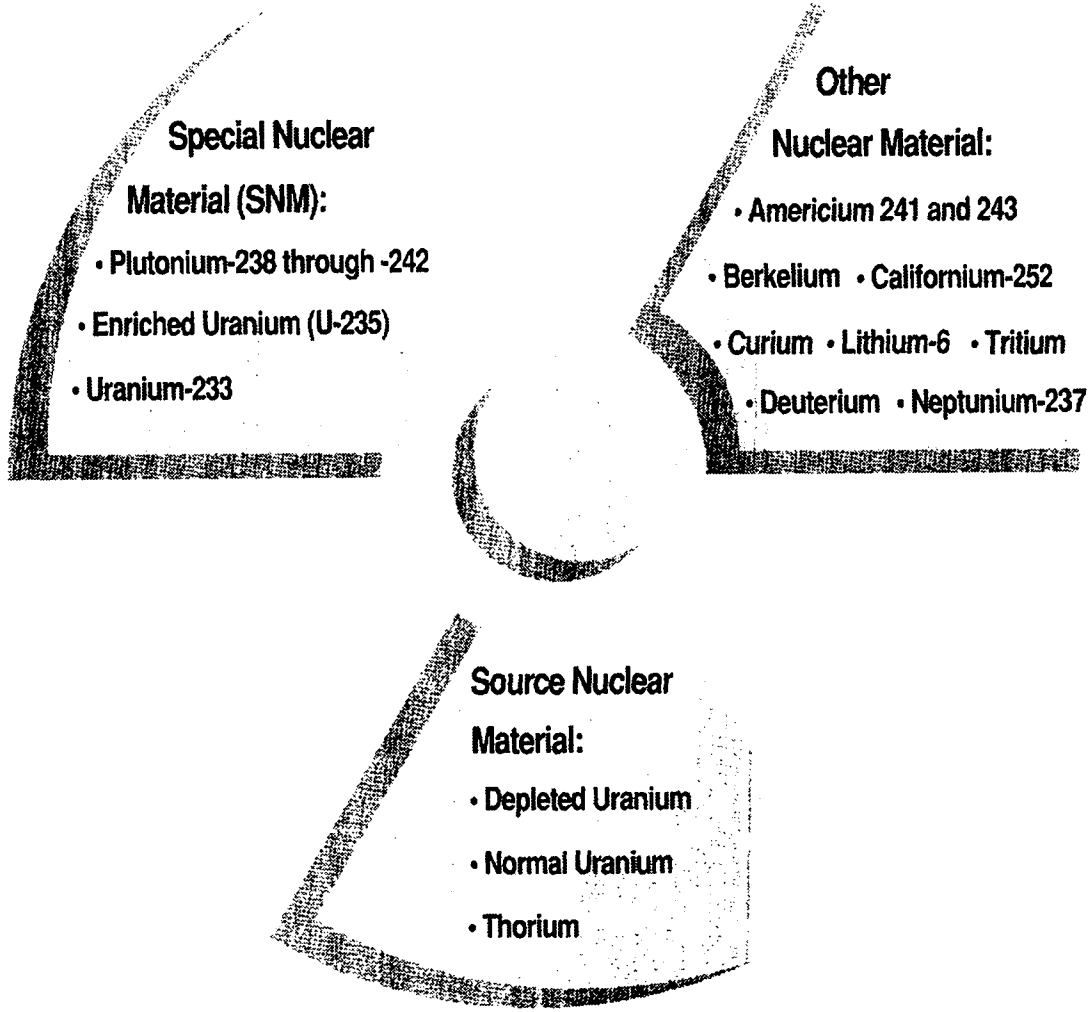
Since the early 1940s, Los Alamos has handled, processed, stored, transported, and safeguarded NM. Los Alamos must continue to control and account for NM at all times to ensure the safety of its employees, the public, and the environment. To help you fulfill your responsibilities as an NM handler, it is important that you learn some basic information about NM.

Specific Objectives

Identify and define special nuclear material, source nuclear material, and other nuclear material.

Types of NM

Los Alamos maintains and safeguards a variety of NM. NM is divided into three types: (1) special nuclear material (SNM), (2) source nuclear material, and (3) other nuclear material. SNM is fissile nuclear material, which means its atoms are capable of being split and releasing energy. Because of this capability, SNM can be used in nuclear weapons. This makes SNM extremely important. SNM must be guarded against unauthorized personnel and actions to prevent possible theft or sabotage. Source nuclear material can be used to produce SNM, although source nuclear material is not fissile. Other nuclear materials cannot be used to produce SNM and are not fissile. As an NM handler, you may work with the NM listed on this page.



Specific Objectives

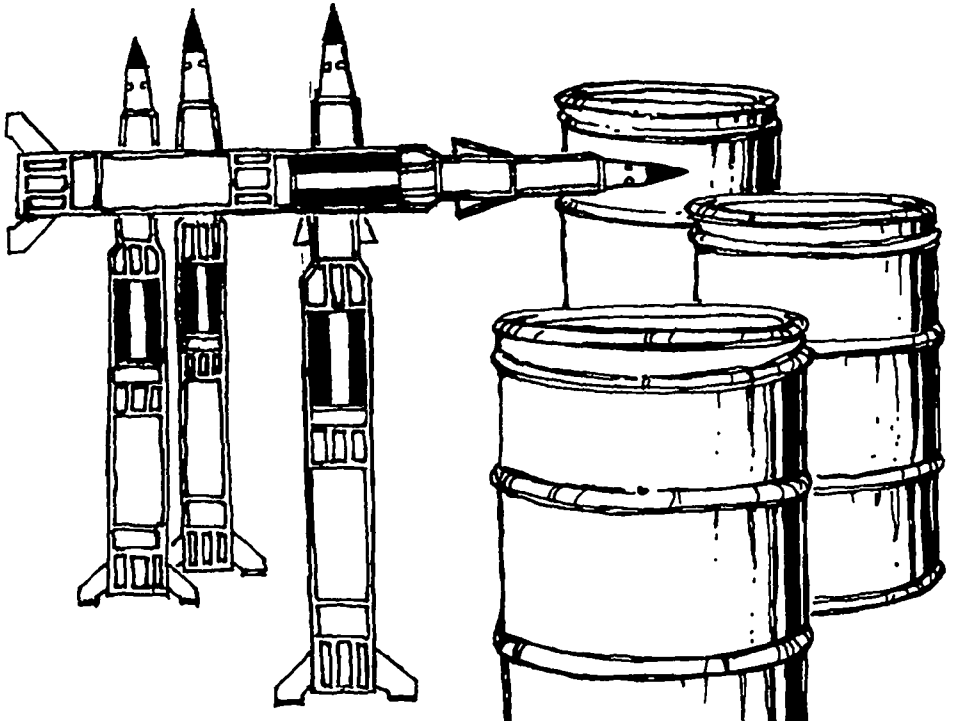
Identify and define attractiveness levels, categories of NM, graded safeguards, and security/containment areas.

Attractiveness Levels

One way of labeling NM is by type, such as plutonium or thorium. Another way of labeling NM is by attractiveness. The attractiveness of NM is determined by its usefulness for the development of nuclear weapons. For example, pure plutonium metal is more attractive than plutonium-contaminated waste. To indicate attractiveness levels of NM, Los Alamos uses the labels A, B, C, D, and E. Each letter indicates a different level of attractiveness. Nuclear material at level A is the most attractive, while NM at level E is the least attractive.

Categories of NM

In addition to type and attractiveness, NM is also labeled by category. Categories are used to determine the amount of protection needed to safeguard the NM. Los Alamos uses the categories I, II, III, and IV. Nuclear material assigned to category I is given the most protection, while NM assigned to category IV is given the least protection. Nuclear materials of different types, amounts, and attractiveness levels require different levels of protection. For example, plutonium requires more protection than thorium. Therefore, a large amount of plutonium is often assigned to category I, while thorium is always assigned to category IV.



Nuclear Weapon Classification: IA

Low-Level Radioactive Waste Classification: IVE

Graded Safeguards

Having graded safeguards means adjusting the level of protection to match the monetary and strategic value of the NM. Graded safeguards provide various degrees of physical protection, materials accountability, and materials control. These safeguards apply to NM of different types, quantities, physical forms, and chemical or isotopic compositions.

Security/Containment Areas

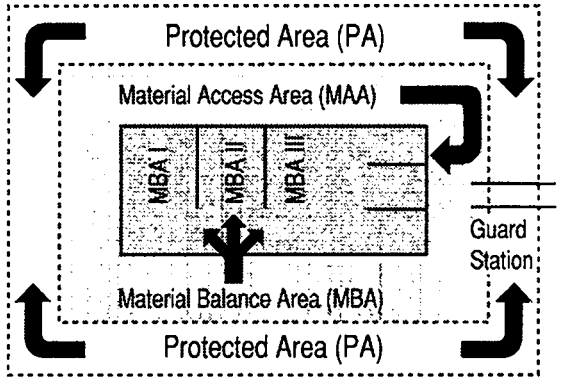
As part of the graded safeguards program, Los Alamos has three types of security/containment areas that help protect certain categories of SNM and tritium. These areas are called limited area, protected area, and material access area.

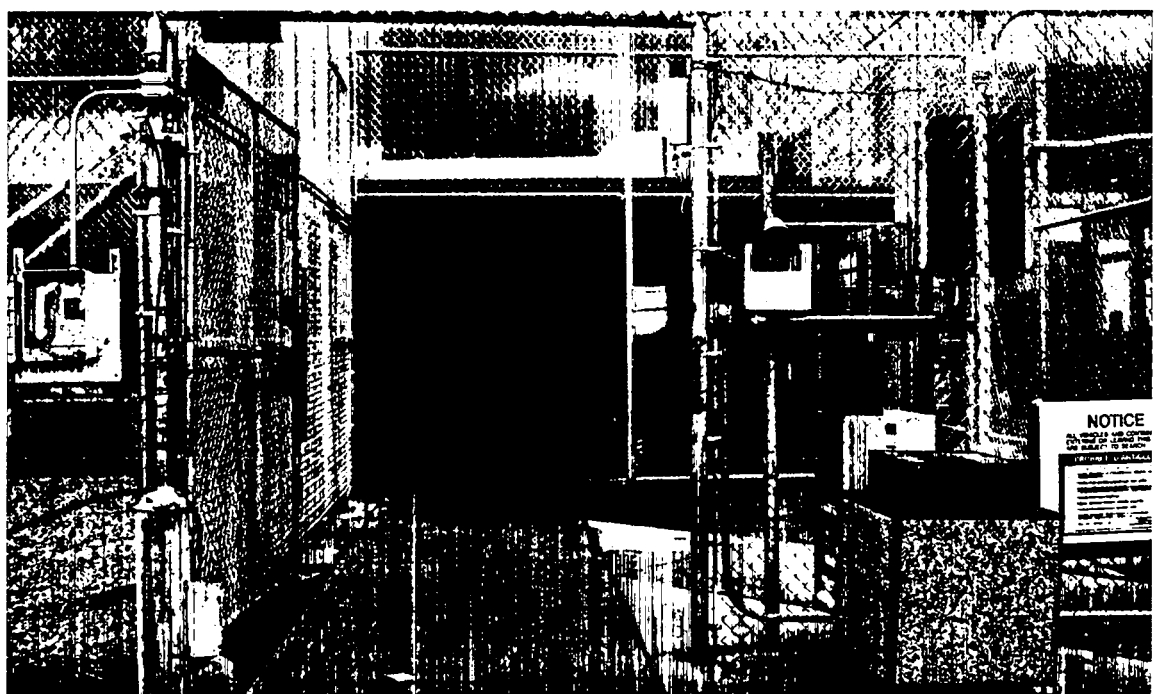
- Limited Area—A security/containment area in which access is controlled to protect category III SNM or tritium, classified information, or classified material. Limited areas provide protection against unauthorized activity that might endanger national security.

- Protected Area (PA)—A security/containment area that encloses one or more material access areas (MAAs) with physical barriers, such as walls or fences. The PA also has entry/exit access controls that include personnel verification, x-ray machines, and SNM and metal detectors.

- Material Access Area (MAA)—A security/containment area enclosed by physical barriers and located within a PA. Category I and II MBAs must be located within an MAA. The MAA also has entry/exit access controls.

Note that category IV MBAs are not required to be in a security/containment area. The type of security/containment area in which you work will depend on the type, amount, and attractiveness of the NM with which you work.





Specific Objectives

Identify and define material balance area (MBA), ultimate MBA responsibility, roll-up, and reasons for placing an MBA "on hold."

Material Balance Area

An MBA is a unique geographical area designed for using, processing, and/or storing NM. Each MBA maintains control and accountability for the NM in its inventory. An MBA is designated by categories I, II, III, or IV according to the type, amount, and attractiveness of the NM in its inventory. Each MBA has its own operating procedures that govern activities within the MBA. The group leader has ultimate responsibility for managing the MBA.

The amount of SNM or tritium present in an MBA cannot exceed a certain level. An MBA with more SNM or tritium than procedures allow is in violation of Los Alamos policy. Great care must be taken to prevent "roll-up," which is the unauthorized accumulation of SNM or tritium in an MBA.

There are times when an MBA must be placed "on hold," which suspends MBA operations. The NM custodian, Material Control and Accountability group (OS-2), PDSA, and/or DOE are authorized to place an MBA on hold. Reasons for placing an MBA on hold include the following:

- Poor housekeeping;
- NM not in correct location;
- Accountability measurements performed with malfunctioning instruments;
- MC&A procedures and requirements not being followed; and
- Other identified deficiencies.

You should become familiar with the MBA Operating Procedures (MBA OPs) for your group. The MBA OPs will provide you with more details on your MC&A responsibilities.

RESPONSIBILITIES OF PERSONNEL

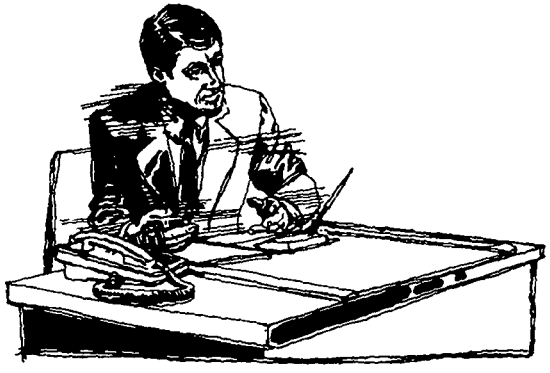
Responsibility for NM is distributed among a variety of positions and groups at Los Alamos. These positions and groups have specific responsibilities that contribute to the overall management and safeguarding of NM.

Specific Objectives

Identify and define the responsibilities of managers, groups, NM custodians, and NM handlers.

Director of Facilities, Security, and Safeguards Division

The division director is responsible for supporting the Laboratory's graded safeguards program. The director—along with the PDSA—must ensure that the Laboratory's MC&A activities comply with DOE safeguards requirements.



Material Control and Accountability Group (OS-2)

The OS-2 group supports and oversees the Laboratory's MC&A activities. OS-2 provides accountability, control, and technical support for the Laboratory's NM inventory.

Program Director for Safeguards Assurance (PDSA)

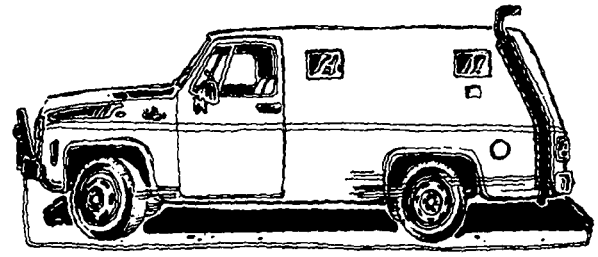
The PDSA is responsible for ensuring the effectiveness of the Laboratory's operational safeguards program. The PDSA must ensure that this program is consistent with DOE requirements and the Laboratory's mission.

Group Leaders

Group leaders of groups or programs using or storing NM are responsible for ensuring that their organization follows the Laboratory's MC&A requirements. To ensure this, group leaders—along with the NM custodian—prepare the MBA OPs for their organization. The MBA OPs must comply with the Laboratory's MC&A requirements.

Property and Transportation Management Group (MAT-2)

MAT-2 is responsible for on- and off-site transfers of NM. The group coordinates with the DOE Transportation Safeguards Division, OS-2, and Laboratory NM users for off-site transportation of NM.



NM Custodian

Groups having NM conduct MC&A activities through a designated NM custodian or an alternate NM custodian. The alternate NM custodian assists and backs up the NM custodian. These individuals are designated by their group leader and are trained and qualified by the Facilities, Security, and Safeguards Division. The NM custodian is the "NM traffic controller" for the MBA(s) within your group. As such, your NM custodian is the first person you should notify concerning any NM activity. Depending on the nature of work within your organization, the NM custodian's responsibilities may vary considerably. The NM custodian's duties include the following:

- Perform physical inventory duties;
- Prepare inventory difference justifications;
- Write and update MBA OPs;
- Initiate or request transfers of NM;
- Perform transfer checks on NM;
- Perform appropriate MASS transactions;
- Implement measurement and measurement control activities;
- Establish administrative controls; and
- Implement material control and related physical security activities.

The designated NM custodian and alternate NM custodian for your group are key individuals who can help you with any MC&A question or issue. Get to know these individuals. They are a valuable resource for assisting you with your NM handler responsibilities.

NM Handler

An NM handler is any person who is authorized to handle, move, process, store, and/or transport NM. In some cases, NM handlers may use NM to periodically calibrate an instrument. In other cases, NM handlers may handle kilograms of plutonium every day. In all cases, NM handlers are responsible for the control, accountability, and safe handling of NM. These duties must be carried out in accordance with approved written procedures. Your MC&A duties will vary depending on your organization's mission. As an NM handler, your MC&A responsibilities may include the following:

- Perform MASS transactions;
- Perform administrative controls;
- Perform on- and off-site transfers of NM (shipping and receiving);
- Operate and calibrate measuring instruments;
- Perform or assist in physical inventory duties;
- Perform administrative MC&A duties; and
- Perform duties in the NM management program.

Consult your NM custodian or MBA OPs for more information about your MC&A responsibilities as an NM handler.

NM CUSTODIAN NM HANDLER

MATERIALS ACCOUNTING AND SAFEGUARDS SYSTEM (MASS)

Specific Objectives

Identify and define MASS, timeliness goals, and direct and indirect MASS users.

MASS is the Laboratory's official accounting system for all reportable NM in its inventory. MASS includes important NM information such as amount, status, location, MBA, composition, measurement data, and the relevant DOE project. Specifically, MASS provides a central computer database for

- Tracking NM inventories;
- Documenting internal and external transfers;
- Generating reports based on database information;
- Using measurement control data; and
- Performing all other necessary accounting functions.

Updating MASS

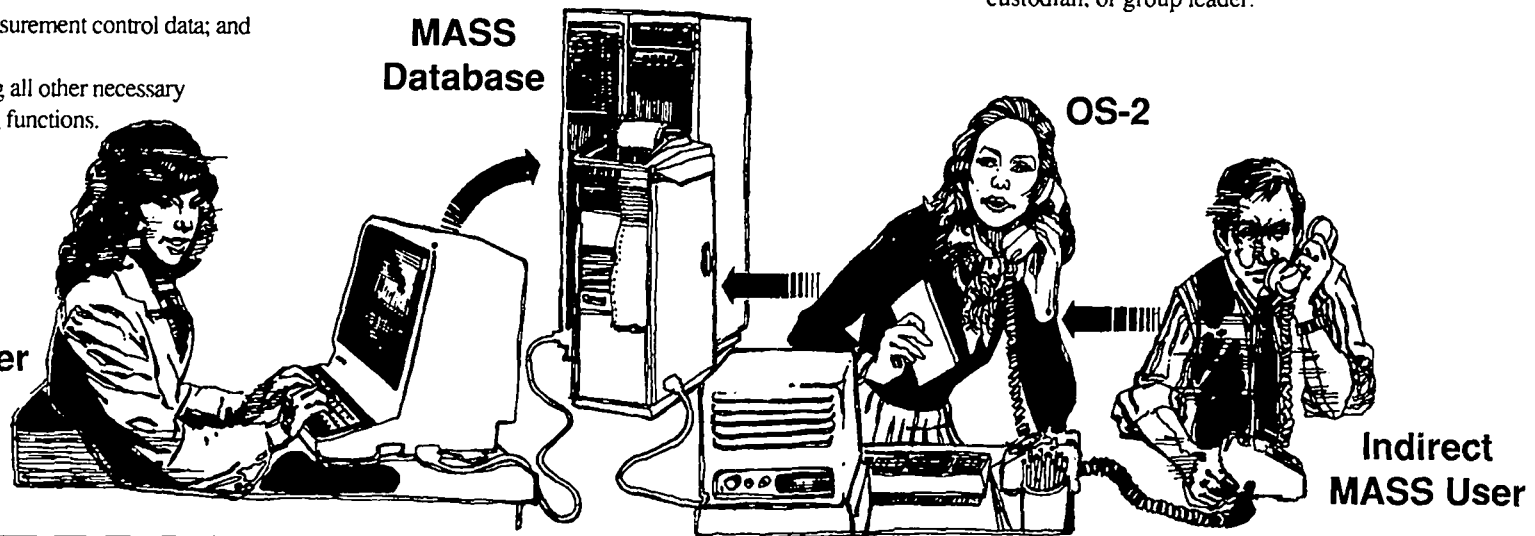
MASS is a near-real-time accounting system. Near real time recording is defined as recording an event as soon as practical after the event occurs. Events related to MC&A are called NM transactions. NM transactions include changes in inventory accounts, locations, item identification, quantities, item descriptions, measurement methods employed, and all other affected data elements. NM transactions must be updated on MASS within a specific time. The time requirements for reporting NM transactions are known as timeliness goals. The timeliness goals are based on the NM categories and are as follows:

- Categories I and II—2 hours,
- Category III—3 hours, and
- Category IV—4 hours.

For example, if you changed the location of a category III SNM item, then the NM transaction must be updated on MASS within 3 hours.

MASS Users

NM transactions are updated on MASS by both direct and indirect MASS users. Direct MASS users are NM custodians, alternate NM custodians, and NM handlers who have been authorized by the group leader with OS-2 approval. Before becoming a direct MASS user, an individual must train and qualify under the MC&A training program. Once qualified, direct MASS users can use a secured computer terminal in their work area to update MASS. This terminal is directly linked to the MASS database. Indirect MASS users are NM custodians and alternate NM custodians who do not have access to a MASS computer terminal. Indirect MASS users report NM transactions to OS-2 within the timeliness goals; OS-2 will then update MASS. As an NM handler, unless you have been authorized as a direct MASS user, you must report all NM transaction information to your NM custodian, alternate NM custodian, or group leader.



INVENTORY OF NM

Specific Objectives

Identify and define inventory schedules, reasons for conducting a special inventory, and tamper-indicating device.

Regularly Scheduled Inventories

Regularly scheduled physical inventories of NM are conducted to ensure that the Laboratory's NM inventory is correctly stated in the MASS inventory records. The Laboratory's Physical Inventory Program applies to all Laboratory organizations that possess or use reportable quantities of NM. Physical inventory frequencies are based on the category level of NM in each MBA. Physical inventories for NM are conducted according to the following schedule:

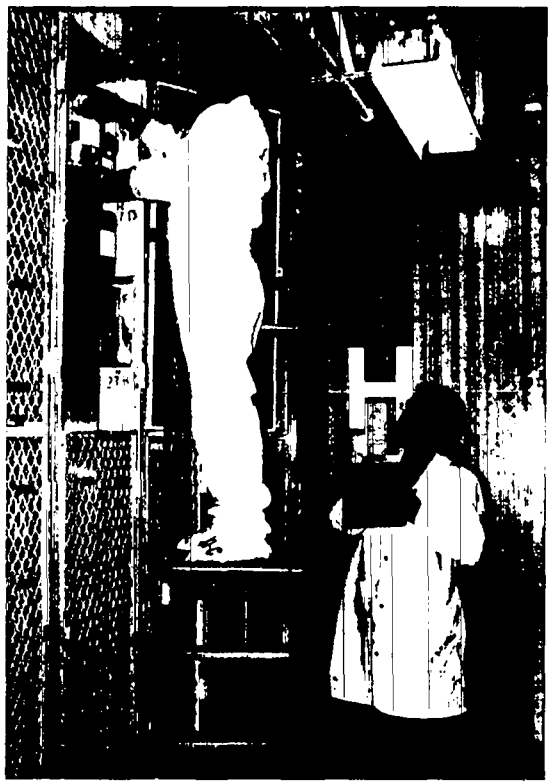
- Categories I and II—bimonthly,
- Category III—semiannually, and
- Category IV—annually.

Under the observation of OS-2 auditors, the NM custodian is responsible for performing the required physical inventories. As an NM handler, you may be asked to assist the NM custodian with the physical inventory.

Special Inventories

In addition to the regularly scheduled inventories, special inventories may be conducted. Reasons for conducting a special inventory include the following:

- Different or new NM custodian;
- Nonroutine dismantling of critical assemblies;
- Potential missing items;
- Inventory differences exceeding control limits;
- Abnormal occurrences (for example, an emergency evacuation); and
- Requests by the NM Custodian, OS-2, the PDSA, the Safeguards Policy Council, or DOE.

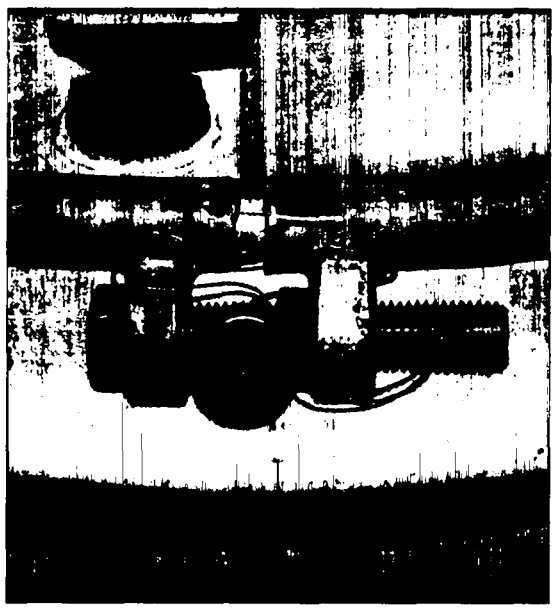


As an NM handler, if you detect or suspect that a significant inventory difference has occurred, notify your NM custodian immediately. In most cases, you are in a key position to spot an inventory problem and should take appropriate action. If the inventory problem is not readily solved, it may be necessary to perform a special inventory.

Tamper-Indicating Device (TID)

The TID is an authorized seal placed on NM containers. These seals help to ensure and indicate the integrity of the NM inside the containers. The TID serves the same purpose as a "tamper-proof" seal on a bottle of aspirin or other commercial product. While TIDs are not intended to prevent theft of NM, they do provide evidence of tampering. TIDs are used immediately after verification measurements are made and immediately following a 100% inventory to seal vaults, rooms, safes, glove boxes, etc. If a container has a TID, then the NM inside the container generally does not have to be measured as accurately during the next physical inventory.

Only qualified TID users may receive and apply TIDs. Your group leader can authorize you to take the appropriate training if you need to be qualified as a TID user.



MEASUREMENT OF NM

Specific Objectives

Identify and define measurement responsibilities, valid measurement code, defensible measurement code, accountability measurement, and measuring techniques.

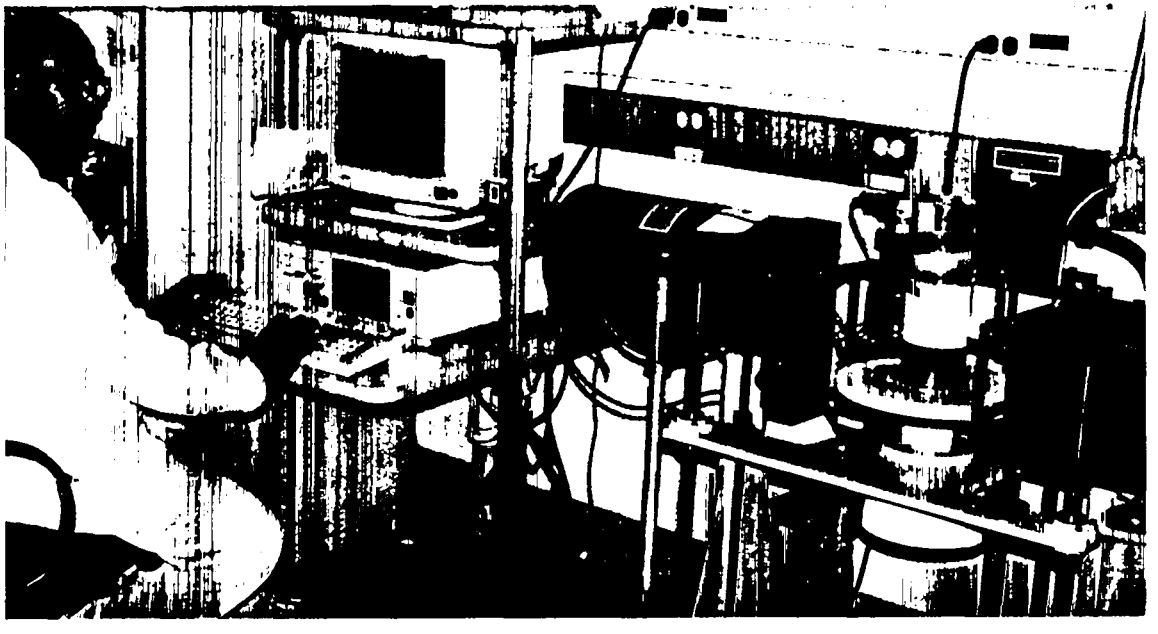
The OS-2 Technical Support section is responsible for the Laboratory's NM measurement control program. This program ensures that all measurement activities meet the requirements of the Laboratory's graded safeguards program. In carrying out its measurement control responsibility, the Technical Support section performs the following activities:

- Evaluates all measurement data taken during physical inventory;
- Certifies all techniques or instruments before they are used to make an NM accountability measurement; and
- Evaluates all instrument or technique measurement control data.

As an NM handler, you may be required to support the measurement control program. To fulfill this requirement, you will perform and record control measurements of NM using various instruments and techniques.

Recording NM Data

When a quantitative measurement is taken with an instrument or technique, the obtained measurement data is recorded in source documents (for example, logbooks or on-line computer software). The source documents serve as a record-keeping system for all measurement data. These documents also serve as an accounting system for all NM transactions. Source documents are maintained and updated by the NM custodian.



After recording the measurement data in the source documents, this same data must also be entered in MASS within the timeliness goals. The purpose of this double-entry procedure is to maintain a check-and-balance accounting system for the Laboratory's NM inventory.

Measurement Codes

Measurement codes provide traceability between the measuring techniques and the NM inventory quantities. Whenever a quantitative measurement of an NM item is made with an instrument or technique, a measurement code is assigned to the NM item. This code is entered into MASS. Measurement codes are required on all NM items. These codes indicate the instrument or technique used to determine the NM accountability.

When a measurement of NM is taken, the measurement code is selected and entered into both the source document and MASS. This allows employees to trace an NM item to the source document by looking up the measurement code in MASS. The source document can then be cross-referenced to provide historical information, such as location, amount, and transactions. Only valid measurement codes are eligible to be entered into MASS. Valid measurement codes are those codes that MASS is programmed to accept. If an instrument or technique is no longer used to take measurements, then its measurement code is no longer valid, and MASS will no longer accept the code.

The measurement codes also help to establish accountability for the NM inventory. The NM custodian must be able to verify all measurements of NM within his or her area. Therefore, the NM custodian must have defensible measurement codes that show a balance between MASS and source documents. The NM custodian must be able to prove—through the source document—that the information in MASS is accurate. A defensible measurement code is any MASS measurement code that is supported by source documents that verify the NM accountability of the data on MASS.

Accountability Measurements

An accountability measurement is the quantitative determination of the bulk or NM attributes used in NM accounting. Examples of bulk or NM attributes include grams of NM, bulk weight, and concentration. The accountability measurement establishes the official accountability value for the NM. To defend this accountability, the NM custodian must either have the source documents or have access to them.

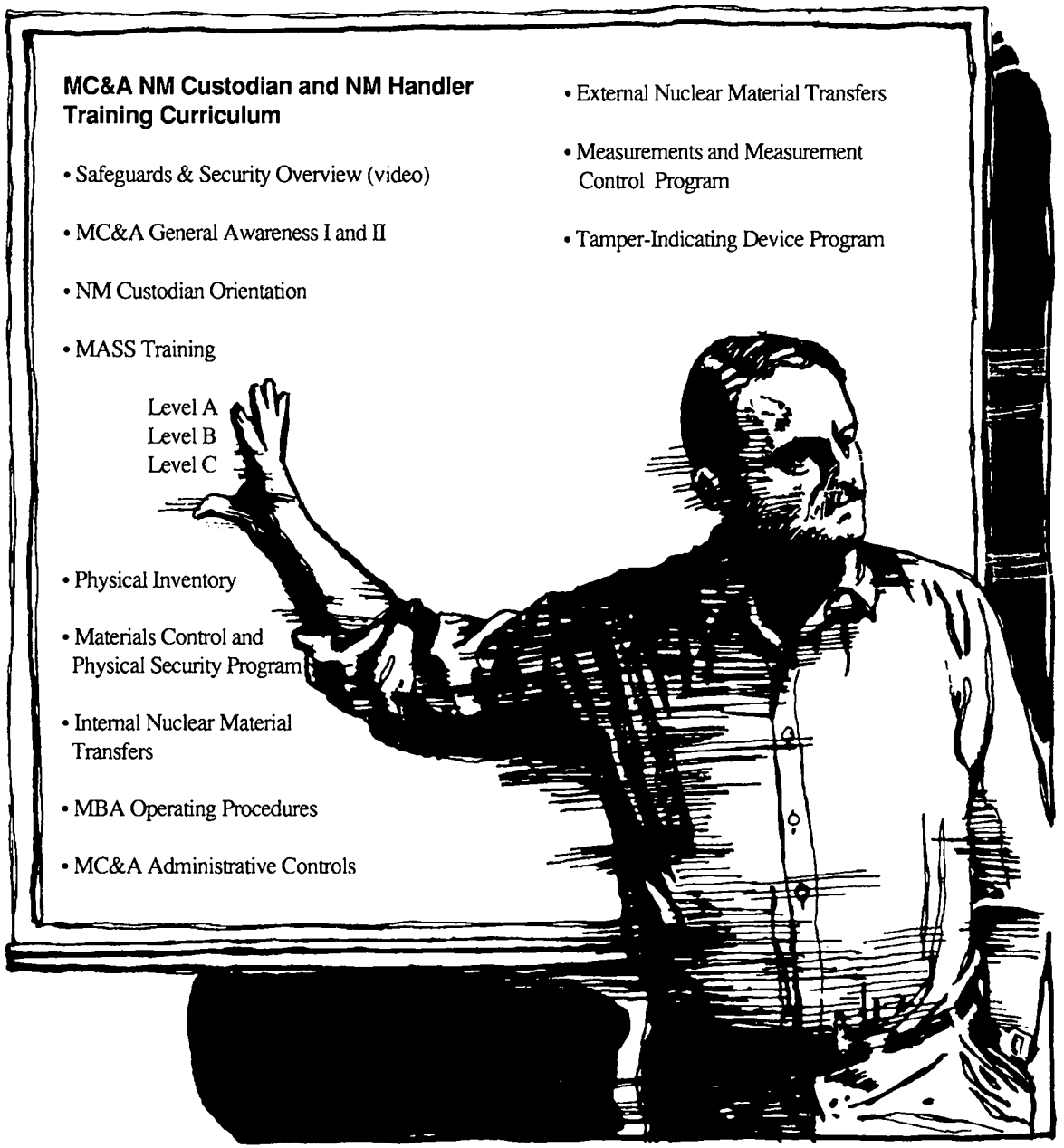
Measuring Techniques

As an NM handler, you may be required to assist the NM custodian to ensure that all NM measurements are accurate and entered on MASS and in source documents. OS-2 certifies two types of techniques to measure NM: destructive analysis (DA) and nondestructive assay (NDA). In DA, a sample is taken from the NM and then destroyed during the measurement process. Chemical analysis is an example of the DA measuring technique. In NDA, the measurement process generally does not alter the chemical or physical form of the NM. The NDA is an external measurement; that is, the radiation emitted by the NM is measured to obtain the quantity present.

OPTIONAL TRAINING

In addition to completing this workbook, you are eligible to take some optional training courses. These courses are part of the MC&A NM custodian and NM handler training curriculum. Depending on your job assignment, you may want to take some of these additional courses.

If you are interested in taking any of these optional courses, contact the Safeguards and Security Training Officer at 665-5712 or 667-7688.



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