

NRC INSPECTION MANUAL

NMSS

INSPECTION PROCEDURE 85405

ITEM CONTROL PROGRAM

PROGRAM APPLICABILITY: 2683

85405-01 INSPECTION OBJECTIVES

The objective of this inspection procedure is to verify that the licensee's¹ material control and accounting (MC&A) program, for a Category III fuel facility or uranium enrichment facility, includes an item control program, and that it meets the appropriate regulatory requirements, for the applicable type of facility.

85405-02 INSPECTION REQUIREMENTS

The inspector should:

02.01 Detection Capability. Ensure that the licensee has implemented an item control program that maintains knowledge of the identity, special nuclear material (SNM) content, and location of items, and that can detect the loss of 500 grams of U²³⁵ (or greater), as individual non-exempt items, or as uranium contained in non-exempt items.

02.02 Item Identity. Review SNM transfer documentation, SNM inventory records, and the control and implementation of tamper-indicating devices (TIDs).

02.03 Item Storage. Review the containment of, and access controls for, stored non-exempt items containing SNM.

¹Hereinafter, the term licensee subsumes the term "certificate holder," which applies in the case of the gaseous diffusion plants (GDPs). Likewise, all certificate-related requirements, including those in GDP compliance plans and corrective action commitments, are subsumed under the term "licensee."

02.04 Item Monitoring. Review the licensee's item monitoring records; verify the location (as shown by program records) of randomly selected inventory items; and verify the proper recording of randomly selected items in storage.

02.05 Item Discrepancy Investigation and Resolution. Verify procedures and controls for the investigation and resolution of item discrepancies. The inspector should determine whether the validity of the assigned SNM values is ensured through reviewing procedures for tamper-safing containers, controlling access to storage areas, and observing implemented practices. Item monitoring activities performed by the licensee should include: (1) item identification verification; (2) seal integrity checks; (3) container integrity checks; and (4) location confirmation. The inspector should review item monitoring procedures and observe item monitoring activities to verify that the item monitoring procedures are followed.

85405-03 INSPECTION GUIDANCE

General Guidance

The item control program must be effectively implemented. Each item that is not exempt from the item control program should be stored and handled in a manner that enables detection of, and provides protection against, unauthorized or unrecorded removals of SNM.

Exempted items include: (1) licensee-identified items, each containing less than 500 grams of U^{235} (up to a cumulative total of 50 kilograms of U^{235}); (2) solutions with a concentration of less than 5 grams of U^{235} per liter; (3) items destined for burial or incineration; and (4) items that exist for less than 14 calendar days, including the time for making a record of the item, and for locating the item.

Even exempted items are required to have a unique identity, so that the 50-kilogram cumulative total qualification on exempted items containing less than 500 grams of U^{235} can be demonstrated.

To prepare for the inspection, the inspector should:

1. Review those portions of the Fundamental Nuclear Material Control (FNMC) Plan and the license conditions pertaining to the planned inspection activities.
2. Review the previous two MC&A inspection reports for the site.
3. Review any unresolved or follow-up items from the previous inspections to be addressed during the current inspection.

4. Review the content of any communications (including information notices and bulletins) to the licensee that were issued since the last inspection.

Specific Guidance

Item Control Program Management

03.01 Detection Capability. The inspector should verify that the item control program provides current knowledge of the location, identity, and quantity of all SNM contained in all items that are not exempt from item control. A record of all SNM items, exempt or non-exempt, regardless of quantity of contained SNM or duration of existence, should be maintained by the MC&A system. The MC&A record system should be protected such that the records specifying the item characteristics and locations cannot be destroyed or falsified by a single person without a high probability of detection. Each nonexempt item should be stored and handled in a manner that enables detection of, and provides protection against, unauthorized or unrecorded removals of SNM.

The individual responsible for overseeing the item control program should be identified in the FNMC Plan by position title. Positions of those individuals who have significant item control program responsibilities also should be identified in the FNMC Plan. Measured uranium and U^{235} content values must be ensured through tamper-safing or storage that provides protection at least equivalent to tamper-safing. Storage areas should be operated with physical and administrative controls for personnel access, such that prevention or prompt detection is ensured for: (1) unauthorized material additions to items, or removals from items; or (2) item removals from the storage area. In addition, every change of inventory in a storage area should be recorded.

The inspector should verify the following:

- a. The individual responsible for the item control program (as identified in the FNMC Plan by position) is cognizant of program activities and results.
- b. Personnel with item control responsibilities (as identified in the FNMC Plan by position) are cognizant of their MC&A responsibilities.
- c. Authorized locations for nuclear material are identified.
- d. All SNM transfers to, from, and within a material balance area (MBA) are documented.
- e. Procedures that specify requirements for transfer authorization, item tracking, documentation, verification,

and response to abnormal situations are documented and implemented.

- f. The procedures and control points on which the item control program are based are documented and implemented.
- g. The mechanisms used to detect unauthorized activities are identified.
- h. Periodic audits of item controls are performed to ensure system effectiveness.

03.02 Item Identity. The inspector should verify that the identification for each item is consistent with the descriptions of item records provided in the FNMC Plan for each material type and each type of container. Each item must be uniquely identified, the uranium and U²³⁵ content quantitatively measured, and the validity of the measurement independently confirmed and ensured through tamper-safing, as applicable. The item identification system should provide attributes that ensure unique item identification and preclude identity falsification (or, as a minimum, make prompt detection of such attempts achievable).

All items, whether or not they are subject to item control program coverage, should have a unique identity. Location designations shown by the MC&A records need not be unique, but location designations should be specific enough so that the presence of any given item can be confirmed within 1 hour. (Longer times may be acceptable but should have been further justified in the FNMC Plan.) The MC&A records should provide the following information on the item population:

- (1) Type of item, including chemical and physical forms (which may be indicated by use of a material code), and type of container.
- (2) The item's unique identification number.
- (3) The measured or assigned uranium and U²³⁵ content of the items within specific item strata.
- (4) The location of the item.

The inspector should verify the following:

- a. All items bear a unique identifier.
- b. The item identifier system deters identity falsification.
- c. Authorized activities and locations for storing and processing nuclear material are documented.

- d. Book inventory records show item identity, quantity, and location; and are updated and maintained on a near-real-time basis (e.g., 24 hours).
- e. The accounting structure provides the capability for recording the inventory for each material type by storage area.

The inspector should review the method(s) for assigning responsibility to approve and to perform material transfers, and should review the records maintained for SNM movements and physical inventories. Material transfer control data should identify movements of SNM and the new storage or use locations of the items. Unauthorized transfers should be prevented or detected by the system.

All transfers of SNM between internal control areas should be properly documented and measured. Transfer records should contain appropriate descriptive information such as date, material type, enrichment, weight, item or container number, and should be uniquely identified and controlled. Once a material transfer record has been generated, the SNM custodian should immediately forward a copy to the accounting office. All material transfer records should be accounted for.

The inspector should verify the following:

- a. The control and accounting for inter- and intra-facility transfers of SNM, and of internal, external, and accounting adjustment transactions are documented and part of an established program.
- b. Transfers of SNM are conducted by established procedures.
- c. Controls are implemented to ensure compliance and to detect noncompliance with material transfer procedures.
- d. Assignment of material transfer responsibilities is specific.
- e. The criteria used to delineate authorized placement (e.g., material types, forms, and quantities permitted) and movement of SNM in an internal control area are documented.
- f. The quantities of material transferred to or from an internal control area are based on measured values.
- g. Transfers between MBAs are controlled by two authorized personnel or by an equivalent control method.
- h. Acceptance and rejection criteria that are established and used to determine acceptability and authenticity of material transfers are documented.

- i. The custodian of the receiving internal control area does not accept custody of SNM unless properly completed transfer documentation was received before or with the SNM.
- j. Readily retrievable accounting data are maintained that reflect quantities of SNM received and shipped, adjustments to inventory, and remaining quantities on inventory.
- k. The facility control system for internal transfers monitors transfer activities and deters and/or detects unauthorized removal of material.
- l. The procedures used to authenticate material movement authorizations and material movements are documented and implemented.
- m. Procedures that ensure removal of only authorized and confirmed forms and amounts of SNM from storage and process areas are documented and implemented.
- n. Internal transfer procedures are current and approved by responsible management before being used and implemented.
- o. All internal transfers are documented on a nuclear material transfer form or an electronic equivalent, contain the required information, are prepared and distributed within established time frames, and are signed by authorized material custodians.
- p. The flow of materials within and between internal control areas is reflected in the system of records and measurements.
- q. Controls ensure that materials are moved only by authorized pathways and are subject to transfer and verification procedures.
- r. Internally transferred SNM is subject to a transfer check within 1 day of receipt.
- s. Only authorized personnel are able to place and to remove SNM from process and storage areas.
- t. Personnel responsible for releasing external transfers and making internal transfers know who can authorize the transfer and who is authorized to possess the material.
- u. Personnel authorized to ship and to receive SNM are identified.
- v. Final authorization for shipment is made only after all material control requirements are satisfied.

- w. A log is maintained that identifies all inter-plant shipments, their estimated times of arrival, and tracking actions when overdue.
- x. Confirmation is made that the intended receiver of external transfers is authorized to accept the material being transferred.
- y. The intended receiver of shipments is advised of proposed shipments of SNM and provided all pertinent advance notification.
- z. Approval from the receiver and agreement on pertinent details of the shipment are received before shipments are dispatched.
- aa. Authorized personnel verify material item contents before shipment and after receipt.
- bb. Acknowledgment of receipt of SNM is transmitted to the shipper.
- cc. Any shipment that does not arrive within a specified time after the estimated time of arrival is traced until located or declared to be lost.
- dd. Within the facility, material transfer reports are numbered in sequence, and all copies of a specific report bear the same number as the original. An independent nuclear material accounting organization assigns and accounts for the supply of material transfer report forms and records the disposition of all forms in a log book. The supply of forms and the log book are kept in a locked area when unattended.
- ee. Nuclear material transfer forms for external transfers of SNM contain required information and are distributed within required time limits for shipments and receipts.
- ff. Transfers of SNM between facilities having different Reporting Information Symbol (RIS) codes are documented on DOE/NRC Form 741, which is distributed as required.
- gg. Measured values associated with external transfers are documented on DOE/NRC Forms 741 and 741A.
- hh. Receipts are subjected to a transfer check, on receipt, that includes confirmation of container or item count, validation of TID and container integrity and identifications, and comparison with the shipping documentation, to ensure that the shipment was received intact.

- ii. Measured values for shipped items are independently verified before shipment unless the integrity of the item and its prior existing measured value are assured.
- jj. All external transfers of SNM, except samples, are independently measured by the shipper and receiver.
- kk. MC&A measurements are completed on transfers received from off-site before the material is fed to the process system.
- ll. Confirmatory measurements are performed within a specified number of days whenever verification measurements cannot be performed or are delayed.

Tamper-indicating Devices

| If TIDs are used by the licensee, the inspector should verify that the TIDs are used in a manner that will indicate if an item is compromised. An effective TID applications program is based on TID design and TID control. The design should preclude duplication and should make TID compromise apparent. The devices should use a consecutive numeric or alpha-numeric identification system to prevent surreptitious use of blank TIDs. The licensee | should have in his or her possession a commitment from the TID manufacturer that plates and/or dies and production or enrichment residuals will be controlled and protected.

The control of TIDs and TID records should preclude or make readily apparent any attempts at illicit use of TIDs. A TID custodian must be designated for controlling and issuing the devices. The TID custodian should not have any TID application or destruction responsibilities. The devices should be stored in a locked repository within a room that is locked when unoccupied. The TID log book maintained by the TID custodian should be kept separate from the TIDs and stored in a locked repository. Individuals who apply TIDs should keep unused TIDs in their personal possession or place them in a locked repository.

The number of TIDs issued to such individuals should normally be limited to a typical single day's use. Used TIDs should be crimped, flattened, mutilated, or otherwise rendered unusable and disposed of properly.

The inspector should verify the following:

- a. A TID program to detect violations of container integrity is documented and implemented.
- b. Control procedures ensure that all TIDs are accounted for.
- c. Containers to which TIDs are to be applied are specified.

- d. TIDs used are resistant to ambient environmental factors that could conceal any indication of tampering.
- e. Procedures ensure that TIDs are uniquely identified and that TIDs cannot be reused after violation.
- f. Individuals with responsibility for the control of TID storage and distribution are designated.
- g. A TID custodian is designated and is responsible for the acquisition and disposition of TIDs.
- h. TID control procedures define access authorization requirements and TID custodial duties and responsibilities.
- i. Procedures for the control of procurement, storage, distribution, and application of TIDs used for material control purposes are documented and implemented.
- j. Personnel authorized to apply, to remove, and to dispose of TIDs are designated.
- k. Two authorized individuals are present when a TID is applied to ensure the integrity of the sealed item and to attest to the container's contents.
- l. TID control procedures ensure that records are maintained that include procurement; the quantity purchased; serial numbers; dates of issuance (or distribution), application, and destruction; and name of the responsible person.
- m. The records system to control and account for these devices indicates the date and time of application, the item or container number to which the TID was applied, the signatures of persons to whom the TID was issued, the signatures of those who applied and witnessed the application, the device type, and the TID identification number.
- n. For removed TIDs, the records system indicates the date and time of removal, the item or container number, the device number, and the signature or unique identification (for computerized systems) of the authorized individual who removed and destroyed the TID.
- o. TIDs and records of their issue, application, and destruction are stored separately in locked container(s), and these records are reconciled at least once per calendar quarter.

- p. TIDs are applied to SNM containers before nondestructive assay (NDA) MC&A measurements are made, where appropriate.
- q. TIDs are applied to SNM containers immediately after sampling for destructive assay MC&A measurements, where appropriate.
- r. Procedures are maintained and followed that provide guidance for proper application of TIDs to doors, as well as to containers of SNM.
- s. Procedures for the application of TIDs and for reporting and responding to TID violations are documented and implemented.
- t. Procedures for verifying TID presence and integrity are documented and implemented, and the procedures specify the process by which tampering is indicated for each type of TID used, the method of verification, and verification frequencies.
- u. The response to potentially compromised TIDs is carried out in accordance with documented procedures.
- v. The frequency and method of internal audits of the TID control program are documented.
- w. The TID program is evaluated to identify weaknesses, to ensure that corrective actions are completed, and to ensure that TID access controls are effective.

Containment and Surveillance

03.03 Item Storage. Inspectors should examine the integrity of containers and protected storage areas to verify that no means of undetected access to SNM exist. Adequate protection against unauthorized entry is provided by containers that must be severely damaged, if opened, without compromising the TID. Storage provides protection equivalent to tamper-safing if it meets the following requirements:

1. Access to the protected storage area is limited to the minimum number of persons necessary, and records are kept of the persons who enter and leave it.
2. Personnel authorized to enter and work in the protected storage area are not authorized to remove or handle SNM beyond the boundaries of the storage area unless controls are in place that would preclude an individual from surreptitiously removing an item or any portion of an item.

3. A person entering a protected storage area is accompanied by another person, and all activities by either person are verifiable by the other.
4. Remote surveillance, such as closed circuit television, that is capable of seeing both individuals at all times, is used. The remote surveillance need not be continuous if the occupants cannot determine or predict when they are or will be under surveillance. The frequency and duration of the surveillance mode must provide a high probability of detecting unauthorized activities.

The inspector should verify the following:

- a. Compromising containers without compromising their TIDs would be readily detectable.
- b. The program for containment of nuclear materials is documented.
- c. Controls on SNM being used or stored in processing areas are documented.
- d. The amount of SNM in use is limited to that required for operations.
- e. SNM not in use is stored in repositories or other enclosures that ensure that access is provided only to authorized individuals.
- f. Components used to detect unauthorized activities or conditions are identified.
- g. A surveillance program for monitoring SNM and detecting unauthorized activities or anomalous conditions is documented and implemented.
- h. Surveillance procedures support the investigation, notification, and reporting of anomalies.

Access Control

The inspector should determine whether only authorized personnel have access to SNM. By touring the facility and reviewing access control and authorization methods (e.g., badges), the inspector should verify that unauthorized access to storage areas would be detected.

The inspector should verify the following:

- a. SNM is under the control of a designated nuclear material custodian.
- b. Access to SNM in storage areas is limited to authorized individuals.
- c. Authorized access to unsealed SNM items stored in controlled access areas, who is authorized, and when access occurs, is documented.
- d. Access list records are protected and controlled to ensure that only authorized changes are made to the list.
- e. Authorization procedures and mechanisms to detect and respond to unauthorized access are documented.
- f. Access controls detect unauthorized entry during emergency and other unusual situations.

03.04 Item Monitoring. The inspector should verify that, as part of the item control program, a licensee maintains a system of item monitoring that:

- a. Verifies that items shown in the MC&A records are actually stored and identified in the manner indicated in the records.
- b. Verifies that generated items and changes in item locations are properly recorded in the MC&A record system in a timely manner.
- c. Can detect, with high probability, any real loss of items or uranium from items amounting to 500 grams or more of U^{235} .

The inspector should review the statistical methods for determining the sample size, audit the item monitoring records to determine whether a sufficient number of items are verified, at the approved frequency, and observe the conduct of the item monitoring activities to ensure that integrity is verified as described in the FNMC plan. The number of items verified by the licensee should be sufficient to detect, with high probability (e.g., 90 percent or as defined in the FNMC plan), any real loss of items or uranium from items amounting to 500 grams of U^{235} or more. The inspector should review how the window is established for the test, including start time and criteria for completion; weekends and holidays should be given specific consideration. The inspector should check the licensee's sampling plan by independently verifying the sample sizes for the tests performed in the period since the last inspection.

The inspector should verify the following:

- a. Elements for the detection of SNM loss are identified for each internal control area, and these elements and associated data are monitored to determine the status of inventories and to identify abnormal situations.
- b. The actual storage status of items is compared to the recorded status of a sufficient sample of randomly selected items from the item control program records to provide the probability of detection specified in the licensee's FNMC plan.
- c. The accuracy of the MC&A records is checked for a sufficient sample of randomly selected items from each storage area.
- d. The accuracy of a sufficient sample of randomly selected production or enrichment records is checked against created and consumed items.
- e. Statistically-based acceptance and rejection criteria are established, documented, and used to evaluate confirmatory measurement data.
- f. A response plan for the investigation and resolution of confirmatory measurements that fail the acceptance criteria is documented and implemented.

Investigation and Resolution of Item Discrepancies

03.05 Item Discrepancy Investigation and Resolution. The inspector should verify that the procedures and controls, specified in the FNMC plan, which ensure that incidents involving missing or compromised items or falsified item records will be investigated, are implemented. A compromised item is (1) one displaying evidence of tampering, or (2) an unencapsulated and unsealed item assigned to a controlled, limited-access storage area that is found elsewhere. If any unsealed or unencapsulated item is located after having been determined to be missing, or if an item is found to be compromised, the contents should be reestablished by measurement (e.g., by NDA or by weighing, sampling, and analysis).

The inspector should verify the following:

- a. Notification and response procedures for detected material removals, or other abnormal situations, are documented.
- b. Procedures for investigating, documenting, and reporting abnormal conditions are documented.

85405-06 REFERENCES

Regulations

10 CFR 74.31(a) and 74.31(c)(6); 10 CFR 74.33(a) and 74.33(c)(6).

Regulatory Guides and Reports

NUREG-1065, Rev. 2, "Acceptable Standard Format and Content for The Fundamental Nuclear Material Control Plan Required for Low-Enriched Uranium Facilities," November 1995.

NUREG/CR-5734, "Recommendations to the U.S. Nuclear Regulatory Commission on Acceptable Standard Format and Content for the Fundamental Nuclear Material Control (FNMC) Plan Required for Low-Enriched Uranium Enrichment Facilities," Chapter 6, November 1991.

Draft Regulatory Guide DG-5005, "Proposed Revision 1 to Regulatory Guide 5.15, "Tamper-Indicating Seals for The Protection and Control of Special Nuclear Material," January 1996, or subsequent issue of the document.

END