

# NRC INSPECTION MANUAL

NMSS

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## INSPECTION PROCEDURE 85305

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### ITEM MONITORING

PROGRAM APPLICABILITY: 2681

#### 85305-01 INSPECTION OBJECTIVE

Determine that a program is established, maintained and used to provide for the ongoing confirmation of the presence of SSNM in assigned locations and is capable of detecting item losses totaling five formula kilogram of SSNM.

#### 85305-02 INSPECTION REQUIREMENTS

The item monitoring system must comply with all applicable NRC regulations and safeguards license conditions. The FNMCP contains general commitments relative to the item monitoring systems. By inspection determine whether:

02.01 The licensee has verified on a statistical sampling basis, the presence and integrity of SSNM items. The statistical sampling plan must have at least 99 percent power of detecting item losses that total five formula kilograms or more, plant wide, within:  
[74.55(b)]

- a. Thirty calendar days for Category IA items and 60 calendar days for Category IB items contained in a vault or in a permanently controlled access area isolated from the rest of the material access area (MAA).
- b. Three working days for Category IA items and seven calendar days for Category IB items located elsewhere in the MAA, except for reactor components measuring at least one meter in length and weighing in excess of 30 kilograms for which the time interval shall be 30 calendar days.
- c. Sixty calendar days for items in a permanently controlled access area outside of an MAA.
- d. Sixty calendar days for samples in a vault or permanently controlled access area and 30 calendar days for samples elsewhere in the MAA for samples each containing less than 0.05 formula kilograms of SSNM.

02.02 Procedures have been developed for tamper-safing of or controlling access to containers of SSNM not in process that include adequate controls to assure the validity of assigned SSNM values. Items containing scrap in the form of small pieces, cuttings, chips, solutions, or in other forms that result from a manufacturing process, held in containers of 30 gallons or larger, with an SSNM

concentration of less than 0.25 grams per liter are exempt from the requirements of 74.55(b). [74.59(f)(2)(i), 74.55(a), and 74.55(c)]

## 85305-03 INSPECTION GUIDANCE

### 03.01 Regulations. 74.55

03.02 Regulatory Guides and Reports. NUREG-1280, Standard Format and Content Acceptance Criteria for the Material Control and Accounting (MC&A) Reform Amendment, Section 2, "Item Monitoring." NUREG/CR-4604, Statistical Methods for Nuclear Material Management.

03.03 Criteria. The inspector should evaluate item monitoring procedures and instructions, audit item monitoring records, observe item monitoring activities, and check of a random sample of SSNM items to confirm that they are in their designated locations. The inspector should verify the capability for timely plant-wide detection of the loss of items that total 5 FKG or more.

To provide this capability, the licensee is expected to verify the presence and integrity of selected SSNM items on a periodic basis. The required frequency of tests for missing items is graded according to the relative attractiveness of the material type in the item, the ease with which the item could be diverted without being observed, and the degree of surveillance and containment provided by physical security. If SSNM is not tamper-safed, stored in a vault or permanently controlled access area (CAA) that provides protection at least equivalent to tamper-safing, encapsulated, or in samples containing less than 0.05 FKG, then it is not considered an item and the SSNM is subject to the in-process control requirements for bulk material.

Pre-inspection Activities. To prepare for the inspection, the inspector should review the specific portions of the FNMCP and the safeguards license conditions for the planned inspection activities; review the previous inspection report for the site; review any unresolved or followup items to be addressed during the inspection; and review any communications (including information notices and bulletins) with the facility since the last inspection.

Post Inspection Activities. Followup is conducted as described in Manual Chapter 92701 and the Inspection Report is generated as described in Manual Chapter 0610.

- a. Audit of Item Monitoring Records. 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 have been verified at the approved frequency, and observe the conduct of the item monitoring activities to assure that integrity is verified as described in the FNMCP. Review of the inventory records and a tour of the storage areas confirm that assignment to category IA or IB is appropriate. Records of samples and encapsulated items are reviewed by random selection for compliance with the controls identified in the FNMCP.

Items are classified as either Category IA or IB at the time they are created in order to fix the frequency of tests for item loss. During tours of the storage areas, the inspector observes the items classified as Category IB material to determine whether the dimensions are large enough to preclude hiding the item on an individual (at least two meters in one dimension, greater than one meter in each of two dimensions, or greater than 25 cm in each of three dimensions); the weight of the 5 FKG of the material is so large that one person cannot carry the item inconspicuously (50 kilograms); or the quantity of SSNM in the item is so small that a large number of diversions are needed to accumulate 5 FKG (maximum of 50 formula grams per item). The inspector should tour the item storage areas to review the Category IB items and determine whether the items have been appropriately classified.

Independent confirmation of the SSNM content of items will be achieved by having a second person observe the bulk measurement and sampling of measured items; observe the nondestructive analysis of the item or perform a second quantitative analysis independently that does not destroy the integrity of the item; and witness and attest to the application of an approved tamper-seal or accompany the first person and the item to a vault or permanently controlled access area which will provide storage equivalent to tamper-safing.

#### Evaluation of Item Monitoring Procedures and Instructions.

The inspector should determine whether the number of items verified by the licensee is sufficient to give a power of detection of at least 99 percent for a loss of items totaling 5 FKG from each stratum or inventory subdivision. If an attributes sampling plan is used (see NUREG/CR-4604, p.887) and if each strata in a facility is sampled for verification with at least a 99 percent power of detecting a loss of items (within the stratum) containing 5 FKG, that criterion also will be achieved for a loss of items containing 5 FKG or more plant-wide. The inspector should check how the window is established for the test including start time and criteria for completion. Specific considerations are weekends and holidays.

The inspector can check the licensee's sampling plan by independently calculating the sample size for ten percent of the tests performed in the period since the last inspection.

The item inventory should be stratified or subdivided by the licensee in a manner that assures at least a 99 percent power of detection while minimizing the number of items to be verified. It is advantageous to subdivide the inventory into classes or strata having approximately uniform quantities of SSNM per item. A moderate range of SSNM contents within a class, such as  $\pm 10$  to 20 percent, is usually acceptable. Typical classes for sampling are fuel elements, containers of scrap, containers of feed material, containers of waste, etc.

For higher tier components (such as fuel blocks, preassemblies, subassemblies, etc.) stored outside of a CAA, the inspector

should check the item monitoring records to determine whether they have been verified in accordance with a sampling plan that provides the capability to detect a 5 FKG loss within one month.

For small items, such as element sections and samples, amassed in a tamper-safed container to alleviate excessive item verification, the inspector should review the time since creation and the method of estimating the contained SSNM. An item is created whenever a quantity of SSNM is placed in a container (usually portable) having a fixed volume. Items which exist for longer than some predetermined time limit (approved by the NRC in the FNMCP) should be uniquely identified and entered into an item control program according to an NRC-approved schedule. Processing vessels (e.g., closed V-blenders, boats, and trays of UO<sub>2</sub> pellets, etc.) would normally be excluded from this program unless they are removed from the process line for storage. Time limits and schedules associated with the item control program should be specified in the FNMCP along with a general listing of those items which will be included in and those which will be excluded from the program. In addition, periodic verification of the reliability of the item control program should be conducted as described in the FNMCP. The inspector should determine whether scrap items are subject to [74.50(h)(2)(ii)].

The inspector should review the methods of monitoring samples within the process and storage areas. Samples containing in excess of 0.05 FKG can be considered a sidestream in a bulk test performed in the originating process unit provided the samples are returned to process within 7 days. SSNM removals from such samples should be documented and the area records corrected accordingly.

Review of CAA Access and Surveillance Records and Control.  
The inspector should review CAA access and surveillance records to verify compliance with the storage requirements in the FNMCP. Storage must meet certain requirements to be accepted as a permanently controlled access area (CAA) isolated from the rest of the MAA for the purposes of 10 CFR 74.55:

1. The CAA must be equipped with physical protection capabilities.
2. Access to the storage area must be limited to the minimum number of persons necessary and records kept of the persons who enter and leave it.
3. Records of the items in storage must be maintained.
4. Any operator within the storage area must be continuously observed by another person, and all additions, removals and movements of material by either person must be verifiable by the other person.

Storage provides protection at least equivalent to tamper-safing if it meets the following requirements:

1. Access to the vault or CAA is limited to the minimum number of persons necessary and the records are kept of the persons who enter and leave it.
2. The personnel authorized to enter and operate the vault or CAA are not authorized to remove or handle SSNM beyond the boundaries of the vault or area unless controls are in place that would preclude an individual from surreptitiously removing an item or any portion of a nontamper-safed container.
3. A person entering the vault or permanently controlled access 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, with the capability of seeing both operators at all times will be 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 (as opposed to the non-surveillance mode) must provide a high probability of detecting unauthorized activities.
5. The SSNM content of nontamper-safed and non-encapsulated items is measured, independently confirmed by a second person, and the item is under continuous surveillance of the two persons from the time of measurement until placed in a vault or CAA. A record is maintained of the location, identity and SSNM content of these items. The licensee should verify the SSNM contents of these items by quantitative measurements when removed from a vault or CAA except for solid components which can be verified by a weight check. The verification measurement and the original result must agree within the combined measurement uncertainties.
6. Appropriate alarm resolution response actions are initiated if an unauthorized vault or CAA penetration is suspected or if the SSNM content of any container is unexplainable and significantly different from the recorded value.

Check of a Random Sample of Items to Confirm Location. A random sample of SSNM items should be examined by the inspector to confirm that they are in their designated locations and that they are properly identified.

- b. By review of the procedures for tamper-safing containers and vaults and by observation of the implemented practices, the inspector should determine whether the validity of the assigned SNM values has been assured. Item verification by the licensee should include positive identification, seal integrity checks, container integrity checks and location

confirmation. The inspector should review item monitoring procedures and observe item monitoring activities to determine that procedures are followed.

Positive Identification of Items. The inspector should verify that each item meets the applicable requirements in the FNMCP. Each SSNM item must be uniquely identified; the SSNM content quantitatively measured; the validity of the measurement independently confirmed and assured through tamper-safing; and a record of the identity, location, and SSNM content maintained. The item identification system must possess attributes that assure unique item identification, preclude falsification, or as a minimum, make prompt detection of such attempts achievable.

Measurements of SSNM content must be assured through tamper-safing or storage in a vault or CAA that provides protection at least equivalent to tamper-safing. Vaults or permanently controlled access areas isolated from the rest of the MAA must be operated with physical and administrative controls over personnel access such that unauthorized additions and removals of items from the storage area will be either prevented or promptly detected. In addition, every change of inventory in the storage area must be recorded.

The seal control officer must not have any seal application or destruction responsibilities. The seal log book maintained by the seal control officer must be kept separate from the seals and stored in a locked repository. Individuals who apply seals must keep unused seals in their personal possession or place them in a limited access locked compartment. The number of seals issued to such individuals is normally limited to a typical single day's use. The licensee must have in his possession a commitment from the seal manufacturer that plates and/or dies and production residuals will be controlled and protected. Used Type E seals must be crimped, flattened or otherwise rendered unusable, and properly disposed of.

Examination of Tamper Safing Systems and Seal Integrity. The inspector should verify that the licensee's tamper-safing program uses tamper-indicating devices in a manner such that, if tampering occurs, an indication will result. The seals must use a consecutive numeric or alpha-numeric identification system to prevent surreptitious use of blank seals. Seal design should help preclude duplication. The control of seals and seal records must preclude or make readily apparent any attempts at illicit use of seals. Seals must be stored in a locked repository within a room that is locked when unoccupied. Blocks of seals issued to designated individuals must be provided equivalent protection. A seal control officer must be designated for controlling and issuing the devices.

The acceptability of tamper-seals is based on an evaluation of the seal attributes in relation to time to defeat and tamper-indicating features. Seals deemed acceptable by NRC

include Type E, Pressure-Sensitive, and Steel Padlock Seals. The inspector should review the licensee's information and references to assess the adequacy of other than currently approved seals.

Procedures must be maintained and followed that provide guidance for proper application of tamper-indicating devices. They should include procedures for seal application to doors and frames as well as containers of SSNM. The records system to control and account for these devices should indicate the date and time of application, the item or container number to which applied, the signatures of persons to whom issued, the signatures of those who applied and witnessed the application, the device type, and the seal identification number. For application or use on items or containers of HEU, U-233, or Pu, two individuals must witness seal application and be able to attest to the contents. For devices being removed, the records system should indicate 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 tamper-indicating device. Records of seal issuance, application and destruction should be stored in a locked container. In addition, as a minimum, these records should be reconciled once per material balance period (i.e., during each physical inventory). Periodic monitoring of the presence and integrity of seals and response to compromised seals should be carried out in accordance with the program outlined in the licensee's FNMCP.

Identification of Means to Defeat Seals and Surveillance. Inspectors should conduct physical tests of tamper-safing devices as applied, for example, opening a container or vault without damaging the seal or being detected by surveillance systems.

Verification of Container Integrity. Inspectors should examine the integrity of sealed vaults and containers to verify that there is no means of undetected access to SSNM.

03.04 Inspection Activities Flowchart. Figure 1 shows a flow chart of the item monitoring inspection activities.

END



FIGURE 1

ITEM MONITORING INSPECTION

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