

### MATERIAL CONTROL AND ACCOUNTING – NON-POWER REACTORS

Effective Date: 06/01/2020

PROGRAM APPLICABILITY: IMC 2545

#### 81606-01 INSPECTION OBJECTIVE

The objective of this inspection procedure (IP) is to gather information to determine whether reasonable assurance exists that licensee activities, since the last inspection, were conducted in accordance with regulatory requirements in Title 10 of the *Code of Federal Regulations* (CFR) Part 74, "Material Control and Accounting of Special Nuclear Material."

- 01.01 To assure that the licensee has appropriately limited possession and use of special nuclear material (SNM) to the locations and purposes authorized under license.
- 01.02 To assure that the licensee has implemented an adequate and effective program to control and account for the SNM possessed.
- 01.03 To assure that the licensee can detect loss, theft, or diversion of SNM.

#### 81606-02 INSPECTION REQUIREMENTS

- 02.01 Material Status Reports. Verify that the licensee has submitted, in computer readable format, completed Material Balance Report forms (also known as Department of Energy (DOE)/Nuclear Regulatory Commission (NRC) Form 742). [10 CFR 74.13(a)]
- 02.02 Nuclear Material Transaction Reports.
  - a. If the licensee transferred 1 gram or more of SNM, verify that the licensee submitted, in computer readable format, completed Nuclear Material Transaction Report forms (also known as DOE/NRC Form 741) no later than the close of the next business day. [10 CFR 74.15(a)]
  - b. If the licensee received 1 gram or more of SNM, verify that the licensee submitted, in computer readable format, completed DOE/NRC Form 741 within ten days after receipt of the material. [10 CFR 74.15(a)]
  - c. If the licensee received 1 gram or more of SNM from a foreign source, verify that the licensee: 1) completed the supplier and receiver portions of the DOE/NRC Form 741; 2) performed independent tests to assure the accurate identification and measurement of the material received (including weight and enrichment); and 3) indicated results of

the tests on the receiver portions of the DOE/NRC Form 741. [10 CFR 74.15(b)(1), 10 CFR 74.15(b)(2), 10 CFR 74.15(b)(3)]

02.03 Physical Inventory Listing Reports. Verify that the licensee has submitted, in computer readable format, completed Physical Inventory Listing Report forms (also known as DOE/NRC Form 742C) along with each submitted Material Status Report (DOE/NRC Form 742). [10 CFR 74.13(a)]

02.04 Recordkeeping.

- a. Verify that the licensee retains records showing the receipt, inventory (including location and unique identity), acquisition, transfer, and disposal of all SNM in possession regardless of origin or method of acquisition. [10 CFR 74.19(a)(1)]
- b. Verify that the licensee retains records related to material control or material accounting until termination of the license that authorizes the activity, unless otherwise specified in the regulations. [10 CFR 74.19(a)(2)]
- c. Verify that the licensee retains records related to receipt, acquisition, or physical inventory of SNM for as long as the licensee retains possession of the material and for three years following transfer or disposal of the material. [10 CFR 74.19(a)(3)]
- d. Verify that the licensee retains records related to transfer of SNM to other persons until termination of the license that authorized the licensee to possess the material. [10 CFR 74.19(a)(4)]
- e. For licensees authorized to possess more than one effective kilogram of SNM, verify that the licensee has established, maintained, and followed written material control and accounting procedures that are sufficient to enable the licensee to account for the SNM in possession under the license. Procedures shall be retained until termination of the license that authorized the licensee to possess the material and superseded portions for three years following procedure revision. [10 CFR 74.19(b)]
- f. For licensees authorized to possess more than 350 grams of SNM, verify that the licensee conducted a physical inventory of all material at intervals not to exceed 12 months. Results of the inventory need not be reported, but shall be retained until termination of the license that authorized the licensee to possess the material. [10 CFR 74.19(c)]

## 81606-03 INSPECTION GUIDANCE

This section is intended to provide guidance to assist the inspector in measuring the licensee's performance in each of the preceding sections. The statements below do not represent regulatory requirements, but are standards and methods by which the individual elements may be judged.

The inspector should review all of the MC&A records available since the last inspection in this area. Actual inventory information, i.e. MC&A records, are not publicly available or shared. Most facilities will only have the records of annual reporting to review; only a couple facilities will have multiple transfers or receipts of SNM throughout the year to review. Depending on the

timing of the inspection, the inspector should note that the current year reports may not yet be reconciled and available for review. In this case, a review of the results of the annual inventory and past reports should provide an understanding of the program status.

An inspection sample that includes physical verification of SNM may be included, provided the material can be handled safely. These materials will typically be stored in a vault, safe, or similar type container; unless routinely used in a laboratory type setting, where it may be stored separately in a locked cabinet or similar type container.

When conducting physical verification of irradiated fuel bundles or assemblies, verify that there are bundles or assemblies in storage locations identified as containing the same. The inspector may find it useful to review the fuel location map and fuel movement records. The inspector should not request that the licensee conduct fuel handling operations to visually verify individual bundles or assemblies by serial number unless discrepancies surface that warrant an extensive verification<sup>1</sup>. Alternatively, the inspector may consider scheduling the inspection to coincide with planned fuel inspection, fuel inventory, or fuel handling operations at the facility.

MC&A inspections at reactors primarily involve a review of the licensee's programs and procedures for controlling and accounting for discrete items. The review should address the adequacy of the licensee's written and implemented program for controlling and accounting of receipt, storage, internal transfers, inventory, burnup-related measurements and calculations, shipments, records, and reports.

#### 03.01 Material Status Reports.

The inspector should verify that the Material Status Reports (DOE/NRC Form 742) accurately reflect the licensed activities for that period. Method of computing uranium depletion<sup>2</sup> and plutonium production in each fuel assembly, region, and entire core of the reactor should include decay of Pu-241. Reports and summation of data should be generated on Material Status Report (DOE/NRC Form 742). Facility records, supported by properly authorized documentation, provide enough information to comply with recordkeeping requirements to substantiate information provided on Material Status Reports (DOE/NRC Form 742). The inspector may consider referencing annual reports or console logs to determine the number of hours of reactor operation.

For questions regarding completion of Material Status Reports, the inspector can refer to NUREG BR-0007, "Instructions for Completing Material Balance Report, Physical Inventory Listing, and Concise Note Forms."

#### 03.02 Nuclear Material Transaction Reports.

The inspector should verify that the licensee completed Nuclear Material Transfer Reports (DOE/NRC Form 741) files as required. Incoming Nuclear Material Transfer Reports (DOE/NRC Form 741) should be receipted within 10 days and returned to the shipper. The inspector should verify that the licensee restricted transfers of SNM to authorized recipients.

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<sup>1</sup> An initiating event for the Maximum Hypothetical Accident at some non-power reactors is postulated to occur due to a fuel handling accident. Additionally, fuel handling outside of planned operations will result in additional dose accumulation and, therefore, is generally not consistent with the ALARA principle.

<sup>2</sup> For these types of facilities, uranium depletion generally occurs at a rate of around 1 gram per megawatt-day.

For questions regarding completion of Nuclear Material Transaction Reports, the inspector can refer to NUREG BR-0006, "Instructions for Completing Nuclear Material Transaction Reports."

### 03.03 Physical Inventory Listing Reports.

For questions regarding completion of Physical Inventory Listing Reports, the inspector can refer to NUREG BR-0007, "Instructions for Completing Material Balance Report, Physical Inventory Listing, and Concise Note Forms."

### 03.04 Recordkeeping.

The inspector should verify that material control areas are established in such a manner as to ensure that physical and administrative control of SNM is maintained. Subsidiary accounting records should be maintained for each material control area (i.e. pool, irradiated material storage locations, unirradiated storage locations, etc.).

Inventory documentation, pertaining to the review of fresh fuel storage areas; irradiated fuel in the reactor and in storage; fission chambers; sealed sources; test specimens; etc., includes: 1) internal card files, log books, source documents, manufacturer's quality documentation, and any other records that include serial number identification, location, and amount of SNM contained; and 2) operating logs, core loading diagrams, and fuel movement records for irradiated fuel assemblies in the reactor or storage. Shipments and receipts of nuclear fuel are confirmed by piece count and serial number.

The inspector should confirm that MC&A records are retained for the period specified by the appropriate regulation, license condition, or until termination of the license that authorized possession of the material.

Where applicable, the inspector should confirm written MC&A procedures are established and maintained to ensure knowledge of the quantity, identity, and location of fuel assemblies, sealed sources, fission chambers, and other items containing SNM in the licensee's possession. Procedure review and approval should be conducted in accordance with the licensee's TS and administrative processes. While not a regulatory requirement, inventory procedures should provide for management review of the MC&A system at intervals not to exceed 12 months, and that records document management follow-up action based on results of the annual reviews. The licensee should identify positions with responsibility and authority for SNM receiving, shipping, inventory, storage, internal transfers, burn-up related measurements, records, and reports. Records and procedures support reporting of accidental criticality or loss or theft of an identifiable item containing SNM. Additionally, MC&A personnel should be trained and qualified on the procedures and processes in place.

The inspector should confirm that the most recent physical inventory was performed within 12 months of the previous inventory.

## 81606-04 RESOURCE ESTIMATE

For planning purposes, the estimated, direct, onsite inspection effort to complete this inspection procedure is 4 hours. Actual inspection at any facility may require more or less effort depending on past inspection history, changes since the last inspection, conditions at the facility, and significance of the inspection findings.

81606-05      PROCEDURE COMPLETION

The inspection of each of the applicable areas described above will constitute completion of this procedure. The frequency at which this inspection procedure is to be completed is dependent on the quantity of SNM possessed and is described in Manual Chapter 2545. The typical frequencies are biennially for facilities possessing SNM MSS or triennially for facilities possessing SNM LSS.

81606-06      REFERENCES

NUREG BR-0006, "Instructions for Completing Nuclear Material Transaction Reports."

NUREG BR-0007, "Instructions for Completing Material Balance Report, Physical Inventory Listing, and Concise Note Forms."

Manual Chapter 2545, "Research and Test Reactor Inspection Program"

END

Attachment:

1. Revision History Sheet for IP 81606

Attachment 1 - Revision History for IP 81606

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional, Non-Public Information)
	ML19190A270 03/13/20 CN 20-015	Initial issue to support inspection of research and test reactor programs described in IMC 2545.	None	ML19205A354