# Special Nuclear Material (SNM) Material Control and Accounting Program Description

## Revision 0

## 1. Scope

The Special Nuclear Material (SNM) Material Control and Accounting Program establishes guidelines concerning control of and accounting for SNM at the Florida Power & Light Company (FPL) Turkey Point Units 6 and 7.

The criteria prescribed in the SNM Material Control and Accounting Program are applicable to SNM and various material mixtures containing SNM. Generally, the SNM involved is plutonium, $^{233}U$, or uranium enriched in the isotope $^{235}U$. The $^{235}U$ content will vary depending on various reactor parameters. SNM is typically in the form of pellets encapsulated in fuel rods. Criteria are established for the SNM control and accounting system, including criteria for the receipt, internal control, physical inventory, and shipment of SNM.

In addition to the information provided in this program description, the following Turkey Point Units 6 and 7 licensing basis documents provide the regulatory basis that describes how the applicable requirements for material control and accounting under 10 CFR 74 will be met:

- Information related to amounts of SNM as reactor fuel required for reactor operation is provided in FSAR Section 4.1.
- Information related to storage of SNM as reactor fuel is provided in FSAR Section 9.1.
- Information related to the organizational structure of the applicant, including those responsible for SNM material control and accounting, is provided in FSAR Section 13.1.
- Information related to training of personnel, including those responsible for SNM material control and accounting, is provided in FSAR Section 13.2.
- Information related to implementation of this SNM MC&A Program is provided in FSAR Table 13.4-201.
- Information related to plant procedures, including those used to control special nuclear material, is provided in FSAR Section 13.5.

## 2. Definitions

In this program description, the following definitions shall apply:

**2.1. book inventory (inventory of record).** A master database or listing of all SNM currently possessed, reflecting the input of all material control records.

**2.2. dry storage canister.** The smallest structurally discrete item containing fuel assemblies or fuel components, which is stored on an ISFSI pad within the area controlled by the owner.

**2.3. fuel assembly.** The grouping of fuel components combined as an integral unit for use in a nuclear reactor.

**2.4. fuel component.** The smallest structurally discrete part of a fuel assembly that contains SNM. This is normally a fuel rod for intact components, but includes

rod fragments, or pellets (or significant fraction thereof) if the rod structural integrity is not maintained.

2.5. **fuel component container.** A container that provides protection to fuel components comparable to that afforded by an intact fuel assembly and that is held to the same accounting standards as a fuel assembly, in that the container has the following attributes:
- The container is specifically designed to contain rods/rod fragments;
- The container is stored in the fuel storage racks; and
- The use of specialized handling tools and equipment is required to access the SNM stored in the container.

2.6. **Independent Spent Fuel Storage Installation (ISFSI).** A complex designed and constructed for dry interim storage of spent nuclear fuel.

2.7. **item.** Fuel assembly, fuel component container, non-fuel SNM container, sealed container, reassembled reactor vessel, dry storage canister, or a discrete piece of SNM (fuel or non-fuel) that is not stored in a container.

2.8. **item control area (ICA).** A defined area within the owner controlled area for which the SNM (fuel assemblies, fuel components, or non-fuel SNM) is maintained in such a way that, at any time, an item count and related SNM quantities can be obtained from the records for the SNM located within the area. ICAs have defined physical boundaries; these generally comprise fresh and irradiated fuel storage areas, including ISFSIs, reactor vessels, spent fuel pools, and non-fuel SNM storage areas.

2.9. **item count (piece count).** Visual verification that an item is in the location documented in the material control records. Verification of an item's identification number is not necessary for a piece count.

2.10. **material control records.** Records of SNM receipt, internal transfer, reconstitution, acquisition, inventory, and shipment (including disposal).

2.11. **non-fuel SNM.** Items containing SNM that are not intended for use as fuel, e.g., fission detectors.

2.12. **non-fuel SNM container**. A container used to store non-fuel SNM items, which has the following attributes:
- The container is specifically designed or evaluated for storage of SNM;
- The container is stored in an area with controlled access; and
- The use of specialized handling tools and equipment is required to access the SNM stored in the container.

2.13. **physical inventory.** Determination on a measured basis of the quantity of SNM on hand at a given time; a complete check of all material on hand. The methods of physical inventory and associated measurements will vary depending on the material to be inventoried and the process involved. The typical physical inventory at a power reactor plant consists of an item count (piece count) of SNM in each ICA.

**2.14. sealed container.** Container storing SNM that has been sealed with a tamper-safing device or other mechanical means, e.g., welding.

**2.15. special nuclear material (SNM).** Plutonium, uranium-233, uranium enriched in the isotope $^{233}U$ or in the isotope $^{235}U$, and any other material which the Nuclear Regulatory Commission (NRC), pursuant to the provisions of Section 51 of the Atomic Energy Act of 1954, as amended, determines to be SNM.

**2.16. tamper-safing.** The use of a device on a container in a manner and at a time that ensures a clear indication of any violation of the integrity of the contents of the container.

## 3. Organizational Requirements

### 3.1. Delegation of Responsibilities and Authority

Material control functional and organizational relationships are set forth in writing in organizational directives, instructions, procedures, manuals, and other documents. Documentation includes position qualification requirements and definitions of authority, responsibilities, and duties. The assignment of SNM material control and accounting functions is such that the activities of one person or unit serve as a control over and a check of the activities of other persons or units. Activities involving handling, accounting, or control of SNM are verified by a second person. Specific assignments of responsibilities are prescribed for all facets of the SNM control system. Delegation of material control responsibilities and authority are in writing. Material control functions are assigned in accordance with 3.1.1 through 3.1.2.

Titles assigned to the positions are intended to be descriptive only. Organizations, specific titles, and related functions may vary.

#### 3.1.1. Site Vice President (Site VP)

The site VP is responsible for the physical control and surveillance of SNM and the establishment of procedures and administration of the SNM Material Control and Accountability Program at the nuclear power plant site.

#### 3.1.2. Director Nuclear Fuels

The director nuclear fuels has overall responsibility for implementation of the SNM control and accounting function, develops the methodology and analysis procedures to calculate changes in SNM while burning in the core, and prepares the SNM balance and inventory change reports for annual governmental reports.

### 3.2. Experience or Training

Personnel responsible for SNM control and accounting have experience or training applicable to their functions.

### 3.3. Vendor/Contractor Oversight

A program is established to provide adequate oversight of vendors/contractors conducting activities involving handling, accounting, and control of SNM.

## 4. Material Control and Accounting Program

### 4.1. Procedures

Written procedures are prepared and maintained covering the SNM control and accounting system, as required in 10 CFR 74.19(b). These procedures shall address, as a minimum, the following topics:

(1) Organization and personnel responsibilities and authorities;
(2) Designation and description of ICAs;
(3) Material control records and reporting;
(4) Notification for events concerning SNM;
(5) Receiving and shipping SNM;
(6) Internal transfer of SNM;
(7) Physical inventory of SNM;
(8) SNM element and isotopic calculation method; and
(9) Characterization and identification of items as SNM or non-SNM to preclude loss of control of SNM items.

### 4.2. Configuration Control

Provisions are made for written approval of revisions to the contents of the SNM material control and accounting procedures by the appropriate plant personnel, such as the Plant General Manager.

### 4.3. Corrective Action Program

Discrepancies or program deficiencies are documented, investigated, reported, as required in 10 CFR 74.11 and 10 CFR 20.2201, and resolved using the Plant Corrective Action Program.

## 5. Input Control

### 5.1. Review of Fuel Supplier's Values

Nuclear Fuels reviews the adequacy of the fuel supplier's material control and accounting system used in establishing the quantities and assays of SNM. In the event of a significant discrepancy between the fuel supplier's values for SNM quantities and assays and those determined by FPL, the cause of such discrepancies are investigated with the fuel supplier and the differences are resolved and reconciled expeditiously.

### 5.2. Receipt of SNM

For SNM received at the plant site, FPL:

(1) Contacts the shipping vendor in the event the SNM does not arrive as scheduled; initiates an investigation and resolves, as required in 10 CFR 73.67 and 10 CFR 74.11;
(2) Verifies the integrity of the shipping container and tamper-safing devices and resolves any problems identified, as required in 10 CFR 73.67 and 10 CFR 74.11;
(3) Verifies that the quantity (item count) and unique identification numbers are in agreement with those indicated on the shipper's documents;
(4) Takes appropriate steps to resolve and reconcile any differences in quantities or identification numbers, as required in 10 CFR 73.67 and 10 CFR 74.11; and
(5) Notifies the regulatory body, as required in 10 CFR 73.67 and 10 CFR 74.11.

### 5.3. Documentation

Nuclear Fuels reports the receipt of each item containing SNM, by serial number or other unique identifier, for accounting. The receipt of SNM is documented in the material control records and the book inventory updated for the applicable ICA, as required in 10 CFR 74.19(a). A Nuclear Material Transaction Report is completed, as required in 10 CFR 74.15.

## 6. Internal Control

### 6.1. Unit of Control

Units of SNM that require control are the items defined in paragraph 2.7. Each of these units are identified in the material control records by its serial number or other unique identifier (e.g., a physical description of the item) and location, as required in 10 CFR 74.19(a).

### 6.2. Item Control Areas

ICAs are established for physical and administrative control of SNM. The number of ICAs is sufficient to establish control.

### 6.3. Internal Transfers

Transfers of SNM into, out of, or within an ICA are accomplished only upon written authorization of Site Vice President or other individual(s) at the plant site responsible for the SNM program. Written authorization is obtained prior to the movement. All transfers of SNM are documented using a material control record by the responsible person involved in each operation, and the book inventory is updated for the applicable ICA.

### 6.4. Non-SNM items

Non-SNM items stored with items containing SNM are clearly identified as such to preclude SNM items from being mistaken for non-SNM items.

### 6.5. Sealed containers

A container with a tamper-safing device can be treated as a single item for inventory purposes; however, before the container is closed and the tamper-safing device is installed, the contents are physically inventoried. If the contents of a sealed container are accessed, the contents will be physically re-inventoried or administrative procedures will be in place to establish the integrity of the contents before it can be treated as a single item for inventory purposes.

### 6.6. Damaged Cladding

Severe damage to cladding, where rod structural integrity has not been maintained, has the potential to result in inadvertent physical separation and dispersal of fuel components from the fuel rod. Upon visual identification of inadvertent physical separation, an estimate of the SNM quantity and an engineering judgment concerning the origin of the SNM will be made and documented. The amount of irretrievable or inadvertent loss will be reported, if the quantity is reportable, as required in 10 CFR 74.13. Methods used to estimate SNM quantities include, for example, engineering calculation, engineering judgment, physical measurement of length, destructive or non-destructive measurement, and count of the number of pellets retrieved or missing.

## 7. Physical Inventory

### 7.1. Conduct

Physical inventory is taken at intervals not to exceed 12 months, as required in 10 CFR 74.19(c). Physical inventory is conducted according to written inventory procedures, as required in 10 CFR 74.19(b).

### 7.2. Coverage

Physical inventory includes all SNM possessed under license and is conducted in all ICAs, including:

(1) New fuel storage areas;
(2) Irradiated fuel storage areas;
(3) Reactors;
(4) ISFSIs; and
(5) Areas containing non-fuel SNM.

### 7.3. Inventory Method

An item count is conducted of all SNM, as required in 10 CFR 74.19(c).

#### 7.3.1. Assemblies and Fuel Component Containers

For fuel assemblies and fuel component containers, an item count is sufficient. If the contents of an assembly or a fuel component container are accessed, the contents are physically reinventoried before the assembly or container can be treated as a single item for inventory purposes.

### 7.3.2. Fuel Components

For fuel components that are not part of an intact assembly, physically captured in an assembly, stored in a sealed container, or stored in a fuel component container, each component is inventoried.

### 7.3.3. Sealed Containers

For sealed containers, verification of the integrity of the tamper-safing device is sufficient.

### 7.3.4. Reactor

Whenever fuel assemblies are loaded into a reactor, the unique identifier and location of each item is visually verified. When the reactor vessel is reassembled, the reactor is considered one item for inventory purposes.

### 7.3.5. Non-fuel SNM

For non-fuel SNM, the method of physical inventory depends on the method of storage and use:

- For installed components, verification is performed at the time of installation, and administrative procedures and controls are established so that records concerning the location and unique identity are accurate.
- For non-installed components stored in primary containment, administrative procedures and controls are established so that records concerning the location and unique identity are accurate when the reactor is at power, and verification is performed during refueling outages.
- For non-fuel SNM containers, item count of the containers is sufficient. If the contents of the container are accessed, the contents are physically re-inventoried or administrative procedures are in place to ensure the integrity of the contents before the container can be treated as a single item for inventory purposes.

## 7.4. Reconciliation and Resolution

The physical inventory is reconciled to the book inventory. Discrepancies between the physical inventory and the book inventory are investigated and addressed expeditiously. The book inventory shall be adjusted to agree with the result of the physical inventory.

## 7.5. Documentation

The results of the physical inventory of SNM are documented in the material control records of the applicable ICA and utilized as input to the isotopic calculations. A Material Balance Report and Physical Inventory Listing Report are completed, as required in 10 CFR 74.13.

## 8. SNM Calculations

### 8.1. Element and Isotopic Computations

Methods of computation are established and utilized for determining the total element and isotopic composition of SNM in irradiated nuclear fuel assemblies and fuel components. The computed values are the basis for shipment documents, as required in 10 CFR 74.15, and material status reports, as required in 10 CFR 74.13.

### 8.2. Analysis of Results

Refinement of the element and isotopic computations used in determining the SNM content of irradiated fuel are considered as new technologies evolve. For reprocessed fuel, this may include a collection and comparison of reprocessing plant measurement data with computed data for fuel assemblies.

## 9. Output Control

### 9.1. Shipment

Procedures are established, as required by 10 CFR 74.19(b), to provide for:

(1) Verification and recording of the serial number or unique identifier of each item containing SNM;
(2) Recording of the quantities of SNM contained in each item;
(3) Reporting the quantity of SNM shipped, if the quantity is reportable, as required in 10 CFR 74.15;
(4) Verification of compliance with regulations, including licensing, transportation, and security requirements for shipment; and
(5) Reporting the completion of each shipment for accounting

Care is taken to assure that SNM contained in fuel is not shipped inadvertently with shipments of non-fuel SNM waste.

### 9.2. Documentation

The shipment of fuel assemblies, fuel components, or non-fuel SNM is documented in the material control records and the book inventory updated for the applicable ICA. Nuclear Material Transaction Reports are completed, as required in 10 CFR 74.15.

### 9.3. Review and Audit of Reprocessing (Recycling) Measurements

For SNM being reprocessed, FPL or its representative:

(1) Reviews the adequacy of the reprocessor's material control system used in establishing the quantities and assays of SNM, including written procedures;
(2) Audits the implementation of the reprocessor's material control system used in establishing the quantities and assays of SNM, including observation of measurement and material control activities;
(3) Audits the reprocessor's accounting activities, measurements, analyses, computations, and records affecting the determination of SNM quantities and assays; and
(4) In the event of a significant discrepancy between the reprocessor's values for SNM quantities and assays and those determined by audit, investigates and reconciles any differences expeditiously.

## 10. Records and Reports

Records are created and retained, as required in 10 CFR 74.19(a). The accounting records are the basis for the material control and accounting program. Quantitative data generated by FPL's calculations of changes in quantities and isotopic composition due to irradiation and decay are recorded and reported in accordance with FPL's standard recording and reporting procedures. The records and reports system include:

(1) An accounting system for maintaining the book inventory;

(2) Material control records maintained for each ICA;

(3) Reconciliation of the results of physical inventories to the book inventory;

(4) Recording the transfer of SNM into or out of each ICA;

(5) Recording movement of SNM between locations within an ICA, for ICAs where locations have been established;

(6) Recording the creation of items containing SNM, such as creation of a rod fragment;

(7) Recording the estimated quantity and origin of SNM which has been inadvertently separated from fuel upon the discovery of the separation;

(8) Reporting to the accounting group the transfer of SNM into, within, or out of an ICA, if applicable;

(9) Perpetual inventory records of each ICA, including the serial number or other unique identifier and location of each item in the ICA that contains SNM;

(10) Historical data of SNM in each nuclear fuel assembly, fuel component, or non-fuel SNM item while in FPL's possession; and

(11) Retention as required in 10 CFR 72 and 74.

## 11. System Review and Assessment

Reviews of the SNM program are conducted periodically. The results of the reviews are documented and reported in accordance with the requirements of the quality assurance or self-assessment program.

## 12. Physical Security

Protection of SNM is in accordance with the requirements of 10 CFR 73.67 and FPL's Physical Security Plan.