

REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 5.49

INTERNAL TRANSFERS OF SPECIAL NUCLEAR MATERIAL

A. INTRODUCTION

Paragraph 70.51(e) of 10 CFR Part 70 requires, with certain exceptions stated in the rule, that each licensee authorized to possess more than one effective kilogram of special nuclear material (SNM) maintain certain procedures. These procedures are to include:

(1) Records of the quantities of SNM added to or removed from the process;

(2) Documentation of all transfers of SNM between material-balance areas to show the identity and quantity of SNM transferred;

(3) Requirements for authorized signatures on each document used to record the transfer of SNM between material-balance areas; and

(4) Means for control of and accounting for internal transfer documents.

Paragraph 70.58(e) requires licensees to establish, maintain, and follow a system for measuring the SNM transferred between material-balance areas and item-control areas.

Paragraph 70.58(f) requires that licensees have a program that evaluates and controls the quality of their measurement system.

Additionally, all licensees authorized to possess SNM must comply with paragraph 70.51(b) of 10 CFR Part 70. That rule requires licensees to keep records showing, among other things, the inventory of all SNM in their possession and its location.

This guide sets forth acceptable methods for controlling and documenting transfers of SNM within a plant site in order to meet the requirements listed above.

B. DISCUSSION

To help determine when and where losses of SNM have occurred within a plant, each licensee subject to the requirements of paragraph 70.58(d) of 10 CFR Part 70 should divide the plant into a number of areas and account for the SNM in each of these areas separately. The number of areas should be sufficient to localize nuclear material losses or thefts and identify the mechanisms.

In the past, all of these accounting areas have been called "material-balance areas." More precise terminology now in use distinguishes between material-balance areas (MBAs) and item-control areas (ICAs).^{*} The newer usage will be followed in this guide. Under this usage, MBAs and ICAs are contrasted on the basis of how SNM is accounted for within the area.

SNM can enter and leave an ICA only as a number of discrete, unique items. It is also accounted for as discrete items, with account books containing records of the amount of SNM in each of these items. The presence of all material in an ICA is assured by showing the presence of each item. No change takes place in the form or amount of SNM in any item in an ICA.

MBAs, in contrast, generally are process areas in which some physical or chemical change is made in the SNM. Material in MBAs thus should be accounted for on the basis of measured amounts of input, output, and inventory. Loss of material from an MBA can be assured only by balancing these quantities. However, since no measurement can be free from error, errors will be included in the material balance. Hence each material balance in an MBA results in some positive or negative

^{*}See Regulatory Guide 5.26, "Selection of Material Balance Areas and Item Control Areas."

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amount of material unaccounted for (MUF)—solely as a result of errors made in measuring. In an ICA, on the other hand, MUF cannot be ascribed to errors in measurement: it can result only from a misplacement, loss, or theft of one or more discrete items of SNM.

Licenses control and account for their holdings of SNM, in part, by setting up procedures to monitor the movement of SNM from one MBA or ICA to another. The movements are documented by means of internal material transfer tickets (MTs). These tickets (a) provide needed data to the nuclear material accounting office, (b) provide a record of each internal transfer of SNM, and (c) meet the signature requirements of paragraph 70.51(e).

MTs in most cases are paper forms with multiple copies. However, they may also consist of a single original, which contains the authorized signatures. Copies are then made on an office copying machine or are produced as computer output. Descriptions in this guide are limited to MTs of these two kinds (multiple copy and single original). Guidance will be provided later to cover the use of precoded computer cards or punched tape as MTs by those facilities that are planning on using computerized real-time material-accounting systems.

C. REGULATORY POSITION

1. **Control of internal transfers of special nuclear material.** The guidelines under this heading pertain to procedures for controlling the transfer of special nuclear material (SNM) within a facility.

a. The custodian of a receiving material-balance area (MBA) or item-control area (ICA) should not accept custody of SNM unless a properly completed internal material transfer ticket (MT) has been received before or at the same time as the SNM.

b. SNM may not be transferred into or out of an ICA unless the SNM consists only of identifiable items that are sealed sources or tamper-safed.

c. For any transfer outside of a material access area that involves moving plutonium, uranium 233, or uranium enriched to 20 percent or more in the isotope U-235 in the amounts listed in paragraph 73.1(b) of 10 CFR Part 73,* the SNM should be under the continual surveillance of two persons. Where feasible, one of these persons should be from the originating MBA or ICA and the other from the receiving MBA or ICA.

d. For any transfer outside of a protected area that involves the amounts and kinds of SNM cited in paragraph c above, the SNM should be escorted by one or more armed guards in addition to the two persons

who maintain surveillance between material access areas. At least one armed guard should escort such transfers that are wholly on land under the control of the licensee. Two or more armed guards should accompany any such transfer that crosses a public road or other land not under control of the licensee.

2. **Internal material transfer tickets.** The guidelines under this heading pertain to the tickets that are used for documenting transfers of SNM within a facility.

a. Each MT should show all of the following information:

(1) Date of transfer:

(2) Identity of MBAs or ICAs from and to which transfer is made;

(3) Identity, amount, enrichment (where applicable), and form of the SNM transferred;

(4) Sample number and/or analytical request form number;

(5) Applicable data on

(a) Identity of uniquely identifiable items,

(b) Identity of tamper-safing devices,

(c) Lot number(s),

(d) Batch number(s),

(e) Job number(s),

(f) Contract number(s), and

(g) For scrap, the appropriate classification;

(6) Signatures of the participating MBA/ICA custodians or their designated agents.

b. When possible, SNM should not be transferred until analytical results have been obtained. If a transfer must be made before chemical or isotopic analysis is complete, the MT should show amounts of SNM based on nominal values or best available data. The MT should also show the identifying number on the analytical request form so that the nuclear material accounting department can later adjust the records to the actual amount transferred.

c. The MT should contain enough information to enable the recorded measurement and tamper-safing data associated with the transfer to be confirmed.

*Material described in §73.6 of 10 CFR Part 73 is excepted.

d. Entries on MTs should not be erased or obliterated. Alterations, as by lining through, should be initialed. No entry should be made by pencil.

e. MTs should be prenumbered in sequence, and all copies should bear the same number as the original. All forms should be accounted for. The nuclear material accounting department should maintain and control (assign and account for) the supply of MT forms and should record the disposition of all forms in a log book. The supply of forms and the log book should be kept in a locked area when unattended.

f. The nuclear material accounting department should review each MT for completeness. Copies of completed MTs should be distributed to all affected persons or departments, including at least the custodians of the originating and receiving MBAs or ICAs.

g. The completed original of the MT should be retained for at least five years. As a rule, the original should be retained by the nuclear material accounting department. However, if the form also is used for production purposes, the production department may retain the original.

h. Damaged or misused MTs should be marked "VOID." All voided copies should be forwarded to the nuclear material accounting department for logging.

i. MTs may have uses other than those that are the subject of this guide. Their use in production control has been suggested above. They also may be used to record and report such SNM accounting data as burnup, material unaccounted for (MUF), or measured discards of waste.

3. Measurement of transferred material. The guidelines under this heading pertain to the measurements associated with SNM transferred within a facility.

a. The following SNM may be transferred out of and into MBAs or ICAs without measuring the contained SNM:

(1) Samples that have been determined by other means to contain less than ten grams of plutonium, uranium 233, or uranium 235;

(2) Reactor-irradiated fuels involved in research, development, and evaluation programs in facilities other than irradiated-fuel reprocessing plants; and

(3) Sealed plutonium-beryllium sources.

b. Except for the items listed in paragraph 3.a., all SNM should be transferred out of and into MBAs or ICAs on the basis of acceptable accountability measurements. To be acceptable, the measurements should:

(1) Be made in accordance with a measurement program that is controlled to conform with proposed §70.57 of 10 CFR Part 70;

(2) Be validated by intact tamper-safing until the material has been accepted by the custodian of the receiving MBA/ICA or his designated agent; and

(3) Have the tamper-safing applied as a part of the sampling procedure* (if the SNM is assayed by traditional methods based on chemical analysis) or prior to measurement (if the SNM is assayed by nondestructive analysis).

c. When SNM is transferred via pipeline from one MBA to another, the SNM should be measured in the receiving MBA prior to any physical or chemical change in the material.

d. For any transfer of identifiable items of encapsulated SNM, the recorded amount of SNM transferred should be that measured at the time of encapsulation.

e. The custodian of the originating MBA should measure all tare and gross weights. The custodian of the receiving MBA should measure all gross weights and confirm the absence of arithmetic errors. He may also confirm the tare weights as a check on the originating MBA. A duly designated agent may act for a custodian in the actions named in this paragraph.

f. If the gross weight measured at the receiving MBA differs from that reported on the MT by the custodian of the originating MBA by a statistically significant amount, the SNM should be left in the transfer container until the difference has been resolved. The value agreed upon must be acceptable to both of the MBA custodians involved and to the nuclear material accounting department.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plans for utilizing this regulatory guide.

Except in those cases in which the applicant proposes an alternate method for complying with specified portions of the Commission's regulations, the method described herein will be used in the evaluation of submittals in connection with special nuclear material license, operating license, or construction permit applications docketed after October 1, 1975.

*See Regulatory Guides 5.10, "Selection and Use of Pressure-Sensitive Seals on Containers for Onsite Storage of Special Nuclear Material," and 5.15, "Security Seals for the Protection and Control of Special Nuclear Material."

If an applicant whose application for a special nuclear material or an operating license or construction permit is docketed on or before October 1, 1975, wishes

to use this regulatory guide in developing submittals for applications, the pertinent portions of the application will be evaluated on the basis of this guide.

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